
COUNTY OF SAN BERNARDINO

GREENHOUSE GAS EMISSIONS REDUCTION PLAN



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San Bernardino County General Plan

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GLOSSARY / ACRONYMS AND ABBREVIATIONS

- A. EXTERNAL INVENTORY/REDUCTION MEASURES METHODOLOGY
- B. INTERNAL INVENTORY/REDUCTION PLAN METHODOLOGY
- C. RELEVANT (EXISTING) SAN BERNARDINO COUNTY GENERAL PLAN POLICIES
- D. SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT INVENTORY
- E. A LOOK FORWARD TO 2030
- F. GREENHOUSE GAS EMISSIONS - DEVELOPMENT REVIEW PROCESSES

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ACRONYMS AND ABBREVIATIONS

AB 32	California Assembly Bill 32 (the Global Warming Solutions Act of 2006)
ACS	American Community Survey
AQMP	Air Quality Management Plan
ARMC	Arrowhead Regional Medical Center
ARRA	American Recovery and Reinvestment Act
BAU	Business-As-Usual
BTU	British Thermal Unit
BVE	Bear Valley Electric
C&D	Construction and demolition
CANHP	California New Homes Program
CAO	County Administrative Officer
CARB	California Air Resources Board
CB ECS	Commercial Building Energy Consumption Survey
CCAR	California Climate Action Registry
CCAs	Community Choice Aggregators
CSDSP	Comprehensive Disposal Site Diversion Program
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH ₄	Methane
CIWMB	California Integrated Waste Management Board
CNG	Compressed natural gas
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
COP	Conference of the Parties
County	San Bernardino County
CPUC	California Public Utilities Commission
CREB	Clean Renewable Energy Bonds
CSI	California Solar Initiative
CTC	California Transportation Commission
CWSRF	Clean Water State Revolving Funds.
DEER	Database for Energy Efficiency
EECBG	Energy Efficiency Community Block Grants
EIR	Environmental Impact Report
ESCO	Energy Service Companies
ESPs	Energy Service Providers
EUL	Effective Useful Life
FTA	Federal Transit Authority
FY	Fiscal Year
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GIVE	Green Institute for Village Empowerment
GPS	Global positioning system
GRT	GHG Reduction Team
GWP	Global Warming Potential
HCFCs	Halogenated Chlorinated Fluorocarbons
HFCs	Hydrofluorocarbons

**ACRONYMS AND ABBREVIATIONS (CONT'D)**

HHV	High heating values
HOV	High Occupancy Vehicle Lanes
HVAC	Heating, Ventilation, and Air Conditioning
IEUA	Inland Empire Utility Agency
IIP	Interregional Improvement Program
IOUs	Investor-Owned Utilities
IPCC	Intergovernmental Panel on Climate Change
kBTU	Thousand BTU
kWh	Kilowatt Hour
LCFS	Low Carbon Fuel Standard
LEED	Leadership in Energy and Environmental Design
LGOP	Local Government Operations Protocol
LNG	Liquefied Natural Gas
LMOP	Landfill Methane Outreach Program
LPG	Liquefied Petroleum Gas
LTF	Local Transportation Funds
LUA	Land use authority
LUSD	Land Use Services Department
MDAQMD	Mojave Desert Air Quality Management District
MGI	McKinsey Global Institute
MMTCO ₂ e	Million Metric Tons of CO ₂ Equivalent
MPOs	Metropolitan Planning Organizations
MTCO ₂ e	Metric Tons of Carbon Dioxide Equivalent
MWH	Megawatt Hour
N ₂ O	Nitrous Oxide
NSHP	New Solar Homes Partnership
O ₃	Ozone
ODS	Ozone depleting substances
OPR	Office of Planning and Research
PFCs	Perfluorinated carbons
PG&E	Pacific Gas & Electric
ppm	Parts per million
PV	Photovoltaic
R1	Reduction Classification 1
R2	Reduction Classification 2
R3	Reduction Classification 3
RCRA	Resource Conservation and Recovery Act
RECS	Residential Energy Consumption Survey
RIP	Regional Improvement Program
RPS	Renewable Portfolio Standard
RTGGT	Regional Transportation Greenhouse Gas Targets
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
SANBAG	San Bernardino Association of Governments



ACRONYMS AND ABBREVIATIONS (CONT'D)

SBCGB	San Bernardino County Green Builder
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCAQMP	South Coast Air Quality Management Plan
SCE	Southern California Edison
SCG	Southern California Gas Company
SF ₆	Sulfur hexafluoride
SRI	Solar Reflectance Index
STIP	State Transportation Improvement Program
SUV	Sports utility vehicle
SWG	Southwest Gas
SWP	State Water Project
TACs	Toxic air contaminants
TBD	To Be Determined
TDA	Transportation Development Act
ULEV	Ultra low emission vehicle
UNEP	United Nations Environmental Programme
UNFCC	United Nations Framework Convention on Climate Change (UNFCC)
USEIA	United States Energy Information Administration
USEPA	United States Environmental Protection Agency
VMT	Vehicle miles travelled
WARM	Waste Reduction Model
WIP	Waste-in-place



CHAPTER 1.0

INTRODUCTION

The San Bernardino County Board of Supervisors recognizes that prosperity and economic development cannot be achieved at the expense of our environment. The County must strike a balance between development and environmental stewardship to keep the economy strong and, at the same time, protect the environment.

In August 2007, the Board of Supervisors launched Green County San Bernardino to spur the use of “green” technologies and building practices among residents, business owners, and developers in the County. By supporting “green” building practices, renewable energy, resource conservation, and other efforts to safeguard our environment, the Board of Supervisors set the course for sustainability and paved the way for responsible growth in the County of San Bernardino.

Recognizing that reducing greenhouse gas (“GHG”) emissions is an important part of ensuring a sustainable future, the County Board of Supervisors also directed the Land Use Services Department to prepare a GHG Reduction Plan, to provide a framework and strategy for the County’s efforts. By using energy more efficiently, harnessing renewable energy to power buildings, enhancing access to sustainable transportation modes, and recycling waste, the County can keep dollars in the local economy, create new green jobs, and improve the community quality of life.

The Conservation Element of the County’s General Plan addresses a number of different natural resources within the County that must be managed properly. Among these resources are air quality and the control of GHG emissions. Goal CO 4 specifically speaks to air quality and states:

“The County will ensure good air quality for its residents, businesses, and visitors to reduce impacts on human health and the economy.”

In order to implement this goal and to provide a more livable and economically vibrant community, the County will implement this GHG Reduction Plan to ensure that impacts on air quality are minimized, and that land use and internal operations within the County are consistent with adopted state legislation.

County Jurisdiction

Although San Bernardino County is the largest county (approximately 13 million acres) in the contiguous United States, the Board of Supervisors’ land use authority over the entire County is limited to 15 percent (about 1.9 million acres) of the total area. This GHG Reduction Plan has been undertaken with full recognition of these limitations of land use jurisdiction and other governmental structure issues.



Federal and state agencies own and control 81 percent (10.5 million acres) of the total County lands (approximately 13 million acres). This land is referenced as “non-jurisdiction” land or “non-jurisdiction” territory as it lies outside the governing control of the County Board of Supervisors. Of this non-jurisdiction land, approximately six (6) million acres are owned and controlled by the U. S. Bureau of Land Management; and 1.9 million acres are owned and controlled by the United States Department of Defense. In addition, approximately four (4) percent lies within 24 incorporated towns and cities. Incorporated areas are regulated by the respective town and city councils. The County’s influence over development activity within the incorporated boundaries of these towns and cities is limited primarily to County owned administrative buildings, criminal justice facilities, and certain infrastructure, including County-maintained roads.

The County’s land use authority has other limitations. Public utilities and railroads are generally not subject to the County’s land use authority. Public water districts/agencies are also not subject to the County’s land use authority; however, private water companies generally are.

Figure 1-1 depicts the incorporated and unincorporated portions of the County, as well as federal and state lands. The entire 13 million-acre area is the County’s geopolitical territory (“Countywide” area). The area over which the County has discretionary land use authority as well as its ministerial building permit authority is depicted in white on **Figure 1-1**.

The County’s discretionary land use authority, as well as its ministerial building permit authority, is collectively referred to herein as “Land Use Authority” or “LUA.” In this Plan, the terms “Unincorporated County” and “County LUA” are used interchangeably.

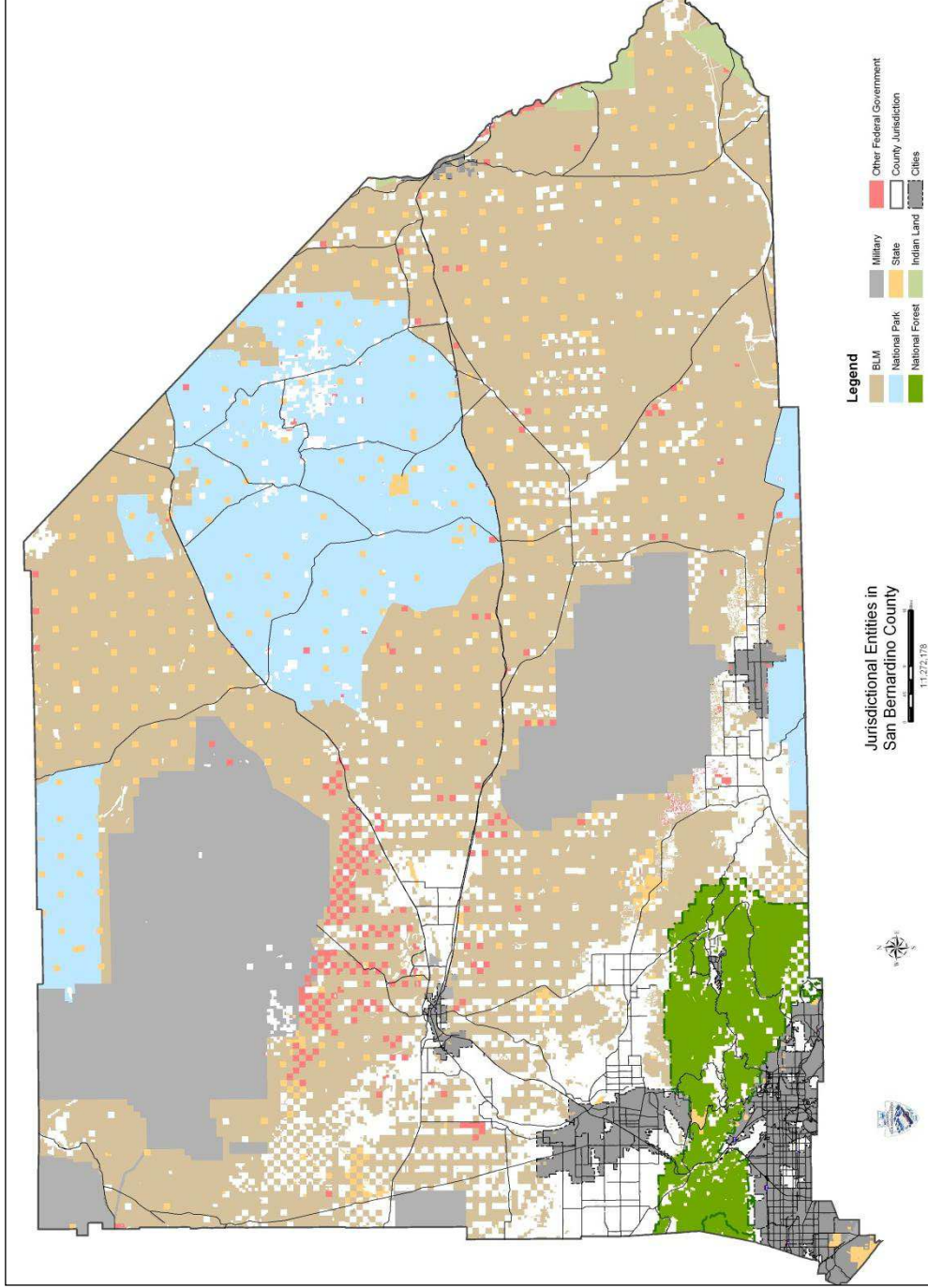
GHG 1.1 Purpose of the GHG Reduction Plan

The San Bernardino County GHG Reduction Plan (“GHG Plan” or “GHG Reduction Plan”) is based on the premise that the County and the community it represents are uniquely capable of addressing emissions associated with sources under the County’s jurisdiction and that the County’s emission reduction efforts should coordinate with the state strategies of reducing emissions in order to reduce emissions in an efficient and cost-effective manner.

This GHG Plan presents a comprehensive set of actions to reduce the County’s internal and external GHG emissions to 15% below current levels by 2020, consistent with the AB 32 Scoping Plan. (AB 32 Scoping Plan page ES 5, CARB, December 2008,)



Figure 1-1: Jurisdictional Land Use Authority in San Bernardino County



Cities in San Bernardino County	
1.	Adelanto
2.	Apple Valley
3.	Barstow
4.	Big Bear City
5.	Chino
6.	Chino Hills
7.	Colton
8.	Fontana
9.	Grand Terrace
10.	Hesperia
11.	Highland
12.	Loma Linda
13.	Montclair
14.	Needles
15.	Ontario
16.	Rancho Cucamonga
17.	Redlands
18.	Rialto
19.	San Bernardino
20.	Twentynine Palms
21.	Upland
22.	Victorville
23.	Yucaipa
24.	Yucca Valley

Source: San Bernardino County Land Use Services Department, 2011



GHG 1.2 GHG Reduction Plan Objectives

The County's GHG Reduction Plan has been prepared to accomplish the following specific objectives to:

- Reduce emissions from activities over which the County has jurisdictional and operational control consistent with the target reductions of Assembly Bill (AB) 32 Scoping Plan;
- Provide estimated GHG reductions associated with the County's existing sustainability efforts and integrate the County's sustainability efforts into the discrete actions of this Plan;
- Provide a list of discrete actions that will reduce GHG emissions; and
- Approve a GHG Plan that satisfies the requirements of Section 15183.5 of the California Environmental Quality Act (CEQA) Guidelines, so that compliance with the GHG Plan can be used in appropriate situations to determine the significance of a project's effects relating to GHG emissions, thus providing streamlined CEQA analysis of future projects that are consistent with the approved GHG Plan.

GHG 1.3 Relationship to the County General Plan

The County General Plan¹ includes a series of linked documents, including: the General Plan text and a series of land use, hazard, circulation, and resource overlay maps, a separately bound Housing Element, the community plans, and the background reports. Additionally, the General Plan lists various implementation tools that are incorporated as separate policies and documents. The General Plan will be amended to include a policy and programs addressing the County's intent to reduce GHG emissions that are reasonably attributable to : (1) the county's internal activities, services and facilities; and (2) private industry and development tht is located within the area subject to the County's land use and building permit authority. The GHG Plan will act as an implementation tool similar to those described in the General Plan to guide development in the County by focusing on attaining the various goals and policies of the General Plan and all community plans relative to GHG emissions and to achieve the goals, objectives and strategies set forth in GHG Plan. The goals, objectives and reduction strategies described in the GHG Plan are consistent with the goals, policies, and programs contained in the General Plan.

GHG 1.4 Description of Greenhouse Gases

The temperature on Earth is regulated by a system commonly known as the "greenhouse effect." GHGs absorb heat radiated from the Earth's surface. As the atmosphere warms, it in turn radiates heat back to the surface to create the greenhouse effect. According to the United States Environmental Protection Agency (USEPA), a GHG is any gas that absorbs infrared radiation in

¹ References to the "General Plan" include the General Plan as adopted in March 2007 and amendments made subsequent thereto.



the atmosphere. AB 32 and the CEQA Guidelines define the following six (6) GHGs: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO₂), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). In 2009, nitrogen trifluoride (NF₃) was listed by California as a high global warming potential GHG to be listed and regulated under AB32 (CARB 2010).

GHGs are both naturally occurring and anthropogenic (e.g. man-made). Once emitted, GHGs remain in the atmosphere for decades or centuries and can mix on a global scale. Innumerable direct and indirect sources, both natural and anthropogenic, cause increased atmospheric concentrations of GHGs. Natural sources of GHGs include decomposition of organic matter, volcanic activities, and wildfires. Many human activities add to the levels of naturally occurring gases. Carbon dioxide is released to the atmosphere when solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products are burned. Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels. Carbon dioxide and nitrous oxide are the two (2) GHGs released in the greatest quantities from mobile sources burning gasoline and diesel fuel. Methane, a highly potent GHG, results from releases associated with agricultural practices and landfills, among other sources.

As the global, national, and statewide population and economy continue to grow, anthropogenic emissions of GHGs continue to increase. The associated increase in atmospheric concentrations has the potential to cause adverse environmental impacts (see discussion in legislative findings associated with AB 32 below).

GHG 1.5 Summary of California Emissions

Worldwide, California is responsible for approximately two percent of the world's CO₂ emissions (CEC 2006a). The California Energy Commission (CEC) estimates that California is the second largest emitter of GHG emissions in the United States. CARB estimates that 1990 emissions amounted to 433 MMTCO₂e and that 2004 emissions levels were 484 MMTCO₂e (CARB 2007). The transportation sector produced 40.7 percent of California's GHG emissions in 2004. The next largest sources of GHG emissions in 2004 include: electric power production (22.2 percent), industrial sector (20.5 percent), agriculture and forestry (8.3 percent), and other miscellaneous sectors (8.3 percent) (CEC 2006b).

GHG 1.6 Regulatory Background

AB 32—The Global Warming Solutions Act of 2006

California Assembly Bill 32 (AB 32), the “Global Warming Solutions Act of 2006,” codified the state's GHG emissions target by directing California Air Resources Board (CARB) to reduce the state's global warming emissions to 1990 levels by 2020.



As established by AB 32, California Health and Safety Code Section 38501 states the following:

The Legislature finds and declares all of the following:

Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

Global warming will have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, skiing, recreational and commercial fishing, and forestry. It will also increase the strain on electricity supplies necessary to meet the demand for summer air-conditioning in the hottest parts of the state.

California has long been a national and international leader on energy conservation and environmental stewardship efforts, including the areas of air quality protections, energy efficiency requirements, renewable energy standards, natural resource conservation, and greenhouse gas emission standards for passenger vehicles. The program established by this division will continue this tradition of environmental leadership by placing California at the forefront of national and international efforts to reduce emissions of greenhouse gases.

National and international actions are necessary to fully address the issue of global warming. However, action taken by California to reduce emissions of greenhouse gases will have far-reaching effects by encouraging other states, the federal government, and other countries to act.

By exercising a global leadership role, California will also position its economy, technology centers, financial institutions, and businesses to benefit from national and international efforts to reduce emissions of greenhouse gases. More importantly, investing in the development of innovative and pioneering technologies will assist California in achieving the 2020 statewide limit on emissions of greenhouse gases established by this division and will provide an opportunity for the state to take a global economic and technological leadership role in reducing emissions of greenhouse gases.

AB 32 was established as law by Governor Arnold Schwarzenegger on September 27, 2006. Since that time, CARB, California Energy Commission (CEC), the California Public Utilities Commission (CPUC), and the Building Standards Commission have all been at work on regulations that will help meet the goals of AB 32 and Executive Order S-3-05.

Key AB 32 milestones are as follows:

- June 30, 2007—Identification of “discrete early action GHG emissions reduction measures.” This has been completed and is discussed below.
- January 1, 2008—Identification of the 1990 baseline GHG emissions level and approval of a statewide limit equivalent to that level. Adoption of reporting and verification requirements concerning GHG emissions. This has been completed. In December 2007, CARB approved the 2020 emission limit of 427 MMTCO₂e of



GHGs for the State of California.

- January 1, 2009—Adoption of a Scoping Plan for achieving GHG emission reductions. A scoping plan was adopted in December 2008 and is summarized below.
- January 1, 2010—Adoption and enforcement of regulations to implement the “discrete” early actions.
- January 1, 2011—Adoption of GHG emission limits and reduction measures by regulation.
- January 1, 2012—GHG emission limits and reduction measures adopted in 2011 become enforceable.

AB 32 Early Actions

CARB adopted the following early actions on June 21, 2007:

Group 1—Three (3) new GHG-specific regulations are proposed to meet the narrow legal definition of “discrete early action greenhouse gas reduction measures” in Section 38560.5 of the Health and Safety Code. These include the Governor’s Low Carbon Fuel Standard, reduction of refrigerant losses from motor vehicle air conditioning maintenance, and increased methane capture from landfills. These actions are estimated to reduce GHG emissions between 13 and 26 MMTCO₂e annually by 2020 relative to projected levels. If approved for listing by the Governing Board, these measures will be brought to hearing in the next 12 to 18 months and take legal effect by January 1, 2010.

Group 2—CARB is initiating work on another 23 GHG emission reduction measures in the 2007–2009 time period, with rulemaking to occur as soon as possible where applicable. These GHG measures relate to the following sectors: agriculture, commercial, education, energy efficiency, fire suppression, forestry, oil and gas, and transportation.

Group 3—CARB staff has identified ten (10) conventional air pollution control measures that are scheduled for rulemaking in the 2007–2009 period. These control measures are aimed at criteria and toxic air pollutants, but will have concurrent climate co-benefits through reductions in CO₂ or non-Kyoto pollutants (i.e., diesel particulate matter, other light-absorbing compounds, and/or ozone precursors) that contribute to global warming.

In October 2007, CARB expanded the early actions to include the following measures:

Group 1 Discrete Early Actions—SF₆ reductions from the non-electricity sector; reduction of emissions from consumer products; Smartway Truck Efficiency (require existing trucks and trailers to be retrofitted with devices that reduce aerodynamic drag); tire inflation (require tune-up and oil change technicians to ensure proper tire inflation as part of overall service); reduction of PFCs from semiconductor industry; and Green ports (allow docked ships to shut off their auxiliary engines by plugging into shoreside electrical outlets or other technologies).



Group 2: Other Early Actions—refrigerant tracking, reporting, and recovery program; energy efficiency of California cement facilities; blended cements; anti-idling enforcement; and research regarding nitrogen land application efficiency.

Since October 2007, CARB has taken the following actions concerning Early Action Measures:

Low Carbon Fuel Standard – CARB approved for adoption regulations establishing a low-carbon fuel standard on April 23, 2009. The intent of the standard is to reduce the carbon intensity of transportation fuels by an average of ten percent by 2020. CARB intends to finalize rule-making for regulations to take effect by January 1, 2010.

Landfill Methane Capture – On June 25, 2009, CARB approved for adoption regulations for control of methane emissions from municipal solid waste (MSW) landfills. The regulations will require the installation and proper operation of gas collection and control systems at active, inactive, and closed MSW landfills having 450,000 tons or greater of waste-in-place and that received waste after January 1, 1977. The regulations contain performance standards for the gas collection and control system, and specify monitoring requirements to ensure that the system is being maintained and operated in a manner to minimize methane emissions. The regulations include a leak standard for gas collection and control system components, a monitoring requirement for wellheads, methane destruction efficiency requirements for most control devices, surface methane emission standards, and reporting requirements. CARB is presently considering several modifications and clarifications to the regulations. CARB intends to finalize rule-making for regulations to take effect by January 1, 2010.

Small Containers of Automotive Refrigerant – On January 22, 2009, CARB approved for adoption regulations associated with do-it-yourself (DIY) recharging of motor vehicle air conditioning (MVAC) systems. This regulation is intended to help reduce GHG emissions attributable to small containers of automotive refrigerant largely by establishing certification requirements that require containers to be equipped with self-sealing valves, and by establishing a small container deposit and return and refrigerant recovery program. Other components of the regulation include improved container labels and consumer educational materials to promote consumer education of proper MVAC charging practices and of the environmental consequences of releasing refrigerant to the environment. On September 1, 2009, the Office of Administrative Law (OAL) approved the majority of the regulations, but disapproved the portion of the regulatory filing for adjustment of the refrigerant container deposit. CARB intends to finalize rule-making for regulations to take effect by January 1, 2010.

Semiconductor Perfluorocarbon Emissions – On February 26, 2009, CARB approved for adoption regulations related to semiconductor operations. The regulation applies to an owner or operator of a semiconductor or related devices operation that uses fluorinated gases or fluorinated heat transfer fluids. The regulation includes emission standards, and reporting and recordkeeping requirements. Final rule-making has not yet been completed.



Sulfur Hexafluoride Reduction – On February 26, 2009, CARB approved for adoption regulations related to the reduction of SF₆ from non-semiconductor and non-utility applications. This regulation would achieve GHG emission reductions from SF₆ applications through a phase-out of use over the next several years in the non-semiconductor and non-utility sectors. Several modifications to the adopted regulation are currently under consideration.

High Global Warming Potential Gases in Certain Consumer Products – On September 24, 2009 CARB approved for adoption regulations concerning toxic compounds, aromatics and high GWP gases in certain consumer products. The amendments are designed to reduce volatile organic compound (VOC) emissions but would also prohibit compounds with high GWP in multi-purpose solvent, paint thinner, and double-phase aerosol air fresheners, which are the three categories of consumer products proposed for regulation. Final rule-making has not yet been completed.

Heavy-Duty Vehicle GHG Emission Reduction Regulation – On December 11, 2008, CARB approved for adoption regulations concerning long-haul Heavy Duty Vehicle (HDV) fuel efficiency. A more efficient HDV uses less fuel, and as a result, emits less GHG emissions. A HDV consists of a heavy-duty tractor (tractor) and a trailer. The regulation requires new and existing long-haul on-road tractors (of a certain size), which operate on California highways, to be equipped with SmartWay approved aerodynamic technologies and low-rolling resistance tires. The regulation contains a phased implementation and includes several exemptions (such as for emergency vehicles). Final adoption of the regulation is expected in November 2009.

Tire Pressure – On March 26, 2009, CARB approved for adoption regulations to reduce GHG emissions from vehicles operating with under inflated tires. The regulation requires all Automotive Service Providers perform a tire inflation service (check and inflate) on all passenger vehicles that are brought into a facility for service or repair. Final rule-making has not yet been completed.

Shore Power – On December 6, 2007, CARB approved for adoption regulations to reduce emissions from diesel auxiliary engines on ocean-going vessels while at berth in California. The regulation requires operators of vessels meeting specified criteria to turn off their auxiliary engines for most of their stay in port. CARB anticipates that such vessels would then receive their electrical power from the shore, or use an alternative, but equally effective, means of emission reductions. Although the measure is intended to reduce NO_x and particulate matter emissions, the measure will produce a co-benefit of also reducing CO₂ emissions. The regulation took effect on January 2, 2009.

AB 32 Scoping Plan

In December 2008, CARB adopted its Scoping Plan, which outlines an approach to meet the AB 32 goal. The plan identifies measures to reduce GHG emissions to 1990 levels, which is approximately 28 percent below business as usual (BAU) emission levels projected for 2020, or about 15 percent from current levels.



SB 1078/SB 107—Renewable Portfolio Standard (RPS)

Established in 2002 under Senate Bill 1078 and accelerated in 2006 under Senate Bill 107, California's RPS obligates investor-owned utilities (IOUs), energy service providers (ESPs), and community choice aggregators (CCAs) to procure an additional one percent of retail sales per year from eligible renewable sources until 20 percent is reached, no later than 2010. The CPUC and CEC are jointly responsible for implementing the program.

AB 1493—Greenhouse Gas Emission Standards for Automobiles

In 2002, California AB 1493 required CARB to develop and adopt the nation's first GHG emission standards for automobiles. The State of California in 2004 submitted a request for a waiver from federal clean air regulations (as the state is authorized to do under the Clean Air Act) to allow the state to require reduced tailpipe emissions of CO₂. In late 2007, the USEPA denied California's waiver request and declined to promulgate adequate federal regulations limiting GHG emissions. In early 2008, the state brought suit against USEPA related to this denial. In January 2009, President Obama directed the USEPA to assess whether its denial of the waiver was appropriate under the Clean Air Act. In June 2009, the USEPA granted California the waiver. Also in 2009, the Obama administration proposed federal vehicle greenhouse gas emissions and mileage standards that are roughly equivalent to AB 1493. If they are implemented, they would preempt implementation of AB 1493.

Executive Order S-3-05—Greenhouse Gas Emission Reduction Targets

In 2005, Governor Schwarzenegger issued California Executive Order S-3-05 establishing the following aspirational GHG emission reduction targets for California:

- Reduce GHG emissions to 2000 levels by 2010;
- Reduce GHG emissions to 1990 levels by 2020; and
- Reduce GHG emissions to 80 percent below 1990 levels by 2050.

Executive Orders are binding only on state agencies. Accordingly, S-3-05 will guide state agencies' efforts to control and regulate GHG emissions, but will have no direct binding effect on local efforts.

Executive Order S-01-07

Executive Order S-01-07 was enacted by Governor Schwarzenegger on January 18, 2007. The order mandates the following: (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least ten (10) percent by 2020; and (2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established in California.



GHG 1.7 Settlement Agreement with Attorney General's Office

Following the County's adoption of its General Plan in March 2007, the California Attorney General (AG) filed a lawsuit alleging that the EIR prepared for the General Plan Update did not comply with the requirements of CEQA in its analysis of GHG emissions and climate change. The County and the Attorney General subsequently entered into a settlement agreement, which required the AG to dismiss its lawsuit to set aside the General Plan and required the County to do the following:

- Prepare an amendment to its General Plan adding a policy that describes the County's goal of reducing those GHG emissions reasonably attributable to the County's discretionary land use decisions and the County's internal government operations; and
- Prepare a GHG Emissions Reduction Plan, which includes inventories, a reduction target, and reduction measures to meet the reduction target, by regulating those sources of GHG emissions reasonably attributable to the County's discretionary land use decisions and the County's internal government operations.

GHG 1.8 The California Environmental Quality Act (CEQA)

In 2007, the California State legislature adopted Senate Bill 97 (SB 97) requiring that the Office of Planning and Research (OPR) prepare guidelines to submit to the California Resources Agency regarding feasible mitigation of greenhouse gas emissions or the effects of GHG emissions as required by CEQA.

The new CEQA Guidelines require:

- Inclusion of GHG analyses in CEQA documents;
- Quantification of GHG emissions;
- Determination of significance of GHG emissions; and,
- If significant GHG emissions would occur, adoption of mitigation to address significant emissions.

The Guidelines provide for streamlining the environmental review of project-level analysis of GHG emissions from a programmatic document, such as a greenhouse gas reduction plan, and allow for a finding of less than significant where a project is determined to be consistent with a local reduction plan. The CEQA Guidelines provide that the environmental analysis of specific projects may be tiered from a programmatic GHG plan that substantially lessens the cumulative effect of GHG emissions. If a public agency adopts such a programmatic GHG Plan, the environmental review of subsequent projects may be streamlined. A specific project's incremental contribution of GHG emissions will not be considered cumulatively significant if the project complies with the adopted GHG plan.



The provisions of the GHG Plan and the Appendices that support the GHG Plan comply with these provisions by providing a quantified reduction inventory of GHG emissions, and by providing a level based on substantial evidence below which activities subject to the GHG Plan will not make a cumulatively considerable contribution to greenhouse gas impact. That level is based on the State's AB 32 goals. The GHG Plan and associated documents also identify and analyze the emissions associated with specific actions, and set forth performance standards to achieve the specified emissions goals. The analysis in the GHG Plan and the supporting documents demonstrates that this level will be achieved by these measures. Finally, the GHG Plan includes monitoring, and the GHG Plan will be adopted in a public process following environmental review.

GHG 1.9 The County's Role in GHG Emissions Reduction

Local governments have influence and, in some cases, exclusive authority over activities that contribute to direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, as well as their own internal operations. The County has two distinct roles that it can play in promoting reductions of GHG emissions:

Community ("External") GHG Emissions

The County has primary authority to plan, zone, approve and permit how land is developed to accommodate population growth and the changing needs of its jurisdiction. These decisions have impacts on the GHG emissions resulting from such land uses as transportation, housing, community waste and recycling, industry, forestry, water, agriculture, electricity and natural gas sectors, among others. Due to its unique position, the County can provide local leadership in reducing GHG emissions, for example, through the promotion of policies that reduce vehicle use and by working collaboratively with developers, building owners and residents to achieve energy efficiency and energy savings. In addition, the County, as CEQA lead agency must ensure that impacts of GHG emissions are mitigated when discretionary projects go through CEQA review. Through these mechanisms, the County can reduce emissions that occur within its land use jurisdiction, which are referred to in this GHG Plan as "community" or "External" emissions.

Municipal ("Internal") GHG Emissions

The County can demonstrate leadership through taking actions to reduce the GHG emissions associated with County government operations including those associated with County buildings, fleet operations, solid waste management, and other government functions (Internal Emissions). By doing so, the County can demonstrate the feasibility of taking action to the community as a whole. When implementing certain measures with net positive economic benefits (such as many energy efficiency improvements), the County can also reduce the long-term cost of County government as well.



GHG 1.10 Organization of GHG Reduction Plan

The information in this Chapter describes the purpose and goals of the GHG Reduction Plan, its relationship to the County General Plan, a description of GHG emissions, the regulatory background and a summary of California emissions. Chapter 2 of this Plan details the inventories of the GHG Reduction Plan; Chapter 3 sets forth the County's reduction target; Chapter 4 discusses the reduction goals, objectives and strategies to reduce GHG emissions; and, Chapter 5 describes the implementation steps. The following Appendices provide technical support for the GHG Plan: Appendix A, External Inventory/Reduction Measure Methodology; Appendix B, Internal Inventory/Reduction Measure Methodology; Appendix C, General Plan Policies; Appendix D, SCAQMD Inventory; Appendix E, a 2030 Analysis; Appendix F, GHG Screening Tables and Methodology for Determining Project Unmitigated and Mitigated GHG Emissions.



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CHAPTER 2.0

INVENTORY

GHG 2.1 Inventory Methodology

As discussed in the previous chapter, the County can influence GHG emissions in two distinct ways: (1) through the exercise of its land use authority it can affect community/external emissions; (2) through its management of County government and facilities it can affect municipal/internal emissions. As a consequence, two separate emission inventories were prepared for the County's GHG Plan: an External Inventory and an Internal Inventory.

The External Inventory includes GHG emissions from land uses within the County's unincorporated areas where the County has jurisdictional land use authority (the "External Inventory"). The External Inventory also includes GHG emissions generated outside the County that are the result of service and operation demands from land uses located within the County's unincorporated area.

The Internal Inventory includes GHG emissions associated with the County's provision of services and internal operations (the "Internal Inventory"). The Internal Inventory includes emissions that occur within the unincorporated County (where County facilities and operations are located and/or take place in unincorporated areas) as well as emissions that occur outside the unincorporated County (where County facilities and operations are located and/or take place in other jurisdictions). The intent of the Internal Inventory is to identify all GHG emissions related to County government operations.

The two inventories partially overlap. As noted above, some of the County government facilities and operations are located or occur within the unincorporated County area and some are not (e.g. are located or occur within the incorporated cities or outside the County). Thus, some of the County government emissions are included within the External Inventory. As a result, the two inventories cannot be added together as that would double-count the County Government emissions that occur within the unincorporated area. Instead the County has decided to track External and Internal emissions separately, in order to clearly identify the influence of the County over both the External Inventory and the Internal Inventory over time. Reduction measures identified within this Plan address both sources of GHG emissions. Where appropriate, GHG reduction measures that affect both Internal and External GHG emissions (such as for landfill methane controls), are included in both the Internal and External parts of the Plan.

The inventories and the methodology used to prepare the inventories are more fully described in Appendices A and B, to this Plan.

The unit of measure used throughout this GHG Reduction Plan is the metric ton of carbon dioxide (CO₂) equivalent (MTCO₂e). This is the international unit that combines the differing

impacts of all greenhouse gases into a single unit, by multiplying each emitted gas by its global warming potential (GWP). GWP is the measure of how much a given mass of greenhouse gas contributes to global warming. GWP compares the relative warming effect of the GHG in question to that of carbon dioxide.¹

The External Inventory includes a current year inventory and a 2020 year inventory. The year 2007 (referred to as the “Current” year inventory, or “2007” inventory, for the External Inventory) was selected as the current year for the External Inventory as it was the most recent year with the necessary data to perform a comprehensive inventory. The 2020 inventory is an unmitigated emissions projection² based on current energy consumption and unit emission rates adjusted by sector-specific growth rates or based on CARB’s 2020 forecast inventory growth rates without taking into account the effect of any state, regional, or local GHG reduction measures (CARB 2009).

The Internal Inventory also includes a current year inventory and a 2020 year inventory. Fiscal year July 1, 2006, to June 30, 2007 (referred to as the “Current” year inventory, “2007” inventory, for the Internal Inventory) was selected as the current year for the Internal Inventory because it represents the most recent year with the necessary data to perform a comprehensive inventory. A number of widely accepted protocols for estimating GHG emissions were used to prepare the County’s Internal and External inventory. The major protocols used are:

- *California Air Resources Board (CARB) Local Governments Operations Protocol (LGOP) (2008)*. This protocol is the standard for estimating emissions resulting from government buildings and facilities, government fleet vehicles, wastewater treatment and potable water treatment facilities, landfill and composting facilities, and other operations.
- *California Climate Action Registry (CCAR) and General Reporting Protocol (2009)*. This protocol provides guidance for preparing GHG inventories in California.
- *CARB California Greenhouse Gas Inventory Data 1990–2006 (2009)*. CARB’s documentation provides background methodology, activity data, protocols, and calculations used for California’s statewide inventory.
- *California Energy Commission (CEC) Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 (2006)*. This inventory provides useful methodology and emission factors for statewide GHG emissions inventorying.
- *U.S. Environmental Protection Agency (USEPA) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2007 (2009)*. This inventory provides useful methodology and emission factors for nationwide GHG emissions inventorying.
- *Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (2006)*. This document is the international standard for

¹ The GWP of CO₂ is, by definition, one (1). The GWP values, based on Intergovernmental Panel on Climate Change (IPCC guidance) used in this Plan are as follows: CO₂ = 1, Methane (CH₄) = 21, Nitrous Oxide (N₂O) = 310.

² Some refer to an unmitigated forecast as a “Business as Usual” or BAU forecast. In this plan, such forecasts are referred to as an “unmitigated emissions forecast.”



inventories and provides much of the baseline methodology used in the national and statewide emission inventories.

The County utilized the approach employed by the Local Government Operations Protocol (LGOP), which categorizes local government emission sources as Scope 1 (direct), Scope 2 (indirect), and Scope 3 (other indirect). The LGOP defines these emissions as follows:

- Scope 1:** All direct GHG emissions (with the exception of direct CO₂ emissions from biogenic sources).
- Scope 2:** Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling.
- Scope 3:** All other indirect emissions not covered in Scope 2 that are not under the control or influence of the local government, such as the emissions resulting from the extraction and production of purchased materials and fuels, and transport-related activities in vehicles not owned or controlled by the reporting entity.

Scope 1 and 2 emissions were quantified and included in both the Internal and External Inventories. For example, direct emissions associated with onsite natural gas and fuel oil use are included in Scope 1 because these emissions occur in the unincorporated area and are subject to the County's influence or control. Indirect GHG emissions associated with electricity use are included in Scope 2, since these emissions can occur outside of the unincorporated area, but are subject to the County's influence or control. Several Scope 3 emissions were also quantified for certain emission sources (such as rail emissions and high global warming potential gases for informational purposes but not included in the External Inventory. Scope 3 emissions include emissions that the County does not influence or control but that occur in relation to activity in the unincorporated area of the County³.

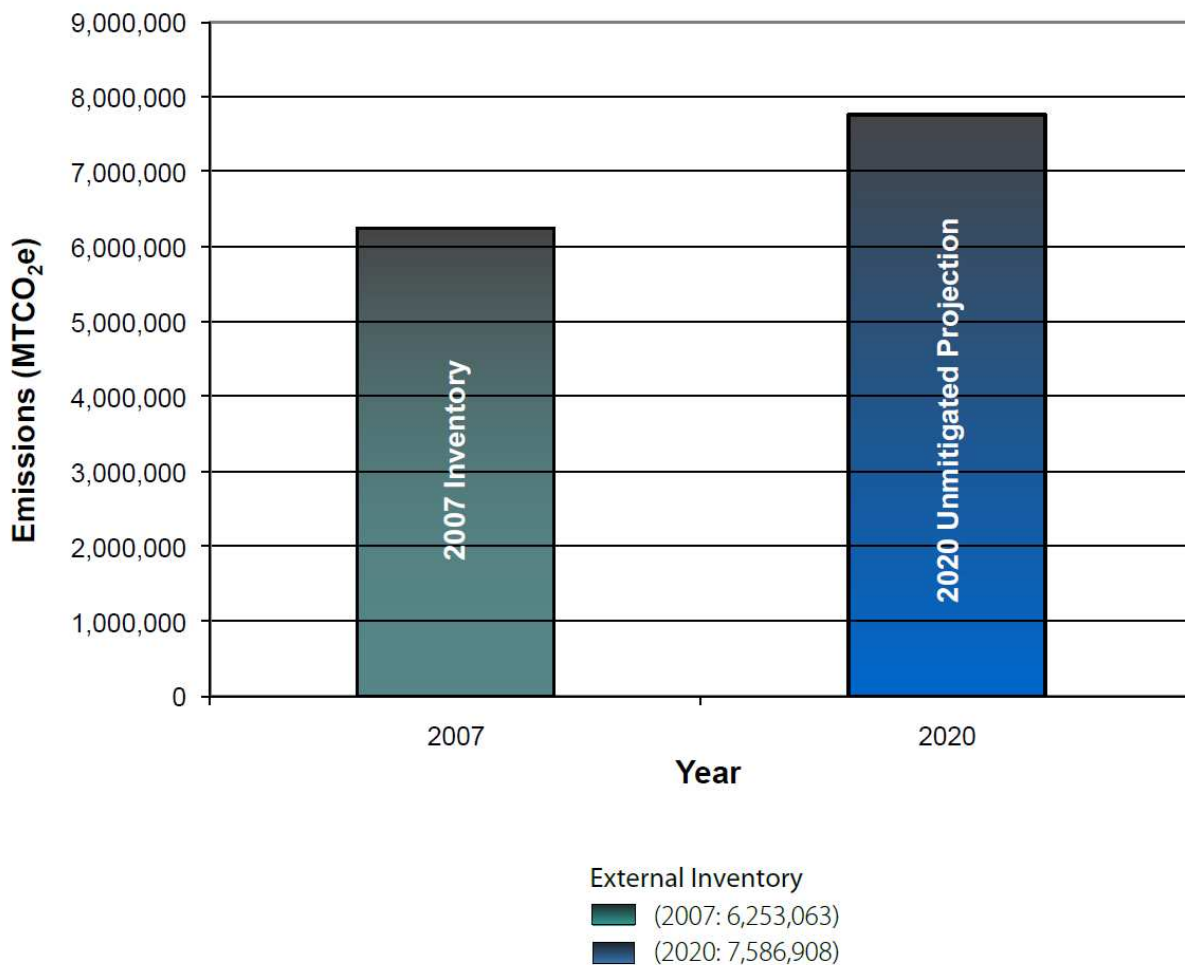
³ See Appendix A for additional information relating to Scope 3 emissions

GHG 2.2 External Inventory

GHG 2.2.1 Total External Emissions

The County’s Current and 2020 External Inventory emissions are 6,253,063 MTCO₂e and 7,586,908 MTCO₂e, respectively (see **Figure 2-1** below). The projected 2020 emissions are not adjusted to reflect adopted or future legislation that will result in statewide GHG emissions reductions.

Figure 2-1: External Inventory of GHG Emissions (Current –2020)



GHG 2.2.2 Sector-Specific Analysis of the External Emissions

Although there are no sector-specific reduction goals outlined in AB 32, the County’s sector-specific inventories and analysis provide a useful metric to gauge the County’s progress towards achieving its aggregated 2020 emissions reduction goal.



The following emissions sectors are included in the External Inventory. The data source for each emission sector is also included.

- *Stationary Sources*: cement plants, fuel combustion, industrial process emissions etc. Data provided by the South Coast Air Quality Management District (SCAQMD) and by the California Air Resources Board (CARB) (See Appendix A and Appendix D).
- *Transportation (on-road and off-road)*. Data provided by SCAQMD (See Appendix A and Appendix D).
- *Energy End-Use*: (See Appendix A for specific data sources)
 - *Industrial*: natural gas and electricity consumption for the industrial sector. Data provided by utilities (See Appendix A);
 - *Residential*: natural gas and electricity consumption for the residential sector. Data provided by utilities; and,
 - *Commercial*: natural gas and electricity consumption for the commercial sector. Data provided by utilities.
- *Solid Waste/Landfills*: methane emissions from landfilled waste. Data provided by the County's Solid Waste Management Department, (SWMD), the California Integrated Waste Management Board (CIWMB), and the United States Environmental Protection Agency (USEPA). (see Appendix A).
- *Agriculture*: enteric fermentation and manure management from dairy operations. Data provided by the SCAQMD Countywide inventory (See Appendix A and Appendix D).
- *Water-Related*:
 - *Wastewater*: fugitive emissions from domestic wastewater treatment. Data provided by CARB (See Appendix A).
 - *Water Conveyance*: electricity consumption associated with water importation. Data provided by the CEC (See Appendix A).
- *Miscellaneous*: GHG emissions associated with residential from residential fireplaces and outdoor cooking.

The sector-specific Current Year emissions for the External Inventory are presented in **Table 2-1**. Accounting for projected population and economic growth, unmitigated projected External Inventory emissions in 2020 are also presented in **Table 2-1**. In descending order of magnitude, External emissions sources are dominated by stationary sources, followed by on-road transportation, industrial sources, residential energy consumption, commercial energy consumption, landfill waste, off-road transportation, agriculture, wastewater, water conveyance, and miscellaneous emissions.

Table 2-1: San Bernardino County External Emissions Summary

Current External Inventory and Unmitigated 2020 Projections (MTCO₂e)					
Sector		Current		2020	
		Emissions	Percent	Emissions	Percent
Stationary Sources		2,866,435	45.8	3,173,592	41.8
Transportation:	On-road	1,631,666	26.1	2,176,132	28.7
	Off-road	157,185	2.5	235,054	3.1
Building Energy Use:	Industrial	593,716	9.5	760,834	10.0
	Residential	440,851	7.1	467,217	6.2
	Commercial	246,364	3.9	314,603	4.1
Solid Waste/Landfills		213,191	3.4	359,318	4.7
Agriculture		64,619	1.0	50,991	0.7
Water-Related:	Wastewater	27,994	0.4	35,525	0.5
	Water Conveyance	10,696	0.2	13,211	0.2
Miscellaneous: Residential fires and cooking		346	0.01	431	0.01
Total		6,253,063	100	7,586,908	100

Stationary source emissions in San Bernardino County are substantially different compared to more industrialized counties like Los Angeles County. Cement plants constitute approximately 95 percent of the stationary source emissions in San Bernardino County, and represent nearly one half (45.8%) of all external emissions. There are 11 cement plants located in California, four are located in San Bernardino County, three of which are located in the unincorporated area of the County. These three cement plants represent approximately 30 percent of GHG emissions from cement production in California⁴.

⁴ See Appendix A.

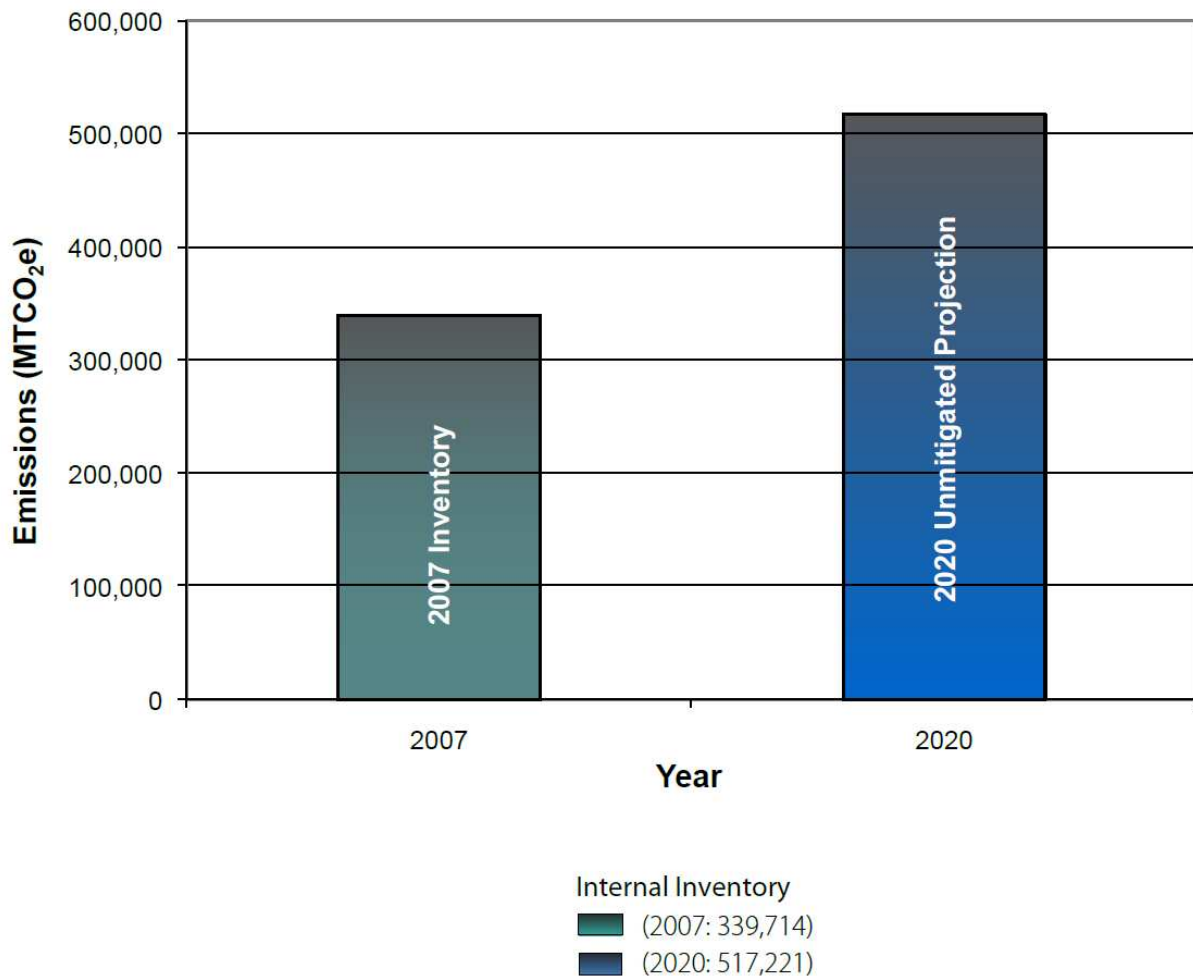


GHG 2.3 Internal Inventory

GHG 2.3.1 Total Internal Emissions

The County's Current and 2020 Internal Inventory emissions are 339,714 MTCO₂e and 517,221 MTCO₂e⁵, respectively (See **Figure 2-2** below). The projected 2020 emissions are not adjusted to reflect recent legislation that will result in statewide GHG emissions reductions.

Figure 2-2: Internal Inventory of GHG Emissions (Current –2020)



GHG 2.3.2 Sector-Specific Analysis of the Internal Inventory Emissions

The following emissions sectors are included in the Internal Inventory (see Appendix B for detailed discussion of data sources and assumptions).

⁵ Internal emissions are shown as thousand metric tons and External emissions are shown as million metric tons.

- *County Facilities:* natural gas and electricity consumption for County-owned and operated facilities.
- *Water Pumping and Wastewater Treatment:* natural gas and electricity consumption for County-owned and operated water pumping and treatment facilities.
- *Outdoor Lighting:* electricity consumption for County-owned and operated outdoor lighting.
- *County Vehicle Fleet:* fuel consumption for County fleets.
- *Solid Waste/Landfills:* methane emissions from landfilled waste.
- *Employee Commute:* fuel consumption for County employees commuting to and from work.

The data in the Current year inventory is based on information gathered from County departments, the County General Plan, California Integrated Waste Management Board (CIWMB), and United States Environmental Protection Agency (USEPA). The 2020 inventory is a projection of unmitigated emissions based on current energy consumption and unit emission rates adjusted by sector specific projected growth rates.

The County's sector-specific Current year and 2020 GHG emissions are presented in **Table 2-2** below. In descending order of magnitude, the County's emissions sources are dominated by solid waste, County facilities, County fleet, employee commute, water pumping and wastewater treatment, and outdoor lighting.

Table 2-2: San Bernardino County Internal Emissions Summary

Sector	Current		2020	
	Emissions	Percent	Emissions	Percent
Solid Waste/landfills	206,817	60.9	342,480	66.2
County Facilities	62,981	18.5	84,915	16.4
County Vehicle Fleet	34,958	10.3	42,526	8.2
Employee Commute	32,490	9.6	42,869	8.3
Water Pumping and Wastewater Treatment	2,192	0.7	4,114	0.8
Outdoor Lighting	276	0.1	317	0.1
Total	339,714	100	517,221	100

Source: ICF International, Inc., 2009



CHAPTER 3.0

2020 GHG REDUCTION TARGET

GHG 3.1 The 2020 GHG Reduction Target

GOAL: Reduce Current Greenhouse Emissions from activities over which the County has jurisdictional and operational control by at least 15% by 2020.

The County’s GHG Reduction Plan and its reduction goal are based on AB 32 and CARB’s recommendations to ensure California GHG emissions are less than 1990 GHG emissions by the year 2020.

“ARB recommended a greenhouse gas reduction goal for local governments of 15 percent below today’s levels by 2020 to ensure that their municipal and community-wide emissions match the State’s reduction target” (AB32 Scoping Plan 2008, p. ES-5).

The County’s External and Internal GHG Inventories form a benchmark and projected unmitigated 2020 inventory from which the County has established its reduction target. The County’s External Inventory of GHG emissions for the Current (2007) year is 6,253,063 MTCO_{2e}. The County’s Internal Inventory of GHG emissions for the Current (2007) year is 339,714 MTCO_{2e}. As discussed in Chapter 2 “*Inventory*”, page 2-1, the two inventories overlap in part and are exclusive in part and cannot be simply added to each other accordingly.

Tables 3-1 and 3-2 show the total emissions by sector for the External and Internal Inventories, respectively.

Figure 3-1: External Emissions By Sector

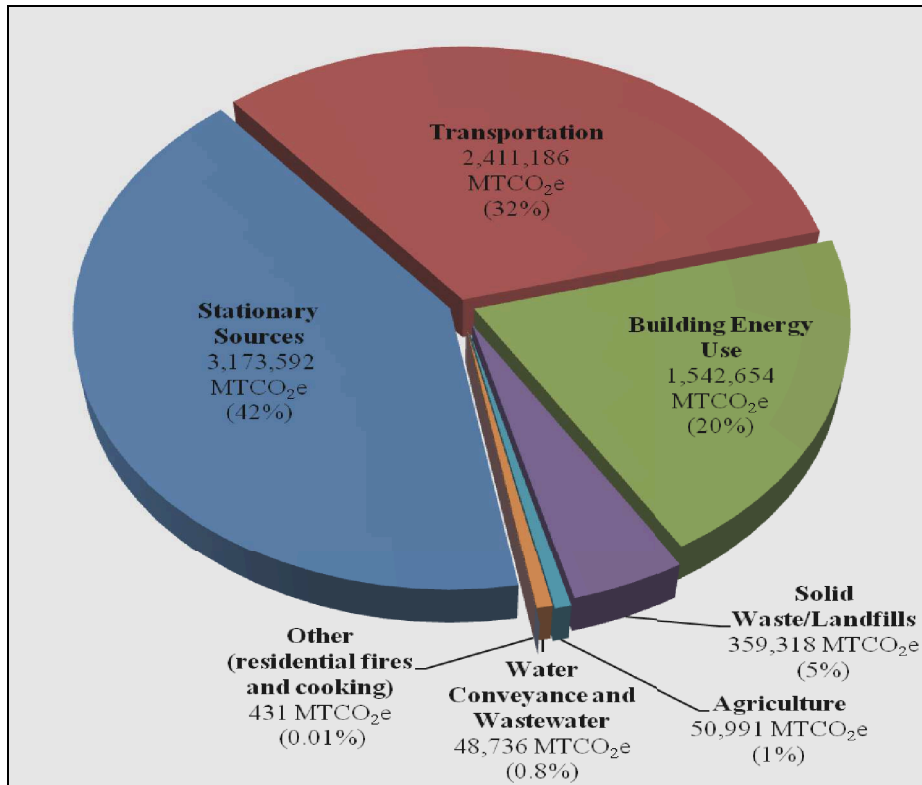
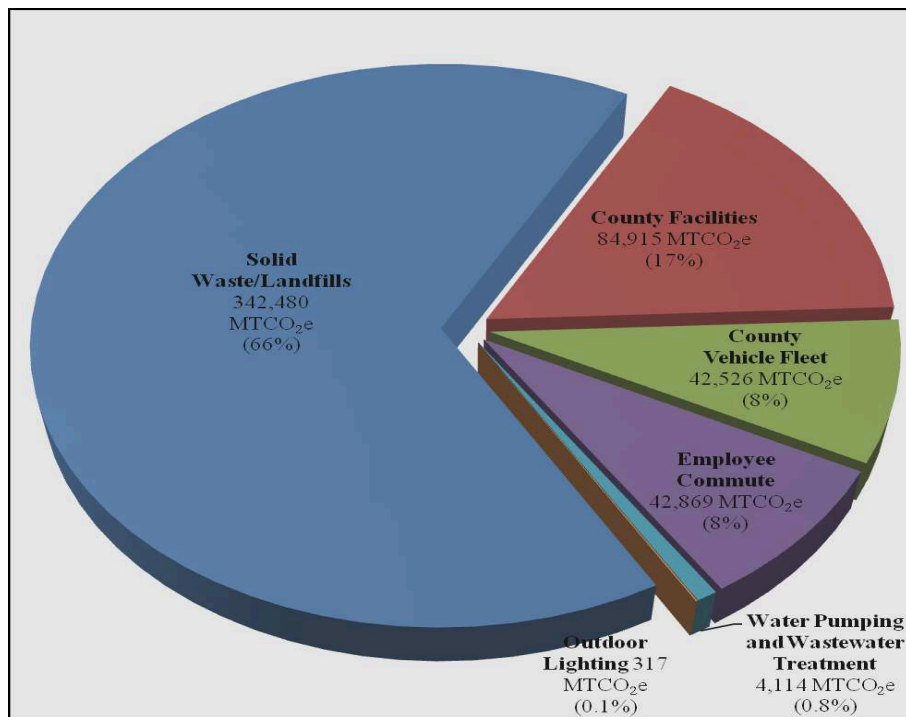


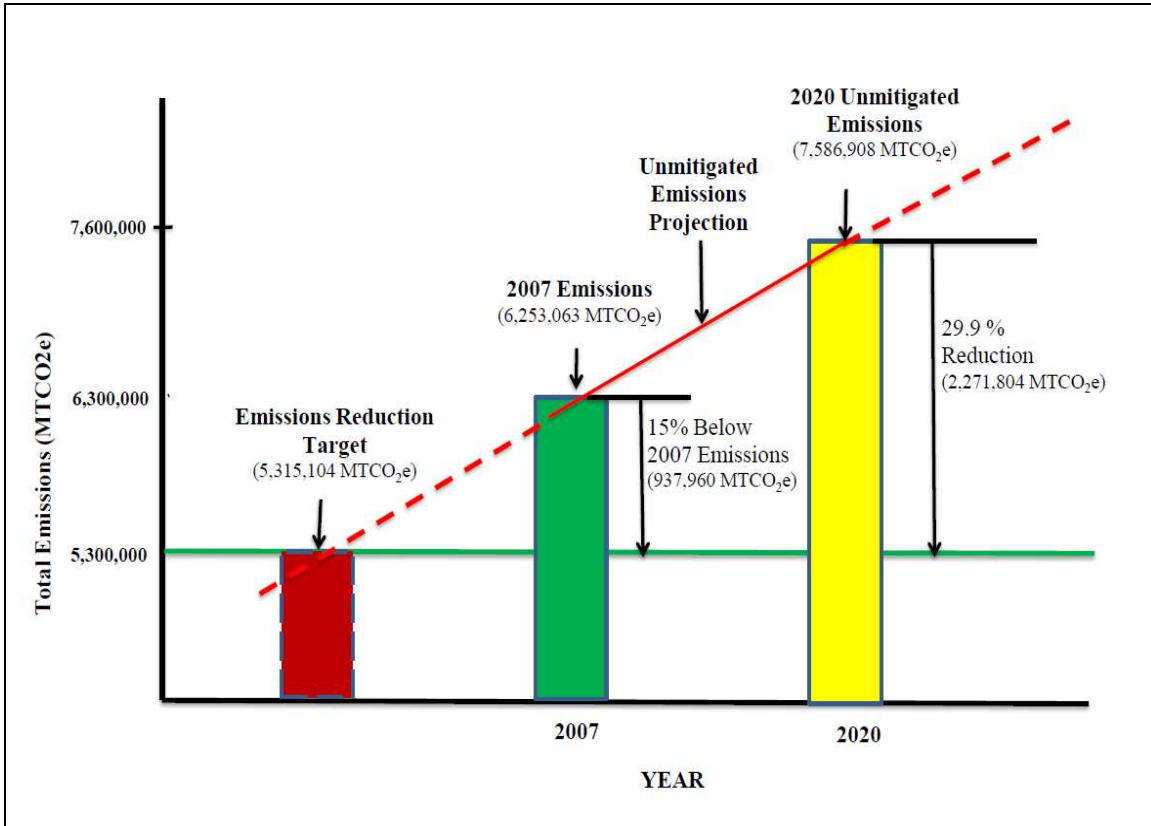
Figure 3-2: Internal Emissions By Sector





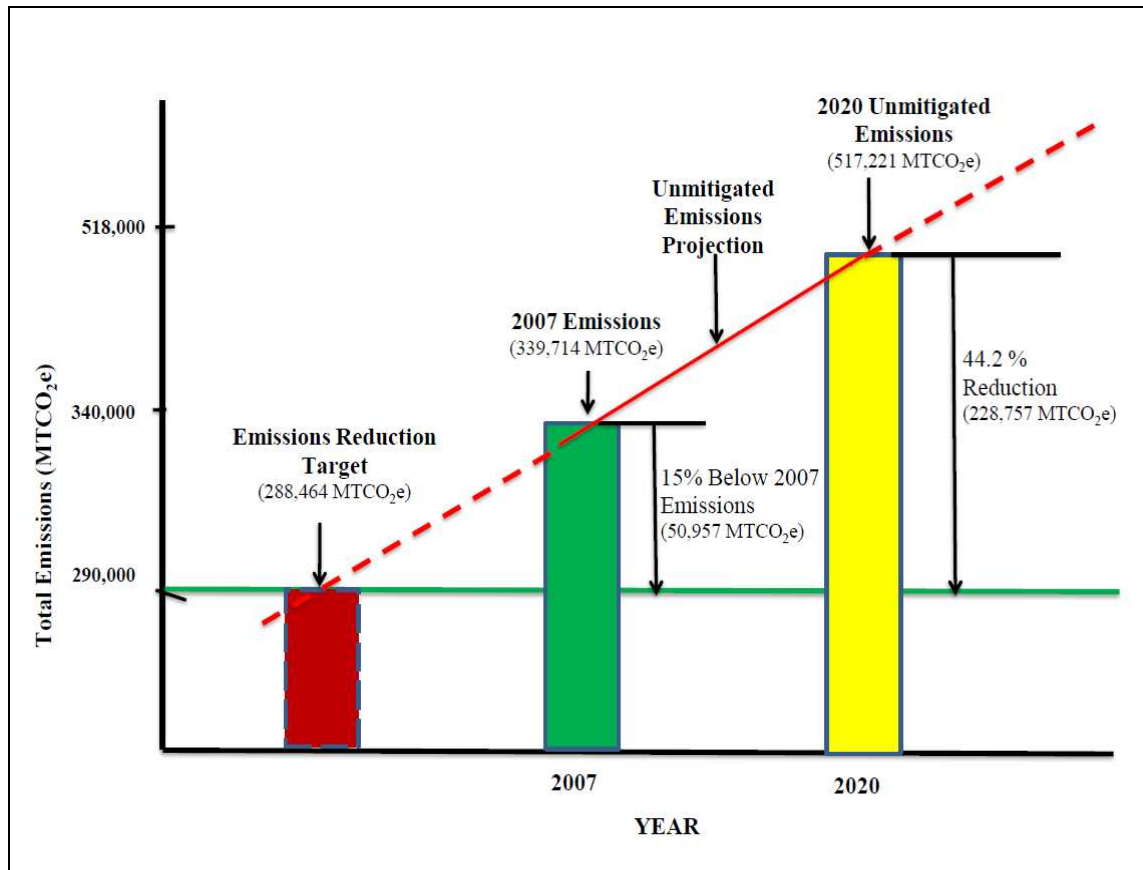
The County's 2020 goal is to decrease both the External and Internal Inventories of emissions to a level at least 15% below Current (2007) year emissions. To achieve this goal, by 2020 the External Inventory will be reduced by approximately 2,272,000 MTCO₂e (compared to 2020 unmitigated levels) to a level of approximately 5,315,000 MTCO₂e as shown in **Figure 3-3**. This constitutes a reduction of approximately 30 percent.

Figure 3-3: External Emissions Inventory and Reduction Targets



The County's goal is also to reduce its 2020 Internal Inventory by approximately 229,000 MTCO₂e (compared to 2020 unmitigated levels) to a level of 289,000 MTCO₂e. This constitutes a total of approximately 42 percent.

Figure 3.4: Internal Emissions Inventory and Reduction Targets



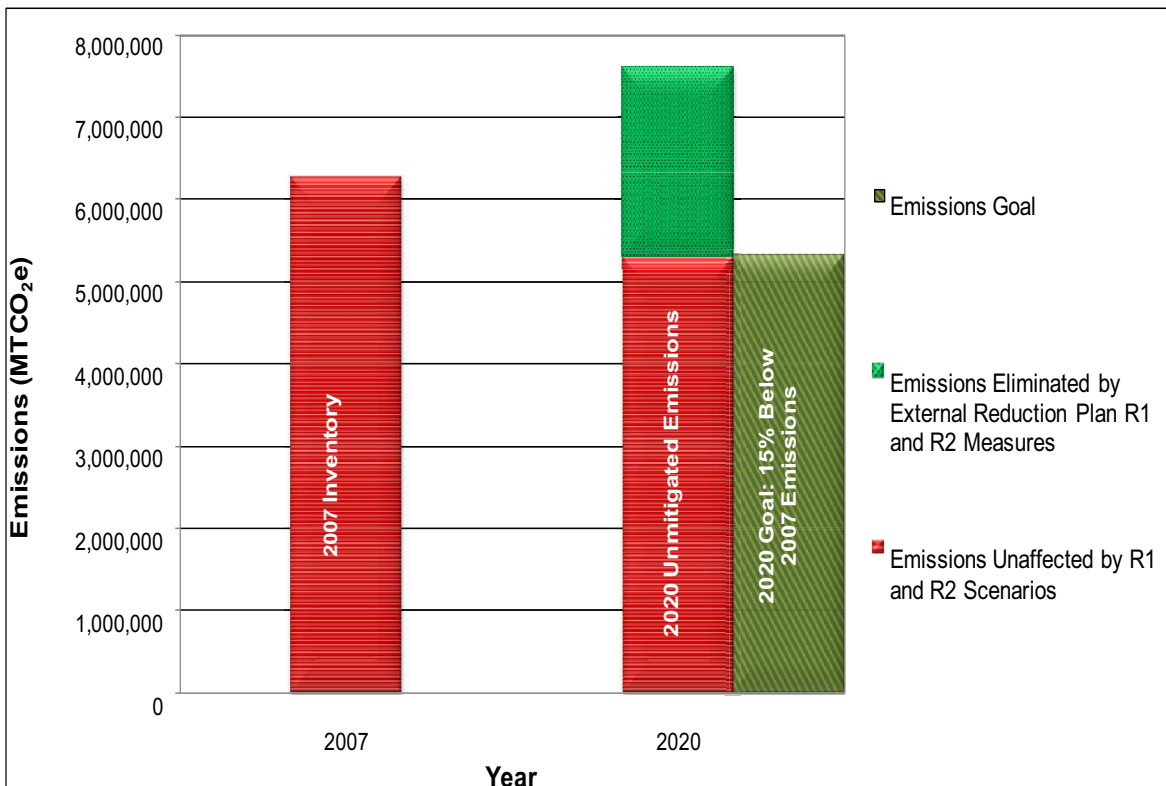


GHG 3.2 External Inventory of GHG Emissions - Projection and Target

The Current (2007) External Inventory, 2020 unmitigated emission projections and the 2020 reduction target are presented in Figure 3-5. This figure also shows 2020 emissions after taking into account the reduction measures described in Chapter 4. Together, the sum of these reduction measures achieves slightly more emissions reductions than necessary to meet the 2020 emissions target.

Unmitigated emissions are expected to increase from 6,253,063 MTCO₂e in 2007 to 7,586,908 MTCO₂e in 2020 due to growth in population, the number of households and jobs, increase in vehicle travel, solid waste production, and industrial activity in the County, among other factors. However, the reduction measures included in this Plan will reduce emissions by 2,290,874 MTCO₂e (approximately 30.2 percent) compared to these unmitigated projections. Reduction measures include both state and local measures. Implementation of all measures identified in this Plan will reduce projected 2020 emissions approximately 15.3% below 2007 emissions.

Figure 3-5: External Inventory, Current, 2020 Unmitigated, and 2020 Mitigated Emission Levels, with Reduction Goal

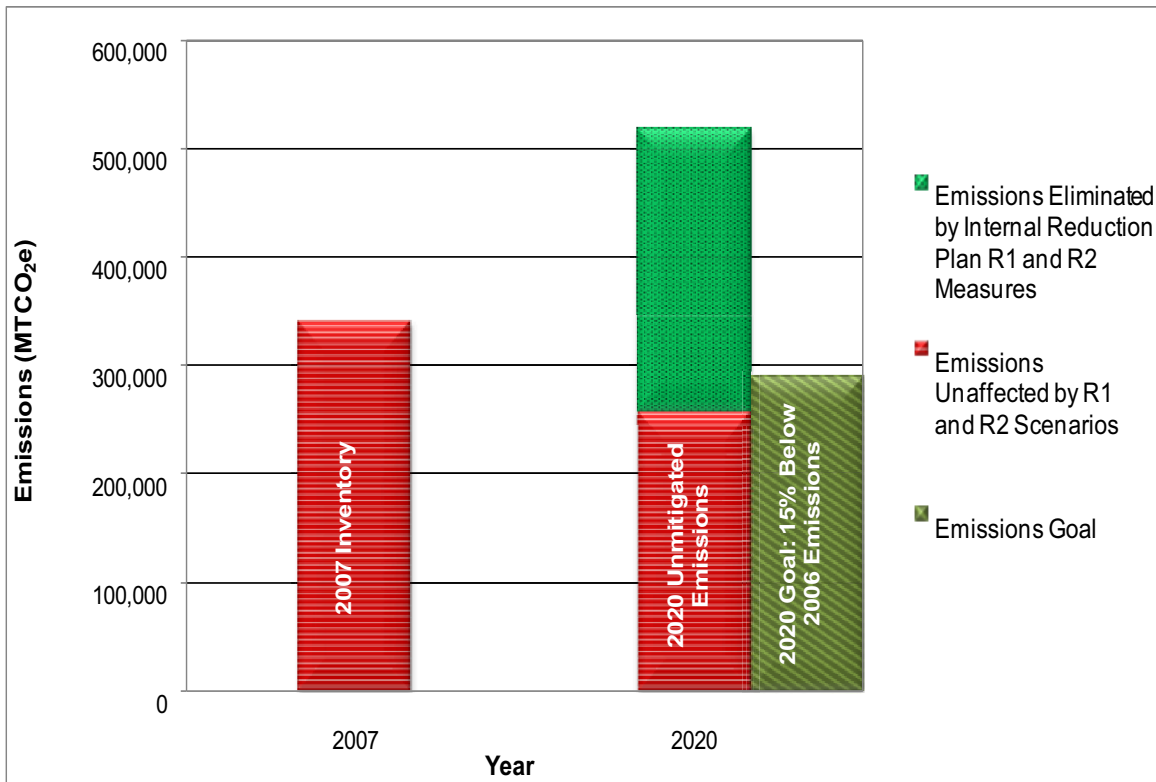


GHG 3.3: Internal Inventory of GHG Emissions – Projection and Target

The Current (2007) Internal Inventory, 2020 unmitigated emission projections and the 2020 goal are presented in Figure 3-6. This figure also shows 2020 emissions after taking into account the reduction measures described in Chapter 4. Together, the sum of these reduction measures achieves more emissions reductions than necessary to meet the 2020 emissions target. The majority of these reduction measures are local measures, requiring County action to achieve the associated emissions reductions.

Unmitigated emissions estimates are expected to increase from 339,714 MTCO₂e in 2007 to 517,221 MTCO₂e in 2020 due to growth in building energy use, County vehicle fleets, new waste being deposited in County-owned landfills, and the number of County employees. However, the reduction measures included in this Plan will reduce emissions by 260,692 MTCO₂e (50.4 percent) from unmitigated projections. With implementation of the state and local measures identified in this Plan, 2020 emissions will be approximately 24 percent lower than 2007 emissions, substantially exceeding the 2020 goal of 15 percent below current emissions.

Figure 3-6: Internal Inventory, Current, 2020 Unmitigated and 2020 Mitigated Emission Levels, with Reduction Goal





CHAPTER 4.0

GHG REDUCTION GOALS, OBJECTIVES AND STRATEGIES

GHG 4.1 ATTAINING THE REDUCTION TARGET

The County's goal is to reduce its External Inventory of emissions by 2020 to approximately 5,315,000 MTCO₂e, requiring a reduction of approximately 2,272,000 MTCO₂e compared to 2020 unmitigated emissions. It is also the County's goal to reduce its Internal Inventory of emissions by 2020 to approximately 289,000 MTCO₂e, requiring a reduction of approximately 229,000 MTCO₂e compared to 2020 unmitigated emissions.

The purpose of this Chapter is to describe the reduction strategies currently being employed by the County, as well as those that will be employed by the County and the State, many of which are quantifiable. Existing and newly implemented strategies in place through the various County departments will help reduce the countywide GHG emissions level. In addition, proposed new private developments will also contribute to GHG emissions reduction through the County's GHG development review process, AB 32 requirements, and other state initiatives.

External Inventory emission reductions are classified into the following six sectors: Building Energy (including both Energy Efficiency and Alternative Energy), Transportation and Land Use, Solid Waste/Landfills, Stationary Sources, Agriculture and Resources Conservation, and Water Conservation. Internal Inventory emission reductions are classified into the following four sectors: Building/Energy, Fleet/Fuel, Solid Waste/Landfills and, Employee Commute. For each sector, reduction strategies have been developed to achieve the County's 2020 emissions reduction target.

The External Inventory is projected to reach 7,586,908 MTCO₂e by 2020 if unmitigated. With the State and County strategies described in this Chapter, the projected 2020 External Inventory of emissions will be reduced to 5,296,034 MTCO₂e, a level 15.3 percent less than the 2007 External Inventory emissions. The projected 2020 unmitigated Internal Inventory of emissions will be reduced by 260,692 MTCO₂e, to a level approximately 24 percent less than 2007 Internal Inventory emissions.

Figure 4-1 and **Table 4-1** summarize the reductions that will be achieved for the External Inventory, by emissions sector. External Inventory reductions were identified from the following sectors: Stationary Sources (46%); Transportation and Land Use (23%); Building energy (22%); Solid Waste Landfills (9%); Water conservation (0.4%); and Agriculture & Resource Conservation (0.1%).

Figure 4-1: 2020 External Emissions Reduction Summary (MTCO₂e)

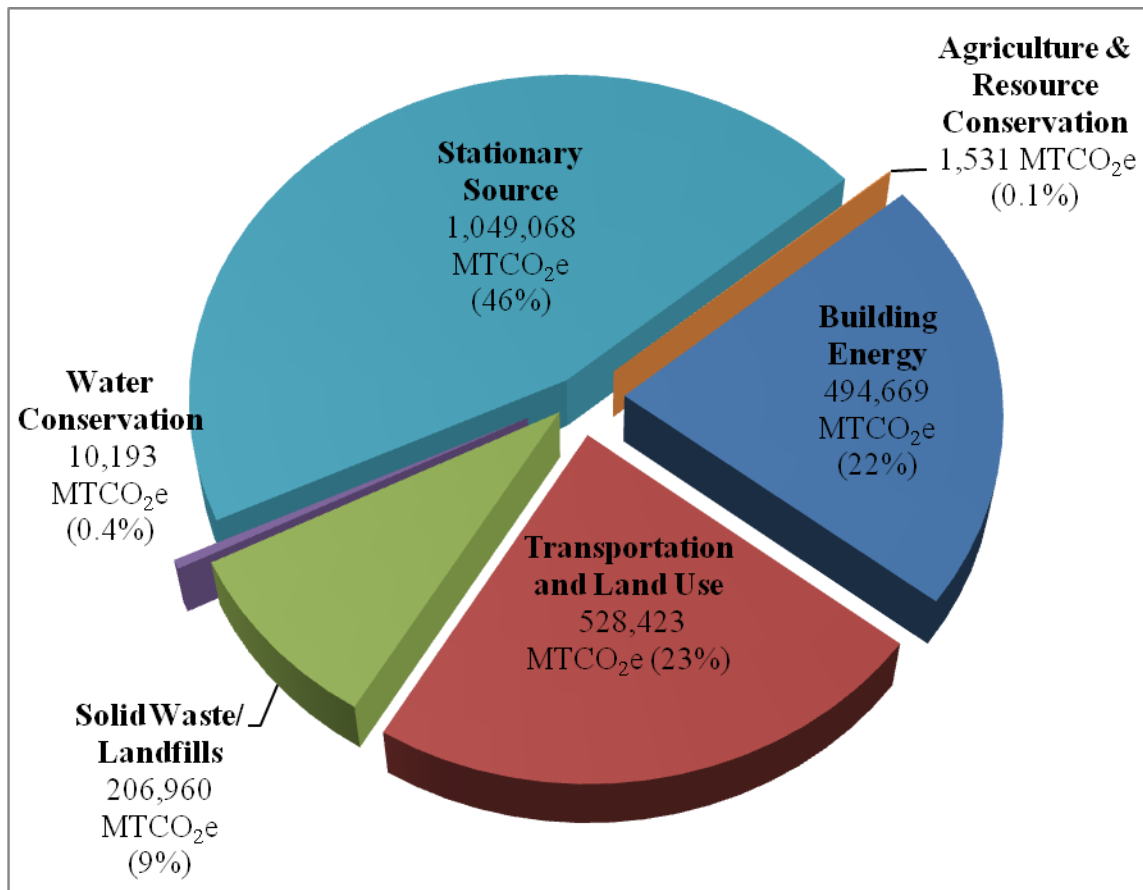


Table 4-1: Summary of External Emissions Reduction by Sector

Sector	2020 Reduction (MTCO ₂ e)		
	State Strategies	County Strategies	Total
Building Energy			
Energy Efficiency	167,129	70,691	237,820
Alternative Energy	168,117	88,761	256,879
Transportation and Land Use	486,157	42,266	528,423
Solid Waste/Landfills ¹	--	206,960	206,960
Stationary Source	1,049,068	0	1,049,068
Agriculture & Resource Conservation	1,531	0	1,531
Water Conservation	2,007	8,186	10,193
Total	1,874,009	416,864	2,290,874

Figure 4-2 and Table 4-2 summarize the reductions that will be achieved for the Internal Inventory, by emissions sector. Internal Inventory emissions reductions were identified

¹ Refer to Chapter 2, page 2-1, regarding overlap between Internal and External inventories.



from the following sectors: solid waste/landfills (79%), building/energy use (13%), fleet/fuel (6%), and employee commute (2%).

Figure 4-2: 2020 Internal Emissions Reduction Summary

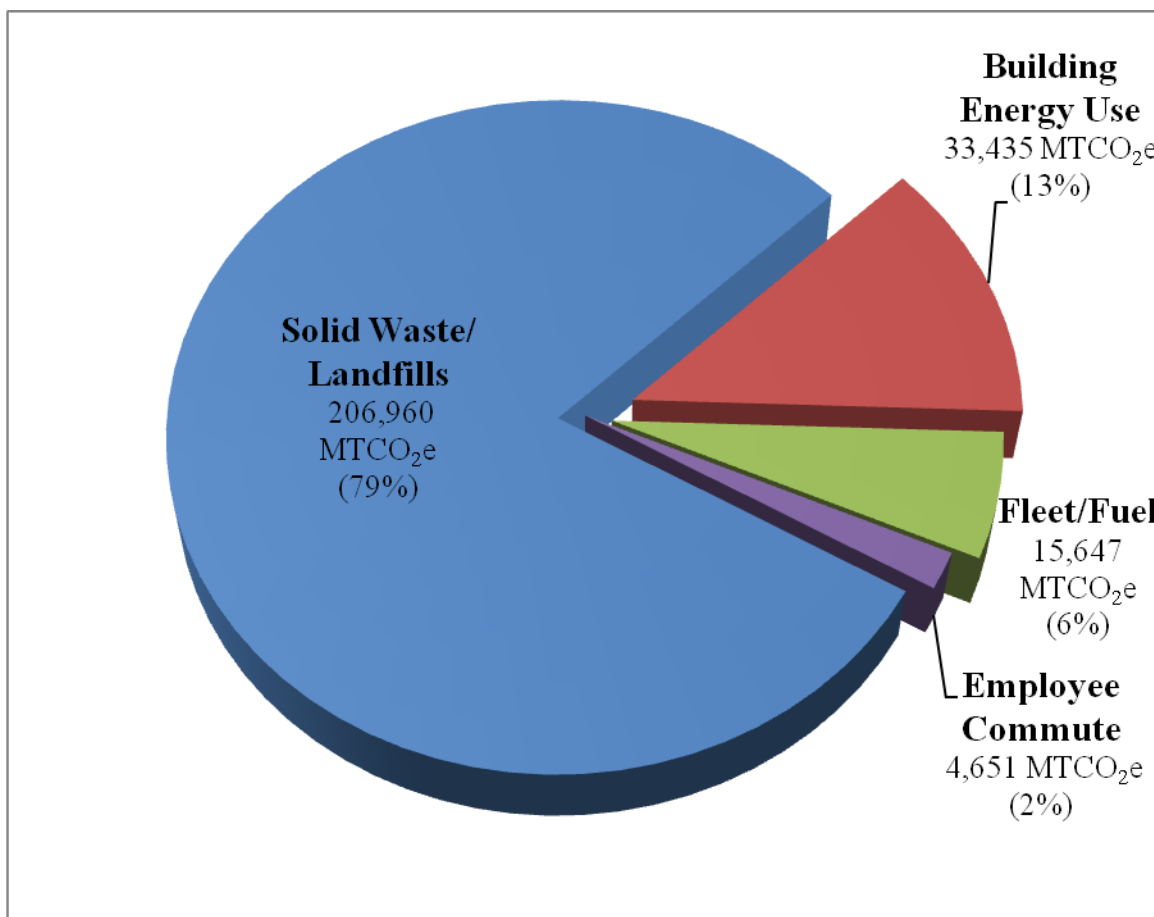


Table 4-2: Summary of Internal Reductions by Sector

Sector	2020 Reduction (MTCO ₂ e)		
	State Strategies	County Strategies	Total
Solid Waste/Landfills ²	0	206,960	206,960
Building Energy Use	15,892	17,543	33,435
Fleet/Fuel	11,179	4,467	15,647
Employee Commute	0	4,651	4,651
Total	27,071	233,621	260,692

² Refer to Chapter 2, page 2-1, regarding overlap between Internal and External inventories.

RELATIONSHIP OF REDUCTION STRATEGY TO REDUCTION MEASURES

The reduction strategies discussed in the GHG Plan (reduction strategies) correspond to the reduction measures described in Appendix A for the External Inventory and Appendix B for the Internal Inventory (reduction measures). For purposes of this GHG Plan, the term “reduction strategy” and “reduction measure” have the same meaning. Following the description of each County implemented GHG Plan reduction strategy, is a specific reference to the corresponding reduction measure found in the Appendices. Where the reduction strategy is quantified, the amount of emissions reduction and methodology is set forth in the Appendices A and B.

The reduction strategies are consistent with one or more existing County General Plan policies and programs and/or Development Code requirements. Relevant County General Plan policies are identified under each sector and listed in Appendix C.

REDUCTION MEASURE CLASSIFICATION

The emission reduction measures included in this Plan include existing and proposed state, regional, county, and other local measures that will result in GHG emissions reductions in the County’s External and Internal inventories. The emission reduction measures are organized as follows, for each sector:

1. Reduction Class 1 (R1) includes all adopted, implemented, and proposed state and regional measures that do not require additional County action and that will result in quantifiable GHG reductions for the County’s LUA³ area and internal operations. These measures may require County action to achieve the GHG reductions, but that action is limited and compulsory.
2. Reduction Class 2 (R2) includes all quantifiable measures that have been implemented or will be implemented by the County, as well as any additional quantifiable measures that require County action and will further reduce the GHG emissions for the County’s LUA area and internal operations. R2 also includes any state and regional measures that require substantial action by the County to achieve the expected GHG reductions.

The R2 measures include specific quantifiable measures as well as reductions achieved through the development review process.

Measurable reductions of GHG emissions will be achieved through the County’s GHG Development Review Process (DRP) by applying appropriate reduction requirements as part of the discretionary approval of new development projects. Through its development review process, the County will implement CEQA requiring new development projects to quantify project GHG emissions and adopt feasible mitigation to reduce project emissions below a level of significance. Mitigation of GHG emissions impacts through the DRP provides one of the most substantial reduction strategies for reducing external emissions. The DRP procedures for evaluating GHG impacts and determining significance for CEQA

³ The County’s discretionary land use authority, as well as its ministerial building permit authority are collectively referred to herein as “Land Use Authority” or “LUA.”

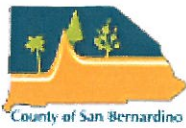


purposes will be streamlined by (1) applying a uniform set of performance standards to all development projects, and (2) utilizing Screening Tables to mitigate project GHG emissions. Projects will have the option of preparing a project-specific technical analysis to quantify and mitigate GHG emissions. A review standard of 3,000 metric tons per years (MTY) will be used to identify projects that require the use of Screening Tables or a project-specific technical analysis to quantify and mitigate project emissions. The review standard of 3,000 MTY and the Screening Tables are described in Appendix F.

As part of the implementation of the County GHG Plan, a uniform set of performance standards will be applied to development projects. These performance standards will be added to the County Development Code to ensure consistent application during development review. The complete Development Review Process, including the use of performance standards, for assessing and mitigating GHG emissions is outlined below.

- a) **County Performance Standards.** All development projects, including those otherwise determined to be exempt from CEQA will be subject to applicable Development Code provisions, including the GHG performance standards, and state requirements, such as the California Building Code requirements for energy efficiency. With the application of the GHG performance standards, projects that are exempt from CEQA and small projects that do not exceed 3,000 MTCO_{2e} per year will be considered to be consistent with the Plan and determined to have a less than significant individual and cumulative impact for GHG emissions. (See Appendix F for a full description of the Performance Standards and the methodology relating to the 3,000 MTCO_{2e} per year level.)
- b) **Regulatory Agency Performance Standards.** When, and if, South Coast Air Quality Management District or Mojave Basin Air Quality Management District adopts standards, the County will consider such guidance and incorporate all applicable standards.
- c) **Projects Using Screening Tables.** For projects exceeding 3,000 MTCO_{2e} per year of GHG emissions, the County will develop Screening Tables as a tool to assist with calculating GHG reduction measures and the determination of a significance finding⁴. Projects that garner a 100 or greater points would not require quantification of project specific GHG emissions. The point system will be devised to ensure project compliance with the reduction measures in the GHG Plan such that the GHG emissions from new development, when considered together with those from existing development, will allow the County to meet its 2020 target and support longer-term reductions in GHG emissions beyond 2020. Consistent with the CEQA Guidelines, such projects are consistent with the Plan and therefore will be determined to have a less than significant individual and cumulative impact for GHG emissions. (See Appendix F for a full description of the Screening Tables and methodology.)

⁴ The Screening Tables, attached as Appendix F to this Plan, are substantially similar to the Screening Tables to be used by the County.



- d) Projects Not Using Screening Tables. Projects exceeding 3,000 MTY of GHG emissions that do not use the Screening Tables, will be required to quantify project specific GHG emissions or otherwise demonstrate that project specific GHG emissions achieve the equivalent level of GHG emissions efficiency as a 100-point project. Consistent with the CEQA Guidelines, such projects are consistent with the Plan and therefore will be determined to have a less than significant individual and cumulative impact for GHG emissions. (See Appendix F for a full description of the Screening Tables.)
- e) Residential Projects Located Outside City Sphere of Influence. Residential Projects (or mixed use projects with a residential component) in excess of 250 dwelling units that are located in unincorporated area not within a City Sphere of Influence (SOI) will not be eligible to use the Screening Tables or rely on the Plan for a determination of less than significant on individual or cumulative impact for GHG emissions. These projects must perform an independent project-specific evaluation of GHG emissions and present project-specific conclusions regarding significance of GHG emissions impacts. (See Appendix F for a full description of the mitigation analysis and methodology for these projects.)
- f) Projects Requiring EIR. This process shall not be construed as limiting the County's authority to require an EIR and if needed to adopt a statement of overriding consideration for projects with significant GHG Impacts.

The County will monitor the emissions reductions from new development, calculate those emissions and make any needed modifications to the County's reduction strategies to enable the County to reach its 2020 target.

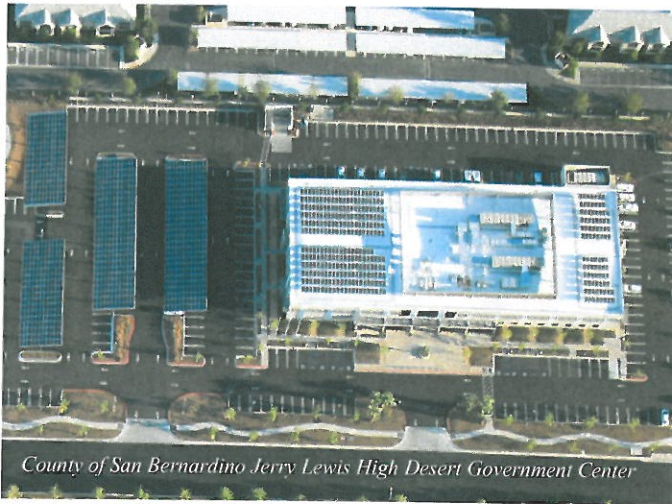
- 3. Reduction Class 3 (R3) includes all other measures that have been implemented or will be implemented by the County which were not quantified, but are included in the County's GHG Plan. These measures are either facilitative in nature or there are methodological issues that prevent their quantification at this time. The R3 measures were not used to demonstrate achievement of the proposed County 2020 GHG emissions reduction target. Some of these measures (such as education or financing programs) are necessary to facilitate their success, but do not have separately quantifiable benefit from the R2 measures they support. Other measures may contribute to additional GHG reductions, but lack data or protocols for quantification.

No federal measures were relied upon to achieve the reduction targets included in this plan due to the uncertainty surrounding federal action at this time.

GHG 4.2 EXTERNAL GHG EMISSIONS REDUCTION GOALS, OBJECTIVES AND STRATEGIES

The County's External GHG Emissions reduction goals, objectives, and strategies are categorized into the following six sectors discussed below: Building Energy (including both Energy Efficiency and Alternative Energy), Transportation and Land Use, Solid Waste/Landfills, Stationary Sources, Agriculture and Resource Conservation, and Water Conservation.

GHG 4.2.1 BUILDING ENERGY SECTOR



The Building Energy sector includes and addresses energy efficiency and alternative energy use in buildings, and renewable energy generation facilities.

Building energy use results in GHG emissions associated with electricity and natural gas use. Concurrent with the rise in demand for more energy has been the demand for more efficient production, distribution and use. By promoting efficiency and

alternative energy use in existing and new buildings, the demand for electricity and natural gas can be reduced and the GHG emissions associated with electricity generation and natural gas combustion can be reduced. The increasing cost of energy has stimulated technological research and development of alternative energy, generated from sources that are naturally replenished (renewable) such as solar power, wind, cogeneration, and/or geothermal power. Use of solar energy for water and space heating is commercially feasible and its use for power generation is now a reality and is fast becoming a major resource with the many renewable energy projects proposed for the Desert Region of the County.

The Building Energy sector is estimated to account for approximately 20 percent of the 2020 unmitigated external emissions forecast in the County. This is the second largest GHG source of all sectors. With the adoption and implementation of all State and County GHG reduction strategies in this Plan, the total emissions reductions related to Building Energy is projected to decrease by approximately 494,699 metric tons CO₂e, which is a 33.3 percent reduction from 2020 unmitigated projections.

GHG 4.2.1.1 BACKGROUND

The County's General Plan and Development Code contain numerous policies and programs that guide development and also support the County's efforts to reduce GHG emissions reductions. The following General Plan (GP) policies, while not specifically quantifiable in terms of the amount of GHG reduction, effectively contribute to the County's reduction efforts.

1. **Minimize Energy Consumption.** GP Goal CO 8 states: The County will minimize energy consumption and promote safe energy extraction, uses and systems to benefit local regional and global environments.
2. **Energy Conservation.** The County supports planning that conserves energy, reduces natural resource consumption, and minimizes environmental impacts (GP Policy CO 8.1 and 8.2). The County promotes energy-efficient design features, including appropriate site orientation, use of lighter-color roofing and building materials, use of deciduous shade trees and windbreak trees to reduce fuel consumption for heating and cooling, and use of automated time clocks or occupant sensors to control central heating and air conditioning (GP Policy CO 8.8 and 8.9). Recognizing that fossil fuel combustion contributes to poor air quality, General Plan Policy CO 8.6 requires alternative energy production and conservation, as follows:
 - (i) New developments in the County are encouraged to incorporate the most energy-efficient technologies that reduce energy waste by weatherization, insulation, efficient appliances, solar energy systems, reduced energy demand, efficient space cooling and heating, water heating, and electricity generation; and,
 - (ii) All new subdivisions for which a tentative map is required are required to provide to the extent feasible, for future natural heating or cooling opportunities in the subdivision. This can be accomplished by design of lot size and configuration for heating or cooling from solar exposure or shade and breezes, respectively.
3. **Land Use and Building Controls.** To take advantage of the unique climatic and geographic opportunities for energy conservation and small-scale alternative energy systems in each of the County's three geographic regions, the County will: implement land use and building controls and incentives to ensure energy-efficient standards in new developments that comply with California energy regulations as minimum requirements; quantify local climate variations and in each climatic region require energy conservation systems in new construction; and fully enforce all current residential and commercial California Energy Commission energy conservation standards (GP Policy CO 8.5).
4. **Energy Efficiency.** The County: evaluates residential developments with an emphasis on energy-efficient design and siting options that are responsive to local climatic conditions and applicable laws; provides an Insulation and Weatherization



Program for eligible households; and, encourages the use of energy conservation features in residential construction, remodeling, and existing homes (GP Policy H 2.5, H 2.9 and H 2.10).

5. **Renewable Energy.** G.P. Policy CO 8.3 states that the County will assist in efforts to develop alternative energy technologies that have minimum adverse effect on the environment, and explore and promote newer opportunities for the use of alternative energy sources. The County's goal is to site renewable energy facilities equitably to minimize net energy use and consumption of natural resources, and avoid inappropriately burdening certain communities (GP Policy CO 4.1 and G.P. Goal CO 8).

GHG 4.2.1.2 BUILDING ENERGY GHG PLAN GOALS, OBJECTIVES AND STRATEGIES

As a compliment to the General Plan goals and policies stated above, the following GHG Plan goals, objectives, and strategies reduce greenhouse gases generated by energy use in buildings and facilitate siting of renewable energy facilities.

GHG Goal EE 1: Reduce GHG emissions from the generation of electricity by reducing electricity use through increased efficiency and project design that incorporates renewable energy.

Objective GHG EE 1.1 Promote Community energy conservation and encourage incorporation of green features in buildings.

Reduction Strategies

1. **Public Education.** The County will engage in public outreach to increase community awareness about energy efficiency, emissions reduction programs, and incentives, including rebates available for their residence or type of business.

(Measure R3E6, Appendix A)

2. **Cross-Jurisdictional Coordination.** The County will coordinate its efforts to increase energy efficiency and use of alternative energy with other local governments, special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop green building policies and programs that are optimized on a regional scale.

(Measure R3E7, Appendix A)

3. **Green Building Development Facilitation and Streamlining.** The County will encourage and facilitate Green Development by continuing to identify and remove regulatory or procedural barriers to implementing green building practices in the County, such as updating codes, guidelines, and zoning.

(Measure R3E1, Appendix A)

Objective GHG EE 1.2 Establish policies and programs to improve energy efficiency and increase renewable energy use in existing buildings

Reduction Strategies

1. **Residential Energy Efficiency Retrofits.** Through County incentives and market forces, a segment of existing residential dwellings will be retrofit with energy efficient features, resulting in a GHG reduction of at least 1.2 percent reduction of the total 2020 unmitigated emissions attributable to the Building Energy sector. This measure will be implemented and facilitated through a combination of County permitting of major renovations and incentives for homeowners to voluntarily retrofit their properties, such as funding mechanisms, and the Green County Program for waiving permit fees. The County will also increase community awareness of the potential for energy efficient retrofits, engage in efforts to ensure a qualified retrofit workforce and remove regulatory barriers, if any, to implementing green building practices.

(Measure R2E1, Appendix A; The R3 measures that facilitate this measure are more fully discussed in sections 4 through 8 below.)

2. **Commercial Energy Efficiency Retrofits.** Through County incentives and market forces, a segment of existing commercial buildings will be retrofit with energy efficient features, resulting in a GHG reduction of at least 0.6 percent of the total 2020 unmitigated emissions attributable to the Building Energy sector. This measure will be implemented and facilitated through a combination of County permitting of major renovations and incentives for building owners to voluntarily retrofit their commercial properties, including funding mechanisms, and the Green County Program for waiving permit fees. The County will also increase community awareness of the potential for energy efficient retrofits, engage in efforts to ensure a qualified retrofit workforce and remove regulatory barriers, if any, to implementing green building practices.

(Measure R2E2, Appendix A; The R3 measures that facilitate this measure are more fully discussed in sections 4 through 8 below)

3. **Residential Retrofit Renewable Energy Incentives.** Through County incentives and market forces, solar photovoltaic panels will be installed in a segment of existing residential dwellings during a retrofit or major renovation, resulting in GHG reduction of at least 1.4 percent of the total 2020 unmitigated emissions attributable to the Building energy sector. This program will be implemented and facilitated through a combination of County permitting for major renovations and incentives for homeowners to voluntarily retrofit their properties, such as renewable energy funding mechanisms, and the Green County Program for waiving permit fees. The County will also increase community awareness of the potential for renewable energy retrofits, engage in efforts to ensure a qualified



retrofit workforce and remove regulatory barriers, if any, to implementing green building practices.

(Measure R2E3, Appendix A; The R3 measures that facilitate this measure are more fully discussed in sections 4 through 8 below)

4. **Permitting Process for Retrofits.** The County will continue to identify and remove regulatory and procedural barriers to implementing green building practices and will ensure that plan review and building inspection staff are trained in green building materials, practices, and techniques.

(Measure R3E1, Appendix A)

5. **Green Building Training.** The County will contribute to developing a trained and qualified retrofit workforce by providing green building information, marketing, training, and technical assistance to property owners, development professionals, schools, and special districts.

(Measure R3E2, Appendix A)

6. **Community Building Energy Efficiency & Conservation for Existing Buildings.** The County will perform community outreach to increase community awareness of the benefits of retrofitting existing buildings with energy efficiency features and alternative energy improvements, as follows:

- a. Providing public education about energy efficiency and alternative energy programs and incentives, using the County's Green County website and other informational tools.
- b. Providing information to home and business owners about the benefits of energy efficient products, features and improvements.
- c. Encouraging performance of energy audits when residential and commercial buildings undergo major renovations.

(Measure R3E3, Appendix A)

7. **Incentives for Retrofits.** The County will continue to implement incentive programs to promote energy efficiency in existing buildings.

- a. Green County Program. Through the Green County Program, adopted in August 2007, building permit fees are waived⁵ for projects that make an existing home or business more energy-efficient, such as through the installation of solar systems, wind-generated electrical systems, tankless water heaters, or highly energy-efficient heating, ventilation, and air-conditioning (HVAC) systems.

(Measure R3E1, Appendix A)

⁵ The waiver of permit fees is limited to a maximum of \$5,000 per project and a maximum total of \$45,000 per fiscal year for the entire program.

- b. Solar Hot Water Incentives. The County will participate in the California Solar Initiative (CSI) Thermal Program established in January 2010 by the California Public Utilities Commission to provide incentives for the installation of solar water heating systems in new and existing homes and business in the territories of Southern California Edison, Southern California Gas Company, and Pacific Gas and Electric Company. In accordance with AB 1470, the statewide incentive program to encourage the installation of 200,000 solar water-heating systems will run through 2017, or until the program funds are exhausted. The County will facilitate participation in this program by providing access to information about the program and waiving permit fees⁶.

(Measure R2E5, Appendix A)

8. **Funding for Retrofits – Energy Efficiency Financing.** The County will pursue grants and financing options for energy efficiency retrofits and renewable energy improvements and increase community awareness of these options.
 - a. AB 811-Type Program. The County will pursue implementation of a Property Assessed Clean Energy (PACE) type financing program, providing capital for energy efficient retrofits and renewable energy improvements that are permanently fixed to real property. With the adoption of AB 811 in September 2008, the California Legislature authorized local governments to create programs providing an option whereby property owners can finance renewable energy generation and energy efficiency improvements through low-interest loans that would be repaid as an item on the property owner’s tax bill. One advantage of the program for a homeowner is that the payments stay with the property and not with the owner if the property is sold prior to the repayment of the retrofit lien.⁷

(Measure R3E4, R3E12, Appendix A)

- b. Other Financing Options. The County will continue to explore additional financing options for energy efficiency and renewable energy retrofits.

(Measure R3E4, R3E12, Appendix A)

- c. Insulation and Weatherization Program. Through the County’s program, administered by the Community Action Partnership, income-eligible homeowners or renters that qualify will have weatherization improvements installed including: attic/ceiling insulation; weather stripping; set back

⁶ The waiver of permit fees is limited to a maximum of \$5,000 per project and a maximum total of \$45,000 per fiscal year for the entire program.

⁷ AB 811 financing districts for residential retrofits are currently constrained by Fannie Mae and Freddie Mac mortgage requirements. It is presumed that this constraint can be lifted in the future and/or other alternative financing mechanisms will be available to implement this GHG Reduction Plan for residential retrofits. There is no current constraint for AB 811 type programs for commercial mortgages; as such the County can commence toward developing such a program upon adoption of this plan.



thermostats; window/glass replacement; duct repair; water heater/range replacement; heating system repairs/replacement; and other improvements. The County will continue to target local funds including Redevelopment and Community Development Block Grants for retrofits for existing low-income housing.

(Measure R3E4, Appendix A)

- d. Energy Efficient Mortgage (EEM). An EEM, sponsored by federally insured mortgage programs and conventional markets, credits a home's energy efficiency through the home's mortgage. Since this is a little known financing option, the County will increase community awareness of the program and provide information relating to EEMs with reference to the federal website at www.energystar.gov. This website states that "EEMs give borrowers the opportunity to finance cost-effective, energy-saving measures as part of a single mortgage and stretch debt-to-income qualifying ratios on loans thereby allowing borrowers to qualify for a larger loan amount and a better, more efficient energy-efficient home."

(Measure R3E4, R3E12, Appendix A)

9. **Accessory Wind Energy Systems.** The County Development Code currently provides a comprehensive set of standards for the placement of accessory wind energy systems on parcels in order to encourage the generation of electricity for onsite use, thereby reducing the consumption of electrical power supplied by utility companies. (Chapter 85.18)

(Measure R3E14, Appendix A)

Objective GHG EE 1.3	Establish policies, standards and incentives to increase energy efficiency and alternative energy use in new building construction.
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Reduction Strategies

1. **Mitigation of GHG Emissions Impacts Through Development Review Process.** The County will reduce GHG emissions attributable to new development projects at least 31% by 2020. Measurable reductions of GHG emissions will be achieved through the County's review and discretionary approval of residential, commercial, and industrial development projects. It is expected that project proponents will include energy efficiency and alternative energy strategies to help reduce projects' GHG emissions because these are often the most cost-effective approach to reducing GHG emissions.

(Measures R2E6, R2E7, R2E8, R2E9 and R2E10, Appendix A)

2. **Solar Hot Water Incentives.** The County will participate in the California Solar Initiative (CSI) Thermal Program to provide incentives for the installation of solar water heating systems in new homes and business.

(Measure R2E5, Appendix A)

3. **Solar-Ready Buildings Promotion.** The County will work with the building and real estate industries to encourage new building construction to provide for the easy, cost-effective installation of solar energy systems in the future. Solar-ready features should include: proper solar orientation (south facing roof area sloped at 20° to 55° from the horizontal), clear access on the south sloped roof (no chimneys, heating vents, plumbing vents, etc.), electrical conduit installed for solar electric system wiring, plumbing installed for solar hot water system, and space provided for a solar hot water storage tank.

(Measure R3E11, Appendix A)

4. **Warehouse Renewable Energy Incentives.** The County will promote and encourage participation in an incentive program, for installation of solar photovoltaic panels on new warehouse development projects, to be developed through a partnership between Southern California Edison and California Public Utilities Commission.

(Measure R2E4, Appendix A)

5. **Accessory Wind Energy Systems.** The County's regulations to facilitate use of wind energy systems will encourage the generation of electricity for onsite use of new construction. (Chapter 85.18 of the County Development Code).

(Measure R3E14, Appendix A)

6. **Off-Site Mitigation of GHG Impacts for New Development.** The County will pursue development of a policy and/or guidelines for off-site mitigation of GHG impacts from new development projects in accordance with CEQA, including retrofitting off-site buildings to improve energy efficiency.

(Measure R3E15, Appendix A).

7. **Heat Island Mitigation Plan.** The County will evaluate the feasibility of developing a "heat island" mitigation plan including guidelines for cool roofs, cool pavements, and strategically placed shade trees.

(Measure R3E5, Appendix A).



GHG Goal EE 2 Reduce GHG emissions from the generation of electricity by promoting and supporting the siting of new renewable energy generation facilities.

Objective GHG EE 2.1 Establish and promote policies and strategies that facilitate the siting of new renewable energy generation.

Objective GHG EE 2.2 Establish and promote policies and strategies that facilitate renewable energy generation and co-generation projects where feasible and appropriate.

Objective GHG EE 2.3 Establish and implement measures that support the purchase and use of renewable and alternative energy.

Reduction Strategies

1. **Renewable Energy Generation Facilities.** The County has adopted standards and permit procedures for the establishment, maintenance and decommissioning of renewable energy generation facilities within its authority. These regulations are intended to facilitate development while ensuring that renewable energy generation facilities are designed and located in a manner that minimizes visual, safety and economic impacts on the surrounding community. Prior to this Development Code update, the County required all renewable energy projects to go through a General Plan amendment and Zone Change, if necessary, to put into effect an Energy Facilities overlay, that would allow such facilities to be developed. With the approval and adoption of Chapter 84.29, renewable energy facilities that are located in Resource Conservation (RC), Agricultural (AG), Floodway (FW), Regional Industrial (IR) or Rural Living (RL-20) land use zones are considered compatible uses and no longer require a General Plan Amendment or Zone Change (Chapter 84.29 of the County Development Code).

(Measure R3E10, Appendix A).

2. **Community Alternative Energy Development Plan.** The County will explore the development of an alternative energy plan with Southern California Edison for alternative energy production for the existing built environment which includes identification of appropriate types of alternative energy facilities and potential sites for location in the County.

(Measure R3E8, Appendix A)

3. **Support Utility-Scale Renewable Energy Siting and Transmission Lines.** The County will work with state and federal agencies and the renewable energy industry to identify suitable sites for production of renewable energy using local renewable resources such as solar, wind, small hydro, and biogas.

(Measure R3E9, Appendix A)

4. **Regional Renewable Energy Collaboration.** The County will collaborate with local governments, special districts, nonprofits, and other public organizations to

share resources, achieve economies of scale, and develop renewable energy policies and programs that are optimized on a regional scale.

(Measure R3E13, Appendix A)

5. **Identify and Resolve Potential Barriers to Renewable Energy Deployment.** The County will continue to identify and remove regulatory or procedural barriers to producing renewable energy in building and development codes, design guidelines, and zoning ordinances.

(Measure R3E10, Appendix A)

6. **Mitigation of GHG Emissions Impacts Through Development Review Process.** Measurable reductions of GHG emissions will be achieved through the County's review and discretionary approval of new renewable energy facilities.

(Measures R2E6, R2E7, R2E8, R2E9, and R2E10, Appendix A).

GHG 4.2.1.3 SUMMARY OF STATE ACTIONS TO REDUCE GHG EMISSIONS RELATING TO BUILDING ENERGY

With the adoption of Senate Bills (SBs) 1075 (2002) and 107 (2006), the State created the Renewable Portfolio Standard (RPS), with an initial goal of 20 percent renewable energy production by 2010. Executive Order (EO) S-14-08 establishes a RPS target of 33 percent by the year 2020 and requires State agencies to take all appropriate actions to ensure the target is met. The 33 percent RPS by 2020 goal is supported by the California Air Resources Board (CARB). Additionally, Assembly Bill (AB1109) mandates that the California Energy Commission (CEC) on or before December 31, 2008, adopt energy efficiency standards for general purpose lighting. These regulations, combined with other State efforts, are structured to reduce State-wide electricity consumption in the following ways: (1) At least 50 percent reduction from 2007 levels for indoor residential lighting by 2018; (2) At least 25 percent reduction from 2007 levels for indoor commercial and outdoor lighting by 2018.

The State will also be pursuing energy efficiency measures that CARB views as crucial to meeting the State-wide 2020 GHG reduction target, and will result in additional emissions reductions beyond those already accounted for in the current California's Energy Efficiency Standards for Residential and Non-Residential Buildings (Title 24, Part 6 of the California Code of Regulations). CARB also intends to promote increased combined heat and power systems, which capture "waste heat" produced during power generation for local use, will to offset 30,000 GWh of electricity use State-wide in 2020. Approaches to lowering market barriers include utility-provided incentive payments, a possible CHP portfolio standard, transmission and distribution support systems, or the use of feed-in tariffs. These measures are more specifically described in Appendix A.



GHG 4.2.2.4 SUMMARY OF REDUCTION MEASURES RELATING TO BUILDING ENERGY USE

Total estimated GHG percent reductions and quantities from the energy efficiency and renewable energy reduction measures (both R1 and R2) are presented below in **Table 4-3**. Emission reductions for each measure are applied to the 2020 unmitigated projected emissions for the appropriate emission quantity affected by that measure. Reductions attributed to these measures from the unmitigated 2020 building energy use emissions will be 33.3 percent.

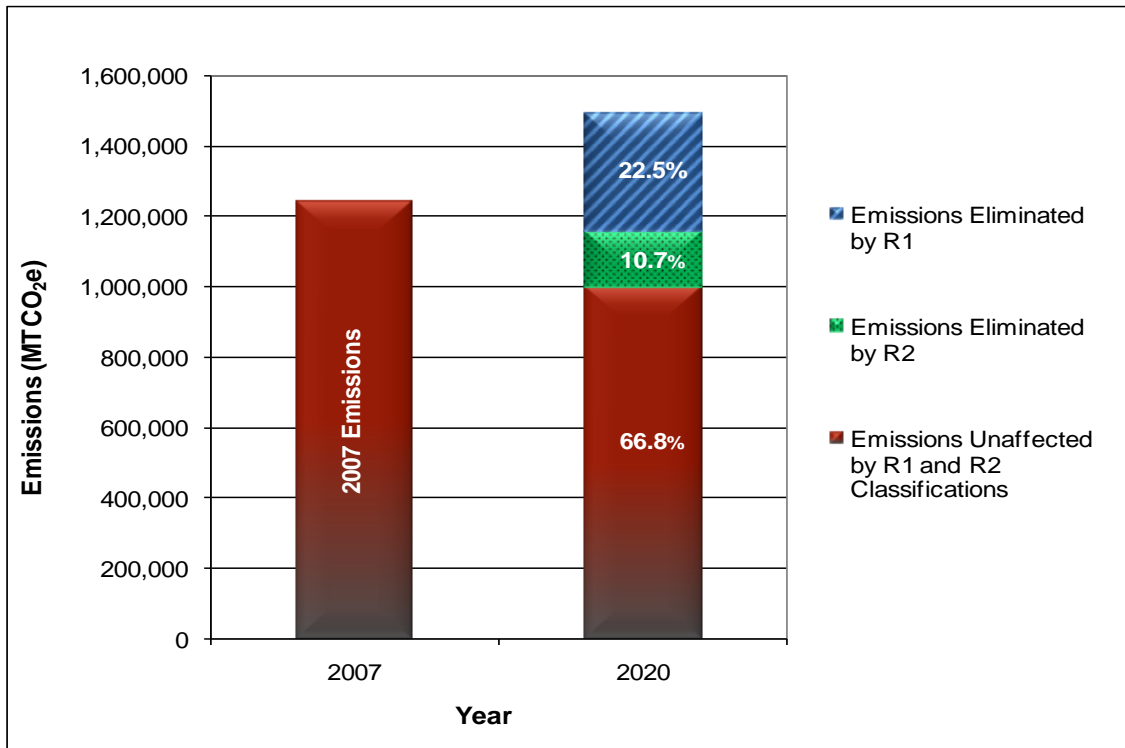
Table 4-3: External GHG Emission Reductions from Implementation of Building Energy (Energy Efficiency & Renewable Energy) Strategies

Reduction Classification and Reduction Measure	GHG reductions	
	Emission Reduction from 2020 unmitigated levels	Percent Reduction from 2020 unmitigated levels
R1: Existing and proposed state and regional building energy measures that do not require County action		
R1E1: RPS – 33 percent by 2020	104,236	7.0
R1E2: AB 1109 Residential Lighting	23,473	1.6
R1E3: AB 1109 Commercial/Outdoor Lighting	14,814	1.0
R1E4: Electricity Energy Efficiency (AB 32)	106,925	7.2
R1E5: Natural Gas Energy Efficiency (AB 32)	9,429	0.6
R1E6: Increased Combined Heat and Power (AB 32)	63,881	4.3
R1E7: Industrial Efficiency Measures (AB 32)	12,488	0.8
R2: Existing and new building energy measures that require County action		
R2E1: Residential Energy Efficiency Retrofits	17,350	1.2
R2E2: Commercial Energy Efficiency Retrofits	8,540	0.6
R2E3: Residential Renewable Energy Incentives	21,351	1.4
R2E4: Warehouse Renewable Incentive Program	6,786	0.5
R2E5: Solar Hot Water Incentives	11,907	0.8
R2E6: New Residential Energy Efficiency (through DRP)	9,460	0.6
R2E7: New Commercial Energy Efficiency (through DRP)	35,342	2.4
R2E8: New Home Renewable Energy (through DRP)	2,239	0.2
R2E9: New Commercial/Industrial Renewable Energy (through DRP)	25,392	1.7
R2E10: Commercial/Industrial Rehabilitation/Expansion Renewable Energy (through DRP)	21,086	1.4
Total	494,699	33.3
R3: Existing and new building energy measures—reductions not quantified or relied upon to achieve reduction goal		
R3E1: Green Building Development Facilitation and Streamlining		
R3E2: Green Building Training		
R3E3: Community Building Energy Efficiency & Conservation for Existing Buildings		
R3E4: Energy Efficiency Financing		
R3E5: Heat Island Mitigation Plan		
R3E6: Public Education		

Reduction Classification and Reduction Measure	GHG reductions	
	Emission Reduction from 2020 unmitigated levels	Percent Reduction from 2020 unmitigated levels
R3E7: Cross-Jurisdictional Coordination		
R3E8: Community Alternative Energy Development Plan		
R3E9: Support Utility-Scale Renewable Energy Siting and Transmission Lines		
R3E10: Identify and Resolve Potential Barriers to Renewable Energy Deployment		
R3E11: Solar Ready Buildings Promotion		
R3E12: Renewable Energy Financing		
R3E13: Regional Renewable Energy Collaboration		
R3E14: Accessory Wind Energy Systems		
R3E15: Off-Site Mitigation of GHG Impacts for New Development		

With implementation of the Building Energy reduction strategies included in this Plan, by 2020 GHG emissions will be approximately 20 percent lower than 2007 emissions. **Figure 4-3** below, graphically depicts this reduction.

Figure 4-3: External GHG Emission Reductions from Building Energy Measures



GHG 4.2.2 TRANSPORTATION AND LAND USE SECTOR



The County of San Bernardino encompasses 20,164 square miles of land area of which approximately 15 percent falls under the jurisdictional control of the County Board of Supervisors. Approximately eighty percent (81%) of the County's total land area is in public ownership while the incorporated cities collectively have jurisdictional control over the remaining four percent.



The County is located on the eastern edge of the Los Angeles metropolitan region. In this location, the County acts as the gateway between southern California and the continental United States. It is also the largest County within the continental United States by area, containing three very distinct regions—Valley, Mountain and Desert. The vast majority of travel trips in the County are made by automobile, using the existing network of freeways and arterial highways. Transit (bus and commuter rail) service is also an increasingly important mode of transportation, in the more urbanized parts of the



County. A small fraction of the trips are made utilizing other modes of transportation such as air, intercity rail, bicycling, and walking.

There are three fundamental approaches to reducing transportation emissions: 1) increasing vehicle fuel efficiency, 2) lowering the Carbon content of fuels and 3) reducing vehicle-miles traveled (VMT). For the most part, the state and federal governments are addressing vehicle fuel efficiency and carbon content of fuels through vehicle emissions standards, mileage standards, low carbon fuel standards, and the promotion of alternative fuels. The County's objective to reduce VMT can be accomplished through two primary approaches: by providing alternatives to single-occupancy vehicle travel that includes transit, ridesharing, carpools, bicycling, walking and telecommuting; and through effective land use planning techniques that reduce the need for lengthy vehicle trips.

GHG 4.2.2.1 BACKGROUND

The County General Plan and Development Code contain numerous policies and programs that guide development and also support the County's efforts to reduce GHG emissions. The following General Plan (GP) Policies, while not specifically quantifiable in terms of the amount of GHG reduction, effectively contribute to the County's reduction efforts.

1. **Vehicle Miles Traveled (VMT).** To reduce VMT and provide alternatives to single-occupancy vehicle travel, the County has numerous policies and programs outlined in the General Plan's circulation, economic development, housing, land use, conservation and open space elements. The General Plan calls for an increase in the densities of certain parcels, mixed land uses, and a refocus on existing neighborhoods in order to reduce dependence on the private automobile and to reduce VMT through supporting multiple centers. Through the land use zoning districts, the County encourages residences to be located near neighborhood commercial centers in new developments to encourage walking to nearby shopping. The County also strives to maximize the use of telecommunications to reduce transportation and land use demands (GP Policy CI 15.1).

Through implementation of its General Plan, the County strives to provide transportation and circulation systems that adequately provide for intra-city and regional transportation needs. Alternatives to the drive-alone mode, such as mass transit, ride sharing, bicycling, trail systems and telecommuting are encouraged to reduce VMT, traffic congestion and enhance air quality. The County is committed to coordinating with Caltrans, SANBAG, the Southern California Association of Governments (SCAG) and other agencies regarding transportation system improvements in the County's Measure I (transportation tax mechanism) and other adopted Capital Improvement Programs. Where appropriate, the County also seeks to jointly fund studies and transportation system improvements through coordination with other cities, adjacent counties and developers. (GP Policy CI 1.1, CI 2.2, CI 2.3, CI 2.6, CI 2.7).

2. **Parking Requirements.** In order to discourage the use of single occupant vehicles, the County will continuously reevaluate the parking requirements in the Development Code to ensure that excessive parking is not required, to address options for shared parking, covered parking, and other parking alternatives (GP Policy M/CI 2.2).
3. **Alternative Fuel Vehicles.** In order to minimize energy consumption attributable to transportation (GP Policy CO 8.4), the County is committed to providing incentives such as preferential parking for alternative-fuel vehicles (such as compressed natural gas or hydrogen) (GP Policy CO 4.6) and to establish programs for priority or free parking on County streets or in County parking lots for alternative fuel vehicles (GP Policy CO 4.11). County will also support the development of alternative fuel infrastructure that is publicly accessible (GP Policy CO 4.10).



4. **Job/Housing Balance.** The County strives to achieve and maintain a jobs/housing balance by ensuring that housing and employment opportunities (current and projected) are located close to each other, acknowledging housing and employment opportunities within both unincorporated County areas and cities (GP Policy LU 5.1) and by facilitating business growth, and encouraging the economic revitalization of business centers in the communities within the County. Specifically, the County encourages a variety of industries to locate in the County, including commercial/professional office uses and “clean,” high-technology industries that provide high-skill/high-wage job opportunities (GP Policy ED 10.1).
5. **Land Use Planning.** The County is also committed to reducing the dependence on automobiles for local trips by integrating transportation and land use planning at the community and regional levels, by encouraging mixed-use development through the planned development process that includes dense, multiple-family residential development and clustered, single-family residential development, and other uses that provide convenient shopping and employment opportunities close to major transportation corridors (GP Policy H11.6, CI 4.2, LU 6.1) and by promoting such facilities as the Mag-Lev/high-speed rail system that would link the County with other parts of the region (GP Policy ED 15.1). The County, however, discourages leap-frog development and urban sprawl by restricting the extension or creation of new urban services or special districts to areas that cannot be sustained in a fiscally responsible manner. (GP Policy LU 9.2).
6. **Park-and-Ride Facilities.** County supports the development of park-and-ride transit service in County communities (GP Policy M/CI 1.10) and based on population and residential densities, promotes the development of shuttle services from residential neighborhoods to recreational areas and major commercial centers (GP Policy M/CI 1.11). There are 11 Park & Ride facilities located across the southwestern portion of the County. Currently, there are five facilities located in the Valley Region, four in the Desert Region and two in the Mountain Region. Each Park & Ride lot is free of charge and open for public use 24 hours a day, seven days a week.
7. **Non-motorized Transportation Plan.** The San Bernardino County Non-Motorized Transportation Plan recommends the completion of a comprehensive Countywide Bikeway Network, a refinement in the way bicycle projects in the County are funded, to help cities identify, prioritize, and fund portions of the Countywide bicycle network, and implementation of new programs to be implemented over the 5-10 year life of the Plan.

Specifically, the County requires safe and efficient pedestrian and bicycle facilities in residential, commercial, industrial, and institutional developments to facilitate access to public and private facilities and to reduce vehicular trips (GP Policy CI 6.1). The County also encourages the installation of bicycle lanes and sidewalks on existing and future roadways, where appropriate and as funding is available. The County regularly coordinates with local and regional transportation agencies

and cities to plan and construct new multi-modal transportation facilities (GP Policy CI 4.5).

Trails are an important part of the non-motorized transportation system that currently exists within the County. These facilities provide public access to open space lands and fulfill an increasingly important role as recreational amenities and provide major backbone linkages to which community trails might connect. To this end, the County is committed to providing a regional trail system and rest areas to furnish continuous interconnecting trails that serve major populated areas of the County and existing and proposed recreation facilities (GP Policy OS 2.1). In the Mountain and Valley regions the County encourages the creation of hiking and biking trails as tourist attractions (GP Policy M/ED 1.6) and, where feasible, to connect new and existing residential areas with major activity and commercial centers (GP Policies V/OS, M/OS 2.3, M/OS 2.4, M/OS 2.6 and M/OS 2.7). The addition of bicycle routes is also encouraged whenever existing highways are widened or significant lengths of highways are improved (GP Policy M/OS 2.5). The County Department of Regional Parks is responsible for maintaining all County-designated regional trails, all of which are multi-use trails that allow pedestrian, bicycle and equestrian use.

8. **Rideshare Programs.** County encourages the reduction of automobile usage throughout the County through various incentive programs (GP Policy CI 3.1) and by supporting the efforts of other agencies working in the County. The County, for example, encourages special event center operators to provide discounted transit passes with event tickets or offer discounted on-site parking for carpooling patrons (for two or more persons per vehicle) (GP Policy CO 4.7).

GHG 4.2.2.2 TRANSPORTATION AND LAND USE GHG PLAN GOALS, OBJECTIVES AND STRATEGIES

As a compliment to the General Plan goals and policies stated above, the following GHG Plan goals, objectives, and strategies r reduce greenhouse gases generated by vehicle miles traveled.

GHG Goal TL 1: Promote land use strategies that decrease reliance on automobile use, increase the use of alternative modes of transportation, maximize efficiency of urban services provision and reduce emissions of greenhouse gases.

Objective GHG TL-1.1: Encourage development that promotes non-automobile transportation.



Reduction Strategies:

1. **Regional Land Use/Transportation Coordination (SB 375).** In accordance with SB 375, as Regional Planning Agencies set regional targets for GHG emissions and create a plan to meet those targets, coordinate with local jurisdictions, the San Bernardino Associated Governments (SANBAG), the Southern California Association of Governments (SCAG) and the regional transit providers to promote mixed-use development, transit linkages and transit-oriented development in unincorporated portions of the County. With the regional planning activities taking place over the next three to four years, the reduction value of this measure will be quantified as the planning is developed and completed.

(Measure R3T4, Appendix A)

2. **Mitigation of GHG Emissions Impacts Through Development Review Process.** Measurable reductions of GHG emissions will be achieved through the County's review and discretionary approval of new development projects. It is anticipated that significant transportation/land use GHG reduction measures will be among the mitigation, such as, pedestrian and bike paths, transit oriented development, mixed use, etc.

(Measure R2T2, R2T6, and R2T7, Appendix A)

3. **Bicycle/Pedestrian Infrastructure and Promotion.** To promote bicycle and pedestrian infrastructure, the County will: 1) require new development, through the development review process, to address and incorporate bicycle/pedestrian facilities where appropriate and require new development to provide bicycle lanes and walking paths near schools with adequate bicycle parking; 2) encourage the development of bicycle stations at intermodal hubs in collaboration with regional transportation providers; 3) establish a network of multi-use trails to facilitate safe and direct off-street bicycle and pedestrian travel, and will require bike racks along these trails at secure, lighted locations; and 4) apply for regional, State, and federal grants for bicycle and pedestrian infrastructure projects, and will consider using development exactions/impact fees, such as the County's Santa Ana River Trail development fee, to provide bicycle and pedestrian facilities.

(Measure R2T7, Appendix A)

4. **Parking Policy.** The County will develop and implement a comprehensive parking policy for public and private lots throughout the County that:
 - a. Encourages carpooling, shared parking and the use of alternative transportation, including providing parking spaces for carpool vehicles and alternative fuel vehicles at convenient locations accessible by public transportation;
 - b. Reduces parking requirements and/or provide for shared parking for special uses such as mixed-use projects, residential developments for senior citizens or projects that are within 0.25 mile of a public transit stops;

- c. Promotes the designation of preferred commercial parking spaces for high-occupancy, car-share, and alternative fuel vehicles;
- d. Encourages larger parking spaces to accommodate vans used for ride-sharing; and
- e. Promotes the use of shade trees, and convenient pedestrian pathways through parking areas.

(Measure R2T3, Appendix A)

5. **Pedestrian-oriented Character.** The County will foster distinct, identifiable neighborhoods whose characteristics support pedestrian travel, especially within, but not limited to, mixed-use and transit-oriented development projects through the use of planned developments and specific plans.

(Measure R3T10, Appendix A)

6. **Site-Specific Development Standards.** Continue to allow site-specific development standards to be implemented for Planned Development projects.

(Measure R3T10, Appendix A)

Objective GHG TL 1.2: Promote infill, mixed-use, and higher density development, and provide incentives to support the creation of affordable housing in mixed use zones.

Reduction Strategies

1. **Revise Zoning Ordinance.** The County will consider revising the County Development Code where appropriate to allow local-serving businesses, such as childcare centers, restaurants, banks, family medical offices, drug stores, and other similar services near employment centers to minimize midday vehicle use.

(Measure R3T10, Appendix A)

2. **Complementary Land Uses.** The County will continue to identify and facilitate the inclusion of complementary land uses not already present in the zoning land use districts, such as supermarkets, parks and recreational fields, schools in neighborhoods, and residential uses in business zoning districts, to reduce the vehicle miles traveled and promote bicycling and walking to these uses.

(Measure R3T10, Appendix A)

3. **Mixed Use Projects.** The County will encourage mixed-use development especially within areas of city's spheres of influence or where the project is located within one-half mile of intermodal hubs and future rail stations.



(Measure R3T10, Appendix A)

4. **Density Bonuses.** The County will continue to provide density bonuses for selected development.

(Measure R3T10, Appendix A)

5. **Preparation of Specific Plans.** The County will seek funding to prepare specific plans and related environmental documents to facilitate mixed-use development at selected sites, and allow these areas to serve as receiver sites for transfer of development rights away from environmentally sensitive lands and rural areas outside of developed areas.

(Measure R3T10, Appendix A)

6. **Mixed-Use Structures.** The County will enable the development of mixed-use structures in neighborhood centers that can be adapted to new uses over time with minimal internal remodeling.

(Measure R3T10, Appendix A)

7. **Complementary Land Uses.** The County will continue to encourage the inclusion of complementary land uses in local zoning districts that allows a mix of uses, such as supermarkets, parks and recreational fields, schools in neighborhoods, and residential uses in business districts to reduce the vehicle miles traveled and promote bicycling and walking to these uses.

(Measure R3T10, Appendix A)

8. **Infill.** The County will encourage infill development and the creative reuse of brownfield, under-utilized and/or defunct properties within areas of County's spheres of influence.

(Measure R3T10, Appendix A)

9. **Increase Densities in Sphere Areas.** The County will consider higher-density development within areas of city's spheres of influence or where the project is located within one-half mile of intermodal hubs and future rail stations.

(Measure R3T10, Appendix A)

GHG Goal TL 2: Reduce GHG emissions by reducing vehicle miles traveled, by encouraging the use of alternative fuels, alternative modes of transportation and providing roadway improvements that improve mobility and reduce congestion.

Objective GHG TL 2.1: Reduce VMT related-emissions by implementing and supporting trip reduction programs.

Reduction Strategies

1. **Regional Employment Based Trip Reduction Programs.** The County will continue to support and promote trip reduction programs developed by SANBAG. SANBAG is responsible for efforts throughout San Bernardino County to encourage commuters to carpool, vanpool, use public transit, cycle, or walk to work. This is primarily accomplished by working directly with large and small employers, as well as providing support to commuters who wish to share rides or use alternative forms of transportation. SANBAG operates two programs for individuals and one for employers through which commuters can receive financial incentives by participating in a rideshare program. Option Rideshare is a program that offers commuters financial incentives of up to \$2.00 per day when they use a rideshare mode for three consecutive months. Team Ride is an extension of the initial program that provides discounts and special offers to participants at restaurants and events in both San Bernardino and Riverside Counties. The final program is the Inland Empire Commuter Services Program. This program is designed to help employers develop and maintain a rideshare program through free education and assistance from SANBAG.

(Measure R3T5, Appendix A)

2. **Employment-Based Trip Reduction Plan.** SCAQMD Rule 2202 applies to any employer who employs 250 or more employees. Employers who qualify must annually register with the SCAQMD to implement an emission reduction program to meet a worksite-specific emission reduction target through measures such as work-related trip reduction plans, emission reduction credits, or Air Quality Investment Program fees. The purpose of this Rule is to provide employers with a menu of options to reduce mobile source emissions generated from employee commutes, to comply with federal and state Clean Air Act requirements, Health & Safety Code Section 40458, and Section 182(d)(1)(B) of the federal Clean Air Act.

Expanding on SCAQMD Rule 2202 (Employee Commute Reduction Program), the County will evaluate the feasibility of implementing a trip reduction ordinance requiring employers with 100 employees or more to prepare a voluntary trip reduction plan (TRP). Trip reduction techniques might include commuter-choice programs, employer transportation management, guaranteed ride-home programs, and commuter assistance and outreach. If adopted, the ordinance would apply to all discretionary land use approvals made on or after the ordinance is effective.



(Measure R2T2, Appendix A)

3. **Increase the Use of Ridesharing.** The County will promote and encourage ridesharing as follows:
 - a. Exploring financing programs for the purchase or lease of vehicles used in employer ride sharing programs;
 - b. Encouraging community car-sharing through employers, such as expanding the existing Commute-Smart measure;
 - c. Encouraging community creation of rideshare incentives such as gas cards, carpool awards, educational seminars, commuter-choice programs, commuter-tax benefits, guaranteed ride-home programs, commuter assistance and outreach.

(Measure R2T6, Appendix A)

4. **County Commuter Services Program.** The County currently operates and will continue to operate an active and effective Commuter Services Program to encourage, coordinate, and reward alternate commuting. The County's Commuter Services Program provides employees with tools to find a carpool partner or vanpool, tips on bicycle commuting, and information on transit.

(Measure R3T6, Appendix A)

5. **Home Employment.** The County will facilitate employment opportunities that minimize the need for private vehicle trips, including:
 - a. Encouraging live/work sites, satellite work centers in appropriate locations, and home occupation for low-impact commercial and office uses in residential zones, regulated by the County's Development Code Home Occupation Permit provisions.
 - b. Encouraging telecommuting with new and existing employers, through project review and incentives, as appropriate.

(Measure R3T7, Appendix A)

Objective GHG TL 2.2: Reduce VMT-related emissions by encouraging the use of alternative modes of transportation.

Reduction Strategies

1. **Public Transit Strategies.** To promote public transit use, the County will: 1) ensure that new development is designed to make public transit a viable choice for residents and/or the local work force; 2) require that new development incorporate both local and regional transit measures into the project design that promote the use of alternative modes of transportation; and 3) collaborate with regional transit



providers to offer public transit incentives, and improve service, safety, customer satisfaction and user-friendliness of mass transit.

(Measure R3T1, Appendix A)

2. **Leverage Existing Financing Mechanisms and Opportunities.** The County will promote and pursue financing mechanisms and opportunities including the Federal Energy Efficiency Community Block Grant (EECBG), Measure I Funds through SANBAG, Regional Improvement Program (RIP) funds available under the State Transportation Improvement Program (STIP), the Interregional Improvement Program (IIP), the Regional Transportation Improvement Program through SANBAG and SGAG, the Passenger Rail Short Transportation Plan, the San Bernardino County Public Transit – Human Services Transportation Coordination Plan, and the Transportation Development Act. (A more detailed description of these funding mechanisms is presented in the Implementation section of this plan.)

(Measure R3T2, Appendix A)

Objective GHG TL 2.3: Implement traffic and roadway management strategies to improve mobility and efficiency, and reduce associated emissions.

Reduction Strategies

1. **Roadway Improvements.** The County will modify arterial roadways, when needed, to allow more-efficient bus operation, including possible signal preemption, expanding signal-timing programs where air quality benefits can be demonstrated, synchronizing traffic signals throughout the County and with adjoining cities while allowing free flow of mass transit systems, and continuous maintenance of the synchronization system.

(Measure R2T4, Appendix A)

2. **San Bernardino Valley Coordinated Traffic Signal System Plan.** The County participated in developing the San Bernardino Associated Governments (SANBAG) strategic plan for interconnecting and coordinating traffic signals in the San Bernardino Valley area across jurisdictional boundaries. In addition to the County, study participants include the cities of Chino, Chino Hills, Colton, Fontana, Grand Terrace, Highland, Loma Linda, Montclair, Ontario, Rancho Cucamonga, Redlands, Rialto, San Bernardino, Upland, and Yucaipa; the California Department of Transportation (Caltrans) District 8; and SANBAG.

(Measure R2T4, Appendix A)

3. **Intelligent Transportation Systems Applications.** The County will continue to utilize Intelligent Transportation Systems, which constitute a wide spectrum of techniques and applications that are currently being applied to existing roadways,



highways and transit systems to increase their efficiency, safety and ability to relieve congestion. The County is currently employing several types of Intelligent Transportation Systems applications including:

- a. 1-800-COMMUTE telephone line, which provides travel information for highways, transit, rideshare and other commuting alternatives;
- b. Closed-circuit television cameras to help in identifying and responding to accidents more quickly;
- c. Electronic sensors placed in freeways that transmit vehicle counts to a traffic management center and can be used for monitoring and transmitting real-time traffic conditions;
- d. Traffic signal control systems that are synchronized through computer software specifically designed to better monitor and respond to local traffic congestion;
- e. Changeable message signs that alert drivers to possible delays due to accident or congestion and allow for route diversion; and
- f. Smart call boxes that gather traffic count data and transmit this information to traffic management centers and the CHP.

(Measure R3T8, Appendix A)

4. **High Occupancy Vehicle (HOV) Lanes.** The County supports regional construction of HOV lanes on arterial roadways to encourage carpooling and alternative forms of transportation for commuting. Currently, San Bernardino County has approximately 43 miles of carpool lanes along four separate freeways (i.e., I-10, SR-60, SR-210 and SR-71).

(Measure R2T8, Appendix A)

Objective GHG TL 2.4: Support and promote the use of low- and zero- emission vehicles, and alternative fuels and other measures to directly reduce emissions from motor vehicles.

Reduction Strategies

1. **Expand Use of Renewable Fuels.** The County will collaborate with local and regional governments, businesses and energy purveyors to support expanded use of renewable fuels. Said efforts may include, but are not limited to, the following:
 - a. Preferential parking for alternative fuel vehicles.
 - b. Collaboration with energy purveyors to provide the necessary facilities and infrastructure to encourage the use of privately owned low or zero-emission vehicles such as electric charging facilities and conveniently located alternative fueling stations.
 - c. Encourage taxi operators to use smaller, more fuel-efficient taxicabs and offer incentives to taxicab owners to use gas-electric hybrid vehicles.

(Measure R2T5, Appendix A)

GHG Goal TL 3: Reduce GHG emissions through public education relative to transportation systems.

Objective GHG TL 3.1: Continue to develop and implement educational programs relative to the various modes of transportation.

Reduction Strategies

1. **Bicycle Safety Programs.** The County will continue to implement bicycle safety educational programs to teach drivers and riders the laws, riding protocols, routes, safety tips and emergency maneuvers.

(Measure R3T9, Appendix A)

2. **Motorcycle Safety Programs.** The County will consider developing and implementing a motorcycle safety educational program to teach drivers and riders the laws, riding protocols, routes, safety tips and emergency maneuvers.

(Measure R3T9, Appendix A)

3. **Public Transit and Ride Share Opportunities.** The County will provide educational information about the benefits of and opportunities for public transit and rideshare.

(Measure R3T9, Appendix A)

GHG Goal TL 4: Reduce GHG emissions by regulating the idling of diesel-fueled vehicles and equipment and encouraging the use of alternative fuels and transportation technologies.

Objective GHG TL 4.1: Reduce the exhaust emissions of diesel-fueled vehicles and equipment.

Reduction Strategies

1. **Anti-Idling Enforcement Policy.** The County requires that diesel-fueled vehicles and off-road equipment shall not be left idling on site for periods in excess of five minutes.

(Measure R2T1, Appendix A)

2. **Diesel Exhaust Emissions Control Measures.** The County will continue to implement the County's diesel exhaust emissions control measures, which extend beyond the County's idling restriction described above in the anti-idling



enforcement policy. The County's diesel exhaust control measures described in Development Code Section 83.01.040, apply to all discretionary land use projects approved by the County on or after January 15, 2009. These measures include, but are not limited to:

Off-Road Diesel Vehicle/Equipment Operations. All business establishments and contractors that use off-road diesel vehicle/equipment as part of their normal business operations shall adhere to the following measures during their operations in order to reduce diesel particulate matter emissions from diesel-fueled engines:

- Use reformulated ultra low-sulfur diesel fuel in equipment and use equipment certified by the U. S. Environmental Protection Agency (EPA) or that pre-dates EPA regulations.
- Maintain engines in good working order to reduce emissions.
- Signs shall be posted requiring vehicle drivers to turn off engines when parked.
- Any requirements or standards subsequently adopted by the South Coast Air Quality Management District, the Mojave Desert Air Quality Management District or the California Air Resources Board.
- Provide temporary traffic control during all phases of construction.
- Onsite electrical power connections shall be provided for electric construction tools to eliminate the need for diesel-powered electric generators, where feasible.
- Maintain construction equipment engines in good working order to reduce emissions. The developer shall have each contractor certify that all construction equipment is properly serviced and maintained in good operating condition.
- Contractors shall use ultra low sulfur diesel fuel for stationary construction equipment as required by Air Quality Management District (AQMD) Rules 431.1 and 431.2 to reduce the release of undesirable emissions.
- Substitute electric and gasoline-powered equipment for diesel-powered equipment, where feasible.

Project Design. Distribution centers, warehouses, truck stops and other facilities with loading docks where diesel trucks may reside overnight or for periods in excess of three hours shall be designed to enable any vehicle using these facilities to utilize on-site electrical connections to power the heating and air conditioning of the cabs of such trucks, and any refrigeration unit(s) of any trailer being pulled by the trucks, instead of operating the diesel engines and diesel refrigeration units of such trucks and trailers for these purposes. This requirement shall also apply to Recreational Vehicle Parks (as defined in Section 810.01.200(k) of this title) and other development projects where diesel engines may reasonably be expected to operate on other than an occasional basis.

(Measure R3T3, Appendix A)

GHG 4.2.2.3 SUMMARY OF STATE ACTIONS TO REDUCE GHG EMISSIONS RELATING TO TRANSPORTATION AND LAND USE

The State Legislature took action relative to the Transportation and Land Use sector through the adoption of AB 1493 (Pavley I and II) in 2002, SB 1007 in 2005 and AB 32 in 2006. In addition, the governor issued Executive Order S-1-07 in 2007 and the South Coast Air Quality Management District (SCAQMD) adopted special rules in 2007 that would require CARB to adopt regulations to reduce GHG emissions from automobiles and light-duty trucks, develop and adopt a state plan to increase the use of alternative fuels, adopt a statewide greenhouse gas emissions limit, and require public transit fleets to acquire alternative-fuel heavy-duty vehicles. These and other measures are more specifically described in Appendix A.

GHG 4.2.2.4 SUMMARY OF REDUCTIONS RELATING TO TRANSPORTATION AND LAND USE

With the adoption and implementation of the State and County GHG reduction strategies the total emissions reductions related to the Transportation and Land Use sector is projected to decrease by approximately 528,428 MTCO₂e, which is a 21.9% reduction from 2020 unmitigated projection of on-road transportation emissions.

Total estimated GHG percent reductions and quantities from the reduction measures included in Reduction Scenarios R1 and R2 are presented below in **Table 4-4**. Emission reductions for each measure are applied to the projected 2020 emissions for the appropriate vehicle type.

Table 4-4: External GHG Emission Reductions from Implementation of Land Use and Transportation Strategies

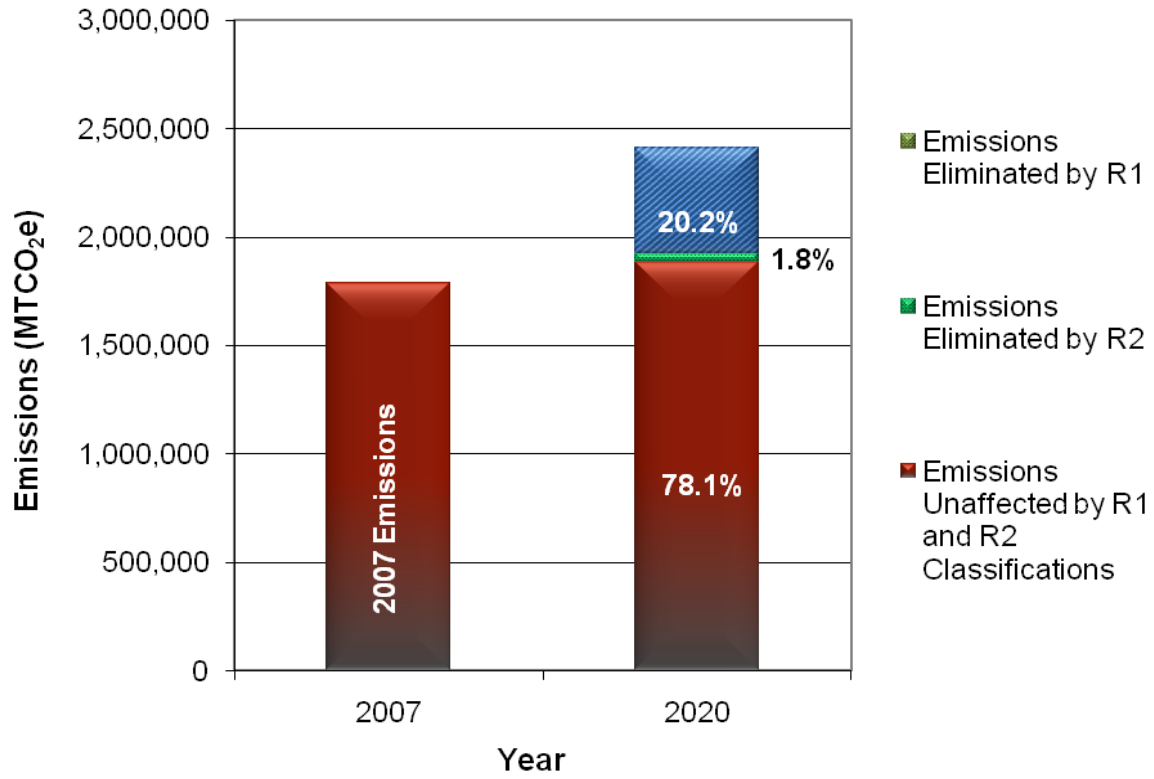
Reduction Classification and Reduction Measure	GHG Reductions from 2020 unmitigated Transportation Emissions (MTCO ₂ e)	
	Emission Reduction from 2020 unmitigated	Percent Reduction from 2020 unmitigated
R1: Existing and proposed state and regional transportation measures that do not require County action		
R1T1: California Light-Duty Vehicle GHG Standards: Implement Pavley I Standards	202,569	8.4
R1T2: California Light-Duty Vehicle GHG Standards: Implement Pavley II	29,252	1.2
R1T3: Low Carbon Fuel Standard	161,819	6.7
R1T4: Tire Pressure Program	4,022	0.2
R1T5: Low Rolling Resistance Tires	2,194	0.1
R1T6: Low Friction Engine Oils	20,476	0.8
R1T7: Cool Paints and Reflective Glazing	6,509	0.3
R1T8: Goods Movement Efficiency Measures	37,441	1.6
R1T9: Heavy-Duty Vehicle GHG Emission Reduction	12,514	0.5



Reduction Classification and Reduction Measure	GHG Reductions from 2020 unmitigated Transportation Emissions (MTCO ₂ e)	
	Emission Reduction from 2020 unmitigated	Percent Reduction from 2020 unmitigated
(Aerodynamic Efficiency)		
R1T10: Medium-and Heavy-Duty Vehicle Hybridization	7,695	0.3
R1T11: Rule 1192—Clean On-Road Transit Buses	835	0.03
R1T12: Rule 1195—Clean On-Road School Buses	831	0.03
R2: Existing and new transportation measures that require County action		
R2T1: Anti-Idling Enforcement Policy	12,076	0.5
R2T2: Employment Based Trip and VMT Reductions Policy	1,651	0.1
R2T3: Revise Parking Policies	824	0.03
R2T4: Roadway Improvements including Signal Synchronization and Traffic Flow Management	8,230	0.3
R2T5: Expand Renewable Fuel/Low-Emission Vehicle Use	16,295	0.7
R2T6: Ridesharing and Carpooling	798	0.03
R2T7: Bicycle/Pedestrian Infrastructure and Promotion	798	0.03
R2T8: Construct High Occupancy Vehicle (HOV) Lanes	1,594	0.1
Total	528,422	21.9
R3: Existing and new transportation measures—reductions not quantified or relied upon to achieve reduction goal		
R3T1: Public Transit Measures		
R3T2: Financing Mechanisms and Opportunities		
R3T3: Diesel Exhaust Emissions Control Measures		
R3T4: Regional Land Use/Transportation Coordination		
R3T5: Regional Employment Based Trip Reduction Programs.		
R3T6: County Commuter Services Program		
R3T7: Home Employment.		
R3T8: Intelligent Transportation Systems Applications.		
R3T9: Public Outreach and Educational Programs Relative to Various Modes of Transportation.		
R3T10: Land Use Strategies to Reduce Reliance on Automobile Use		

With the implementation of the emission reduction strategies included in this Plan, reduced emissions in 2020 will be approximately five percent higher than 2007 emissions. **Figure 4-4** below graphically depicts the 2020 level of decreased emissions as compared to 2007.

Figure 4-4: External GHG Emission Reductions from Transportation and Land Use Measures



GHG 4.2.3 SOLID WASTE MANAGEMENT SECTOR



The County Solid Waste Management Division (SWMD) is responsible for the operation and management of the County of San Bernardino's solid waste disposal system, which consists of six regional landfills, eight transfer stations, and five community collection centers. The County is responsible for the management of waste generated by both the unincorporated County and the incorporated Cities within the County that is deposited in County-owned landfills. The

County operates six active landfills and 14 closed landfill sites. The County's active landfills range in capacity from just over 3,000 cubic yards at Barstow and Landers to over 80,000 cubic yards at Victorville. In total, the County was responsible for the management of 1,920,829 tons of solid waste in 2007 generated in the unincorporated areas of the County and the incorporated cities in the County. Several of the landfills already have control systems in place for methane capture.

GHG 4.2.3.1 BACKGROUND

The County General Plan and Development Code contain numerous policies and programs that support the County's efforts to reduce GHG emissions. The following General Plan (GP) Policies, while not specifically quantifiable in terms of the amount of GHG reduction, effectively contribute to the County's reduction efforts.

1. **Solid Waste Management Programs.** The County is committed to ensure a safe, efficient, economical and integrated solid waste management system that considers all waste generated within the County; and ensures that a variety of feasible processes are utilized, including source reduction, transfer, recycling, landfilling, composting and resource recovery to achieve an integrated and balanced approach to solid waste management (GP Policies CO 8.7, CI 14.1). In addition, the County is ready to assist the private sector where ever possible in developing methods for the reuse of inert materials that currently use valuable landfill space, and will ensure the careful planning and siting of solid waste disposal facilities to allow for equitable distribution of these facilities throughout the County. The County will also explore the feasibility and environmental impacts of reopening inactive landfills where there is useful capacity remaining (GP Policy CI 14.2) and will initiate educational and other programs to reduce waste generation, increase diversion of solid waste away from landfills, promote recycling, discourage indiscriminate dumping, and identify new facilities for waste disposal in the County (GP Policies CI 14.4, D/CI 3.2).



2. **San Bernardino County Landfill Programs.** There are currently methane recovery systems in place at the County's five largest landfills, Victorville, Colton, Mid-Valley, San Timoteo, and Milliken. These methane recovery systems are in place in order to meet the requirements of Title 27, (SCAQMD) Rule 1150.1, and (MDAQMD) Rule 1126. The County expects that within five years there will be a methane recovery system in place at Barstow as well. [This program is incorporated into the current (2007) and 2020 unmitigated landfill emissions estimate.]
3. **Comprehensive Disposal Site Diversion Program (CSDSP).** A program initiated by the County that recovers waste for recycling at the landfill. This is a relatively new program and has been successful at increasing waste diversion from landfilling to recycling. The CSDSP program was implemented in 2007. The program successfully diverted 112,846 metric tons of waste in the 2007–2008 fiscal year and projected diversion rates are assumed to grow at a rate of 1.02 percent annually. This measure will contribute to the total reductions required under AB 1016.

GHG 4.2.3.2 SOLID WASTE/LANDFILLS GHG PLAN GOALS, OBJECTIVES AND STRATEGIES

As a compliment to the General Plan goals and policies stated above, the following GHG Plan goals, objectives and strategies reduce greenhouse gases related to the Solid Waste/Landfills sector.

GHG Goal SW 1: Reduce GHG emissions from waste through landfill methane recovery, waste diversion (including waste minimization, reuse, and recycling) and public education.

Objective GHG SW 1.1 Increase methane recovery at County landfills where such systems are currently installed.

Reduction Strategies

1. **Increase Methane Recovery.** The County will evaluate the performance of existing methane recovery systems at all County landfills where such systems are installed. Where these systems produce a recovery rate of less than 85%, they shall be improved so that they achieve an 85% effective capture for the Colton and Milliken landfills and the unlined portion of the Mid-Valley landfill and a 95% effective capture for the lined portion of the Mid-Valley landfill.

(Measure R2W1, Appendix A)

2. **Landfill Gas to Energy Projects.** The County will consider expanding its Landfill Gas to Energy Projects program to other landfills where the projects are cost-effective and technologically feasible.



(Measure R3W5, Appendix A)

3. **Additional Landfill Methane Controls.** The County will consider the implementation of additional methane controls at County landfills to include the following:
 - a) Use landfill gas extraction system, surface sampling, gas migration probe, and other available to data to get an accurate representation of methane generation at San Bernardino County landfills. This information could be used to accomplish the following:
 - Develop a GHG emission site priority list.
 - Develop strategies based on site priorities.
 - Install additional gas extraction wells as necessary in existing systems.
 - Pursue low tech solution at remote sites that do not have a power source.
 - b) Pursue further study of the chemical reactions of methane gas attenuation as it migrates through the cover soils at each landfill, and develop low power methods for improving these reactions.
 - c) Work with other agencies that are studying GHG emissions from landfills and develop partnerships where information and approaches are shared.
 - d) Further develop waste disposal alternatives such as recycling, waste-to-energy, aerobic digestion of organic materials, and other actions.

(Measure R3W4)

Objective GHG SW 1.2 Install methane recovery systems at County landfills where no such systems are currently installed.

Reduction Strategies

1. **Installation of Methane Recovery Systems at Barstow Landfill.** The County will install a methane recovery system at the Barstow Landfill within five years of the adoption of this plan.

(Measure R2W2, Appendix A)

2. **Installation of Methane Recovery Systems at Landers Landfill.** The County will install a methane recovery system at the Landers Landfill.

(Measure R2W3, Appendix A)

3. **Additional Installation of Methane Recovery Systems at Selected Landfills.** The County will consider the installation methane recovery systems at all landfills with 250,000 or more tons of waste in place where such system are not already installed, including closed landfills.

(Measure R3W1, Appendix A)

4. **Financing Mechanisms and Opportunities.** The County will consider pursuing all grant opportunities to help finance the installation of methane recovery systems and controls, the enhancement of waste diversion programs and public education programs focused on waste stream issues.

(Measure R3W2, Appendix A)

Objective GHG SW 1.3 Expand current waste reduction and recycling plans, including outreach and education programs.

Reduction Strategies

1. **Waste Reduction and Recycling Plans.** The County will expand its efforts relative to the County's Comprehensive Disposal Site Diversion Program to divert up to 11% of waste arriving at County landfills each year to recycling and composting programs.

(Measure R2W4, Appendix A)

2. **Construction and Demolition Debris Diversion.** The County will ensure that at least 50% of all construction and building materials and demolition debris will be diverted to recycling programs.

(Measure R2W5, Appendix A)

3. **County Waste Diversion Program.** The County will strengthen the County Diversion Program to reach a goal of 75% of waste diverted to recycling programs by 2020 through the implementation of one or more of the following measures.

(Measure R2W6, Appendix A)

- a. Expand current waste reduction and recycling plans, including outreach and education programs.
- b. Encourage businesses in the County to adopt a voluntary procurement standard prioritizing products that have less packaging or are re-usable, recyclable, or compostable; support policies at the State level that provide incentives for efficient product design and for reduced product and packaging waste.
- c. Increase disposal fees and/or reduce residential pick-up frequency.
- d. Provide compost bins at no cost.
- e. Expand list of recyclable materials.
- f. Provide waste audits.
- g. Make recycling and composting mandatory at public events.



- h. Establish an appliance end-of-life requirement.
 - i. For new development, require the use of salvaged and recycled-content materials and other materials that have low production energy costs for building materials, hard surfaces, and non-plant landscaping. Require sourcing of construction materials locally, as feasible. Encourage the use of cement substitutes and recycled building materials for new construction.
 - j. Research, evaluate, and report on best practices, innovations, trends, and developments in waste reduction practices, as relevant to GHG emissions reduction.
4. **City Waste Diversion Program.** The County will coordinate with incorporated cities within the County to help strengthen the waste diversion programs within their jurisdictions to reach a goal of 75% of waste diverted to recycling programs by 2020.
- (Measure R2W7, Appendix A)
5. **Waste Education Program.** The County will consider all opportunities to expand its public education program about commercial and residential recycling, waste reduction, composting, grass recycling and waste prevention.
- (Measure R3W3, Appendix A)
6. **Landfill Gas to Energy Projects.** The County will consider expanding its Landfill Gas to Energy Projects program to other landfills where the projects are cost-effective and technologically feasible.
- (Measure R3W5, Appendix A)

GHG 4.2.3.3 SUMMARY OF STATE ACTIONS TO REDUCE GHG EMISSIONS RELATING TO SOLID WASTE MANAGEMENT

The State Legislature took prior action relative to this sector of the GHG Plan through the adoption of SB 2176 in 2004, AB 32 in 2006 and SB 1016 in 2008. These actions directed or recommended the following:

1. Requires a 50% per capita disposal target (average of 50 percent generation in 2003 to 2006 expressed in terms of per capita disposal).
2. Recommends landfill methane control, increase the efficiency of landfill methane capture and high recycling rates, all of which are included as strategies that require County action.
3. Requires the County to divert 50% of the solid waste through source reduction, recycling and composting.

These measures were not quantified as reductions that could be counted on for future reductions separate from the County measures described above.

GHG 4.2.3.4 SUMMARY OF REDUCTIONS RELATING TO SOLID WASTE MANAGEMENT

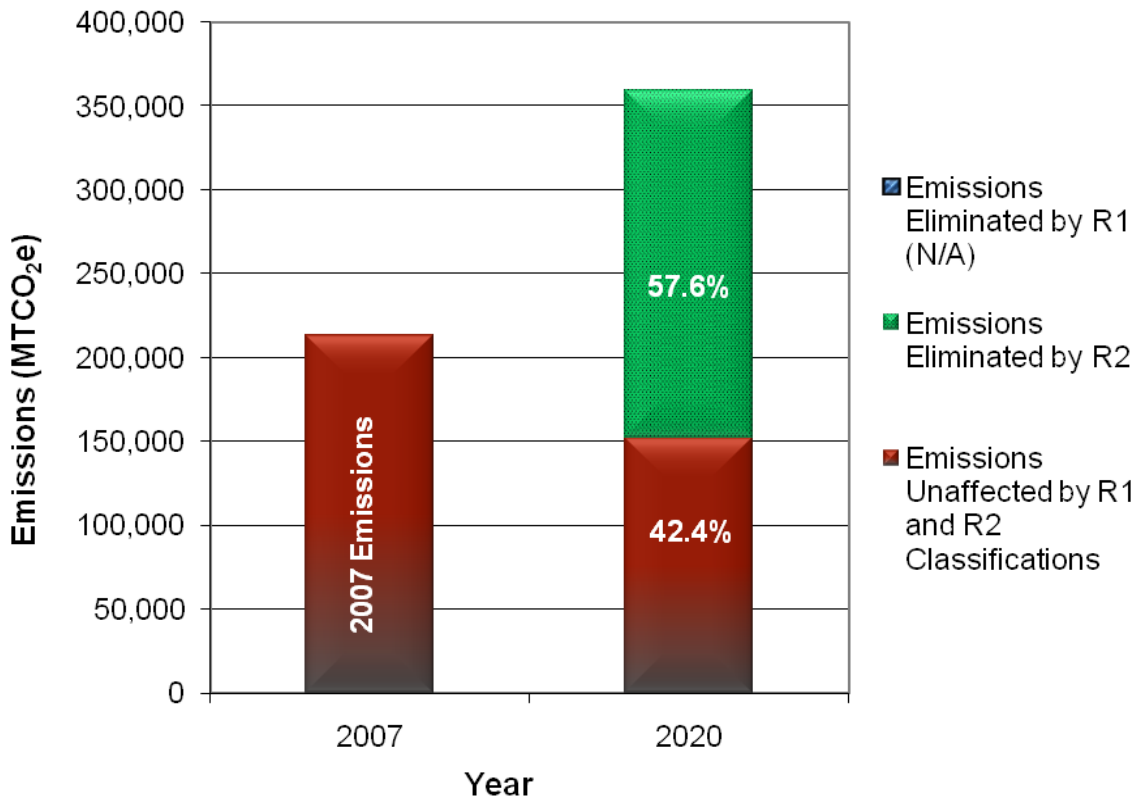
With the adoption and implementation of all proposed County GHG reduction strategies, the total emissions reductions related to Solid Waste is projected to decrease by 206,959 metric tons CO₂e, which is a 57.6 percent reduction from the 2020 unmitigated projections. Results of the emissions reduction calculations are shown in **Table 4-5**.

Table 4-5: External GHG Emission Reductions from Implementation of Solid Waste Strategies

Reduction Classification and Reduction Measures	GHG Reductions from 2020 unmitigated Waste Emissions (MTCO ₂ e)	
	Emission Reduction from 2020 unmitigated	Percent Reduction from 2020 unmitigated
R1: Existing and proposed state and regional waste management measures that do not require County action		
NA		
R2: Existing and new measures that require County action		
R2W1: Increase Methane Recovery at Mid-Valley, Milliken, and Colton Landfills	97,059	27.0
R2W2: Barstow Methane Recovery	37,935 ^a	10.6
R2W3: Landers Methane Recovery	8,471 ^b	2.4
R2W4: Comprehensive Disposal Site Diversion Program	26,390	7.3
R2W5: C&D Recycling Program	295	0.1
R2W6: County Diversion Programs — 75 Percent Goal ^c	4,118	1.1
R2W7: City Diversion Programs— 75 Percent Goal ^c	32,692	9.1
Total	206,959	57.6
R3: Existing and new waste measures – reductions not quantified or relied upon to achieve reduction goal		
R3W1: Install Methane Capture Systems at all Landfills with 250,000 or more Tons of WIP		
R3W2: Leverage Existing Financing Mechanisms and Opportunities		
R3W3: Waste Education Program		
R3W4: Additional Landfill Methane Controls		
R3W5: Landfill Gas to Energy Projects		
<i>Notes:</i> Reductions for these measures solely represent avoided methane emissions at landfills and assume that all waste reduction measures are implemented in combination.		
^a Attributed to waste in place methane reductions from Barstow as well as new waste planned for Barstow.		
^b Attributed only to existing waste in place at Landers.		
^c Assumes linear growth in diversion beginning in 2009 to reach 75 percent diversion of County-generated waste by 2020.		
^d Assumes linear growth in diversion beginning in 2009 to reach 75 percent diversion of City-generated waste by 2020.		

As depicted in **Figure 4-5** below, with the implementation of the reduction strategies included in this Plan, reduced emissions in 2020 will be approximately 29 percent lower than 2007 emissions.

Figure 4-5: External GHG Emission Reductions from Solid Waste/Landfill Measures



GHG 4.2.4 STATIONARY SOURCE SECTOR



The GHG emissions from stationary sources quantified in this GHG Plan result from fuel combustion (such as diesel, gasoline and propane) and fugitive emissions of methane (CH₄) and nitrous oxides (N₂O) at industrial facilities located in the County. The following categories were included in the inventory: oil and gas production (combustion), manufacturing and industrial, food and agricultural processing, fuel combustion, coatings and related processes, cleaning and surface

coatings, petroleum production and marketing, chemical, mineral processes, industrial processes, asphalt paving/roofing, and sewage treatment.

Stationary source emissions are grouped into two categories: Point Sources and Area Sources. Point Source emissions are from facilities having one or more pieces of equipment registered and permitted with the local air quality control boards (SCAQMD or MDAQMD) (e.g. power plants and manufacturing facilities). Area Source emissions are from numerous smaller facilities (e.g. gas stations, dry cleaners and restaurants) or the source of emissions (e.g. consumer products and architectural coatings), for which locations may not be specifically identified.

Industrial land use zoning districts (including Community Industrial and Regional Industrial) occupy 21,834 acres or 1.21 percent of the total unincorporated area. According to the County land use designations, the spheres have a total build-out potential of 304.2 million square feet of Industrial space. In addition, there are 92 active mines and processing plants in the County, including the largest rare earth mine in North America. Extensive aggregate mining is also a major component of the mining industry in the County. However, the primary source of stationary source emissions in the County is cement plants. Cement plant operations emit large quantities of GHG emissions, including fuel combustion, electricity use, and clinker production. The fuel combustion activities at these plants include those associated with cement production, building operations, power plants/cogeneration facilities, and any other activity that consumes fuel. GHG emissions from clinker production result from chemical reactions involved in producing the intermediate cement products from raw materials. There are 11 cement plants located in California, four of which are located in the County and three are located within the County's land use authority area. These three cement plants represent approximately 30 percent of GHG emissions from cement production in California. The County has permitting authority over these three operations.

GHG 4.2.4.1 BACKGROUND

The County's General Plan and Development Code contain policies and programs that guide development and also support the County's efforts to reduce GHG emissions reductions. The following General Plan (GP) policies, while not specifically quantifiable in terms of the amount of GHG reduction, effectively contribute to the County's reduction efforts.

The County is committed to ensuring good air quality for its residents, businesses, and visitors to reduce impacts on human health and the economy. In addition to continued coordination with the South Coast Air Quality Management District and Mojave Desert Air Quality Management District to improve air quality through reduction in pollutants from the region (CO 4.2), the County is committed to establishing special performance standards for industrial uses to control industrial odors, air pollution, dust, and other nuisances (LU1.2(2)).



**GHG 4.2.4.2 STATIONARY SOURCE
 GHG GOALS, OBJECTIVES AND STRATEGIES**

In addition to the General Plan policies described above, new industrial developments subject to County discretionary review authority, will be required to mitigate GHG emissions through the Development Review Process.

GHG 4.2.4.3 SUMMARY OF STATE ACTIONS TO REDUCE GHG EMISSIONS RELATING TO STATIONARY (INDUSTRIAL) SOURCES

The State Legislature took action relative to stationary sources through the adoption of AB 32 in 2006. The actions directed through adoption of AB 32 included reducing combustion emissions from oil and gas extraction, replacing internal combustion engines over 50 horsepower with electric motors, adoption of a cap and trade program including the cement sector which will help to reduce GHG emissions from cement production at cement manufacturing facilities and adoption of a per capita water use reduction goal to comply with the governors Executive Order S-14-08. These and other measures are more specifically described in Appendix A. Reduced emissions in 2020 would be approximately 26 percent lower than 2007 emissions.

4.2.4.4 SUMMARY OF REDUCTIONS RELATING TO STATIONARY SOURCES

With implementation of all State GHG reduction strategies the total emissions reductions related to Stationary Sources are projected to decrease by 1,049,067 MTCO_{2e}, which is a 33 percent reduction from 2020 business as usual projections.

Total estimated GHG percent reductions and quantities from the reduction measures included in Reduction Classifications R1 and R2 are presented below in **Table 4-6**.

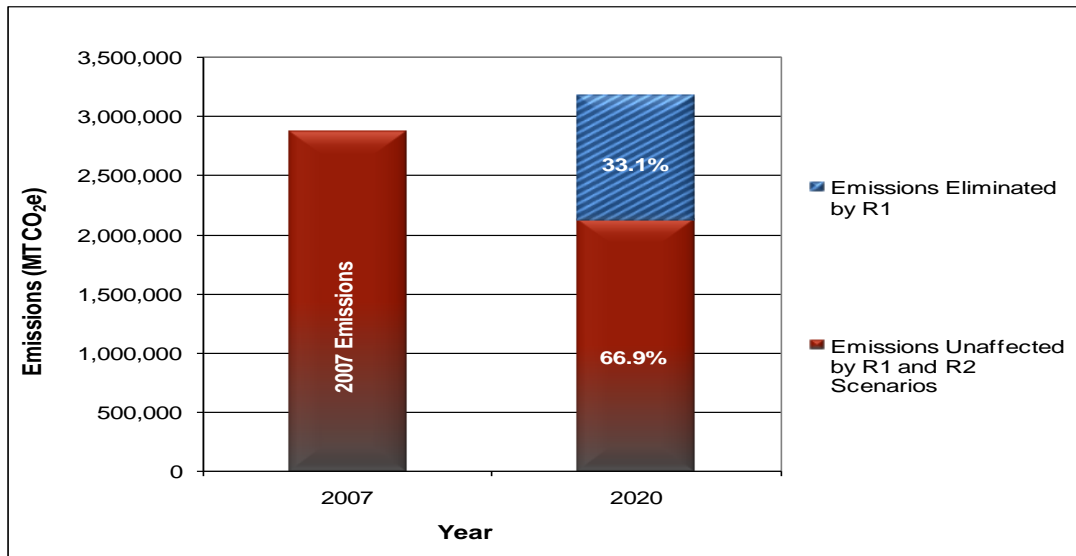
Table 4-6: External GHG Emission Reductions from Implementation of Stationary Source Strategies

Reduction Classification and Reduction Measure	GHG Reductions from 2020 unmitigated Industrial Stationary Source Emissions (MTCO _{2e})	
	Emission Reduction from 2020 unmitigated	Percent Reduction from 2020 unmitigated
R1: Existing and proposed state and regional stationary source measures that do not require County action		
R1I1: Oil and Gas Extraction Combustion Related GHG Emission Reduction	49	0.002
R1I2: Stationary Internal Combustion Engine electrification	736	0.02
R1I3: Reduce Carbon Intensity at Cement Plants (Through Cap and Trade Program)	69,909	2.2
R1I4: Reduce Carbon Intensity at Concrete Batch Plants (Through Cap and Trade Program)	732,086	23.1
R1I5: Waste Reduction in Concrete Use (Through Cap and Trade Program)	246,288	7.8

Reduction Classification and Reduction Measure	GHG Reductions from 2020 unmitigated Industrial Stationary Source Emissions (MTCO _{2e})	
	Emission Reduction from 2020 unmitigated	Percent Reduction from 2020 unmitigated
R2: Existing and new stationary source measures that require County action		
Development Review Process for new industrial and commercial projects	N/A	N/A
Total	1,049,067	33.1

With the implementation of these emission reduction strategies included in this Plan, by 2020 stationary source emissions will be approximately 28 percent lower than 2007 emissions. **Figure 4-6** below, graphically depicts this reduction.

Figure 4-6: External GHG Emission Reductions from Stationary Sources



GHG 4.2.5 AGRICULTURE AND RESOURCE CONSERVATION SECTOR



The preservation of open space and natural land covers preserves the carbon sequestration that occurs within natural vegetation. Although San Bernardino County does not have extensive forest areas compared to other parts of California (like the North Coast), the preservation of carbon sequestration in the County can help to avoid increase in GHG emissions.

Agriculture has historically been an important part of San Bernardino's economy and is dominated by the dairy industry and the related industries of calf production and forage crops. The County's agricultural diversity also includes numerous fruit orchards in the east Valley area and substantial nursery and vegetable production. However, in recent years agricultural uses within the County continue to decline as a result of the effects of urban expansion and economic considerations. As farmers relocate, agricultural uses often change to more specialized and high unit value crops that can be grown in less desirable (from the standpoint of urban development) terrain. In the desert region, field crop value declined due to a significant reduction in alfalfa acreage and poor range conditions due to a lack of rainfall and cost of water production or delivery. The overall net result of this situation is that the amount of vacant land that can be converted to most agricultural uses is steadily diminishing.

GHG 4.2.5.1 BACKGROUND

The County's General Plan and Development Code contain numerous policies and programs that guide development and also support the County's efforts to reduce GHG emissions reductions. The following General Plan (GP) policies, while not specifically quantifiable in terms of the amount of GHG reduction, effectively contribute to the County's reduction efforts.

The County protects its natural resources and open spaces, through compliance with the County's Scenic Resources Overlay District for new development; preservation and protection of scenic resources that contribute to a distinctive visual experience; and protection of scenic and open space qualities of cinder cones and lava flow areas of the County. The County also ensures that flood control and drainage improvements are designed in a way that preserves the scenic values of the County's streams and creeks. For example, consistent with the County's efforts to protect the public from flood hazards, encourage the use of open space and drainage easements, as well as clustering of new development, as stream preservation tools (GP Policy CO 5.4). Also, the Hazard and Resources Overlay Maps is utilized by the County to identify areas suitable or required for retention as open space. Resources and issues identified on the Overlays which indicate open space as an appropriate use may include: flood, fire, geologic, aviation,

noise, cultural, prime soils, biological, scenic resources, minerals, agricultural preserves, utility corridors, water supply and water recharge.

The County has established good working relationships with, and will continue to work with state and federal agencies to conserve critical habitat and minimize recreational uses in sensitive areas supporting protected or sensitive species. Specifically, County coordinates with these agencies to create buffers and mitigation banks for sensitive species within all the Planning Regions in the County that are greater than one-mile from state or federal lands. The County will also continue to coordinate with these resource agencies to ensure that their programs preserve rare and endangered species and protected areas of special habitat value, as well as conserve populations and habitats of commonly occurring species. Through its General Plan Policies (CO 1.2, 2.1, 2.2, 2.3 and 2.4)

The Conservation (CO) Element addresses the conservation, development, and use of natural resources. Through its General Plan Land Use Element, the County is also committed to ensuring that the distribution of land uses will be consistent with the maintenance of environmental quality, conservation of natural resources, and the preservation of open spaces (GOAL LU 7).

1. **Preservation of Natural Resources.** Through its GP Goal OS-1, County strives to provide plentiful open spaces, local parks and a wide variety of recreational amenities for all residents. Policies OS 1.1 through OS 1.9 are designed to support this goal, for example, through the utilization of appropriate land use categories (OS 1.1), supporting the establishment of “urban open space areas” (OS 1.4), and siting of new regional parks (OS 1.6). The County is committed to providing for the grouping or clustering of residential buildings where this will maximize the opportunity to preserve significant natural resources, natural beauty or open space without generally increasing the intensity of development otherwise possible (M/CO 1.3). County will also encourage the protection of natural features by using the Special Development District or Zone to implement Planned Development and Planned Residential Concepts. (Strategies R2NR1 and R3NR3 in Appendix A).
2. **Preservation of Orchards.** The County’s agricultural diversity also includes numerous fruit orchards in the east San Bernardino Valley area and substantial nursery and vegetable production. In addition to preserving prime agricultural lands (GP Policies CO 6.3, CO 6.4), which provide co-benefits for the sequestration of carbon dioxide, the County ensures that the distribution of land uses are consistent with the maintenance of environmental quality, conservation of natural resources, and the preservation of open spaces (GP Goal LU 7).
3. **Preservation of Forest Character.** In the Mountain region, the County is committed to maintaining the health and vigor of the forest environments, pursuant to its General Plan Goal M/CO 2. The County also ensures that developers utilize construction techniques for single family homes that will preserve the forest character of the region by minimizing disruption of land and vegetation during construction (GP Policy M/LU 1.10). In addition, areas in new developments



which are not suitable for habitable structures, for example, are offered for recreation, other open space uses, trails, and scenic uses. Retention of open space lands is also considered with modifications to a site to increase its buildable area. Potential measures used to set aside open space lands of all types include dedication to the County or an open space agency, dedication or purchase of conservation easements, and transfer of development rights (Measure R2NR1 and R3NR3 in Appendix A).

GHG 4.2.5.2 AGRICULTURE AND RESOURCE CONSERVATION GHG PLAN GOALS, OBJECTIVES, STRATEGIES

As a compliment to the General Plan goals and policies stated above, the following GHG Plan goals, objectives, and strategies will reduce greenhouse gases related to agriculture and resource conservation.

GHG Goal OS/RC 1: Reduce GHG emissions by retaining agricultural uses and conserving open space resources by supporting voluntary actions in cooperation with the resource conservation districts, the National Resource Conservation Service, the Department of Conservation, and private organizations.

Objective GHG OS/RC 1.1 Promote and encourage open space and natural resource preservation, as well as conservation of agricultural resources to allow for the sequestration of CO₂ through these resources.

Reduction Strategies

1. **Conservation Areas.** Preserve existing land conservation areas (especially forested areas, oak woodlands, and wetlands) that provide carbon sink benefits.

(Measure R3NR1, Appendix A)

2. **Compensation for Loss of Sequestration.** As part of Development Review, the County will consider requiring project-level compensation for loss of sequestration value through requirements for on-site and off-site tree planting and/or funding for restoration of forested areas, woodlands, and wetlands.

(Measure R3NR2, Appendix A)

3. **Urban Forestry.** The County will evaluate the feasibility of substantially expanding tree planting in the County, including evaluation of potential carbon sequestration from different tree species, potential reductions of building energy from shading, and GHG emissions associated with pumping of water used for irrigation. The pursue implementation of an urban forestry program if GHG emissions reductions exceed GHG emissions associated with implementation and water use.

(Measure R3NR3, Appendix A)

4. **New Agricultural Development Projects.** New agricultural developments subject to County discretionary review authority will be required to mitigate GHG emissions through the Development Review Process. Measure R3NR2 in Appendix A).

GHG 4.2.5.3 SUMMARY OF STATE ACTIONS TO REDUCE GHG EMISSIONS IN THE AGRICULTURE AND RESOURCE CONSERVATION SECTOR

The State Legislature took action relative to the agricultural sector through the adoption of AB 32 in 2006. The actions directed through adoption of AB 32 included voluntary measures to encourage the installation of methane digesters to capture methane emissions at large dairies. This reduction strategy is more specifically described in Appendix A. By 2020, this requirement will reduce emissions in California by 1,500 metric tons of CO₂e, which is a 3% reduction in the 2020 business as usual projections. The 2020 mitigated agriculture emissions are 23 percent lower than 2007 emissions due primarily to the expected reduction in the dairy herd over time in combination with the expansion of methane digestion.

The Agriculture sector accounts for less than one percent of the 2020 Business as Usual (unmitigated) external emissions in the County. With the adoption and implementation of all State GHG reduction strategies the total emissions reductions related to Agriculture is projected to decrease by 1,500 MTCO₂e, which is a three percent reduction from 2020 business as usual projected agricultural emissions.

GHG 4.2.5.4 SUMMARY OF REDUCTIONS IN THE AGRICULTURE AND RESOURCE CONSERVATION SECTOR

Total estimated GHG percent reductions and quantities from the R1 and R2 reduction measures are presented below in **Table 4-7**. Emission reductions for each measure are applied to the projected 2020 unmitigated emissions for the appropriate emissions source. Total reductions attributed to these measures from the unmitigated 2020 emissions would be three percent.

Table 4-7: External Emission Reductions from Implementation of Agriculture and Resource Conservation Strategies

Reduction Classification and Reduction Measure	GHG Reductions from 2020 unmitigated Agriculture Emissions (MTCO ₂ e)	
	Emission Reduction from 2020 unmitigated	Percent Reduction from 2020 unmitigated
R1: Existing and proposed state and regional stationary source measures that do not require County action		
R1A1: Methane Capture at Large Dairies	1,531	3.0
R2: Existing and new agriculture measures that require County action		
Development Review Process for new discretionary		



GHG Reductions from 2020 unmitigated Agriculture Emissions (MTCO₂e)		
Reduction Classification and Reduction Measure	Emission Reduction from 2020 unmitigated	Percent Reduction from 2020 unmitigated
agricultural development		
R3: Existing and new waste measures – reductions not quantified or relied upon to achieve reduction goal		
R3NR1: Conservation Areas		
R3NR2: Compensation for Loss of Sequestration		
R3NR3: Urban Forestry		
Total	1,531	3.0

GHG 4.2.6 WATER CONSERVATION SECTOR



Colorado River through Needles

Water conveyance requires electricity for pumping. Particularly where water is imported from the Central Valley and the Colorado River, pumping energy contributes to GHG emissions related to water use in the County.

The County faces water supply and distribution issues in common with all other counties in the Southern California region. The urbanizing areas of the County are dependent upon adequate quantities and qualities of potable water being available. At present, the majority of the County is dependent upon locally available supplies of groundwater. However imported water will play an increasing role in satisfying the demand for water throughout the County.

The County has a substantial role in promoting water conservation for new development and can help facilitate water conservation from existing development, in cooperation with local water districts and retailers.

GHG 4.2.6.1 BACKGROUND

The County’s General Plan and Development Code contain numerous policies and programs that guide development and also support the County’s efforts to reduce GHG emissions reductions. The following General Plan (GP) policies, while not specifically quantifiable in terms of the amount of GHG reduction, effectively contribute to the County’s reduction efforts.

The County’s steady growth in water usage coupled with two primary challenges: periodic drought and the population growth require the County to be diligent in its water supply and conservation programs. The County recognizes that new development could

substantially deplete groundwater supplies such that there could be a lowering of the local groundwater table level and is; therefore, committed to protecting groundwater resources (GP Policy S 2.4) and promoting activities/measures that facilitate the conservation, replenishment, reclamation and reuse of water and wastewater (GP policies CI 11.9, CO 5.3, D/CI 3.1, D/CI 3.7, D/CI 3.9, M/CI 4.1), consistent with County, state and/or federal policies and regulations. The County also, to the greatest extent feasible, retains existing groundwater recharge and storm flow retention areas as open space lands (GP Policy CI 11.10) and promotes the implementation of low-impact design principles to help control the quantity and improve the quality of urban runoff (GP Policy CI 13.2). In addition, the County promotes water conservation through landscaping requirements, including but not limited to, the use of native or drought-tolerant plants, xeriscape design, drip irrigation, and/or retaining maximum of 10 percent of the project parcel shall be retained in planted landscaped areas (GP Policy D/CI 3.4, D/CI 3.6, D/CI 3.8). The County also encourages water service agencies in the region to adopt and implement water conservation ordinances (GP Policy D/CI 3.5) in order to minimize water use. The County is also committed to working with other agencies such as the U.S. Forest Service to explore land exchange opportunities that would provide additional areas for open space, recreational opportunities and watershed protection (GP Policy M/OS 1.2).

GHG 4.2.6.2 WATER CONSERVATION GHG GOALS, OBJECTIVES AND STRATEGIES

As a compliment to the General Plan goals and policies stated above, the following GHG Plan goals, objectives, and strategies reduce greenhouse gases related to water use.

GHG Goal WC 1 Reduce GHG emissions associated with water use through conservation and efficiency measures
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Objective GHG WC 1.1 Support conservation and protection of water resources through the efficient use of water

Reduction Strategies

1. **County Water Efficient Landscape Ordinance.** In 2007, the County adopted a landscape ordinance that provided for the conservation and protection of water resources through the efficient use of water, appropriate use of plant materials suitable for climate and location, and regular maintenance of landscaped areas. On February 8, 2011, the Board of Supervisors adopted a comprehensive landscaping ordinance (Development Code Sections 83.10.010 et seq.) whose provisions meet or exceed the water conservation requirements development by the Department of water resources pursuant to Government Code Sections 64491 et seq. The County landscaping ordinance implements standards that manage outdoor water use through various conservation measures which include using a water budget and low impact development design strategies such as impervious surface reduction, pollution prevention measures to reduce the introduction of pollutants to the environment, and other integrated practices to reduce and cleanse runoff. This Legislative effort is aimed at meeting interdisciplinary goals such as



protecting the County's limited water supply, groundwater recharge, and storm water management.

(Measure R2WC1, Appendix A)

2. **Water Conservation Ordinance.** The County's Special District Department manages and operates County Service Areas 42 (Ore Grande), 64 (Spring Valley Lake, Victorville) and 70, Improvement Zones CG (Cedar Glen), F (Little Morongo, near Yucca Valley), J (Oak Hills), W-1 (Landers), W-3 (Hacienda) and W-4 (Pioneer Town), that provide water services to county residents. In response to drought conditions that existed within these county service areas and improvement zones (Districts), the Board of Supervisors, acting in its capacity as the governing body of the Districts, adopted ordinance No. SD 90-11, to preserve the water supply in those Districts. This water conservation ordinance prohibits excessive landscape watering, watering during peak daylight hours, watering non-permeable surfaces, excessive water use for noncommercial washing, water use resulting in runoff, and water leaks. The ordinance also requires efficient use of water for construction activities, low-flow toilets and showerheads for all new construction, the use of drought-tolerant plants and efficient landscape watering for all new development, pool covers, water conservation signage at hotels, and recycling of water used for cooling systems.

(Measure R2WC1, Appendix A)

3. **County Water Conservation Programs.** San Bernardino is implementing water conservation programs through public education and by partnering with conservation organizations to promote water conservation, highlighting specific water-wasting activities, such as watering non-vegetated surfaces and uncontrolled runoff, and using water to clean sidewalks. The Green County Initiatives program helps cities implement sustainable policies to reduce greenhouse gas emissions and conserve water. One such program is the Facilities Management Demonstration Garden, where the County is using water efficient landscaping to reduce its carbon footprint and water consumption.

(Measure R2WC1, Appendix A).

4. **Collaboration with Water Purveyors.** The County will collaborate with water purveyors to implement and promote conservation programs and actions including:
 - a. Water audit programs that offer free water audits to single family, multi-family, large landscape accounts and commercial customers; and
 - b. Programs to install ultra-low-flush toilets in commercial, industrial and institutional facilities

(Measure R2WC1, Appendix A):

5. **Recycled Water Use.** The County will establish programs and policies to increase the use of recycled water which may include the following actions (Incorporated into R2WC1):
 - a. Produce and promote the use of municipal wastewater and greywater that can be used for agricultural, industrial and irrigation purposes, including greywater systems for residential irrigation;
 - b. Inventory potential non-potable uses of water for potential substitution by recycled water;
 - c. Assess feasibility of producing and distributing recycled water for groundwater replenishment;
 - d. Collaborate with responsible agencies to encourage the use of recycled water where cost and energy efficiencies for its production, distribution and use are appropriate.

6. **Water Efficiency Training and Education.** The County will encourage water efficiency training and certification for irrigation designers and installers, property managers.

(Measure R2WC1, Appendix A)

7. **Manage Storm Water Runoff.** The County will implement low-impact development practices that maintain the existing hydrologic character of the site to manage storm water, reduce potential treatment, and protect local groundwater supplies.

(Measure R3WC1, Appendix A)

8. **Conservation Areas.** The County will preserve existing land conservation areas for watershed protection to protect water quality (reduces water treatment energy use), and protect local water supplies (reduces imported water energy use). Protection of conservation areas can also provide carbon sequestration benefits, particularly in forested areas.

(Measure R3WC2, Appendix A)

9. **Financing Mechanisms and Opportunities.** The County will pursue multiple financing mechanisms and opportunities available to the County for implementing water conservation measures.

(Measure R3WC3, Appendix A)

GHG 4.2.6.3 SUMMARY OF STATE MEASURES TO REDUCE WATER USE

State legislation (SBX7 7) requires a per capita urban water use reduction of 20 percent by 2020 compared to current conditions. The County would support the achievement of this goal through the measures described above. The County will also support this through



Internal Inventory reduction plan measures for County facilities in the unincorporated areas (see Appendix B).

As described above, the state has adopted a Renewable Portfolio Standard of 33 percent for 2020. The benefit of this measure for building energy was described above. However, this measure will also help to reduce the electricity emissions associated with water conveyance from outside the County into the County and thus will also help to reduce water conveyance GHG emissions.

GHG 4.2.6.4 SUMMARY OF REDUCTIONS ASSOCIATED WITH WATER CONSERVATION

Total estimated GHG percent reductions and quantities from the R1 and R2 reduction measures are presented below in **Table 4-8**. Emission reductions for each measure are applied to the projected 2020 unmitigated emissions for the appropriate emissions source. Total reductions attributed to these measures from the unmitigated 2020 emissions would be approximately 10,193 MTCO₂e.

Table 4-8: External GHG Emission Reductions from Implementation of Water Supply Strategies

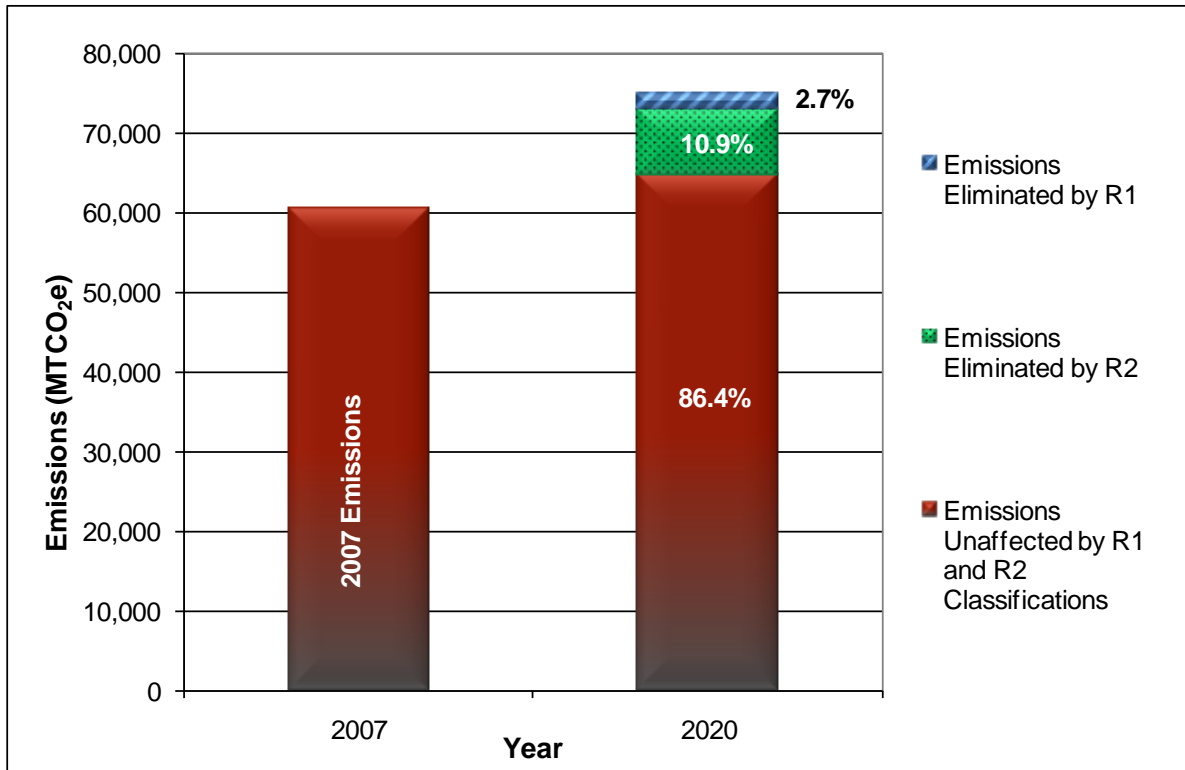
Reduction Classification and Reduction Measure	GHG Reductions from 2020 unmitigated Emissions (MTCO ₂ e)	
	Emission Reduction from 2020 unmitigated	Percent Reduction from 2020 unmitigated
R1: Existing and proposed state and regional water supply measures that do not require County action		
R1WC1: Renewable Portfolio Standard (33 percent by 2020)	2,007	N/A**
R2: Existing and new water supply measures that require County action*		
R2WC1: Per Capita Water Use Reduction	8,186	N/A**
Total	10,193	N/A**
R3: Existing and new water supply measures—reductions not quantified or relied upon to achieve reduction goal		
R3WC1: Manage Storm Water Runoff		
R3WC2: Conservation Areas		
R3WC3: Financing Mechanisms and Opportunities		

* Reductions assume measure will effect water importation from the State Water Project only. The County’s mandatory influence is only direct for new development; impact on existing development must come through voluntary measures in cooperation with water providers.

** These measures reduces emissions associated with electricity inside and outside the County, as well as from fuel combustion and fugitive emissions from wastewater treatment, thus a strict percent reduction compared to the water conveyance emissions is not provided. See Appendix A for further discussion

With the implementation of the emission reduction strategies included in this Plan, emissions from water supply and treatment emissions will be reduced approximately 14 percent from 2020 unmitigated projections. Reduced emissions in 2020 will be approximately eight percent higher than 2007 emissions. **Figure 4-6** below, graphically depicts this reduction.

Figure 4-7: External GHG Emission Reductions from Water Conservation Measures



GHG 4.3 INTERNAL GHG EMISSIONS REDUCTION GOALS, OBJECTIVES AND STRATEGIES

The County can provide a leading example of GHG emissions reduction implementation through its management of County operations and facilities. The strategies described below apply to building energy, fleet management, solid waste management employee commuting, land management and County purchasing. Collectively, by 2020 these measures will reduce Internal Inventory emissions to a level 24 percent below Current emissions levels.



Internal GHG Goal: 1 Reduce GHG emissions from County facilities and operations.

GHG 4.3.1 BUILDING/ ENERGY EMISSIONS

Objective GHG EE1.1-INT: Reduce GHG emissions from the generation of electricity by improving energy efficiency and enhancing renewable energy generation.

Reduction Strategies:

1. **Require LEED Silver for New County Buildings.** All new County buildings (over 5,000 square feet) will be required to attain a minimum level of efficiency to satisfy LEED Silver or equivalent requirements where fiscally sensible. The minimum level of energy performance required to acquire a LEED Silver rating is 14 percent above code for newly constructed buildings.

(Measure R2E1-INT, Appendix B)

2. **Retrofit Existing Buildings.** The County will retrofit that portion of its pre-2008 buildings with energy efficiency features and alternative energy improvements. Not all buildings are large enough or otherwise suitable for retrofit, however, at least 25 percent of the County-owned buildings that existed in 2007 will be retrofit by 2020.

(Measure R2E2-INT, Appendix B)

3. **Increase Use of Combined Heat and Power Systems.** The County will install combined heat and power (CHP) systems at the Arrowhead Regional Medical Center. CHP systems utilize waste heat created during distributed power generation to provide heat locally. This technology lowers energy needed for heating and hence also lowers the GHG emissions associated with this heating.

(Measure R2E3-INT, Appendix B)

4. **Install Solar and Other Renewable Energy Sources on County Buildings.** The County will install renewable energy sources on a portion of County-owned buildings to offset at least ten (10) percent of the County's 2020 emissions from County-owned buildings. The installation of renewable energy sources will lower the amount of fossil fuel energy used by the County and emitted as indirect emissions by the County's main utility, Southern California Edison. The installations may include, for example:

- a. Installing solar collection systems on County-owned building roofs;
- b. Installing solar water heating for County-owned pools; and,
- c. Installing waste-to-energy systems at waste handling operations.

(Measure R2E6-INT, Appendix B)



5. **Heating, Ventilating and Air Conditioning (HVAC) Retrofit Program.** The County will continue to implement its County-wide HVAC retrofit program involving the installation of variable frequency drives (VFD), economizers, and controls to various mechanical systems. The buildings included in the program are: the County Government Center, Old Hall of Records, Library Administration and Regional Youth Education Facility (RYEF).

(Measure R2E7-INT, Appendix B)

6. **Solar Photovoltaic Installation Projects.** The County will install solar photovoltaic panels on the following two buildings: the High Desert Government Complex and the Joshua Tree new County building.

(Measure R2E8-INT, Appendix B)

7. **Training and Support.** The County will ensure that staff receives appropriate training and support to implement objectives and policies to reduce GHG emissions, including, but not limited to, the following:

- a. Providing energy efficiency training to design, engineering, building operations and maintenance staff;
- b. Providing information related to energy use and management, including data from the tracking and management system, to managers and others making decisions that influence energy use; and,
- c. Providing energy design review services to departments undertaking new construction or renovation projects, to facilitate attainment of LEED Silver or equivalent standards.

(Measure R3-E4, Appendix B)

8. **Other Energy Efficiency Related Activities.** In addition to these programs the County will also reduce energy consumption in its operations by:

- a. Utilizing incentives offered by Southern California Edison partnership;
(Measure R3E1-INT, Appendix B)
- b. Benchmarking existing buildings to rate the County's buildings' energy performance, set investment policies, and verify and track progress of improvement projects;
(Measure R3E2-INT, Appendix B)
- c. Linking utility payment/energy usage data into the computer aided facilities management database to enhance the County's energy usage data tracking and facilitate analysis of all County buildings;
(Measure R3E3-INT, Appendix B)
- d. Using energy saving design features such as east-west long axis oriented buildings, operable external shading devices on south facing facades, double



skin facades etc., and energy efficiency features above Title 24 standards.
(Measure R3E5-INT, Appendix B)

9. **Install Outlets To Support Use Of Small Tools and Equipment.** The County will install outdoor electrical outlets on buildings to support the use of electric lawn and garden equipment, and other tools that would otherwise be run with small gas engines or portable generators, when feasible and appropriate.

(Measure R3E7-INT, Appendix B)

GHG 4.3.2 FLEET/FUEL EMISSIONS

Objective GHG 1.2-INT: Reduce GHG emissions from vehicle and equipment engines.

Reduction Strategies:

1. **Implement Accelerated Turnover of Passenger/Light Duty Vehicles.** The County will accelerate its fleet replacement schedule to replace all of its passenger/light duty vehicles in the motor pool and 50 percent of the Fire Department fleet with the most fuel efficient vehicles practical, by 2020. This Measure will reduce GHG emissions faster than the implementation of Pavley I and Pavley II measures.

(Measure R2F1a-INT & R2F1b-INT, Appendix B)

2. **Replace Medium-Duty and Heavy-Duty Vehicles.** The County will replace its medium-duty and heavy-duty vehicle fleet (excluding County Fire vehicles) with new vehicles by 2020.

(Measure R2F2-INT, Appendix B)

3. **Accelerated Turnover of —Other” Vehicles.** In addition to retiring all passenger/light duty, medium duty, and heavy duty vehicles by 2020, the County will replace vehicles classified as —other,” with cleaner-burning diesel engines or alternative fueled engines, when feasible and appropriate. Other vehicles include off-road vehicles, construction equipment, marine vehicles, and stationary engines (i.e., generators).

(Measure R3F1-INT, Appendix B)

4. **Use Hybrid/ULEV Vehicles.** The County will replace retired vehicles with hybrid electric vehicles and/or ULEV that are 50 percent cleaner than average new model cars, when feasible and appropriate.

(Measure R3F3-INT, Appendix B)

5. **Fleet and Equipment Management and Monitoring.** The County will:

- a. Implement an early tire inflation program to monitor and ensure vehicle tire pressure is maintained to manufacturer specifications;
(Measure R3F3-INT, Appendix B)
- b. Implement additional measures for internal operations to reduce excessive idling, such as idle-free stickers, signage, tracking devices, and incentives ;
(Measure R3F4-INT, Appendix B)
- c. Implement a Smart Driving Policy for fuel economy;
(Measure R3F5-INT, Appendix B)
- d. Install global positioning systems (GPS) in all new vehicles (with some exceptions) to monitor mpg, idle time, and emission status;
(Measure R3F7-INT, Appendix B)
- e. Maintain all vehicles and equipment in good working order; and,
(Measure R3F6-INT, Appendix B)
- f. Develop a new fleet management program to assist in “right sizing” the fleet to the number of employees.

(Measure R3F7-INT, Appendix B)

GHG 4.3.3 SOLID WASTE/LANDFILL EMISSIONS

Objective GHG W1.3-INT: Reduce GHG emissions through improved management of waste handling and reductions in waste generation.

Reduction Strategies:

1. **Increase Methane Recovery at Mid-Valley, Milliken and Colton Landfills.** These landfills currently have methane recovery systems in place. However, the County will increase the methane recovery to achieve a capture rate of 95 percent at Mid-Valley and 85 percent at the Colton Landfill.

(Measure R2W-INT, Appendix B)

2. **Barstow Methane Recovery.** The County will install a methane recovery system at the Barstow Landfill aimed at capturing 75 percent of emitted methane from all waste currently in place.

(Measure R2W2-INT, Appendix B)

3. **Landers Methane Recovery.** The County will install a methane recovery system at Landers aimed at capturing 75 percent of emitted methane from all waste currently in place.

(Measure R2W3-INT, Appendix B)



4. **Methane Capture Systems at all Landfills with 250,000 or more Tons of Waste in Place (WIP).** The will explore the feasibility of installing a methane recovery system at landfills with 250,000 or more tons of WIP, including but not limited to Apple Valley (closed), big Bear (closed), Hesperia, (closed), and Yucaipa (closed). The County will also explore the feasibility of providing technical support, for the installation of methane recovery systems, to privately owned landfills within the County.

(Measure R3W1-INT, Appendix B)

5. **Financing Mechanisms and Opportunities.** The County will pursue all appropriate grant opportunities to help finance the installation of methane recovery systems and controls.

(Measure R3W2-INT, Appendix B)

6. **Additional Landfill Methane Controls.** The County will continue to assess, through the use of landfill gas extraction systems, surface sampling, gas migration probe, and other available techniques, the feasibility of installing additional methane capture systems at County landfills. In addition, the County will:
 - a. Pursue further study of chemical reactions of methane gas attenuation as it migrates through the cover soils as each landfill, and develop low power methods for improving these reactions;
 - b. Work with other agencies that are studying GHG emissions from landfills and develop partnerships where information and approaches are shared; and
 - c. Further develop waste disposal alternatives such as recycling, waste to energy, Aerobic digestion of organic materials, and other actions.

(Measure R3W4-INT, Appendix B)

7. **Landfill Gas to Energy Projects.** The County will pursue Landfill Gas to Energy (LFGE) projects at landfills where such projects are cost-effective and technologically feasible.

(Measure R3W5-INT, Appendix B)

Objective GHGW1.4-INT: Implement and/or expand current waste reduction and recycling plans, including outreach and education programs.

Reduction Strategies:

1. **Comprehensive Disposal Site Diversion Program.** The County's Comprehensive Disposal Site Diversion Program (CSDSP) recovers ~~post-~~ "post-diversion" waste for recycling at the landfill. Post-diversion is defined as the waste sent to landfill, after accounting for the County's municipal recycling and composting programs, which are accounted for in the 2020 total waste estimates. By 2020 the CSDSP program will divert an estimated 11% of waste arriving at



County landfills each year, increasing the current per capita diversion rate from 49% to approximately 54.5%.

(Measure R2W4-INT, Appendix B)

2. **Construction and Demolition Recycling Program.** The County requires a minimum diversion of 50 percent of construction and building materials, and demolition debris from landfills. In addition, the County also requires a detailed Diversion Plan that identifies the waste hauler and plan verification procedures before issuing building permits. The County anticipates that it will be diverting at least 60% of construction and building materials, and demolition debris from landfills by 2020.

(Measure R2W5-INT, Appendix B)

3. **County and City Diversion Programs—75 Percent Goal.** The County will continue to work with businesses within the County to expand current reduction and recycling plans through, among other things, outreach and education programs, by making recycling and composting mandatory at public events, by providing waste audits as well as establishing an appliance end-of life requirement. The County will also continue to work with the various cities within its jurisdiction to reduce waste and to increase the waste diversion rates from the current 55 to 75% by 2020

(Measure R2W6-INT and R2W7-INT, Appendix B)

4. **Financing Mechanisms and Opportunities.** The County will pursue appropriate grant opportunities to help finance the enhancement of waste diversion programs and public education programs focused on waste stream issues.

(Measure R3W2-INT, Appendix B)

5. **Waste Education Program.** The County will expand its community education programs designed to educate the public and assist residents with waste reduction, recycling and reuse activities.

(Measure R3W3-INT, Appendix B)

4.3.4 EMPLOYEE COMMUTE EMISSIONS

Objective GHG EC1.5-INT: Reduce employee vehicle trips and mitigate emissions impacts from municipal travel.

Reduction Strategies:

1. **Trip Reduction Program.** The County will implement programs to reduce employee vehicle trips, including:



- a. Expanding Vanpool Program. The County will provide incentives and infrastructure to strengthen and expand its vanpool programs by providing features such as pool vehicles, preferred parking, a website bulletin board to facilitate ride-sharing, expanding the number of work sites where the vanpools operate, offering greater flexibility in vanpool scheduling (i.e., allowing commuters to vanpool on the week days of their choice or allowing unscheduled use of vanpools), implementing vanpool education and rewards programs, and offering premium quality vanpool service options (such as high-quality vans, workstations, complimentary newspapers, drinks, etc.)

(Measure R2EC1-INT, Appendix B)

- b. Increasing the use of Ridesharing. The County will increase the use of ridesharing as an alternative to single occupancy driving through incentives such as gas cards, carpool awards, educational seminars, commuter-choice programs, commuter-tax benefits, guaranteed ride-home programs, commuter assistance and outreach, and parking incentives.

(Measure R2EC2-INT, R3EC2-INT Appendix B)

- c. Increasing the Use of Public Transportation. The County will create new or strengthen existing public transit incentives, including but not limited to, providing subsidized free passes for mass transit, parking incentives, commuter assistance and outreach, marketing promotion, improving rider information and education, creating park-and-ride facilities, and providing transit maps and guides.

(Measure R2EC4-INT, Appendix B)

- d. The County will reduce emissions by encouraging telecommuting, compressed work weeks, and off-peak work hours, where appropriate.

(Measures R3EC1, Appendix B)

2. **Increase Bicycling and Walking.** The County will promote and support the use of bicycles as transportation through the following:

- a. Providing bicycle stations with secure parking and storage areas;
- b. Providing a bicycle safety program and information about safe routes to work (cycling maps);
- c. Creating education programs; and
- d. Reimbursing employee cycling mileage expenses.

(Measure R2EC3- INT, Appendix B)

3. **Increase Use of Clean Air Vehicles.** The County will implement commuter assistance, outreach, and educational programs focused on encouraging employees to purchase hybrids and alternative fueled vehicles, and implementing parking



incentives. Where appropriate, the County will also pursue installation of electric vehicle charging stations at County facilities to encourage use of plug-in hybrids and electric vehicles.

(Measure R2EC5-INT, Appendix B)

GHG 4.3.5 CARBON SEQUESTRATION STRATEGIES

Objective GHG CS1.6_INT: Manage vegetation stock to reduce GHG emissions.

Reduction Strategies:

1. **Tree Management.** The County will maintain and increase its tree inventory, and coordinate tree maintenance responsibilities with all responsible departments, consistent with best management practices

(Measure R3CS1-INT, Appendix B)

2. **Landscaping.** The County will evaluate existing landscaping and options to convert reflective and impervious surfaces to landscaping and will install or replace vegetation with drought-tolerant, low maintenance native species or edible landscaping that can also provide shade and reduce heat-island effects.

(Measure R3CS2-INT, Appendix B)

GHG 4.3.6 COUNTY PURCHASING STRATEGIES

Objective GHG EE1.7-INT: Use purchasing power to promote reductions in GHG emissions by the suppliers of its goods and services.

Reduction Strategies

1. **Office Equipment Procurement Standard.** The County will adopt purchasing practices and standards to support reductions in GHG emissions, including a requirement that all office equipment be energy-efficient (ENERGY STAR rated), the use of recycled materials, and purchasing from manufacturers that have implemented green management practices. ENERGY STAR office equipment would have average energy savings of 50 percent from currently used office equipment.⁸

(Measure R2E4-INT, Appendix B)

2. **Leasing Procurement Standard.** Buildings leased by the County will be required to have at least 20 percent lower energy intensity than buildings leased in 2007.

⁸ ENERGY STAR office equipment uses 30–75 percent less energy than conventional equipment (Energy Star 2009).



This Measure requires benchmarking any building being considered for lease by the County. Benchmarking is the process of creating a measure of a building's energy intensity, expressed in kilowatt hours (kWh) per square foot and cubic feet natural gas per square foot.

(Measure R2E5-INT, Appendix B)

3. **Contracting Practices.** The County will establish bidding standards and contracting practices that encourage GHG emissions reductions, including preferences or points for the use of low or zero emissions vehicles and equipment, recycled materials, and provider implementation of other green management practices.

(Measure R3E8-INT, Appendix B)

GHG 4.3.7 SUMMARY

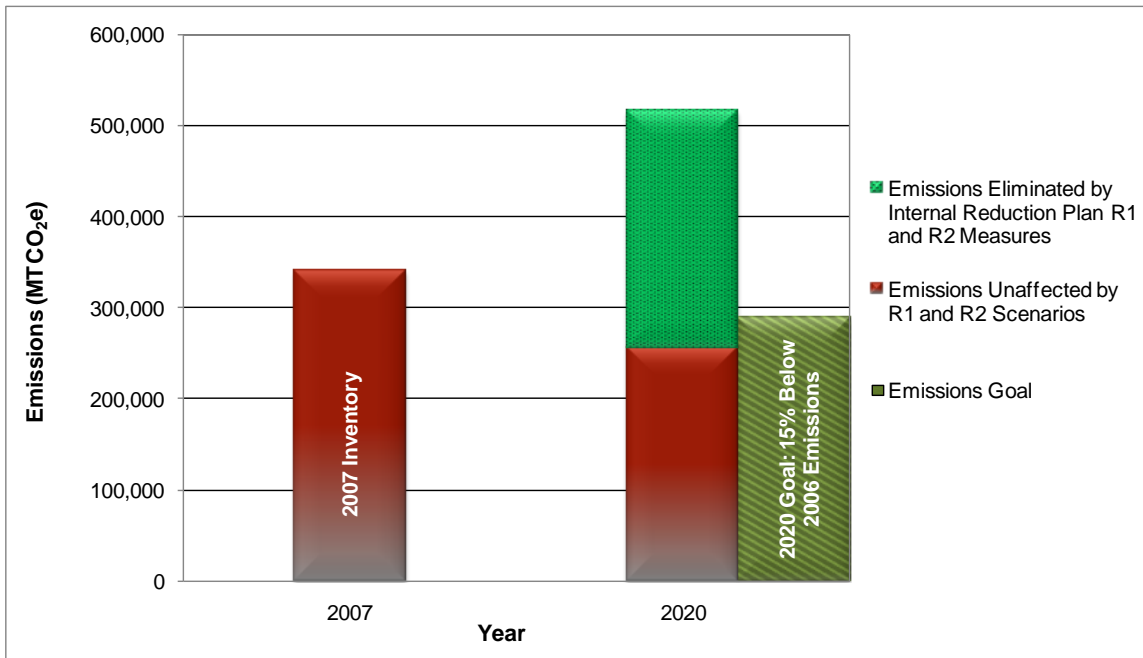
The Internal Inventory reduction strategies described in this Plan provide more than sufficient emission reductions to meet the County's 2020 goal to reduce emissions 15 percent below Current levels. As shown in **Table 4-9** below, the Internal Inventory measures will result in a reduction totaling 260,692 MTCO₂e.

Table 4-9: Internal GHG Emission Reductions from Implementation of Internal Strategies

Sector	2020 Reduction (MTCO ₂ e)		
	State Measures	County Measures	TOTAL
Solid Waste/Landfills	0	206,960	206,960
Building Energy	15,892	17,543	33,435
Vehicle Fleet/Fuels	11,179	4,467	15,647
Employee Commute	0	4,651	4,651
Total	27,071	233,621	260,692

With implementation of the reduction measures for the Internal Inventory by 2020, GHG emissions will be approximately 24 percent lower than 2007 emissions. **Figure 4-8** below graphically depicts this resolution.

Figure 4-8: Summary of Internal GHG Emission Reductions





CHAPTER 5.0

PUTTING THE PLAN INTO ACTION

Success in meeting the County's GHG emission reduction goal will depend on cooperation and participation by County departments, residents, businesses, and other entities in the County's LUA. As with other administrative responsibilities of the County, the level of implementation will depend upon adequate funding. Budgetary considerations regarding Plan implementation will be balanced with other County obligations. Yet, in spite of current fiscal constraints, the County anticipates that it will be able to achieve the overall target of GHG Emissions Reduction by 15% of the 2007 level by 2020. The County believes that this can be accomplished because this Plan builds on a foundation of various activities that the County has already been undertaken and incorporated into its normal operating procedures. The reduction measures that are included in this Plan, which are under County jurisdiction and control, can be implemented by 2020 with current and expected future County revenues. Supplemental funding through grants and sources will be sought out to augment County revenues in cases where accelerated or expanded implementation can be achieved.

This section outlines key steps that the County will follow for the implementation of this Reduction Plan. Some steps will occur in sequence and some concurrently.

GHG 5.1 ADMINISTRATION AND STAFFING

The County will establish a team from among existing County Executive Staff and Department Heads to oversee GHG Plan implementation. Designated Executive Staff and Department Heads will form the County GHG Reduction Team (GRT) to support and guide the County's efforts to reduce emissions.

An Implementation Coordinator will be selected to serve as team leader and coordinate implementation of the GHG Reduction Plan.

The County GRT, reporting to the County Executive Officer (CEO), will be responsible for implementing this Reduction Plan, coordinating all County departments, and recommending modifications and changes to the Reduction Plan over time.

The GRT will include the following departments, but will be expanded as needed to ensure coordinated leadership in Plan implementation:

- *County Executive Office.* The CEO's office can provide economic, financial, and administrative guidance and support to the GRT.
- *Economic Development Agency.* This agency can provide expertise in evaluating and managing the economic impacts of the plan.



- *Land Use Services Department.* LUSD can provide expertise in the use of County code and policies to implement Reduction Plan measures through the project entitlement process and provide long-term planning support.
- *Architecture and Engineering.* This department can provide technical expertise in the development of code requirements and the evaluation of technical feasibility of different reduction measures.
- *Facilities Management.* This department has been and will be implementing energy efficiency measures for County buildings and thus can provide expertise on crafting green building requirements and programs for the community at large.
- *Public Works.* The Transportation and Land Development and Construction divisions can provide expertise on use of alternative fuel vehicles for transportation and for construction, as well as use of solar messaging boards and other energy-saving measures.
- *Fleet Management.* This department can provide expertise in alternative fuel vehicles and infrastructure for both internal operations and private fleet operations.
- *Human Resources.* This department can provide expertise in ride-share activities, telecommute operations and flexible work schedules.
- *Special Districts.* This department can provide expertise in recreational facilities, senior citizen/community centers and in similar functions to Public Works and Solid Waste related to construction and waste management.
- *Solid Waste Management.* This division can provide expertise in the implementation of waste diversion and landfill methane components of the plan.

The Implementation Coordinator will be responsible for monitoring and reporting on progress towards meeting the 2020 reduction goal and will have the following responsibilities:

- Securing long-term financing for reduction programs and coordinating the budget for emissions reduction planning.
- Coordinating GRT meetings and the implementation of specific GRT identified actions.
- Establishing regional partnerships with cities in the County, utilities (including Southern California Edison and Southern California Gas), SANBAG, local businesses, non-profit organizations, and other stakeholders to leverage and maximize efficiency of emissions reduction efforts.
- Conducting periodic outreach efforts to involve the entire community in emissions reduction planning.
- Developing a protocol for regular reporting on reduction measures and progress towards meeting the emissions goals, and coordinating periodic monitoring of emissions reductions.



- Reporting periodically to the GRT, the CEO, the Board of Supervisors, and other boards and commissions on emissions reduction progress.
- Identifying and recommending new actions and programs or modifications to current actions and programs, as data becomes available on cost effectiveness, new revenue sources appear, and technology improvements bear fruition.
- Tracking state and federal legislation and its applicability to the County

GHG 5.2 FUNDING AND BUDGETING

Implementation of the GHG Plan will require creative, continuing and committed funding in order to work. Local, regional, state, and federal public sources of funding will be needed along with the substantial involvement of the private sector. The Reduction Measures labeled as R1 measures are within the federal, state and regional agency authority and responsibility for implementation. The County is prepared to implement all R2 and R3 measures by 2020. However, for the majority of these measures that are within the authority of the County to implement, the measures are anticipated to be in a start-up or continuing operational mode within four years of the adoption of the GHG Plan. Certain measures that involve significant capital improvements such as methane recovery systems at County landfills or retrofit of energy systems at County buildings will be done in accordance with existing capital improvement programs of County Departments such as Solid Waste Management and Facilities Management.

As one of the first priorities for implementation of the plan, the County will assess the on-going or planned activities currently anticipated by County Departments that make a direct or indirect contribution to GHG reduction. The costs of implementing the GHG reduction measures identified in this plan will take into account the costs and staff resources as well as the benefits and cost savings of proposed implementation actions. The County will conduct a cost-effectiveness analysis in cases where there may be limited staff or funding resources in order to identify the highest priority actions. The GRT will establish implementation priorities for annual department budgets based on funding available, priority actions and other factors relevant to building departmental annual work programs. Implementation of the GHG Emissions Reduction Plan will be integrated into the annual work program and budget of each of the key County Departments that are part of the GRT and will be approved by the Board of Supervisors as part of the annual County budget approval process. The GRT Implementation Coordinator will work with each of the GRT participating departments to develop a tracking and accounting process that will facilitate monitoring and reporting of implementation. The tracking and accounting process will provide for an orderly and systematic method for calculation of GHG emission reductions to assist with periodic adjustments, if needed, and for future “re-inventorying” of GHG emissions.

While all of the R2 and R3 measures are expected to be fully implemented by 2020, there may be opportunities to accelerate the timing or extent of implementation through grants, tax incentives and other funding sources. The County will continue to explore such opportunities. For example, Clean Water Act or Clean Air Act grants could assist in earlier completion of specified methane recovery systems at landfills that are currently planned by the County, but may be programmed in out years closer to 2020 based on existing capital improvement plans. Likewise, such federal



grants could assist with improvements to water treatment or water delivery systems or use of treated water for landscaping and other non-potable water use purposes. The following different funding options will be explored by the GRT:

- *State and Federal Grants and Low-interest Loans.* As described below there is a variety of grant and loan programs that exist in various sectors.
- *Support from Local Businesses, Non-Profits, and Agencies.* Opportunities for public-private partnerships (like the existing SCE partnership) exist to provide cooperation on many aspects of the Reduction Plan including energy efficiency retrofits, waste minimization, transit promotion, and education.
- *Self-Funding and Revolving Fund Programs.* Innovative programs to fund residential solar investments.
- *Agreements with Private Investors.* Energy service companies (ESCOs) and other private companies can finance up-front investments in energy efficiency and then be reimbursed through revenues from energy savings.
- *Carbon Offsets.* With an emerging offset market, there will be opportunities to fund reduction efforts through the sale of offsets. In particular, this may be an opportunity for the County related to reductions of landfill methane given that the County landfills receive most of the waste of the entire County while only being responsible for generating a minor (perhaps 15 percent) amount of total waste.
- *Taxes and Bonds.* Various municipalities have used targeted finance instruments for solar, transportation, vehicle improvements, and landfill methane controls.

Given that finance availability is critical to implementing many measures, a review of current and potential funding sources was completed for the different sectors covered in this Plan and is presented below to help early phase implementation of the GHG Plan.

Whether at the federal, regional or state level, it appears likely that there will be some form of a cap and trade system in place within several years. This system, depending on its particular character, is likely to influence energy prices (such as for electricity, natural gas, and vehicle fuels), and may make currently cost-ineffective measures more economically feasible.

GHG 5.2.1 ENERGY EFFICIENCY AND RENEWABLE ENERGY FUNDING

Federal Energy Efficiency Community Block Grants (EECBG)

As part of the stimulus package (the “American Recovery and Reinvestment Act” or ARRA), signed into law by President Obama in spring 2009, block grants are available for energy efficiency planning and improvements in the building, transportation, and other sectors. The purpose of the EECBG Program is to assist eligible entities in creating and implementing strategies to: reduce fossil fuel emissions in a manner that is environmentally sustainable and that maximizes, to the greatest extent practicable, benefits for local and regional communities; reduce the total energy use of the eligible entities; and improve energy efficiency in the building sector, the transportation sector, and other appropriate sectors. Eligible activities include: development of an energy efficiency and conservation strategy; technical consultant services; residential and commercial building energy audits; financial incentive programs; energy efficiency retrofits; energy efficiency and conservation programs for buildings and facilities; development and implementation of certain transportation programs; building codes and inspections; certain distributed energy projects; material conservation programs; reduction and capture of methane and greenhouse gases from landfills and dairies; efficiency traffic signals and street lighting; renewable energy technologies on government buildings; and other appropriate activity.

Federal Tax Credits for Energy Efficiency

On October 3, 2008, President Bush signed into law the “Emergency Economic Stabilization Act of 2008.” This bill extended tax credits for energy efficient home improvements (windows, doors, roofs, insulation, HVAC, and non-solar water heaters). Tax credits for these residential products, which had expired at the end of 2007, will now be available for improvements made during 2009. However, improvements made during 2008 are not eligible for a tax credit. The bill also extended tax credits for solar energy systems and fuel cells to 2016. New tax credits were established for small wind energy systems and plug-in hybrid electric vehicles. Tax credits for builders of new energy efficient homes and tax deductions for owners and designers of energy efficient commercial buildings were also extended.

(See: http://www.energystar.gov/index.cfm?c=products.pr_tax_credits.)

SCE Energy Efficiency / Renewable Energy Incentives

- *Savings By Design* (for new non-residential construction): Design assistance, owner incentives, and design team incentives.
- *Standard Performance Contract Incentives*: Lighting (\$0.05/kWh), Air Conditioning and Refrigeration (\$0.14/kWh), other (\$0.08/kWh).
- *California New Homes Program* (CANHP): New Residential Construction: approximately \$500–\$2,000 / home.
- *Direct Install Program* (business customers with less than 100 kW demand): Free energy analysis; free lighting, refrigeration, and LED exit sign upgrades; free installation.



- *Retro-commissioning Program*: Free analysis, incentives for implementing energy efficiency measures, and free training.
- *California Solar Initiative (CSI) and New Solar Homes Partnership (NSHP)*: Solar rebate program for existing (CSI) and new (NSHP) buildings: ~\$2.50/Watt installed.
- Industrial Energy Efficiency Program.
- Various other commercial incentive/rebate programs (see <http://www.sce.com/b-rs/commercial/>).

Metropolitan Water District of Southern California (Metropolitan) Incentives

Metropolitan has rebates for homeowners, multi-family developers, businesses, and homebuilders and incentives related to water consumption under the Be Water Wise program (see <http://www.bewaterwise.com/rebates01.html>).

Inland Empire Utility Agency (IEUA)

IEUA offers a number of rebates for the residential, commercial, industrial, and municipal sectors (see <http://www.ieua.org/rebates/rebates.html>).

Clean Renewable Energy Bonds (CREBs)

CREBs can be used by certain entities—primarily in the public sector—to finance renewable energy projects. The list of qualifying technologies is generally the same as that used for the federal renewable energy production tax credit. CREBs may be issued by electric cooperatives, government entities (states, cities, counties, territories, Indian tribal governments, or any political subdivision thereof), and certain lenders. The advantage of CREBs is that they are issued—*theoretically*—with a zero (0) percent interest rate. The borrower pays back only the principal of the bond, and the bondholder receives federal tax credits in lieu of the traditional bond interest. (See http://www.irs.gov/irb/2007-14_IRB/ar17.html.)

AB 811 Financing Districts

AB 811 permits the creation of assessment districts to finance installation of distributed generation renewable energy sources or energy efficiency improvements that are permanently fixed to residential, commercial, industrial, or other real property. The use of such a district can remove the up-front cost or up-front financing as an impediment to property owners who would like to install energy efficiency upgrades or renewable energy systems. Financing is repaid through the property tax bill and repayment obligations remain with the property when it is sold to a new owner.¹

¹ AB811 Financing districts are currently constrained by Fannie Mae and Freddie Mac mortgage requirements. It is presumed that this constraint will be overcome in the future and/or alternative financing mechanisms can be developed to support this plan.



GHG 5.2.2 TRANSPORTATION FUNDING

Federal Energy Efficiency Community Block Grants (EECBG)

As described above, eligible activities include development and implementation of certain transportation programs and efficiency traffic signals and street lighting.

Measure I

Measure I authorizes SANBAG to impose a half cent retail transactions and use tax applicable in the incorporated and unincorporated areas of the County for the 20-year period between April 1, 1990 and March 31, 2010. By approving Measure I, County voters guaranteed that all of the funds collected would be expended in the County for certain types of transportation projects. Measure I will generate approximately \$1.8 billion for transportation improvements in the County throughout the life of the 20-year sales tax.

Regional Improvement Program (RIP)

The RIP is funded from 75 percent of the funds made available for transportation capital improvement projects under the State Transportation Improvement Program (STIP). This program targets urban projects that are needed to improve transportation within the region. SANBAG recommends to the California Transportation Commission (CTC) the selection of these projects, which can include state highway improvements, local roads, public transit, intercity rail, grade separations, and more.

Interregional Improvement Program (IIP)

The IIP is funded from 25 percent of the funds made available for transportation capital improvement projects under the STIP. This program targets projects that are needed to improve interregional movement of people and goods. Caltrans recommends to the CTC the selection of these projects, which can include state highway improvements, intercity passenger rail, mass transit guideways, or grade separation projects. SANBAG participates in this process by supporting or recommending the most cost-effective projects for implementation.

Regional Transportation Improvement Program

SANBAG participates in the development of the Regional Transportation Improvement Program (RTIP), assembled by the Southern California Association of Governments (SCAG). The RTIP is a listing of all capital transportation projects proposed over a six (6)-year period for the SCAG region. Projects include highway improvements, transit, rail and bus facilities, carpool lanes, signal synchronization, intersection improvements, freeway ramps, and other related improvements. In the SCAG region, updates are made to the RTIP every two years, during even-numbered years.

Passenger Rail Short Range Transportation Plan



This program funds substantial passenger rail improvements within the San Bernardino Valley. In addition to setting aside SANBAG's share of capital improvements on all three (3) passenger rail lines, SANBAG is also proposing major investments extending passenger rail service from the City of San Bernardino to the City of Redlands and extending Los Angeles County's METRO Gold Line beyond the City of Azusa to a new terminus in the City of Montclair within San Bernardino Valley, as approved in the Measure I extension expenditure plan of 2004. The sum of all these investments in rail is \$290,426,000. Of this total, \$91,300,000 is expected from the federal New/Small Starts program and \$19,606,000 from California State transportation funds.

San Bernardino County Public Transit—Human Services Transportation Coordination Plan

Federal Transit Administration (FTA) Section 5310 provides capital assistance for the purchase of vehicles and associated equipment by non-profit agencies for the provision of transportation to elderly individuals and individuals with disabilities for whom mass transportation services are unavailable, insufficient, or inappropriate.

Transportation Development Act: Article 3 Biennial Call for Projects

SANBAG Board of Directors approved a call for projects for city and County projects related to the construction of pedestrian and bicycle facilities, as well as improvement projects for transit stops. The Transportation Development Act (TDA) provides for two (2) percent of the Local Transportation Funds (LTF) to be made available for these purposes.

GHG 5.2.3 WASTE REDUCTION FUNDING

Resource Conservation Funds 2009

The USEPA Region 9 is soliciting proposals to fund projects that address solid waste reduction and management. Funds will be awarded pursuant to Section 8001 of the Resource Conservation and Recovery Act (RCRA), 42 USC §6981. Funding will be in the form of cooperative agreements and/or grants. Funds will be awarded to applicants carrying out projects that serve the following states and territories: Arizona, California, Hawaii, Nevada, the U.S. territories in the Pacific Ocean, and the lands in Indian Country belonging to over 140 federally recognized tribes which fall under USEPA Region 9's geographic area. The aim of this funding is to support innovative ideas with the goal of fostering positive change. Projects may include studies, surveys, investigations, demonstrations, training, and public education programs. All demonstration projects must demonstrate applications, technologies, methods, or approaches that are new, innovative, or experimental. A demonstration project that is carried out through a routine or established practice is not eligible for funding. Under this announcement, USEPA Region 9 anticipates awarding approximately two to four cooperative agreements and/or grants totaling approximately \$120,000. USEPA Region 9 anticipates that each grant or cooperative agreement will range in size from approximately \$20,000 to \$100,000.

See <http://www.epa.gov/region09/funding/rcra.html> for additional details.

California Integrated Waste Management Board Grants and Loans

The CIWMB offers funding opportunities authorized by legislation to assist public and private entities in the safe and effective management of the waste stream. See <http://www.ciwmb.ca.gov/grants/> for more details.

GHG 5.2.4 WATER CONVEYANCE AND TREATMENT FUNDING

Clean Water State Revolving Funds (CWSRFs)

CWSRFs fund water quality protection projects for wastewater treatment, nonpoint source pollution control, and watershed and estuary management. CWSRFs have funded over \$63 billion, providing over 20,700 low-interest loans to date.

(See <http://www.epa.gov/owm/cwfinance/cwsrf/index.htm> for more details.)

CWSRF's offer:

- *Low Interest Rates, Flexible Terms.* Nationally, interest rates for CWSRF loans average 2.1 percent compared to market rates that average 4.3 percent. For a CWSRF program offering this rate, a CWSRF funded project would cost 18 percent less than projects funded at the market rate. CWSRFs can fund 100 percent of the project cost and provide flexible repayment terms up to 20 years.
- *Funding for Nonpoint Source Pollution Control and Estuary Protection.* CWSRFs provided more than \$240 million in 2007 to control pollution from nonpoint sources and for estuary protection, more than \$2.6 billion to date.
- *Assistance to a Variety of Borrowers.* The CWSRF program has assisted a range of borrowers including municipalities, communities of all sizes, farmers, homeowners, small businesses, and nonprofit organizations.
- *Partnerships with Other Funding Sources.* CWSRFs partner with banks, nonprofits, local governments, and other federal and state agencies to provide the best water quality financing source for their communities.

GHG 5.3 TIMELINE AND PRIORITIZATION

The County will develop an implementation schedule based on the completion of the cost-effectiveness analysis and assessment of existing and planned County activities currently programmed by the County as part of its on-going provision of services. Prioritization will be based on the following factors:

- Cost effectiveness
- GHG reduction efficiency
- Availability of funding



- Level of County Control
- Ease of implementation
- Length of Time required to implement

In general consideration of these factors, the following is an outline of key priorities for three (3) phases starting in 2011 through 2020.

- **Phase 1 (2011–2012):** Development of key programs (such as continuation of the Green County Program adopted in 2007, warehouse solar program, expansion of waste diversion goal to 60 percent, etc.), completion of key planning efforts (e.g., implement DRP process into development permit processing procedures, integrate regional land use/transportation planning); implementation of most cost-effective measures (e.g., energy efficiency retrofits at County facilities and continuation of retrofits existing housing of low-income families, first tier landfill controls, rideshare/carpool measures, etc.); and support of voluntary efforts.
- **Phase 2 (2013–2015):** Continued implementation of Phase 1 measures, implementation of second tier measures (expand waste reduction target to 70 percent, new building solar installations, next level of landfill controls, etc.); and implementation of key planning outcomes from Phase 1 (transit-oriented development, etc.)
- **Phase 3 (2015–2020):** Continued implementation of Phase 1 and Phase 2 measures, implementation of third tier of measures (expand waste reduction target to 75 percent, next level of landfill controls, etc.).

Because the reduction target of this GHG Reduction Plan is aggressive, success in meeting the GHG Reduction Plan goals depend on some flexibility in the GHG reduction actions. While the County is committed to implementing the reduction measures and meeting the goals of this Reduction Plan, flexibility must be maintained in order to be successful. Successful implementation of the reduction measures in this Plan may be implemented through various options. The goals of each reduction measure can often be achieved through a variety of means, especially those related to building energy efficiency. For example, the County has already established procedures to use Green Building practices for new County built facilities that require adherence to energy efficient design as required by reduction measures R2E3 and R2E4. Another example of the County's aggressive actions to reduce its internal emissions inventory is a recently constructed new County Library met the Gold Standard for Green Building practices. Private sector development will need to comply with the Development Review Process for Reduction of GHG Emissions. The process provides a means for streamlined review by incorporating design features that can achieve GHG emissions reductions through many combinations of actions including, but not limited to: installing energy efficient appliances, lighting, and HVAC systems; installing solar panels and solar water heaters; siting and orienting buildings to optimize conditions for natural heating, cooling, and lighting; installing top-quality windows and



insulation; and incorporating natural shading, skylights, and reflective surfaces as well as smart growth and compact and mass transit oriented development design measures.

Table 5-1 presents the anticipate phasing sequence for the GHG reduction measures.

Table 5-1: Anticipated Phasing of External GHG Reduction Measures

Emissions Reduction Measures	Phase
Building Energy	
R2E1: Residential Energy Efficiency Retrofits	1
R2E2: Commercial Energy Efficiency Retrofits	1
R2E3: Residential Retrofit Renewable Energy Incentives	1, 2, 3
R2E4: Warehouse Renewable Energy Incentive Program	1, 2, 3
R2E5: Solar Hot Water Incentives	2
R2E6: Residential Energy Efficiency for New Development	2
R2E7: Commercial Energy Efficiency for New Development	1
R2E8: New Home Renewable Energy	2
R2E9: New Commercial/Industrial Renewable Energy	2
R2E10: Commercial/Industrial Rehabilitation/Expansion Renewable Energy	2
R3E1: Green Building Development Facilitation and Streamlining	1, 2, 3
R3E2: Green Building Training	1, 2, 3
R3E3: Community Building Energy Efficiency & Conservation for Existing Buildings	1
R3E4: Energy Efficiency Financing	1, 2, 3
R3E5: Heat Island Mitigation Plan	2
R3 E6: Public Education	1, 2, 3
R3E7: Cross-Jurisdictional Coordination	1, 2, 3
R3E8: Community Alternative Energy Development Plan	2
R3E9: Support Utility-Scale Renewable Energy Siting and Transmission Lines	1, 2, 3
R3E10: Identify and Resolve Potential Barriers to Renewable Energy Deployment	1
R3E11: Solar Ready Buildings	2
R3E12: Renewable Energy Financing	2
R3E13: Regional Renewable Energy Collaboration	2
R3E14: Accessory Wind Energy Systems	2
R3E15: Off-Site Mitigation of GHG Impacts for New Development	1
Transportation	
R2T1: Anti-Idling Enforcement	1, 2, 3
R2T2: Employment Based Trip and VMT Reductions	1, 2, 3
R2T3: Revise Parking Policies	1
R2T4: Roadway Improvements including Signal Synchronization and Traffic Flow Management	1
R2T5: Expand Renewable Fuel/Low-Emission Vehicle Use	2, 3
R2T6: Ridesharing and Carpooling	1, 2, 3
R2T7: Bicycle/Pedestrian Infrastructure and Promotion	1, 2, 3

Emissions Reduction Measures	Phase
R2T8: Construct High Occupancy Vehicle (HOV) Lanes	1, 2, 3
R3T1: Public Transit Measures	1, 2, 3
R3T2: Leverage Existing Financing Mechanisms and Opportunities	1, 2, 3
R3T3: Diesel Exhaust Emissions Control Measures	1
R3T4: Regional Land Use/Transportation Coordination	1
R3T5: Regional Employment Based Trip Reduction Programs.	1
R3T6: County Commuter Services Program.	1
R3T7: Home Employment.	1
R3T8: Intelligent Transportation Systems Applications.	2
R3T9: Public Outreach and Educational Programs Relative to Various Modes of Transportation.	1
R3T10: Land Use Strategies to Reduce Reliance on Automobile Use	1
Waste	
R2W1: Increase Methane Recovery at Mid-Valley, Milliken, and Colton Landfills	3
R2W2: Barstow Methane Recovery	1
R2W3: Landers Methane Recovery	2
R2W4: Comprehensive Disposal Site Diversion Program	1
R2W5: C&D Recycling Program	1
R2W6: County Diversion Program - 75 percent Goal	1, 2, 3
R2W7: City Diversion Programs - 75 percent Goal	1, 2, 3
R3W1: Install Methane Capture Systems at all Landfills with 250,000 or more Tons of WIP	3
R3W2: Leverage Existing Financing Mechanisms and Opportunities	1, 2, 3
R3W3: Waste Education Program	1, 2, 3
R3W4: Additional Landfill Methane Controls	1, 2, 3
R3W5: Landfill Gas to Energy Projects	3
Water	
R2WC1: Per Capita Water Use Reduction	1
R3WC2: Manage Storm Water Runoff	1, 2, 3
R3WC3: Conservation Areas	1, 2, 3
R3WC4: Financing Mechanisms and Opportunities	1, 2, 3
Natural Resources	
R3NR1: Conservation Areas	1, 2, 3
R3NR2: Compensation for Loss of Sequestration	2, 3
R3NR3: Urban Forestry	2, 3

Table 5-2: Anticipated Phasing of Internal GHG Reduction Measures

Emissions Reduction Measures	Phase
Building Energy	
R2E1-INT: LEED Silver for New County Buildings	1



Emissions Reduction Measures	Phase
R2E2-INT: Retrofit Existing Buildings	1,2,3
R2E3-INT: Increase Use of Combined Heat and Power Systems	2,3
R2E4-INT: Office Equipment Procurement Standard	1
R2E5-INT: Leasing Procurement Standards	1
R2E6-INT: Install solar and other renewable energy sources on County Buildings	1,2,3
R2E7-INT: HVAC Retrofit Program	1,2,3
R2E8-INT: Solar PV Installation Projects	2,3
R3E1-INT: Utilize Incentives Offered by Southern California Edison Partnership	1,2,3
R3E2-INT: Benchmark Existing Buildings	1
R3E3-INT: Link Utility Payment/Energy Usage Data into the Computer Aided Facilities Management Database	1
R3E4-INT: Train County Employees on Energy Efficiency and Conservation	1
R3E5-INT: Apply Energy Saving Design Features	1,2,3
R3E6-INT: Contracting Practices	1
R3E7-INT: Small Tools and Equipment Use	2
Transportation	
R2F1a-INT: Current fleet turnover	1,2,3
R2F1b-INT: Replace Passenger/Light-Duty Vehicles by 2020	1,2,3
R2F2-INT: Replace All Medium and Heavy-duty Vehicles by 2020	1,2,3
R3F1-INT: Implement Accelerated Vehicle Fleet Turnover for Other Vehicles	2,3
R3F2-INT: Use Hybrid/ULEV Vehicles	2,3
R3F3-INT: Implement Early Tire Inflation Program	1
R3F4-INT: Implement Anti-Idling Measures	1
R3F5-INT: Implement Smart Driving Policy	1
R3F6-INT: Implement Vehicle Maintenance Program	1
R3F7-INT: Senate Bill 375, Statutes 2008	2,3
R3F8-INT: California's Low-Emission Vehicle (LEV) Program	N/A (state)
R3F9-INT: Zero Emission Vehicle (LEV) Regulations	N/A (state)
R3F10-INT: Fleet and Equipment Management and Monitoring	1,2,3
Waste	
R2W1: Increase Methane Recovery at Mid-Valley, Milliken, and Colton Landfills	3
R2W2: Barstow Methane Recovery	1
R2W3: Landers Methane Recovery	2
R2W4: Comprehensive Disposal Site Diversion Program	1
R2W5: C&D Recycling Program	1
R2W6: County Diversion Program - 75 percent Goal	1, 2, 3
R2W7: City Diversion Programs - 75 percent Goal	1, 2, 3
R3W1: Install Methane Capture Systems at all Landfills with 250,000 or more Tons of WIP (Optional)	3
R3W2: Leverage Existing Financing Mechanisms and Opportunities (Optional)	1, 2, 3
R3W3: Waste Education Program	1, 2, 3
R3W4: Additional Landfill Methane Controls (Optional)	1, 2, 3



Emissions Reduction Measures	Phase
R3W5: Landfill Gas to Energy Projects (Optional)	3
Employee Commute	
R2EC1-INT: Expand Vanpool Program	1
R2EC2-INT: Increase the Use of Ridesharing as an Alternative to Single Occupancy Driving	1
R2EC3-INT: Increase Bicycling and Walking	1
R2EC4-INT: Increase the Use of Public Transit as an Alternative to Driving	2,3
R2EC5-INT: Increase Use of Clean Air Vehicles	2,3
R3EC1-INT: Telecommuting, compressed Work Week	2,3
Natural Resources	
R3CS1-INT: Tree Management	1,2,3
R3CS2-INT: Landscaping	1,2,3

GHG 5.4 PUBLIC INVOLVEMENT IN THE IMPLEMENTATION PROCESS

The citizens and businesses in the County are integral to the success of GHG reduction efforts. Their involvement is essential in order to reach the reduction goals because this Plan depends on a combination of state and local government efforts, public and private sources of finance, and the voluntary commitment, creativity, and participation of the community at large.

In August 2007, the Board of Supervisors launched Green County San Bernardino to spur the use of “green” technologies and building practices among residents, business owners, and developers in the County. Green County San Bernardino includes a public awareness component aimed at educating residents about steps they can take in their daily lives to conserve resources and protect the environment

The County will educate stakeholders such as businesses, business groups, residents, developers, and property owners about the Reduction Plan and encourage participation in efforts to reduce GHG emissions in all possible sectors.

GHG 5.5 REGIONAL COOPERATION

GHG 5.5.1 Green Valley Initiative

The Green Valley Initiative (GVI) envisions that the Inland Empire region will be a center of green technology with balanced economic and community development. Its mission is to transform Riverside and San Bernardino Counties into a region that integrates people and business with natural resources to create jobs, greater opportunities, and a higher quality of life. Regional organizations, the counties and cities, and businesses will work together to accomplish the goal of creating a healthy economic and environmental future.

San Bernardino and Riverside Counties initiated efforts in June 2007, and over 400 parties have participated in the development of recommendations for the GVI. The GVI is a project of the



Green Institute for Village Empowerment (GIVE), which seeks to empower, encourage, and promote principles of sustainability through education, training, and leading by example.

All San Bernardino County cities are invited to join the GVI by becoming a –Green Valley” jurisdiction. The County will encourage the incorporated cities to join the GVI, participate in the County’s GHG Reduction Plan, and develop their own climate action plans to reduce GHG emissions. To join GVI, cities will need to adopt the GVI resolution, declaring their participation in GVI and commitment to a higher quality of life through the implementation of sustainable policies that promote responsible economic and community development.

Green Valley Cities must pledge to address five (5) or more policy areas that aim to reduce GHG emissions. Cities have complete discretion over which policies they choose to adopt. GVI recognizes that each city is unique and a one-size-fits-all approach is counteractive to the overall goal of sustainable economic and community development.

Participants joining the GVI will document their participation by resolution or letter, identify a Green Valley coordinator, and pledge to address a minimum of five (5) of the listed policy areas shown below, as they are developed:

- Green Building Programs
- Buy Green/Buy Local
- Green Business Programs
- Conservation and Recycling
- Solar and Alternative Energy
- Encourage Green Economic Development
- Green Valley Land Use
- Green Valley Coordinators

San Bernardino County cities that have already joined GVI include Adelanto, Chino, Fontana, Loma Linda, Rancho Cucamonga, Rialto, Redlands, the Town of Yucca Valley, and Yucaipa. Other participants include Cucamonga Valley Water District, the Western Riverside Council of Governments, the Eastern and Western Municipal Water Districts, the Cherry Valley Water District, the March Air Force Base JPA, the County of Riverside, Beaumont, Coachella, Canyon Lake, Cathedral City, Corona, Desert Hot Springs, Indian Wells, La Quinta, and Riverside. GVI and its partners hope to have more agencies join them in their quest to transform the Inland Empire into the –green valley.”

GHG 5.5.2 Other Regional Cooperation Opportunities

There are other substantial opportunities for regional collaboration that will be essential to implementation of this Reduction Plan. These opportunities include, but are by no means limited to the following:

- *Energy Efficiency.* There may be opportunities for regional energy efficiency

- programs that can reduce program implementation and administration costs and that could leverage combined sources of financing to the benefit of the County and the San Bernardino cities.
- *Alternative Energy.* There may be opportunities for cross-jurisdictional cooperation on community-scale alternative energy installations (wind, solar, etc.).
 - *Land Use and Transportation.* The County already coordinates with the San Bernardino cities in planning for their spheres of influence, and works with regional transportation planning agencies and providers. In order to fully implement General Plan policies promoting transit and mixed use development, continued coordination will be necessary to promote transit-oriented development throughout the region by supporting transit funding and development, by promoting adequate densities to support transit in those portions of the County where it is feasible, and to coordinate land use planning with the cities. With SB 375 and its linkage to transportation funding, it will be crucial for the San Bernardino cities and the County to develop a shared vision of how land use and transportation can be consistent with the next Regional Transportation Plan and the required Sustainable Communities Strategy.
 - *Waste/Landfills.* As described above and in Appendix A, this Plan includes the adoption of a 75 percent diversion goal by the cities in San Bernardino in addition to County adoption of such a goal. The County and the cities need to coordinate to provide the facilities, programs, and incentives so that these goals could be achieved by 2020 and to avoid inefficiencies in implementation
 - *Water.* While the County can continue to influence water efficiency through requirements for new development, as well as cooperation with water purveyors to promote conservation in indoor and outdoor water use from existing developments.

GHG 5.6 DEVELOPMENT PROJECT REVIEW

The County will establish procedures to implement the Development Review Process (DRP) for evaluating new projects (as defined by CEQA) in the County's LUA area for consistency with this Plan, CEQA guidelines, and any applicable state, regional and local plans to reduce GHG emissions. The CEQA Guidelines encourages programmatic GHG mitigation strategies including reliance on adopted regional blueprint plans, GHG reduction plans, and general plans that meet regional and local GHG emissions targets and that have also undergone CEQA review. The County, as lead agency, determines significance of a project's generation of GHG emissions and has the authority to make this determination based upon a project's compliance with this Plan.

An important administrative objective of the County in adopting a GHG Plan is that it satisfies the requirements of Section 15183.5 of the CEQA Guidelines, which sets forth standards for using a greenhouse gas reduction plan to address the GHG emissions of specific projects. Under this Guideline, compliance with the GHG Plan can be used in appropriate situations to determine the significance of a project's effects relating to greenhouse gas emissions, thus providing streamlined CEQA analysis of future projects that are consistent with the approved GHG Plan.



Guideline section 15183.5(b) reads as follows:

(b) Plans for the Reduction of Greenhouse Gas Emissions. Public agencies may choose to analyze and mitigate significant greenhouse gas emissions in a plan for the reduction of greenhouse gas emissions or similar document. A plan to reduce greenhouse gas emissions may be used in a cumulative impacts analysis as set forth below. Pursuant to sections 15064(h)(3) and 15130(d), a lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted plan or mitigation program under specified circumstances.

(1) Plan Elements. A plan for the reduction of greenhouse gas emissions should:

- (A) Quantify greenhouse gas 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 greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable;*
 - (C) Identify and analyze the greenhouse gas 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, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;*
 - (E) Establish a mechanism to monitor the plan's progress towards achieving the level and to require amendment if the plan is not achieving specified levels;*
 - (F) Be adopted in a public process following environmental review.*
- (2) Use the Later Activities. A plan for the reduction of greenhouse gas emissions, once adopted following certification of an EIR or adoption of an environmental document, may be used in the cumulative impacts analysis of later projects. 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. If there is substantial evidence that the effects of a particular project may be cumulative considerable, notwithstanding the project's compliance with the specified requirements in the plan for the reduction of greenhouse gas emissions, an EIR must be prepared for the project.*

The provisions of the GHG Plan and the appendices that support the Plan comply with these



provisions by providing a quantified inventory of currently existing and projected greenhouse gas emissions resulting from activities within a defined geographic area of the County. The GHG Plan and associated documents also identify and analyze the emissions associated with specific actions, and set forth performance standards to achieve the specified emissions goals. The GHG Plan establishes a GHG emissions reduction target for 2020 of 15% below 2007 emissions, consistent with AB 32 and sets the County on a path to achieve more substantial long term reduction in the post-2020 period. Achieving this level of emissions will ensure that the contribution to greenhouse gas emissions from activities covered by the GHG Plan will not be cumulatively considerable. The analysis in the GHG Plan and the supporting documents demonstrates that this level will be achieved by the identified mitigation measures. The Plan also includes requirements to monitor progress towards achieving the specified emissions goals, and provisions for amendment of the Plan if it is not making sufficient progress towards reaching those goals. Finally, the GHG Plan, including monitoring, will be adopted in a public process following environmental review.

Screening Tables, in the form presented in Appendix F, will serve as a tool to assist with implementing applicable mitigation based on calculated GHG reduction and aid in the determination of a significance finding. The Screening Tables incorporate a point system that is based on calculated emission reductions for various GHG mitigation using accepted emission factors. The point system is designed to ensure compliance with the reduction measures in the GHG Plan such that the GHG emissions from new development, when considered together with those from existing development, will allow the County to meet its GHG emissions reduction target. Consistent with the CEQA Guidelines Sections 15064(h)(3) and 15064.4, such projects are consistent with the Plan and therefore will be determined to have a less than significant individual and cumulative impact for GHG emissions.

Projects that do not use the Screening Tables, will be required to quantify project specific GHG emissions or otherwise demonstrate that project specific GHG emissions will be consistent with the reduction measures in the GHG Plan and achieve the equivalent level of GHG emissions efficiency as a 100-point project, which will allow the County to achieve the GHG reduction targets in the GHG Plan. Consistent with the CEQA Guidelines, projects that can demonstrate this level of reduction or greater will be determined to have a less than significant individual and cumulative impact for GHG emissions. In some cases, projects may not be able to achieve sufficient reductions in GHG emissions (identified through the use of the Screening Tables or through project-specific quantification), thus resulting in a preliminary determination of a significant impact on GHG emissions that will require preparation of an EIR to analyze the project's impacts and possible mitigation.

Monitoring of Plan implementation in order to track progress, to determine whether emissions are being reduced as forecasted, and to provide a platform for future revisions to the plan, if necessary, is a critical activity. In order to retain the benefits of CEQA streamlining and tiering of the analysis of greenhouse gas emissions for future projects as described in the CEQA Guidelines Section 15183.5 above, the Plan must include a mechanism to monitor the plan's progress towards achieving the level of proposed emissions reductions and to require amendment if the plan is not achieving specified levels. Monitoring is more fully described in section GHG 5.7



below and the process for amending the Plan is described in section GHG 5.9.

Consequently, the County, through CEQA and the County Development Code, will ensure that new development within the County's LUA area meets the requirements set forth in this Plan. This Plan represents a local plan to reduce GHG emissions 15% below 2007 emissions by 2020 consistent with AB 32, and constitutes an "adopted list of regulations and requirements to implement a local plan" as specified in the CEQA Guidelines. Furthermore, the Plan contains an analysis that extends beyond 2020 to 2030 with consideration of the trajectory of reductions needed to provide substantial reductions by 2050 (see Appendix E), consistent with CARB's recommendations for looking forward in its Scoping Plan.

The Plan does not allow larger residential or mixed-use projects outside a City Sphere of Influence (SOI) to use the Screening Tables or rely on this Plan for a determination that the project's individual or cumulative GHG impacts are less than significant. This provision ensures land use commitments outside of SOIs do not impede the expected emissions trajectory to mid-century and are not likely to conflict with the long term goal of substantial reductions through 2050. This provision is an interim procedure that will be re-examined in a major Plan update and amendment anticipated to occur in 2015 following a new emissions inventory and incorporation of the SCS and Regional GHG reduction measures.

Residential projects (or mixed use projects with a residential component) that exceed 250 residential units that are located in unincorporated areas not within a City SOI will not be eligible to use the Screening Tables or rely on this Plan for a determination of less than significant on individual or cumulative GHG impacts. (See Appendix F for a full description of the limitations and uses of the Screening Table.)

Residential Projects outside of a City SOI that exceed 250 residential units will be required to prepare a project specific GHG emissions analysis that includes a robust assessment of emissions, appropriate mitigation measures, and analysis of the issues associated with land use intensification and VMT generation on a project and regional basis. The analysis must produce an assessment that allows for a determination of whether the specific project causes cumulatively considerable GHG impacts. These projects will not qualify for the tiering and streamlining benefits otherwise provided by this Plan as allowed by CEQA Guidelines Section 15183.5 due to the inability to adequately analyze and incorporate programmatic mitigation that comprehensively addresses the issues of GHG emissions for regionally significant residential projects beyond the 2020 analysis horizon.

It is anticipated that upon completion of the Sustainable Communities Strategy (SCS) by Southern California Association of Governments (SCAG) and the Regional GHG Reduction Plan currently under preparation by the San Bernardino County Association of Governments (SANBAG), adequate methodology for quantification of regional VMT and more comprehensive mitigation will provide suitable planning tools that can be incorporated into this Plan through a future amendment. Both the SCS and the Regional GHG Reduction Plan are intended to satisfy the requirements of SB 375 and allow better forecasts of GHG emissions for future years as well as providing a regional strategy for reducing GHG emissions.



GHG 5.7 MONITORING AND INVENTORYING AND REPORTING

The GRT will establish a process of monitoring the implementation of the GHG Reduction Plan and amending the plan as opportunities arise. The Land Use Services Department (LUSD) will compile the monitoring results and report to the Board of Supervisors on Plan implementation progress. The LUSD will incorporate annual monitoring results with the required annual reporting procedures for implementation of the County General Plan. The County will conduct periodic comprehensive reviews on a four year schedule that will involve an appropriate level of re-inventorying emissions sources in order to get a more complete understanding of GHG conditions at that time and the results of the GHG Emissions Reduction program. (See Section GHG 5.3) A four year interval for “re-inventorying” will be synchronized with the reduction measure phasing. Phases 1 and 2 will be concluded in 2014 and thus, re-inventorying (the inventory will be completed in 2015) at this point will provide an important milestone assessment in the progress that the County is making with Plan implementation. The next inventory would be completed to coincide with the 2020 target date and implementation of the Phase 3 reduction measures. This inventory will provide a more comprehensive assessment of the Plan’s success while providing a basis for adjusting the Plan for the 2030 target. As the GHG Plan is implemented and as technology changes, for example, energy consumption, vehicle efficiency, waste diversion amounts, and methane recovery amounts will change. If promising new strategies emerge, the County will evaluate how to incorporate these strategies into the GHG Reduction Plan. Further, state and federal action will also result in changes which will influence the level of the County emissions.

Monitoring the Development Review Process: As noted in Section GHG 5.6 above, monitoring of Plan implementation in order to track progress, to determine whether emissions are being reduced as forecasted, and to provide a platform for future revisions to the plan, if necessary, is essential to retain the benefits of CEQA streamlining and tiering of the analysis of greenhouse gas emissions as described in the CEQA Guidelines Section 15183.5. The LUSD will use development permit tracking to monitor and evaluate the utility and effectiveness of the Screening Tables as the tables are applied to new development permits. Use of the Screening Tables will facilitate calculation of project GHG emissions, with and without mitigation. The quantified emissions can be recorded and tracked with the County’s permit tracking software. As part of the Department’s annual monitoring review an assessment will be made as to the function of the Screening Tables and the effectiveness of mitigation. Recommendations for changes to the DRP process will be made by the Department Director and approved by the CEO. These changes will be part of the amendment process for the GHG Emissions Reduction Plan described in section GHG 5.9.

GHG 5.8 ADDITIONAL PLANNING ACTIVITIES

GHG 5.8.1 Addressing SB 375

Senate Bill 375 (SB 375) (codified at Government Code Sections 65080, 65400, 65583, 65584.01, 65584.01, 65584.04, 65584.04, 65587, 65588, 14522.1, 14522.2, 65080.01 and Public



Resources Code Sections 21061.3, 21159.28, and Chapter 4.2), signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's Regional Transportation Plan (RTP). CARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years, but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012. For the southern California region, the Southern California Association of Governments (SCAG) is the MPO responsible for preparing the SCS.

One of the challenges in addressing the reduction of GHG emissions in response to SB 375 is the regional interconnectedness of various emission sources. On road transportation emissions are particularly hard to reduce because of that regional interconnectedness. Most of the vehicle trips and vehicle miles traveled within Unincorporated San Bernardino County originate and/or terminate in the cities within the County. To address this issue and provide additional GHG reduction opportunities, the County proposed to the San Bernardino County Association of Governments (SANBAG) that a collaborative regional effort in reducing GHG emissions be undertaken. The proposal was to collaborate with the cities within the County, SANBAG and SCAG in addressing regional sources of GHG emissions. The result is the SANBAG Regional GHG Reduction Plan. One aspect of the SANBAG Regional GHG Reduction Plan is the regional traffic modeling effort being coordinated with SCAG in the demonstration of sustainable community strategies (SCS) for the region. The regional traffic modeling effort includes all of San Bernardino Valley as well as the Victor Valley area of the High Desert region of San Bernardino County.

The regional collaborative approach to analyzing and reducing on road transportation related emissions provides quantification of GHG reductions due to County land use policies focusing land use development and increased densities within the cities' spheres of influence (SOI) that was not possible during the drafting of the San Bernardino County GHG Reduction Plan. In addition, this regional approach allows for quantification of reductions associated with transit oriented development (TOD) and mixed land use intensification along transit lines within the cities and proposed transit lines in the unincorporated areas of the County (see GHG Reduction Measure R3T4); regional employment based trip reduction programs (see GHG Reduction Measure R3T5); Intelligent Transportation Systems (ITS) applications (see GHG Reduction Measure R3T8); and others.



The SANBAG Regional GHG Reduction Plan will be able to quantify many of the R3 measures in the San Bernardino County GHG Reduction Plan that were unquantifiable at the time the San Bernardino County Plan was drafted. Once on road transportation reductions are quantified in the SANBAG Regional GHG Reduction Plan, additional reduction quantification will be possible as an update to the San Bernardino County GHG Reduction Plan.

Additionally, the SANBAG regional effort looks past 2020 toward achieving the 2035 reduction target in SB 375, which will yield additional on road transportation reduction quantification related to our region's portion of the SCAG SCS. The SCS for SCAG is anticipated to be adopted in March 2012. The SANBAG Regional GHG Reduction Plan is proposed to be adopted this fall, in 2011. However, the draft SCS will be out in September 2011. The SANBAG Regional GHG Reduction Plan will include elements of the SCS that pertain to our region through coordination with SCAG even though the SANBAG Plan precedes the adoption of that SCS strategy. Both regional programs will provide protocols and mitigation measures that will be needed to fully implement GHG Reduction Measure R3T10 (Land Use Strategies to Reduce Reliance on Automobile Use).

The County anticipates that both the SCAG SCS and SANBAG Regional GHG Reduction Plan will have implications for land use and land use designations in the unincorporated area of San Bernardino County under the County's LUA. The SANBAG GHG Plan is expected to focus on VMT reduction and travel scheduling, while the SCS is anticipated to emphasize Smart Growth concepts such transit oriented development, compact development, mixed use development that positions residential land uses closer to job centers, and walkable community design. While the current County General Plan embraces all of these smart growth principles and aspirations for VMT reduction, the land use designations may require substantial analysis and modification to affect the GHG reduction strategies that may emerge from the SANBAG GHG Plan. Land use designations and zoning changes were not part of the 2007 General Plan Update, however, they will likely need to be re-assessed in the next update to respond to the SCAG and SANBAG programs. When the regional strategies are completed by SCAG and SANBAG, the County will engage in re-evaluating the County General Plan from a land use standpoint with focused consideration of its implications for amending the GHG Plan. The County believes that from a cost-effective and efficiency perspective, a land use analysis and prospective GHG Plan amendment to include the regional strategies should occur in conjunction with the first emissions re-inventorying effort to be completed within four years of Plan adoption provided the regional strategies have been finalized and adopted by the time of that first emissions re-inventory.

GHG 5.8.2 Beyond 2020

In order to assess whether implementing this plan achieves the State's long-term climate goals, one must look beyond 2020 to see whether the emissions reduction measures set the County on a trajectory needed to comply with State mandates. Governor Schwarzenegger's Executive Order



S-3-05 calls for an 80 percent reduction below 1990 GHG emissions levels by 2050. This results in a 2050 statewide target of about 85 MMTCO₂e (total emissions), as compared to the 1990 level (also the 2020 target) of 427 MMTCO₂e. Assuming that San Bernardino County's 2020 goal of 15% below 2007 levels (approximately 5.3 MMTCO₂e, for External Emissions and 0.3 MMTCO₂e for Internal Emissions) is roughly equivalent to 1990 levels, the 2050 County goal to match the S-3-05 goals would be approximately 1 MMTCO₂e in 2050.

Full implementation of CARB's Scoping Plan and the County's GHG Reduction Plan will put the County on a path toward these required long-term reductions. Figure E-1, Appendix E, depicts what an emissions trajectory might look like; assuming San Bernardino County follows a linear path from the 2020 reduction target to a 2050 goal matching that in S-03-05. While the measures needed to meet the 2050 goal are too far in the future to define in detail, one can examine the policies needed to keep us on track through at least 2030.

To stay on course toward the 2050 target, the County's greenhouse gas emissions need to be reduced to approximately 3.9 MMTCO₂e by 2030. This translates to an average reduction of 2.7 percent per year between 2020 and 2030. An additional challenge comes from the fact that the population in unincorporated San Bernardino County will grow further between 2020 and 2030.

To counteract this trend, per-capita emissions must decrease at an average rate of slightly less than 3.1 percent per year during the 2020 to 2030 period. These reductions are possible. The measures needed are logical expansions of the programs recommended in the CARB Scoping Plan at the state level and the measures included in the San Bernardino GHG Reduction Plan at the local level that get the County to the 2020 goal.

As described above under the discussion of GHG Reduction Goals, 2020 is only a milestone in GHG reduction planning. Executive Order S-03-05 calls for a reduction of GHG emissions to a level 80 percent below 1990 levels by 2050. The 2050 target is consistent with the estimated reductions needed to stabilize atmospheric levels of CO₂ at 450 parts per million (ppm). Thus, there will be a need to start planning ahead for the post-2020 period. The County will commence planning for the post-2020 period starting in 2017, at the approximate midway point between plan implementation and the reduction target and after development of key ordinances and implementation of cost-effective measures. At that point, the County will have implemented the first two phases of this GHG Plan and will have a better understanding of the effectiveness and efficiency of different reduction strategies and approaches. Further, the state's regulations under AB 32 would have been fully in force since 2012; federal programs and policies for the near term are likely to be well underway; market mechanisms like a cap and trade system are likely to be in force and will be influencing energy and fuel prices; and continuing technological change in the fields of energy efficiency, alternative energy generation, vehicles, fuels, methane capture, and other areas will have occurred. The County will then be able to take the local, regional, state, and federal context into account. Further, starting in 2017 will allow for development of the post-



2020 plan so that it can be ready for full implementation, including potential new policies, revisions to the General Plan (as necessary), programs, ordinances, and financing by 2020.

The new plan will include a specific target for GHG reductions for 2030, 2040, and 2050. The targets will be consistent with broader state and federal reduction targets and with the scientific understanding of the needed reductions by 2050. The County will target adoption of the new plan by January 1, 2020.

GHG 5.9 Amending the GHG Plan

The GHG Emissions Reduction Plan is viewed by the County as a dynamic program that requires implementation, monitoring, evaluation and adaptation. A critical provision of any dynamic program anticipates amendments that will result in adaptation based on the experience gained from the evaluation of implementation and monitoring. The County GHG Plan will be amended as needed to achieve the 2020 reduction target of 15% below 2007 emission levels and to incorporate future reduction strategies, such as those that are anticipated to result from regional scale reduction planning required by SB 375. Amendments will also be necessary to incorporate new or improved methodologies and protocols for measuring emission generation and mitigation reductions. The County anticipates that both major and minor amendments will be needed as Plan implementation progresses over time. Major amendments will require review by the County GRT (GHG Reduction Team), Planning Commission and adoption by the Board of Supervisors. Minor amendments can be accomplished upon review and recommendation by the GRT and approval by the CEO.

The GHG model for the County GHG Plan forecasts that GHG emissions in the jurisdictional area addressed in this Plan will be reduced by 260,692 metric tons of carbon dioxide equivalent (MTCO₂e) for the Internal Inventory and 2,290,874 metric tons of carbon dioxide equivalent (MTCO₂e) for the External Inventory compared to the unmitigated projections in 2020. Based on comprehensive updates to the GHG inventory, the County will evaluate whether the actual GHG emissions from activities over which the County has jurisdictional and operational control reflect the reductions anticipated by the model. If sufficient reductions are not achieved by the 2015 re-inventory, the County will reevaluate and adjust the measures and overall targets to reach the established 2020 target. A second re-inventory is planned to coincide with an evaluation in 2020 as to Plan success. A second major amendment may be necessary at this point to ensure that emission reductions are on track to maintain a trajectory post 2020, to provide substantial reductions by 2050.

Minor Amendments are anticipated as part of the Department's annual monitoring review of the Development Review Process (DRP). An assessment will be made as to the function of the Screening Table and the effectiveness of mitigation. Recommendations for changes to the DRP process will be made by the Department Director, reviewed by the GRT and approved by the CEO.



Major Amendments will be more comprehensive and are anticipated to occur in conjunction with the four year interval for re-inventorying that will be synchronized with the reduction measure phasing. At a minimum, two major amendments are anticipated to be required between the date of Plan adoption and 2020. Implementation Phases 1 and 2 (described in section GHG 5.3) will be concluded in 2014 with re-inventorying completed in 2015. At this point, an important milestone assessment in the progress that the County is making with Plan implementation will occur. By this time, regional emissions reduction strategies resulting from SB 375 should be completed. Results from monitoring, re-inventorying and new regional reduction strategies will provide the appropriate data for a comprehensive amendment in.

The next inventory is intended to be completed at a point that coincides with the 2020 target date and implementation of the Phase 3 reduction measures. This inventory will provide a more comprehensive assessment of the Plan's success while providing a basis for adjusting the Plan for the 2035 target.

Technical Appendices

INTRODUCTION TO APPENDICES

Prepared By:

ICF INTERNATIONAL

Inventories

Two separate Green House Gas (GHG) inventories were prepared by ICF International for the County and are presented in this GHG Reduction Plan (the ~~Plan~~ or ~~GHG Reduction Plan~~): the External Inventory and the Internal Inventory. These inventories are defined below.

External Inventory

The External Inventory includes GHG emissions from land uses within the County's unincorporated areas where the County has jurisdictional land use authority (External Inventory). The External inventory also includes emissions generated outside the County that are the result of service and operation demands from land uses located within the County's unincorporated area.

For purposes of this Plan, the jurisdictional area subject to the County's land use authority (LUA) is the area within which the County exercises discretionary development permit and ministerial building permit authority.

The year 2007 was chosen for the current External Inventory as it was the most recent year with the necessary data to perform a comprehensive inventory (~~Current~~ or ~~2007~~ inventory). The 2020 emissions projection represents unmitigated emissions associated with the County's LUA in 2020.¹

Internal Inventory

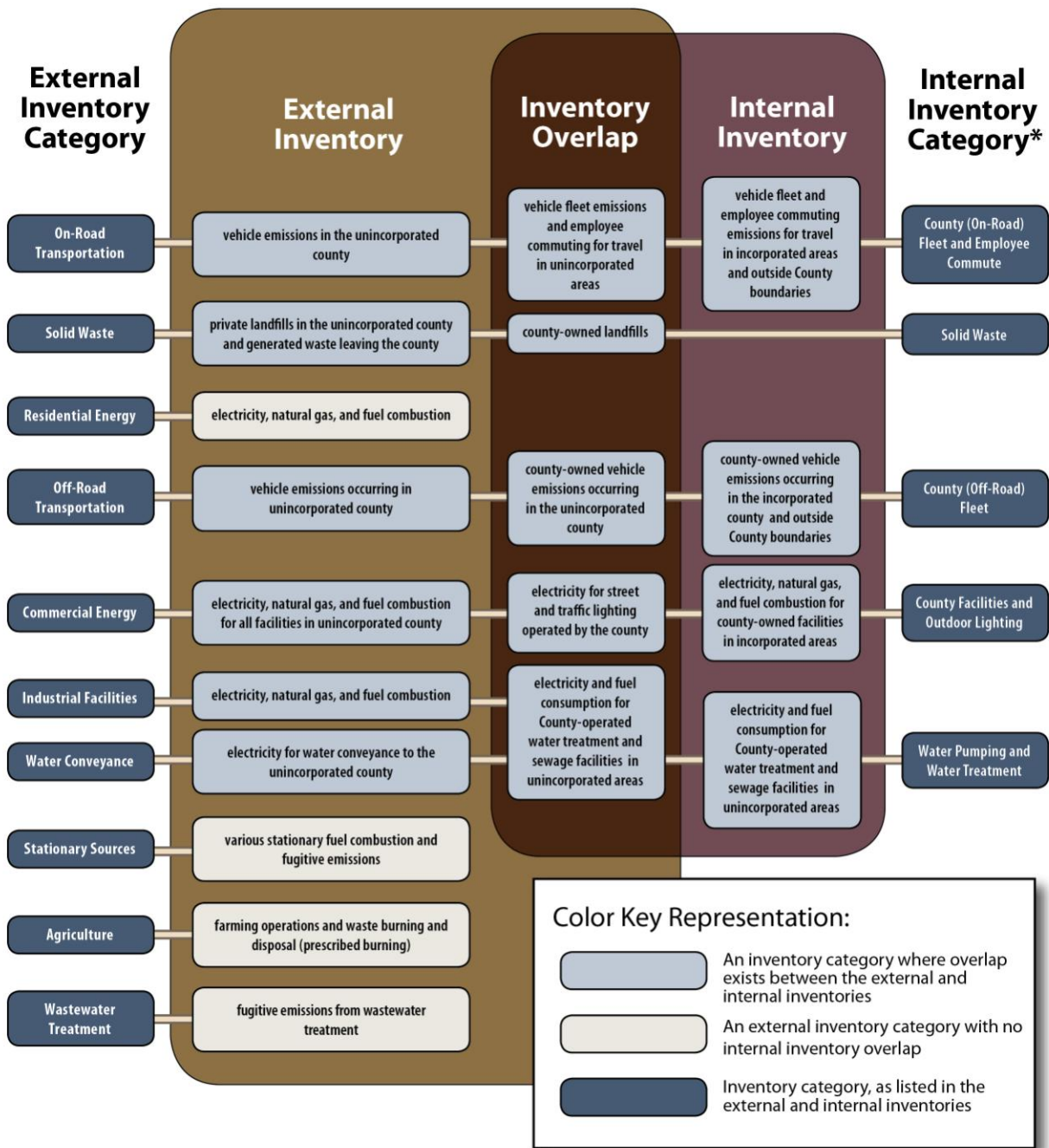
The Internal Inventory includes GHG emissions associated with the County's provisions of services and internal operations. The Internal Inventory includes emissions that occur due to County operations within the unincorporated County (where County facilities and operations are located and/or take place in unincorporated County (where County facilities and operations that occur outside the unincorporated County (where County facilities and operations are located and/or take place in other jurisdictions).

¹ This is sometimes referred to as 2020 ~~Business as Usual~~ or BAU emissions. This report uses the term ~~unmitigated emissions~~ for future emissions forecasts that do not take into account state, regional, or local emission reduction measures.

The County's current Internal Inventory is for the fiscal year (FY) 06/07 (July 1, 2006, to June 30, 2007), which represents the most recent year with the necessary data to perform a comprehensive inventory ("Current" or "2007" inventory). The 2020 emissions projection represents unmitigated emissions associated with the County's internal operations in 2020.

Some emissions sources are included in both External and Internal Inventories, as there are overlaps in the operational boundaries of the two (2) inventories. For example, in the External Inventory, on-road transportation emissions include emissions from all vehicles travelling in the unincorporated County, as calculated with the California Air Resources Board's (CARB) On-Road Emissions Factor (EMFAC) model. The corresponding Internal Inventory category is County vehicle fleet emissions, which operate in the unincorporated County, incorporated County, and outside of the County. The overlap between the External and Internal Inventories for this category are those County vehicle emissions that occur in the unincorporated County since these emissions are accounted for in the EMFAC modeling.

Figure 1: GHG Emission Source Overlap for the External and Internal County Inventories



*Several of the Internal Inventory categories are combined.

Figure 1 shows the “overlap” between inventory categories in the External and Internal Inventories for San Bernardino County. The general categories included in the External Inventory are shown on the left-hand side of the diagram; the general categories included in the Internal Inventory are shown on the right-hand side of the diagram. Where there is overlap of a particular External Inventory category with an Internal Inventory category (“Inventory Overlap”), the particular External Inventory category is linked to the appropriate Internal Inventory category. The “Inventory Overlap,” depicted in the area shaded dark brown, represents those portions of the External and Internal inventories where there is an overlap between inventory categories.

Reduction Measures

The emission reduction measures included in this Plan include existing and proposed federal, state, regional, county, and other local measures that will result in GHG emissions reductions of those emissions inventoried in both the External and Internal Inventories. The emission reduction measures are organized as follows, for each emissions sector:

- *Reduction Classification 1 (R1)* includes all adopted, implemented, and proposed state, and regional measures that will result in quantifiable GHG reductions for the County’s LUA area and internal operations.² These measures may require County action to achieve the GHG reductions, but that action is limited and compulsory.
- *Reduction Classification 2 (R2)* includes all quantifiable measures that have been or that will be implemented by the County, as well as any additional quantifiable measures that require County action and could further reduce the GHG emissions for the County’s LUA area and internal operations. R2 also includes any federal, state, and regional measures that require substantial action by the County to achieve the expected GHG reductions.
- *Reduction Classification 3 (R3)* includes all other measures that have been implemented or that will be implemented by the County which were not quantified, but are included in the County’s GHG Plan. These measures are either facilitative in nature or there are methodological issues that prevent their quantification at this time.

Appendices A and B include a detailed discussion of the methodology applied for each reduction measure for the External and Internal GHG Reduction Plan. The reduction methodology for R1, R2, and R3 measures is summarized below:

- R1 measures were primarily quantified consistent with the CARB methodology outlined in the AB 32 Scoping Plan. In the AB 32 Scoping Plan, CARB quantified reductions associated with each measure identified in the Scoping Plan. The percent reduction associated with each of the AB32 Scoping Plan measures was directly applied to the County’s GHG Reduction Plan measures. For example, the AB 32 Scoping Plan states that Pavley I and II will result in a 20 percent reduction in statewide passenger/light duty emissions by 2020. Consequently, a 20 percent reduction in 2020 passenger/light duty external emissions was attributed to the GHG Reduction Plan measures. R2 measures were

² Includes County buildings located in cities (incorporated areas) which are included in the Internal inventory but not in the External inventory.

quantified on a case-by-case basis, based on available information as well as other protocols and studies. To avoid double counting reductions from R1 measures, reductions from R2 measures incorporate relevant R1 measures and preceding R2 measures. For example, R2T3 (Congestion Pricing and Driving Disincentives) applies to external on-road emissions after all R1 transportation measures, as well as measures R2T1 and R2T2, have been addressed. The R2 measures presented in this Plan are consistent with the County's General Plan; a cross-reference of the proposed measures to General Plan policies is provided in Appendix C.

- R3 measures were not quantified and were not used to demonstrate achievement of the County's 2020 GHG emissions reduction target. Some of these measures (such as education or financing strategies) are necessary to facilitate success of R2 measures and are considered essential parts of this Plan. Other measures may contribute to additional GHG reductions, but lack data or protocols for quantification, and are not necessary to reach the identified 2020 reduction target. These measures may be suitable for quantification in the future subject to further research on viability or development of suitable data or protocols.

Reduction Target

The County's reduction target, of 15 percent below Current levels, is based on AB 32 and CARB's recommended greenhouse gas reduction goal for local governments of 15 percent today's level's by 2020, to ensure that their municipal and community-wide emissions match the State's reduction target. (AB 32 Scoping Plan 2008, p. ES-5).

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APPENDIX A

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APPENDIX A - External Inventory/Reduction Measures Methodology

Prepared By:

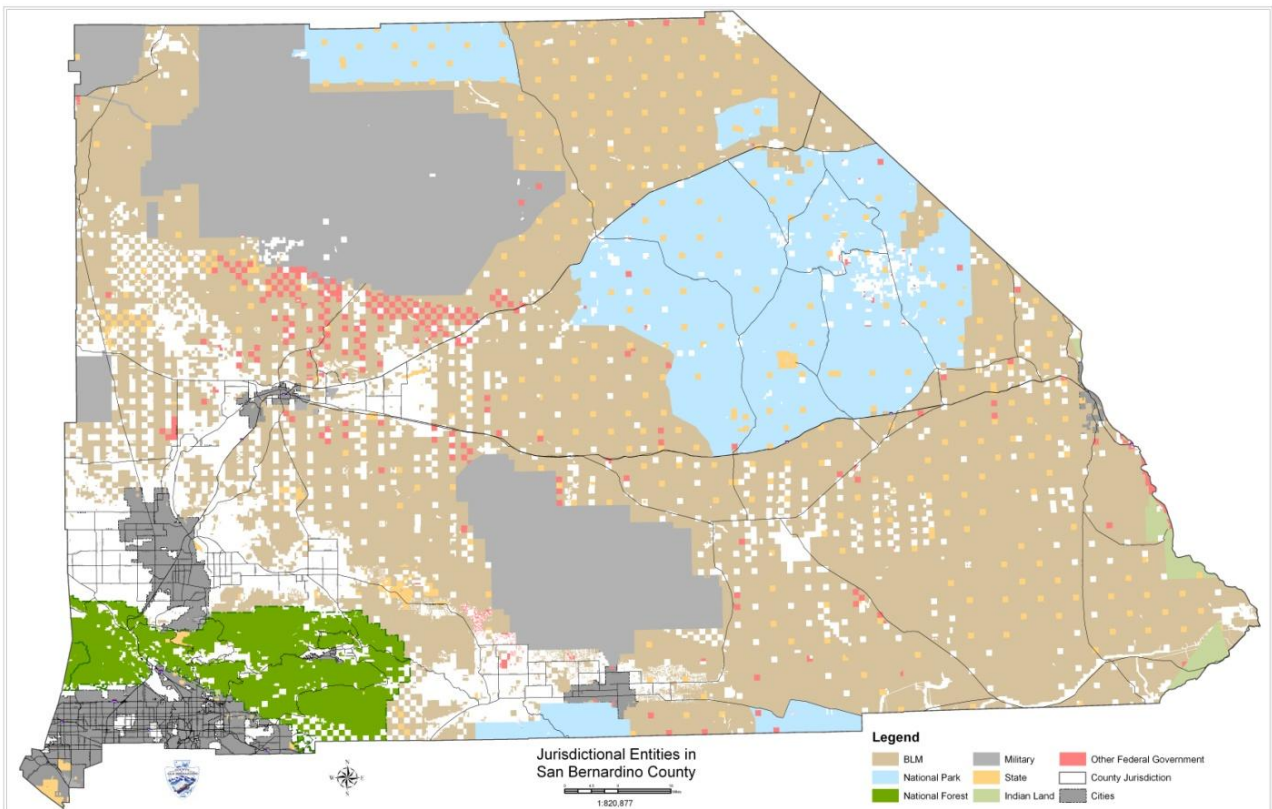
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Jurisdictional Authority

Figure A-1 depicts the incorporated and unincorporated portions of the County, as well as federal and state lands within the County

Figure A-1: Jurisdictional Entities in San Bernardino County



The County regulates land use within the unincorporated portion of the County but does not regulate projects within the boundaries of the incorporated cities, state and federal lands, such as those lands managed by the Bureau of Land Management (BLM), military bases and installations. Additionally, public utilities, water agencies (other than private water agencies), and railroads are generally not subject to the County’s land use jurisdiction.

Methodology for External Inventory Emissions, Calculation and Data Collection

This section provides information, the methodology, and supporting material relating to calculations of greenhouse gas (GHG) emissions for the San Bernardino County (County) External Inventory, and data collection efforts. Emissions were calculated in terms of metric tons carbon dioxide equivalent (MTCO₂e).

The guidelines of the Local Government Operations Protocol (LGOP) (CARB et al. 2008) were followed in developing this inventory, although the LGOP does not specifically establish a community emissions protocol appropriate to this inventory. In cases, where the LGOP did not establish specific guidance, the inventory follows protocol from the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (2006), the U.S. Environmental Protection Agency (USEPA) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007 (2007, 2008, 2009a, 2009b), and the California Climate Action Registry's General Reporting Protocol (2009b). These documents include standard and widely accepted inventory methodology and guidance.

The External Inventory includes the years 2007 and 2020. The year 2007 (referred to as the "2007" inventory, or "Current" year inventory for the External Inventory) was chosen for the External Inventory as it was the most recent year with the necessary data to perform a comprehensive inventory. The 2020 inventory is an unmitigated projection based on current energy consumption and unit emission rates adjusted by sector-specific growth rates provided by the County or based on CARB's unmitigated projections for 2020 (CARB 2009).

Table A-1 presents the emissions sectors included in the External Inventory, the data source for each emission sector, the methodology for scaling countywide emissions to the County's LUA area where appropriate, and the methodology for projecting emissions to 2020.

Table A-1. External Inventory Data Sources and Methodology

Sector	Emission Sources	Source of Data	Scaling Methodology	Projection Methodology
Stationary Sources	Cement plant process emissions	SCAQMD	Population ¹	SCAQMD growth factors
	Fuel combustion	CARB mandatory reporting data		
	Industrial process emissions			
Residential	Electricity consumption	Electricity records from utilities ²	None	County growth forecasts ⁴
	Natural gas consumption	Gas records from utilities ³		
	Other fuel consumption by type (LPG, fuel oil, diesel, gasoline, etc.)	County Assessor data		
Commercial	Electricity consumption	Electricity records from utilities ²	None	County growth forecasts ³
	Natural gas consumption	Gas records from utilities ³		
	Other fuel consumption by type (natural gas, LPG, fuel oil, diesel, gasoline, etc.)	County Assessor data		
Industrial	Electricity consumption	Electricity records from utilities ²	None	County growth forecasts ³
	Natural gas consumption	Gas records from utilities ³		
	Other fuel consumption by type (natural gas, digester gas, LPG, fuel oil, landfill gas and diesel)	County Assessor data		
Transportation (on- and off-road)	On-road vehicles fuel combustion	SCAQMD	Population	SCAQMD growth factors
	Off-road vehicles and equipment fuel combustion			
Agricultural Emissions	Enteric fermentation and manure management from dairy operations	SCAQMD	Population	SCAQMD growth factors
Landfill Waste	Methane emissions from landfilled waste	County SWMD CIWMB USEPA Landfill Methane Outreach Program (LMOP) database.	None	County SWMD projections
Domestic Wastewater Treatment and Discharge	CH ₄ and N ₂ O emissions from the treatment of wastewater from domestic sources (municipal sewage)	CARB California GHG inventory	None	General Plan growth forecasts ⁵
Water Conveyance	Indirect electricity emissions for water supply and irrigation infrastructure	CEC	None	General Plan growth forecasts ⁴

¹ No scaling factor was used for cement plants.

² Electric utilities include Southern California Edison (SCE), Bear Valley Electric (BVE), Colton Public Utilities, and Needles Public Utility Authority.

³ Natural Gas utilities include Southern California Gas Company (SCG) and Southwest Gas (SWG).

⁴ Revised growth forecasts prepared by Hoffman (2009)

⁵ Not adjusted to revised forecast per Hoffman (2009) may overstate emissions due to growth.

These emissions are separated by scope as follows. Scope 1 and 2 emissions were quantified and included in the External Inventory. Several Scope 3 emissions were also quantified for informational purposes but not included in the External Inventory.

Scope 1:

- Stationary emissions from fuels consumed (stationary source, industrial, commercial, and

residential)

- Mobile emissions from fuels consumed by on- and off-road vehicles
- Methane Emissions from landfills
- Agricultural emissions
- Wastewater treatment and discharge emissions (fugitive)
- Miscellaneous emissions

Scope 2:

- Emissions associated with purchased electricity used at all facilities in the County’s LUA (industrial, commercial, and residential)
- Emissions associated with electricity used to import water

Scope 3:

- High GWP GHGs
- Rail emissions

Calculation Approach

Emissions were estimated using the appropriate emission factors for each of the sources included in the External Inventory (see **Table A-2**). For electricity consumption, the Southern California Edison (SCE) emission factor was applied to all electricity within the External Inventory boundaries because these factors were the most specific factors publicly available. All other emissions were calculated based on the emission factors provided in the following guidance documents:

- California Air Resources Board (CARB) Local Governments Operations Protocol (LGOP) (2008)
- California Climate Action Registry (CCAR) and General Reporting Protocol (2009)
- CARB California Greenhouse Gas Inventory Data 1990-2006 (2009)
- California Energy Commission (CEC) Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 (2006)
- U.S. Environmental Protection Agency (USEPA) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007 (2009).
- Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (2006)

Emission factors and references are summarized in **Table A-2**.

Table A-2. GHG Emission Factors

Fuel	Emission Factor	Source
Compressed Natural Gas (CNG) (Vehicle)	0.054 Kg CO ₂ /Standard Ft ³	USEPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006 (2008)
Motor Gasoline (Vehicle)	8.81 Kg CO ₂ /US gal	Provided in the California Local Government

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Propane (Vehicle)	5.74 Kg CO ₂ /US gal	Operations Protocol (CARB et al. 2008)
Diesel (Vehicle)	10.15 Kg CO ₂ /US gal	
Natural Gas	0.0546 Kg CO ₂ /Standard Ft ³	
	0.1 g NO ₂ /MMBTU	
	5 g CH ₄ /MMBTU	
Other Fuels	Variable ¹	SQAQMD
Electricity	290.87 kg CO ₂ /MWh	CCAR (2009a) Public Reports and USEPA eGrid2007 (2005 data)
	2.04 kg NO ₂ /GWh	
	13.88 kg CH ₄ /GWh	

Notes:

¹ Other fuels were included in the SCAQMD Inventory. Associated emissions are based on emission factors from CARB's Regulation for the Mandatory Reporting of GHG Emissions and fuel High Heating Values (HHVs) from USEPA's AP-42 document.

South Coast Air Quality Management District Inventory

Several emissions categories included in the External Inventory are based on emissions data provided by the South Coast Air Quality Management District (SCAQMD) in an inventory of GHG emissions it prepared for the County, dated, May 2009, and revised December 2010 (SCAQMD Inventory). The SQAQMD Inventory, attached as Appendix D to the GHG Reduction Plan includes an inventory of emissions in the entire County area, including both incorporated and unincorporated areas ("Countywide" inventory). These Countywide emissions are not broken out by each incorporated or unincorporated area. SCAQMD scaled the Countywide emissions to the County's LUA area using the ratio of the population within the LUA area to that of the entire County. The base year for SCAQMD's Countywide and LUA GHG inventories is 2002. This base-year inventory was then projected to future years (2007, 2020) using the socioeconomic forecasts provided by Southern California Association of Governments (SCAG) for the 2007 Air Quality Management Plan (AQMP).

2020 Unmitigated Emissions Projections

To measure future reductions, an unmitigated emissions projection was developed for the year 2020 (2020 unmitigated). This projection is used in the reduction plan to help set targets and for future monitoring of emission reductions.

The 2020 unmitigated projections are developed based on current energy consumption and growth rates provided by the County, SCAQMD, CARB, the U.S. Census Bureau, and other data sources. The assumptions associated with growth rates provided in **Table A-3** do not assume the implementation of any federal, state, or local reduction measures but rather projects the future emissions based on current energy and carbon intensity in the existing economy.

Table A-3. 2020 Unmitigated Emission Projection Assumptions

Emission Source	Percent Annual Increase	Assumption Source
Stationary Sources		
Cement Plants	1.5% ¹	CARB Scoping Plan and U.S. Geological Survey cement production data
Other Sources	Variable ²	SCAQMD
Residential		
Electricity and Natural Gas	0.4%	County growth Forecasts ³
Other Fuel Combustion	2.2%	SCAQMD
Commercial		
Electricity and Natural Gas	1.9%	County growth Forecasts ³
Other Fuel Combustion	1.7%	SCAQMD
Industrial		
Electricity and Natural Gas	1.9%	County growth Forecasts ³
Other Fuel Combustion	1.5%	SCAQMD
Transportation: On-Road	2.2% ⁴	EMFAC
Transportation: Off-Road	3.1% ⁴	OFFROAD
Landfill Waste	1.075%	Waste Management
Agriculture	(1.8%)	SCAQMD
Wastewater	1.8%	General Plan
Water Conveyance	1.6%	General Plan
Miscellaneous	1.8%	SCAQMD

Notes:

¹ Cement plant emissions grow 2.0% annually from 2008 to 2020 based on CARB projections; because cement plant emissions *decreased* from 2007 to 2008, the adjusted growth rate from 2007 to 2020 is likely lower than 2%. The 1.5% annual growth rate is equal to the SCAG RTP employment forecast growth from 2008 to 2020 in all of San Bernardino County.

² SCAG and AQMP growth factors depend on each specific source

³ Revised growth forecasts prepared by Hoffman (2009).

⁴ EMFAC and OFFROAD growth factors represent average for each specific source

Population, housing, and employment estimates and forecasts for 2000, 2007, and 2020 are presented in **Table A-4**. These projections were used to project building energy end use emissions.

Table A-4. County Population, Housing, and Employment Estimates and Forecasts

Sector	2000	2007	2020
Population	276,131	283,662	306,437
Housing	91,300	91,803	96,886
Employment	45,147	49,439	63,355

Source: Hoffman 2009.

Growth factors for 2007 through 2020 were calculated as the ratio of 2020 projections to year 2007 estimates. The 2007 consumption estimates were multiplied by those growth factors to project 2020 consumption, as follows:

- Residential Energy End Use—projected using growth in the number of households,
- Commercial Energy End Use—projected using growth in the number of jobs, and
- Industrial Energy End Use—projected using growth in the number of jobs.

External Inventory

This section presents the External Inventory for the County, categorized by sectors of emissions.

Building Energy End Use Emissions

The following section describes the methodology for calculating GHG emissions for building energy end use in the External Inventory. Building energy end use for residential and commercial buildings, and industrial buildings and processes is a significant component of the County's external GHG inventory, accounting for approximately 20 percent of the County's total emissions in 2007.

Electricity and Natural Gas Consumption

Data Collection

Energy consumption data were obtained from SCE, Bear Valley Electric (BVE), Southern California Gas Company (SCG), and Southwest Gas (SWG) and broken down by account type (i.e., residential, commercial, industrial, and institutional). Electricity consumption in kilowatt hours was collected from SCE and BVE, while natural gas consumption was collected from SCG and SWG. Indirect GHG emissions for 2007 from electric consumption were calculated based on a weighted average of utility energy contribution to the SBC region. The data provided by SCE was calculated specifically for the LUA area such that all reported consumption was consumed only within the County's LUA area. The BVE data were provided for each jurisdiction such that consumption within the County's LUA area could easily be determined. All electricity consumption data were segregated into the following categories: residential, commercial/industrial, and municipal/street lighting. The SCG data were provided by jurisdiction such that consumption within the County's LUA area could easily be determined.

This study also employed County Assessor data (San Bernardino County 2009) and U.S. Energy Information Administration (USEIA) end use profile data to achieve the following goals: 1) examine bottom-up residential and commercial energy emissions and compare these estimates to top-down estimates from the utility data; and 2) support reduction quantification for the 2020 mitigated inventory. In this analysis, the County assessor data and energy use profiles are used to identify the mix of uses in the County and unmitigated emissions on a per-unit basis. General plan growth forecasts are applied to project future emissions from the residential, commercial, and institutional sectors.

Emissions Calculations

Emission factors were used to calculate GHG emissions due to electricity and natural gas usage within the County LUA area. Because SCE accounts for roughly 97 percent of the electricity supplied to the County's LUA area, the SCE emission factor for electricity was chosen to reflect that of the entire County LUA area (see **Table A-2** above).

Residential Energy Consumption

Data Collection

To supplement the utility data described above, this analysis used average household energy intensity factors from the 2005 Residential Energy Consumption Survey (RECS), a

household survey conducted every 4 years by the EIA (USEIA 2005). Intensity factors for end-uses of household energy (i.e., space heating fuel intensity, air conditioning intensity, water heating, and appliances and lighting) by housing vintage (i.e., decade the house was built) were calculated for the entire U.S. and adjusted to represent the average energy intensity for California. These intensity factors were used to refine residential energy emissions estimates for the County.

The total number of residential units, the year built, and the square footage were collected from the County Assessor's database and summed. Heating degree days and cooling degree days with a base temperature of 65° F were estimated by averaging the 17 weather stations in the County calculated by the National Oceanic & Atmospheric Administration in its *Annual Degree Days to Selected Bases, 1971–2000*, released June 20, 2002. Estimates of the number of households in the County using natural gas, electricity, propane, wood, or no fuel for heating were collected from the 2007 American Community Survey (ACS) (U.S. Census Bureau 2007). Consumption of each fuel for each end use was estimated by multiplying either the number of households (for water heating and lighting/appliances) or the total square footage (for space heating and air conditioning) by the RECS energy consumption intensity factor for each end use. For fuel-specific calculations (i.e., space heating, water heating, and appliances), consumption of the fuels was estimated only for those households using the fuels designated in the ACS data. This was repeated for each vintage of housing units and summed. Consumption of natural gas, electricity, and LPG was then summed across end uses. The ratio of natural gas consumption to electricity consumption was identified as 1.58:1 on a BTU basis.

The SWG data did not distinguish between LUA area and non-LUA area, so additional effort was required to estimate the natural gas consumption within the LUA area. Because SCG residential consumption for the LUA area was known, the SCG residential consumption for the LUA area was subtracted from the total estimated residential natural gas consumption, with the balance being SWG residential consumption. The estimated SWG residential consumption within the LUA area was approximately 15.7 percent of the total reported by SWG. The estimated SWG consumption and reported SCG consumption were summed to provide total residential natural gas consumption within the LUA area.

Emissions Calculations

Residential energy consumption within the LUA area resulted in GHG emissions of 440,850 MTCO_{2e} in 2007 and 467,217 MTCO_{2e} in 2020, accounting for approximately seven (7) percent and six (6) percent of the External Inventory in the respective years.

The SCAQMD Inventory for the County estimated emissions from residential fuel combustion, based on data from the Mojave Desert Air Quality Management District (MDAQMD), assumptions and data in the 2007 South Coast AQMP, emission factors from CARB's Regulation for the Mandatory Reporting of GHG Emissions, and fuel High Heating Values (HHVs) from USEPA's AP-42. The following categories of fuel combustion from the SCAQMD Inventory were included in the External Inventory because these categories augment the fuel use data obtained from RECS data: liquefied petroleum gas (LPG)/propane/butane, diesel/distillate oil, gasoline, jet fuel, residual fuel oil, compressed natural gas (CNG), and digester gas.

To determine emissions associated with the County's LUA, total Countywide GHG emissions were scaled by the ratio of residential natural gas combustion in the unincorporated County to residential natural gas combustion in the entire County for 2007 as provided by SCG. This ratio is 0.17.

Commercial and Industrial Energy Consumption

Data Collection

To supplement the utility data described above, this analysis used average commercial energy intensity factors from the 2005 Commercial Building Energy Consumption Survey (CBECS), a commercial survey conducted every four (4) years by the EIA (USEIA 2003, 2005). The commercial/industrial electricity consumption obtained from SCE and BVE was split into separate commercial and industrial sectors based on the ratio of natural gas consumption in the commercial and industrial sectors, as reported by SGC and SWG. To account for the non-LUA area consumption reported by SWG, the SWG commercial and industrial data needed to be adjusted in a manner similar to that described for the residential sector. As described above, the estimated SWG residential consumption within the LUA area was 15.7 percent of the total reported by SWG. This percentage was applied to the commercial sector to account for consumption within the LUA area only. The estimated SWG consumption and reported SCG consumption were summed to provide total commercial natural gas consumption within the LUA area.

Emissions Calculations

Commercial energy consumption within the LUA area resulted in GHG emissions of 246,364 MTCO₂e in 2007 and 314,604 MTCO₂e in 2020, accounting for approximately four (4) percent of the External Inventory in each year. Industrial energy consumption within the LUA area resulted in GHG emissions of 593,715 and 760,834 MTCO₂e in 2007 and 2020, accounting for approximately nine (9) percent and ten (10) percent of the External Inventory in the respective years.

The SCAQMD Inventory estimated emissions from commercial fuel combustion, based on data from the MDAQMD, assumptions and data in the 2007 SCAQMP, emission factors from CARB's Regulation for the Mandatory Reporting of GHG Emissions, and fuel HHVs from USEPA's AP-42 emissions factors. The following categories of fuel combustion listed in the SCAQMD Inventory were included in the External Inventory because these categories augment the natural gas fuel use data obtained from RECS data: LPG/propane/butane, diesel/distillate oil, gasoline, jet fuel, residual fuel oil, CNG, and digester gas.

To determine emissions associated with the County's LUA area, total Countywide GHG emissions were scaled by the ratio of commercial natural gas combustion within the LUA versus commercial natural gas combustion in the entire County in 2007, as provided by SCG. This ratio is approximately 0.03.

Emissions resulting from the use of energy in buildings are an important aspect of the total inventory of GHG emissions. Residential, commercial, and industrial uses account for 20 percent, 18 percent, and 28 percent of CO₂ emissions from fossil fuel combustion in the United States, respectively (USEPA 2008a; CARB 2007a). GHG emissions from building

energy end use represent 20 percent of the County's external total emissions for the year 2007.

Current and Projected Emissions

Table A-5 presents the total GHG emissions from each building energy end use subsector—by end-use when available—for the years 2007 and 2020 (unmitigated). GHG emissions from building energy use represent 20 percent of the County's external total emissions for the year 2007 and 2020 unmitigated.

Table A-5. GHG External Emissions by Building Energy End-Use

Sector	2007 Emissions (MTCO₂e)	2020 Unmitigated Emissions (MTCO₂e)	Percentage of 2007 Building Energy End Use Emissions
Residential			
Heating	95,814	101,119	7.5
Air Conditioning	67,786	71,538	5.3
Water Heating	95,357	100,636	7.4
Refrigeration	25,851	27,283	2.0
Lighting/Other Appliances	148,938	157,185	11.6
Other Fuel Combustion	7,105	9,456	0.6
Subtotal	440,851	467,217	34.4
Commercial			
Space Heating	58,001	74,327	4.5
Cooling	22,324	28,608	1.7
Ventilation	8,704	11,154	0.7
Water Heating	17,801	22,811	1.4
Lighting	46,241	59,256	3.6
Cooking	13,073	16,754	1.0
Refrigeration	22,219	28,473	1.7
Office Equipment	1,849	2,369	0.1
Computers	3,546	4,543	0.3
Other	19,735	25,290	1.5
Other Fuel Combustion	32,871	41,018	2.6
Subtotal	246,364	314,603	19.2
Industrial*	593,716	760,834	46.4
Total	1,280,931	1,542,654	100.0

* Industrial end-use emissions were unable to be broken down by end-use due to SCAQMD data restrictions. The industrial use sector includes electricity and natural gas consumption. Combustion emissions are included in the stationary source sector of this inventory.

Transportation and Land Use Emissions

The following section discusses the methodology for calculating GHG emissions for on- and off-road transportation in the External Inventory.

On-Road Transportation

Emissions Calculations

GHG emissions for on-road mobile sources were calculated for 2007 and 2020 based on the SCAQMD Inventory. These GHG emissions within the LUA area are 1,631,666 and 2,176,130 MTCO₂e in 2007 and 2020, accounting for approximately 26 percent and 28 percent of the External Inventory in the respective years. To calculate CO₂ and CH₄ emissions from on-road mobile sources, SCAQMD used the CARB EMFAC2007 V2.3 mobile source emissions model. SCAQMD staff calculated N₂O emissions based on CARB methodology of multiplying fuel consumption for on-road vehicles by N₂O emissions factor. On-road transportation emissions associated with the County's LUA area were established by scaling SCAQMD's on-road mobile County emissions by the ratio of population in the unincorporated County to the population in the entire County for 2007. This ratio is approximately 0.15.

Data Collection

On-road transportation data were collected from the SCAQMD Inventory.

Off-Road Transportation

Emissions Calculations

GHG emissions for off-road mobile sources were included for 2007 and 2020, based on the SCAQMD Inventory. These emissions within the LUA area are 157,184 and 235,053 MTCO₂e in 2007 and 2020, accounting for approximately three (3) percent of the External Inventory in each year. Off-road transportation emissions associated with the County's LUA area were established by scaling SCAQMD's off-road mobile County emissions by the ratio of population in the unincorporated County to the population in the entire County for 2007. This ratio is approximately 0.15.

SCAQMD estimated emissions for construction equipment, recreational vehicles, pleasure craft, and other off-road equipment using CARB's OFFROAD model. For emissions associated with aircrafts, locomotives, and cargo handling equipment at intermodal facilities that are not included in OFFROAD model, SCAQMD used alternative methodologies to estimate these emissions. Locomotives are defined as Scope 3 sources in this inventory due to the County's limited or non-existing jurisdiction over these sources. Emissions from these sources are reported for informational purposes in the Scope 3 section.

Emissions resulting from the on-road and off-road transportation sector are an important aspect of the total inventory of GHG emissions, accounting for one-third of U.S. CO₂ emissions from fossil fuel combustion and approximately 40 percent of California's CO₂ emissions (USEPA 2008; CARB 2007a). GHG emissions from transportation represent four (4) percent of the County's external energy-related emissions and three (3) percent of the County's external total emissions for the year 2007. GHG emissions were estimated

based on EMFAC and OFFROAD modeling performed in the SCAQMD Inventory. Data Collection

Off-road transportation data were included in the SCAQMD Inventory.

Current and Projected Emissions

Table A-6 presents the total transportation GHG emissions by vehicle type for the year 2007 and 2020 (unmitigated). Transportation GHG emissions are listed by general vehicle class.

Table A-6. GHG External Emissions from Transportation by Vehicle Type

Vehicle Type	2007 Emissions (MTCO ₂ e)	2020 Unmitigated Emissions (MTCO ₂ e) ^a	Percentage of 2007 Transportation Emissions
On-Road			
Passenger/light-duty ^b	929,486	1,163,397	52.0
Medium-duty ^c	207,321	261,422	11.6
Heavy-duty ^d	470,645	716,451	26.3
Motorcycles	4,662	8,241	0.3
Buses/Motorhomes ^e	19,552	26,621	1.1
Subtotal	1,631,666	2,176,132	91.2
Off-Road			
Aircraft	31,455	75,652	1.8
Recreational Boats	21,060	31,942	1.2
Off-Road Recreational Vehicles	2,588	4,187	0.1
Off-Road Equipment	94,878	116,566	5.3
Farm Equipment	7,204	6,707	0.4
Subtotal	157,185	235,054	8.8
Total	1,788,851	2,411,186	100.0

Notes:

^a 2020 unmitigated emissions were projected based on SCAQMD Inventory

^b Gross weight 0–5,750 pounds (sedans, pick-up trucks, SUVs, and vans).

^c Gross weight 5,751–8,500 pounds (large pickups and SUVs [Ford F450, F550, Dodge Ram 2500, etc.]).

^d Gross weight 8,500+ pounds (fire trucks, dump trucks, semi trucks, water trucks, flatbed trucks, etc).

^e Includes diesel and gas urban buses, school buses, other buses, and motor homes.

Stationary Source Emissions

The following section discusses the methodology for calculating GHG emissions for stationary sources in the External Inventory. Specifically, this source category represents emissions from fuel combustion (such as diesel, gasoline, and propane) and fugitive emissions of CH₄ and N₂O at industrial facilities located in the County, provided by SCAQMD Inventory. .

Cement Plants

Cement plants emit large quantities of GHG emissions through activities including fuel combustion, electricity use, and clinker production. The fuel combustion activities at these plants include those associated with cement production, building operations, power plants/cogeneration facilities, and any other activity that consumes fuel. GHG emissions from clinker production result from the chemical reactions involved in producing the intermediate cement product from raw materials. There are three cement plants within the County's LUA area: 1) Mitsubishi Cement Plant, Lucerne Valley; 2) CalPortland Cement Plant, Colton; and 3) TWI Cement Plant, Oro Grande. The County has land use permitting authority over these plants' operations. A fourth cement plant, CEMEX, is in Victorville on incorporated land, and was therefore not included in the External Inventory.

Data Collection

GHG emissions data for cement plants for 2008 were obtained from CARB³. Cement plants are required to report their emissions as stipulated by the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions. To estimate cement plant emissions for 2007, 2008 emissions were estimated based on Southern California clinker production. Because clinker is the primary ingredient in cement and also requires the most energy to produce in relation to other cement ingredients, clinker production is a reasonable proxy for estimating emissions. According to the U.S. Geological Survey (USGS), Southern California clinker production was 8,661 MT in 2007 and 7,978 MT in 2008; the decline in clinker production is likely a result of recent economic conditions⁴. The 2008 cement emissions (2,514,034) were multiplied by 1.086 to estimate cement emissions for 2007.

Emissions Calculations

CARB assumes a two (2) percent annual growth in cement production from 2004 to 2020⁵. This growth rate was used to calculate cement emissions, but it is likely an overestimate, because California cement production declined 1.3 percent on average from 2004 to 2007 and 1.8 percent from 1994 to 2007⁶. GHG emissions for cement plants were included for 2007 and 2020, based on CARB data. These emissions within the LUA area are 2,729,261 and 3,188,403 MTCO_{2e} in 2007 and 2020, accounting for approximately 46 percent and 43 percent of the External Inventory in the respective years.

³ Pers. Comm. Bannerman.

⁴ U.S. Geological Survey 2009.

⁵ California Air Resources Board 2008a, 2009a.

⁶ U.S. Geological Survey 2009.

Other Stationary Sources

The following section discusses methodology for calculating GHG emissions for other stationary sources in the External Inventory.

Data Collection

The GHG emissions for stationary sources were obtained from the SCAQMD Inventory. These emissions result from fuel use other than natural gas consumption, which is accounted for in the industrial category above. To determine emissions associated with the County's LUA area, total Countywide GHG emissions were scaled by the ratio of industrial natural gas combustion within the LUA area versus industrial natural gas combustion in the entire County in 2007, as provided by SCG. This ratio is approximately 0.19. The growth factors for each source consuming natural gas were used to determine natural gas emissions for 2007 and 2020, and these emissions were subtracted from the respective GHG emissions for each inventory year.

The following categories were included in the External Inventory: oil and gas production (combustion), manufacturing and industrial, food and agricultural processing, fuel combustion, coatings and related processes, cleaning and surface coatings, petroleum production and marketing, chemical, mineral processes, industrial processes, asphalt paving/roofing, and sewage treatment.

The SCAQMD Inventory for stationary industrial sources also includes emissions from natural gas combustion; the emissions associated with each fuel source were aggregated to provide the total emissions for each category. In this inventory, natural gas emissions were calculated separately, based on data from the utilities and as described above. To avoid double counting emissions from natural gas combustion, the percentage of emissions associated with natural gas consumption was subtracted from the SCAQMD total stationary source inventory.

Emissions Calculations

Other stationary source emissions account for approximately three (3) percent of the County's energy-related emissions and two (2) percent of the County's total emissions in 2007. This source category represents emissions from fuel combustion (such as diesel, gasoline, and propane) and fugitive emissions of CH₄ and N₂O at industrial facilities in the County. (SCAQMD Inventory).

County stationary source GHG emissions account for 137,714 MTCO₂e and 167,767 MTCO₂e for year 2007 and 2020 unmitigated GHG emissions, respectively. These GHG emissions represent two (2) percent of the County's GHG emissions inventory for the years 2007 and 2020 (unmitigated). Stationary source GHG emissions are listed by general category. GHG emissions were estimated in the SCAQMD Inventory.

Current and Projected Emissions

County stationary source emissions account for 46 and 43 percent of the County's GHG emissions inventory for the year 2007 and 2020 (unmitigated), respectively. Stationary source GHG emissions are listed by general category. GHG emissions were estimated in the SCAQMD

Inventory. **Table A-7** presents the total stationary source GHG emissions for each stationary source category for the year 2007 and 2020 (unmitigated).

Table A-7. GHG External Emissions from Stationary Sources by Category

Stationary Source Category	2007 Emissions (MTCO ₂ e)	2020 Unmitigated Emissions (MTCO ₂ e)
Cement Plants		
Clinker Production	1,656,120	1,823,939
Fuel Combustion	1,070,378	1,178,842
Fugitive Emissions	2,763	3,043
Subtotal	2,729,261	3,005,824
Other Stationary Source Emissions		
Oil and Gas Production (combustion)	369	369
Manufacturing and Industrial	84,648	110,502
Food and Agricultural Processing	605	779
Other (Fuel Combustion)	30,806	31,560
Coatings and Related Processes	234	323
Other (Cleaning and Surface Coatings)	52	82
Petroleum Marketing	7,521	7,639
Chemical	367	616
Food and Agriculture	7	7
Mineral Processes	501	652
Other (Industrial Processes)	63	89
Asphalt Paving/Roofing	26	33
Sewage Treatment	11,975	15,115
Subtotal	137,174	167,766
Total	2,866,435	3,173,590

Water Conveyance Embodied Emissions (Imported Water)

The following section discusses methodology for calculating GHG emissions for water conveyance in the External Inventory due to importation of water from outside the County.

Data Collection

Water supply and conveyance involves indirect emissions from the generation of electricity required to supply the County with imported water. Imported water comes from the SWP and the Metropolitan Water District of Southern California (Metropolitan). Imported water quantities were supplied by the General Plan *Circulation and Infrastructure Background Report* (San Bernardino County 2006a).

Emissions Calculations

Indirect emissions associated with water importation to the LUA area resulted in GHG emissions of 10,696 and 13,211 MTCO₂e in 2007 and 2020, as shown in **Table A-8**, accounting for approximately 0.2 percent of the External Inventory for each of the respective years. Electricity and natural gas used for water pumping and treatment in the County was included in the utility data described above. The energy used to transport water from outside of the County is not included in this utility data and was obtained from the CEC 2006 report, *Refining Estimates of Water-Related Energy Use in California*, which provides proxies for embodied energy use for water in southern and northern California (CEC 2006).

Table A-8. GHG External Emissions from Water Conveyance by Imported Source

Water Source	2007 Emissions (MTCO₂e)	2020 Unmitigated Emissions (MTCO₂e)
State Water Project	9,743	12,522
Metropolitan's CRA	953	689
Total	10,696	13,211

Information in the CEC report regarding electricity usage and loss factors, and imported water quantities listed in the General Plan *Circulation and Infrastructure Background Report*, was used to calculate indirect emissions from water importation to the County from the Colorado River and from the State Water Project (SWP) (San Bernardino County 2006a). Electricity emission factors for the CAMX/WECC California region were used (724.12 lbs CO₂/MWh, 30.24 lbs CH₄/GWh, and 8.08 lbs N₂O/GWh) (USEPA 2009c). Last, emissions associated with the County's LUA area were based on total Countywide GHG emissions for water supply and conveyance, as calculated above, by scaling these Countywide emissions by the ratio of the population in the unincorporated County to that of the entire County for 2007. This ratio is approximately 0.15.

County water supply and conveyance GHG emissions due to importation of water account for 10,696 MTCO₂e and 13,211 MTCO₂e for year 2007 and 2020 (unmitigated) GHG emissions, respectively. These GHG emissions represent approximately 0.2 percent of the County's GHG emissions inventory for the year 2007 and 2020 (unmitigated).

Landfill Emissions

The following section discusses the methodology for calculating GHG emissions for landfills in the External Inventory.

Landfill Methane Emissions

Data Collection

The County operates six active landfills and maintains 14 closed landfill sites. The County's Solid Waste Management Department is responsible for the management of all 20 landfills. The County's active landfills range in capacity from just over 3,000 cubic yards at Barstow and Landers to over 80,000 cubic yards at Victorville. In total, the County was responsible for the management of 1,920,829 tons of solid waste in 2007 generated in the unincorporated areas of the County and the incorporated cities in the County. Several of the landfills already have control systems in place for methane capture. The landfills contain waste that has been generated by the entire County population over a long historical period; the oldest landfill site opened in 1949.

In addition to County-owned and operated landfills, there are five private landfills in the County. Due to limited data for two of these landfills, which suggests that these landfills are small, methane emissions from only the remaining three private landfills were included in the External Inventory.

Waste in place (WIP) data, opening and closing dates, and methane capture data from the USEPA were incorporated into the analysis (USEPA 2009b). Waste disposal tonnage for all waste landfilled from the California Integrated Waste Management Board (CIWMB) was reported for 2005 through 2007 and used to project incoming waste for future years (CIWMB 2009).

For further discussion of waste data collection methods, refer to Appendix B.

Emissions Calculations

Landfill emissions associated with the LUA area resulted in GHG emissions of 213,191 and 359,317 MTCO₂e in 2007 and 2020, accounting for approximately three (3) percent and five (5) percent of the External Inventory in the respective years. GHG emissions from landfill waste are primarily the result of methane generation from anaerobic decomposition processes. Methane emissions from landfills were calculated for County-owned landfills, privately-owned landfills within the County's LUA area, and for waste generated by the unincorporated County but landfilled outside County borders. These calculations were performed according to the guidelines outlined in the Local Government Operations Protocol (CARB et al., 2008).

Methane emissions from landfills were calculated using a first order kinetics model. For a particular amount of WIP) at a landfill, it is assumed that the waste was deposited in the landfill in equal installments for each of the years the landfill was open. The methane generated in the current year (before landfill gas recovery) can be estimated as:

Methane = $(k \cdot L_o \cdot R_n \cdot \text{WIP} \cdot e^{-kA} - e^{-kB}) / (e^{-k} - 1)$ where:

- k = the exponential time constant of decay.
- L_o = methanogenic potential of the waste (cubic meters of methane per kg of waste).
- WIP = total waste-in-place in the landfill in the inventory year (metric tons).
- R_n = a factor that incorporates the density of methane and any unit conversions required to balance the equation dimensionally.
- A = the difference between the current year (plus one) and year the landfill opened.
- B = the difference between the current year (plus one) and the most recent year waste was deposited in the landfill.

The k and L_o coefficients for this analysis were selected based on the USEPA LandGEM model assumptions for the climatological conditions specific to San Bernardino County. Landfill size and control technology were also accounted for in these calculations. CO₂e emissions were calculated by multiplying the methane emissions from landfills by the GWP of methane of 21, based on LGOP guidance.

Methane emissions associated with WIP at private landfills within the LUA area were calculated for the following three private landfills: California Street Landfill, Metropolitan Water District of Southern California—Iron Mountain, and Mitsubishi Cement Plant Cushenbury Landfill.

In this analysis, the following were assumed: an annual waste to landfill growth rate of 1.75 percent (same as for the County-owned landfills); and 90 percent of new waste sent to landfills with existing methane recovery systems in place (USEPA 2009b).

The SCAQMD Inventory includes landfill methane emissions and carbon dioxide emissions from landfill flaring. These emissions were reported by individual landfill facilities. The SCAQMD Inventory also included carbon dioxide emissions from landfill flaring. These emissions were not included in this Plan, consistent with applicable protocols, as described below.

Methane emissions from waste generated by a jurisdiction but disposed of outside its organizational boundaries are considered to be “Scope 3 emissions” or “optional,” according to Local Government Operations Protocol (Protocol). The Protocol recommends that these emissions be included in the emissions inventory because doing so provides an opportunity for innovation in GHG management. Therefore, these emissions were included in the County’s External Inventory because the County is responsible for diversion programs that affect the amount and composition of waste sent to landfills outside of the County. To calculate these emissions, waste disposal tonnages from the CIWMB for 2005 through 2007 were used to project incoming waste for future years (CIWMB 2009). Emissions were calculated as described above for the County-owned and private landfills. In addition, the following assumptions were applied: an annual waste to landfill growth rate of 1.75 percent (same as County-owned landfills); and 93 percent of new waste sent to landfills with existing methane recovery systems in place (USEPA 2007).

Landfill Flaring CO₂ Emissions

Although the composition of landfill emissions is estimated to be about 50 percent CH₄ and 50 percent CO₂ by volume, CO₂ emissions from anaerobic digestion of solid waste in landfills are considered to be of biogenic origin. The SCAQMD reported both CO₂ and CH₄ emissions from landfill flaring in their inventory. The LGOP and IPCC recommend that biogenic emissions be reported only as an informational item (CARB et al., 2008; IPCC 2006). CO₂ emissions from combustion of recovered landfill gas (i.e., flared methane) are also not typically reported, as the CO₂ emissions are considered to be of biogenic origin. Consequently, the inventory presented in this report does not include CO₂ from flaring, in contrast to the SCAQMD inventory.

Current and Projected Emissions

County solid waste–related GHG emissions by landfill for 2007 and 2020 (unmitigated) projections are presented in **Table A-9**. 2020 unmitigated GHG emissions were projected through a first-order kinetics method based on:

- current waste in landfills from prior years (i.e., “waste in place”)
- projected new waste added to the landfills that is generated between 2007 and 2020

Landfill emissions account for approximately three (3) and five (5) percent of the External Inventory for the year 2007 and 2020 (unmitigated), respectively.

Table A-9. GHG External Emissions from Solid Waste/Landfills

Landfill Site	Landfill Status	2007 Emissions (MTCO ₂ e)	2020 Unmitigated Emissions (MTCO ₂ e)
County-Owned Landfills			
Barstow	Active	18,110	14,626
Colton	Active	26,167	21,619
Landers	Active	13,830	11,294
Mid-Valley	Active	43,988	39,563
San Timoteo	Active	21,944	18,480
Victorville	Active	19,690	17,730
Apple Valley	Closed	3,547	2,735
Baker	Closed	61	47
Big Bear	Closed	4,491	3,462
Hesperia	Closed	5,280	4,071
Lenwood-Hinkley	Closed	918	708
Lucerne Valley	Closed	673	519
Milliken	Closed	31,366	24,184
Morongo Valley	Closed	801	617
Needles	Closed	1,437	1,138
Newberry	Closed	546	421
Phelan	Closed	2,553	1,968
Trono-Argus	Closed	459	354

Landfill Site	Landfill Status	2007 Emissions (MTCO ₂ e)	2020 Unmitigated Emissions (MTCO ₂ e)
Twenty-Nine Palms	Closed	2,623	2,022
Yermo	Closed	231	178
Yucaipa	Closed	6,051	4,666
New Waste to landfill with methane recovery	NA	NA	119,131
New Waste to landfill without methane recovery	NA	NA	52,947
Subtotal		204,766	342,480
Private Landfills Located in the County			
California Street	Active	3,296	2,958
Mitsubishi Cement Plant Cushenbury	Active	4,979	4,438
Metro Water Dist—Iron Mountain	Closed	20	15
New Waste to landfill with methane recovery	NA	NA	7,701
New Waste to landfill without methane recovery	NA	NA	72
Total		8,295	15,184
Projected Waste to Landfills outside County Borders			
New Waste to landfill with methane recovery	NA	100	1,271
New Waste to landfill without methane recovery	NA	30	383
Subtotal		130	1,654
Total		213,191	359,318

Fugitive Emissions from Wastewater Treatment

The following section discusses methodology for calculating GHG emissions for wastewater treatment in the External Inventory.

Emissions Calculations

Fugitive emissions from wastewater treatment emissions associated with the LUA resulted in GHG emissions of 27,994 and 35,525 MTCO₂e in 2007 and 2020, accounting for approximately 0.4 percent of the External Inventory in each of the respective years as shown in **Table A-10**. Treatment of wastewater from both domestic (municipal sewage) and industrial sources can produce fugitive CH₄ and N₂O emissions (USEPA 2007). Due to lack of data on industrial wastewater treatment, only GHG emissions from domestic wastewater were analyzed. Wastewater from domestic sources is treated to remove soluble organic matter, suspended solids, pathogenic organisms, and chemical contaminants. CH₄ is generated when microorganisms biodegrade soluble organic material in wastewater under anaerobic conditions. N₂O is generated during both nitrification and denitrification of the nitrogen present in wastewater, usually in the form of urea, ammonia, and proteins (USEPA 2007).

Table A-10. GHG External Emissions from Wastewater Treatment

Water Source	2007 Emissions (MTCO₂e)	2020 Unmitigated Emissions (MTCO₂e)
Wastewater Treatment	27,994	35,525

CARB’s current and 2020 inventory provides State-wide emissions for CH₄ and N₂O from wastewater treatment. These emissions were scaled by the reported California population in the appropriate years to derive State-wide per capita emissions of CH₄ and N₂O from wastewater treatment. California Department of Finance population projections were used for the 2020 population projection and to scale to the emissions to the County. To determine emissions associated with the County’s LUA, total Countywide GHG emissions as calculated above were scaled by the ratio of population in the unincorporated County to the entire County for 2007. This ratio is approximately 0.15.

Data Collection

CARB’s current and 2020 inventory provides State-wide emissions for CH₄ and N₂O from wastewater treatment as discussed above.

Agriculture

The following section discusses the methodology for calculating GHG emissions for agriculture in the External Inventory.

Data Collection

The agriculture emissions estimates included in the report are based on the SCAQMD Inventory for San Bernardino County, which included the following agriculture source categories:

- Farming Operations (enteric fermentation and manure management from dairy operations), and
- Waste Burning and Disposal (prescribed burning).

The SCAQMD Inventory emissions estimates for agriculture emissions are based on information provided by the County Department of Agriculture, Weights and Measures for 1990, and information obtained from CARB (2000) and the Andreae and Merlet report (2001).

Emissions Calculations

To determine emissions associated with the County's LUA, total Countywide GHG emissions were scaled by the ratio of population in the unincorporated County to that in the entire County for 2007. This ratio is approximately 0.15.

Agricultural emissions account for approximately one (1) percent of the County's total emissions in 2007. This source represents CH₄ and N₂O emissions from dairy manure management and enteric fermentation and prescribed burning provided by SCAQMD. Other agricultural emissions were not included in SCAQMD's I Inventory; these sources are expected to be minor and were not quantified in this report.

County agricultural emissions account for GHG emissions of 86,854 MTCO₂e and 68,526 MTCO₂e for year 2007 and 2020 (unmitigated) GHG emissions, respectively. These GHG emissions represent one (1) percent of the County's GHG emissions inventory for the year 2007 and 0.7 percent of the 2020 (unmitigated) emissions.

Table A-11. GHG External Emissions from Agricultural Activity

Agricultural Activity	2007 Emissions (MTCO₂e)	2020 Unmitigated Emissions (MTCO₂e)
Farming Operations	33,180	19,580
Waste Burning and Disposal	31,439	31,411
Total	64,619	50,991

Miscellaneous

The following section discusses methodology for calculating GHG emissions for additional miscellaneous sources in the External Inventory.

Data Collection

GHG emissions estimates miscellaneous sources included in the plan are based on the SCAQMD Inventory, which includes methane emissions from two additional, minor sources:

- Residential fires, and
- Cooking (charbroiling emissions).

Only methane emissions from these two sources were included because CO₂ emissions from wood combustion (fires) are considered biogenic (CARB et al., 2008).

Emissions Calculations

To determine emissions associated with the County's LUA, total Countywide GHG emissions as calculated above were scaled by the ratio of population in the unincorporated County to the entire County for 2007. This ratio is approximately 0.15. Emissions from fires and cooking within the LUA resulted in GHG emissions of 329 and 414 MTCO₂e in 2007 and 2020, accounting for approximately 0.001 percent of the External Inventory for the year 2007 and 2020 (unmitigated).

Table A-12. GHG External Emissions from Miscellaneous Sources

Miscellaneous Activity	2007 Emissions (MTCO₂e)	2020 Unmitigated Emissions (MTCO₂e)
Residential Fires	17	17
Cooking (charbroiling emissions)	329	414
Total	346	431

Carbon Sinks and Sequestration

Various land covers in San Bernardino County provide sequestration of carbon in vegetation and soils. The amount of carbon in standing vegetation and soils is called the *carbon stock*. The amount of carbon sequestered from the atmosphere annually is called the *carbon flow*, the *GHG flux*, or the *annual sequestration*. The different types of land covers in the County, their carbon stock, and literature values for sequestration values are noted in **Table A-13**.

Data Collection

The focus for the External Inventory is on annual GHG emissions within the County LUA. Conversion of natural and agricultural land to urban uses results in the loss of the annual sequestration value of that land unless the new landcover provides sequestration value of its own. Loss of sequestration of carbon is functionally equivalent to an emission of carbon dioxide. However, data on specific conversion of land by individual land cover was not available to support quantification of land conversion in 2007 to add these emissions to the 2007 inventory. Similarly, data were not available to support a forecast of the potential conversion of carbon sinks between 2007 and 2020.

Emissions Calculations

No forecast of changes in natural carbon sinks was completed due to a lack of forecasted land use change data. The loss of annual sequestration is a cumulative concern in that the loss accumulates as more natural land cover is converted over time. **Table A-13** below presents potential carbon stock and sequestration values to different land covers that occur in San Bernardino County. These numbers are provided for illustrative purposes only and should not be considered a precise accounting of current or projected annual or cumulative losses of sequestration value.

It should be noted that loss of carbon stocks does not necessarily translate into an equivalent emission of carbon dioxide in the same manner as loss of annual carbon sequestration value. For example, when trees are cut and used in building products, the carbon in the wood fiber is still sequestered and is not released to the atmosphere. However, when carbon stock is burned or otherwise degrades, the carbon is released; in comparison to remaining *in situ*, this then represents a one-time release of the carbon dioxide formerly bound up as stock.

Table A-13: Carbon Stocks and Annual Sequestration Values of Different Land Covers

Land Cover	Planning Area	Carbon Stock (t C/Ha)	Annual Sequestration Value (t C/Ha/Year)	Notes
Chaparral, Sage, and Scrub	Valley Mountain	30 ¹	0.01 ²	
Grassland	Valley Mountain	3.5 ¹	0.01 ²	
Riparian Forest	Valley Mountain	NA	0.35 ² – 1.05 ¹	Limited riparian forest in San Bernardino County
Oak Woodlands and Oak Forests	Valley Mountain	26 – 56 ³ (woodlands) 52 – 114 ³ (forests)	0.35 ² – 1.05 ¹	Total estimated stock in San Bernardino County (all areas including incorporated areas and federal land) is ~2.1 million tons carbon on ~53,000 ha. ⁴
Conifer Forests (Ponderosa, Pinon, Juniper)	Mountain Desert	42 – 106 ⁵	0.5 – 3 ⁶	Ponderosa pine forest sequestration peaks at 3 t C/ha/yr after around 65 years and then declines to 0.5 t C/ha/yr at year 155. ⁶
Wetlands	Valley Mountain Desert	363 – 1,470 ²	0.12 – 0.21 ²	Freshwater wetlands can also be a net source of methane that can offset carbon sequestration value. Limited wetland resources in County.
Alkali Sink, Sand Dune	Desert	NA	NA	Given limited/non-existent vegetation, carbon stock and sequestration very limited.
Cultivated Soils	Valley Desert	3 ¹	0.0 ^{1,2} - 0.19 ⁷	Total carbon stock in agricultural lands in San Bernardino County estimated as ~45,000 t/carbon on 15,000 ha ¹ . Does not account for fossil fuel or fertilizer use by agriculture.
Urban Forest	Valley	NA	0.3 ² – 0.8 ⁷	Limited urban forested areas in County.

Notes

¹ CEC 2004a. Sequestration value for riparian forest and oak woodland/forest is value for hardwood forest and may overstate value.

² USCCP 2007. Carbon stock value for wetlands includes soils. Sequestration value for riparian forests, oak woodlands, and oak forests is average value for all forest types.

³ Gaman 2008. Tree values only included. Additional carbon stock and sequestration in understory, duff, debris, and soil.

⁴ Gaman and Firman 2008.

⁵ NCASI 2009. Excludes soil.

⁶ Stavins and Richards 2005. Values are for ponderosa pine forest.

⁷ Kroodma and Fields 2006.

⁸ Forbes and Dakin, no date. Urban forest value is U.S average. San Bernardino value is likely substantially lower due to arid conditions and sparse tree cover in urban areas.

All specific references to the County are for the County as a whole, including cities and federal lands, and are not limited to the unincorporated area.

External Inventory Results Summary

1990 Emissions

The SCAQMD Inventory included an estimated 1990 Countywide inventory, which totaled 2.8 MMTCO₂e. This 1990 inventory was not included in the Internal or External Inventories for the following reasons:

- The County's jurisdictional boundaries have changed significantly since 1990, introducing considerable uncertainty into an estimate of 1990 external emissions that is based on the current jurisdictional boundaries.
- Internal and External emissions estimates for the year 1990 would be difficult to determine with great accuracy since data for energy use, fuel combustion, landfills, and other sources required for GHG analysis were unavailable; therefore, the SCAQMD Inventory 1990 estimate, is based on backcasting from 2002 and subject to a degree of inherent uncertainty.
- Recognizing the inherent uncertainties in estimating a 1990 inventory for local jurisdictions, the CARB Scoping Plan did not recommend that local municipalities adopt a goal of reducing to 1990 emissions levels, but rather recommended that local governments adopt a future reduction goal that reflects a level of approximately 15 percent emissions reductions from current levels for both community (external) and municipal (internal) (CARB 2008).

Given the CARB Scoping Plan recommendation, the GHG Reduction Plan includes a 2007 inventory and 2020 estimate of emissions. As described below, the 2007 inventory is used to determine the reduction goal.

Current (2007) External GHG Emissions

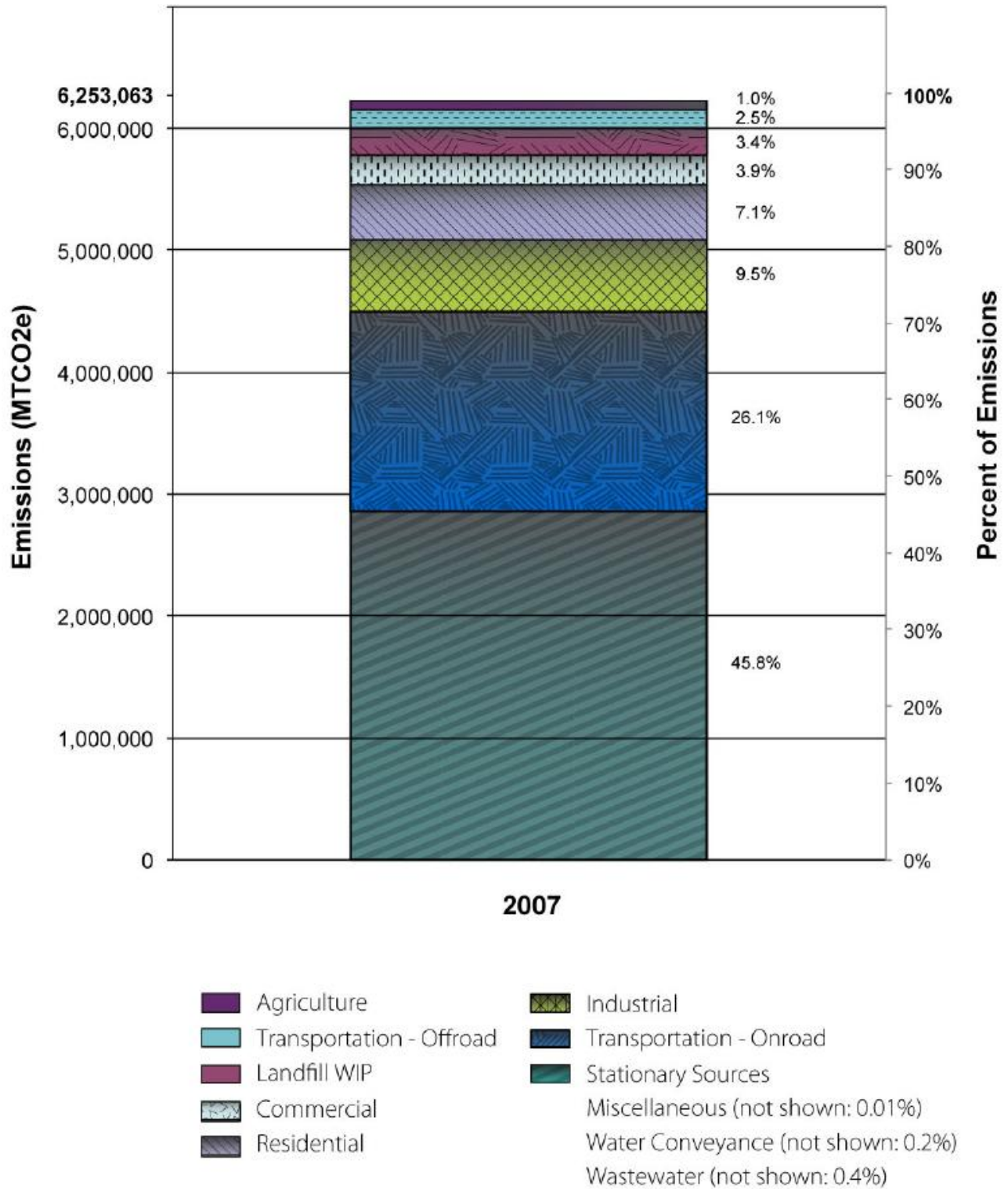
The County's 2007 External Inventory is presented in **Table A-14** by major sector. The largest source of GHG emissions in 2007 is Stationary Source emissions, followed by On-Road Transportation.

The primary source of Stationary Source emissions is cement plants as depicted in **Figure A-2**. The cement plant emissions result from several industrial activities, some of which are under the County's jurisdictional control. There are 11 cement plants located in California, four (4) are located in the County, three (3) of which are located in the County LUA area. These three (3) cement plants represent approximately 30 percent of GHG emissions from cement production in California.

Table A-14. 2007 External Emissions Summary (MTCO₂e)

Sector	2007	
	Emissions	Percent
Stationary Sources	2,866,435	45.8
Transportation: On-road	1,631,666	26.1
Industrial Energy Use	593,716	9.5
Residential Energy Use	440,851	7.1
Commercial Energy Use	246,364	3.9
Landfill waste	213,191	3.4
Transportation: Off-road	157,185	2.5
Agriculture	64,619	1.0
Wastewater	27,994	0.4
Water Conveyance	10,696	0.2
Miscellaneous	346	0.01
Total	6,253,063	100

Figure A-2. 2007 External Emissions by Sector



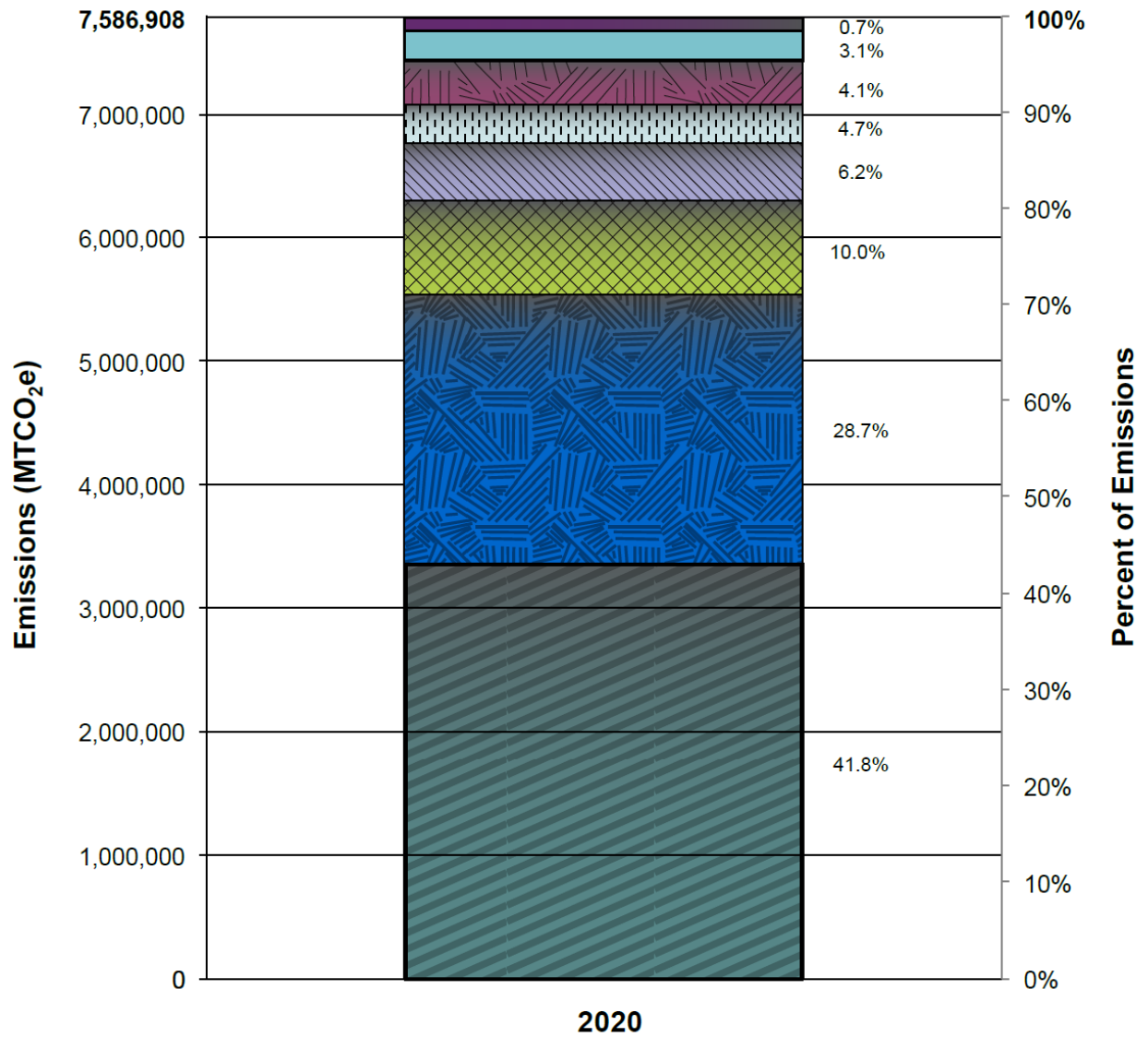
Projected (2020) External GHG Emissions

The 2020 (unmitigated) emissions projections are listed in **Table A-15** and presented in **Figure A-3** below. Projections for 2020 (unmitigated) are based on current emissions, scaled by sector specific growth rates presented in Table 2-1 above.

Table A-15. Projected 2020 Unmitigated External Emissions Summary (MTCO₂e)

Sector	2020	
	Emissions	Percent
Stationary Sources	3,173,592	41.8
Transportation: On-road	2,176,132	28.7
Industrial Energy Use	760,834	10.0
Residential Energy Use	467,217	6.2
Commercial Energy Use	314,603	4.1
Landfill waste	359,318	4.7
Transportation: Off-road	235,054	3.1
Agriculture	50,991	0.7
Wastewater	35,525	0.5
Water Conveyance	13,211	0.2
Miscellaneous	431	0.01
Total	7,586,908	100

Figure A-3. 2020 External Emissions by Sector

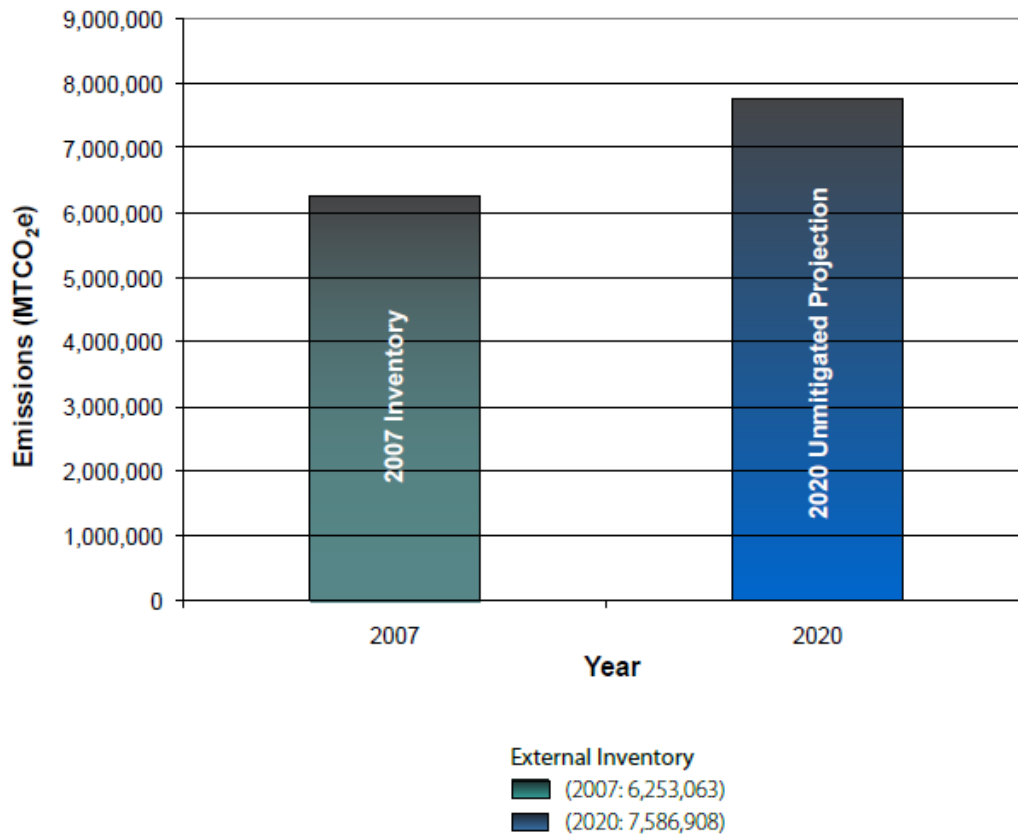


- Agriculture
 - Transportation - Offroad
 - Landfill WIP
 - Commercial
 - Residential
 - Industrial
 - Transportation - Onroad
 - Stationary Sources
- Miscellaneous (not shown: 0.01%)
 Water Conveyance (not shown: 0.2%)
 Wastewater (not shown: 0.5%)

Summary of 2007 and 2020 Unmitigated External Emissions

The County’s external emissions for 2007 and 2020 are 6.3 MMTCO₂e and 7.8 MMTCO₂e, respectively (see **Figure A-4** below). The 2007 GHG unmitigated emissions were calculated based on the most current and comprehensive data available and projected 2020 unmitigated GHG emissions are based on growth factors presented above. These future emissions are not adjusted to reflect recent legislation that will result in statewide GHG emissions reductions.

Figure A-4. External Inventory of GHG Emissions (2007–2020)



Scope 3 External Emissions

The following section discusses the methodology for calculating GHG emissions for Scope 3 sources. Emissions from these sources are reported for informational purposes and are not included in the External Inventory or establishment of the reduction target.

Methane Commitment for Waste Generation

Emissions associated with the “methane commitment” for waste generation within the LUA resulted in 98,504 and 123,424 MTCO₂e in 2007 and 2020, respectively. These emissions are defined as the future landfill methane emissions that result from the current or “active” year’s waste generation. These emissions are reported for informational purposes only and are not included in the inventory since reporting these emissions is considered to be optional (CARB et al. 2008). The “methane commitment” method is based on the USEPA’s Waste Reduction Model (WARM) for calculating lifecycle emissions from waste generation in that it accounts for future emissions from waste generation. The WARM model also addresses other lifecycle emissions such as upstream (i.e., raw material acquisition) emissions and carbon sequestration in landfills that are not included in this analysis. The waste disposal tonnage for all waste generated in the LUA area was obtained from the CIWMB for 2005 through 2007 (CIWMB 2009).

High Global Warming Potential GHGs

These sources of emissions are defined as Scope 3 sources in this inventory due to the County’s limited or non-existing jurisdiction over these sources. In addition, emissions of high global warming potential (GWP) GHGs are not specifically recommended for quantification in regional inventories and their quantification for the External Inventory may include considerable uncertainty.

High-GWP emissions within the LUA area resulted in 160,588 and 390,168 MTCO₂e in 2007 and 2020, respectively. High-GWP gases include SF₆ from electric utility applications, substitutes for ozone depleting substances (primarily hydrofluorocarbons and perfluorocarbons), and other high-GWP gases used in semiconductor manufacturing and other industrial processes.

Emissions of high-GWP GHGs were quantified for two sources:

- Substitutes for ozone depleting substances (ODS), and
- SF₆ emissions from electricity transmission lines.

Emissions from semiconductor manufacturing and specific industrial processes were not included in the inventory because these emissions either do not occur in the County, have negligible emissions, or could not be quantified for this analysis.

County high-GWP GHG emissions for the year 2007 and 2020 (unmitigated) are estimated and presented in **Table A-16** below.

Table A-16. Scope 3 GHG Emissions from High GWP Gases by Source

High GWP Source	2007 Emissions (MTCO ₂ e)	2020 Unmitigated Emissions (MTCO ₂ e)

Use of Substitutes for ozone depleting Substances	152,502	381,415
SF ₆ Emissions	8,086	8,754
Total	160,588	390,169

HFCs and PFCs as ODS Substitutes

Emissions of HFCs and PFCs occur from their use in refrigeration and air conditioning systems. These high-GWP compounds were phased in as ODS substitutes. The California State-wide per capita emissions of HFCs and PFCs from these applications were used to determine emissions for the County on a population basis, as described for wastewater treatment emissions. The CARB’s projected emissions for 2020 were used to determine a per capita emission rate, which was used to estimate emissions from the County in 2020. The California Department of Finance population projections for the County were used to estimate future emissions. To determine emissions associated with the County’s LUA, total Countywide GHG emissions as calculated above were scaled by the ratio of population in the unincorporated County to the entire County for 2007. This ratio is approximately 0.15.

High-GWP GHG emissions account for approximately 3.5 percent of the County’s total emissions in 2007. Most anthropogenic high-GWP GHGs include SF₆, HFCs, and PFCs. Emissions of high-GWP GHGs were quantified for two major source categories: appliances and electricity transmission lines. In appliances, ODS substitutes required by the Montreal Protocol include HFCs and PFCs. These high-GWP gases are emitted during normal use in appliances such as refrigeration and air conditioning systems, and leakage after disposal. Electricity transmission lines result in emission of SF₆, which is used to ensure the safety of electricity transmission.

Electricity Transmission

Electrical transmission and distribution systems emit SF₆. CARB estimates the California Statewide emissions of SF₆ from electricity transmission and distribution to be constant from 2004 to 2020 (CARB 2009). These emissions were used to estimate SF₆ emissions within the County LUA area, using the same methodology as that described above for ODS substitutes and wastewater treatment emissions.

Rail Emissions

Emissions associated with rail operations and trains were considered Scope 3 emissions and were not included in the External Inventory. Many trains travel through the County but have origins and destinations not located within the unincorporated County. In addition, railroads are not subject to County’s regulatory authority. GHG emissions for rail are based on the SCAQMD Inventory

These emissions within the LUA area resulted in 122,255 and 151,755 MTCO₂e in 2007 and 2020, respectively. These emissions are associated with locomotive fuel combustion. These emissions are reported for informational purposes only and are not included in the inventory because railroads are not subject to the County’s land use authority. GHG emissions for rail are based on the SCAQMD inventory.

Summary of Scope 3 Emissions

Various Scope 3 emission sources were calculated for the External Inventory for informational purposes and are presented in **Table A-17**.

Table A-17. Scope 3 External Emissions Summary

San Bernardino 2007 Scope 3 External Inventory and 2020 Unmitigated Projections (MTCO₂e)				
Sector	2007		2020	
	Emissions	Percent	Emissions	Percent
Methane Commitment for Waste Generation	98,504	25.8	123,424	18.6
High GWP GHGs	160,588	42.1	390,168	58.6
Trains	122,255	32.1	151,755	22.8
Total	381,347	100.0	665,347	100.0

The methane emissions are considered biogenic in the LGOP; therefore, not included in the inventory. High GWP GHGs are not typically included in regional inventories since their quantification is based on state-wide emissions factors regarding a suite of possible sources, and thus scaling those emissions to the regional or local scale likely introduces considerable uncertainty. Additionally, rail emissions were also not included in the External Inventory since many trains travel through the County but have origins and destinations not located within the County LUA area.

Data Gap Analysis and Recommendations for Future Inventories

Data for certain sectors of the External Inventory that was used to calculate overall emissions was in some cases incomplete or could be further refined. Data gaps are expected in initial GHG Inventories; an integral component of an initial inventory is the identification of these gaps to develop more robust inventories in the future. Although the External Inventory is comprehensive, subsequent versions of the inventory may address the data gaps described below.

Several emissions sources require further review as part of a future inventory update, including: stationary sources, on- and off-road transportation, and fugitive emissions for wastewater treatment. These are sources that were either 1) scaled down from County- or State-wide data to match the LUA area or 2) require County-specific information to improve accuracy. Future updates to the baseline emissions inventory should address the following specific recommendations.

Stationary Sources

Stationary source data were obtained from the SCAQMD Inventory as discussed above (except for cement plant data). The SCAQMD Inventory scaled Countywide stationary source emissions by population to determine emissions associated with the LUA area. This approach is based on the assumption that stationary sources can be reasonably approximated with population. This is not necessarily the case, because various commercial and industrial fuel combustion and other stationary source emissions activities may not be equally represented in the incorporated and unincorporated portions of the County based on population.

Stationary source data, including fuel combustion for residential, commercial, and industrial activities, should be obtained specifically for the unincorporated County. This will require greater coordination between stationary source facilities, the County, and the SCAQMD, and better tracking systems for residential fuel combustion quantities.

Transportation: On- and Off-road

On- and off-road emissions were estimated based on EMFAC and OFFROAD modeling performed in the SCAQMD Inventory. The SCAQMD Inventory scaled Countywide on- and off-road emissions by population to determine emissions associated with the LUA. On- and off-road emissions were apportioned by population to the LUA area because activity data are not readily available on a scale smaller than the County as a whole. Area-specific data for on- and off-road activity are required to estimate more precise emissions from on-road vehicles and off-road equipment.

More precise on-road data specific to the County's LUA could be obtained through the Southern California Association of Governments (SCAG) regional transportation modeling. SCAG's model data included VMT by vehicle type based on origins and destinations, and general trip purpose. This data could be used to estimate VMT originating, traveling through, and ending up within the County's LUA area. This analysis would provide a more accurate picture of VMT for the External Inventory than scaling by population, and would facilitate more effective design of transportation reduction measures. More precise off-road emissions estimates could be prepared using activity-based fuel consumption data specific to the County's LUA area. The OFFROAD model

does not currently have this capability. Improving the on- and off-road emissions estimates will require greater coordination between SCAG, the County, and the SCAQMD.

Wastewater Treatment

Emissions from domestic wastewater treatment and discharge were based on per capita State-wide averages because data regarding local wastewater treatment processes and emissions was not readily available. This approach is based on the assumption that fugitive wastewater treatment emissions can be reasonably approximated with population. This is not necessarily the case, because various wastewater treatment processes throughout the State produce different per-capita fugitive GHG emissions.

Area-specific data on wastewater treatment plants in San Bernardino County is required to estimate more precise emissions from these plants. Obtaining these data may be time consuming and cost prohibitive, however, unless reporting procedures are initiated to facilitate data collection. This will require greater coordination between wastewater treatment facilities, the County, and the SCAQMD, and better tracking systems for wastewater treatment processes.

Methodology for Estimating External Reduction Measures GHG Effectiveness

Introduction

The GHG Reduction Plan relies on a multiple sector multiple measure approach to support reduction of GHG emissions in the County. Both state and local emission reduction measures are taken into account. For the local measures, the County has identified a variety of reduction approaches and strategies including mandatory measures, incentive-based measures, a Development Review Process, outreach, education, and regional cooperation.

This section provides information on calculations of GHG emissions reductions for the following sectors in the County's GHG Reduction Plan for the External Inventory: residential, commercial, and industrial energy use; Transportation (on-road and off-road) and Land Use; Solid Waste Management; industrial fuel combustion; Agriculture; and Water Conservation. External emission reductions are defined in relation to the 2020 unmitigated emissions level for the County's LUA area. In the text that follows, LUA area and "External" are used interchangeably to describe emissions from sources in or associated with the unincorporated County.

Emission reductions for the R1 measures were based on CARB methodology, as presented in the AB 32 Scoping Plan. In certain cases, CARB's calculations were modified to better estimate reductions for the unincorporated County, as described below. R2 measures were calculated using County-specific assumptions, where available, and custom methodologies for each sector of emission reductions presented below. The reduction methodologies for each emissions sector are based on a combination of widely accepted protocols established by USEPA, CCAR, CARB, and other relevant protocols, as appropriate, or on scientific studies. The following section presents the major assumptions and calculation methodologies used to estimate emission reductions for the GHG Reduction Plan.

Development Review Process

For existing development, the GHG Reduction Plan relies on state measures that are mandatory and local measures that are primarily incentives-based. In some cases, the County and other agencies will be implementing state mandates, such as for urban water use efficiency through regional cooperation and incentives and other measures for existing development.

In the aggregate, new development, subject to County discretionary permit authority, will reduce emissions by 31 percent compared to unmitigated conditions through the County's Development Review Process (DRP). With this 31 percent GHG reduction and the GHG reduction effectiveness of all other measures in the GHG Reduction Plan, the County will reach its reduction target. The County will develop a screening table with a point system that takes into account a wide range of potential measures that new development could implement in order to achieve the overall 31 percent reduction level (Screening Table)⁷. The state measures and mandatory local measures (such as water conservation requirements) and other local action (such

⁷ The Screening Table attached as Appendix F to the GHG Reduction Plan is substantially similar to the Screening Table that will be utilized by the County.

as the County's municipal waste measures) will be included in the Screening Table such that where these measures apply to a specific development; they can be counted toward the 31 percent requirement. The County's Screening Table will be based on a 100 point system that corresponds to a 31 percent reduction in GHG emissions.

Beyond the state measures and the mandatory local measures, the County intends to leave the specific choice of reduction measures to the individual project proponent to facilitate the adoption of the most feasible, effective, and cost efficient measures relevant to each specific project. Through the County's Development Review Process each new project will be reviewed in order to assure that the identified measures are feasible, relevant to the project, committed to by the proponent, funded, and have a definite schedule for their implementation. Using this approach, the precise amount of GHG emissions reductions cannot be estimated for new development on a measure by measure basis. Rather, the analysis examined feasible scenarios of reductions that would result from new development utilizing different reduction strategies relating to energy efficiency, and alternative energy features.

The County will monitor the emissions reductions from new development, calculate those emissions and make any needed modifications to the County's reduction strategies to enable the County to reach its 2020 target.

Residential projects (or mixed use projects with a residential component) of 250 dwelling units or greater that are located in unincorporated area not within a City Sphere of Influence will not be eligible to use the Screening Table. Residential Projects outside of a City Sphere of Influence must perform an independent project-specific evaluation of GHG emissions as described below. (See Appendix F for a full description of the limitations and uses of the Screening Tables)

Residential Projects of 250 dwelling units or greater that are located outside of a City Sphere of Influence will be required to prepare a project specific GHG emissions analysis that includes a robust assessment of emissions, appropriate mitigation measures, and the issues associated with land use intensification and VMT generation on a project and regional basis. The analysis must produce an assessment that allows for a determination of whether the specific project causes cumulatively considerable GHG impacts. Residential Projects of 250 dwelling units or greater that are located outside of a City Sphere of Influence will not qualify for the tiering and streamlining benefits otherwise provided by this Plan as allowed by CEQA Guidelines Section 15183.5 due to the inability to adequately analyze and incorporate programmatic mitigation that comprehensively addresses the issues of GHG emissions regionally significant residential projects beyond the 2020 analysis horizon. It is anticipated that upon completion of the Sustainable Communities Strategy (SCS) by Southern California Association of Governments (SCAG) and the Regional GHG Reduction Plan currently under preparation by the San Bernardino County Association of Governments (SANBAG), adequate methodology for quantification of regional VMT and more comprehensive mitigation will provide suitable planning tools that can be incorporated into this Plan through a future amendment. Both the SCS and the Regional GHG Reduction Plan are intended to satisfy the requirements of SB 375 and allow better forecasts of GHG emissions to 2035 as well as providing a regional strategy for reducing GHG emissions.

Building Energy Reduction Measures

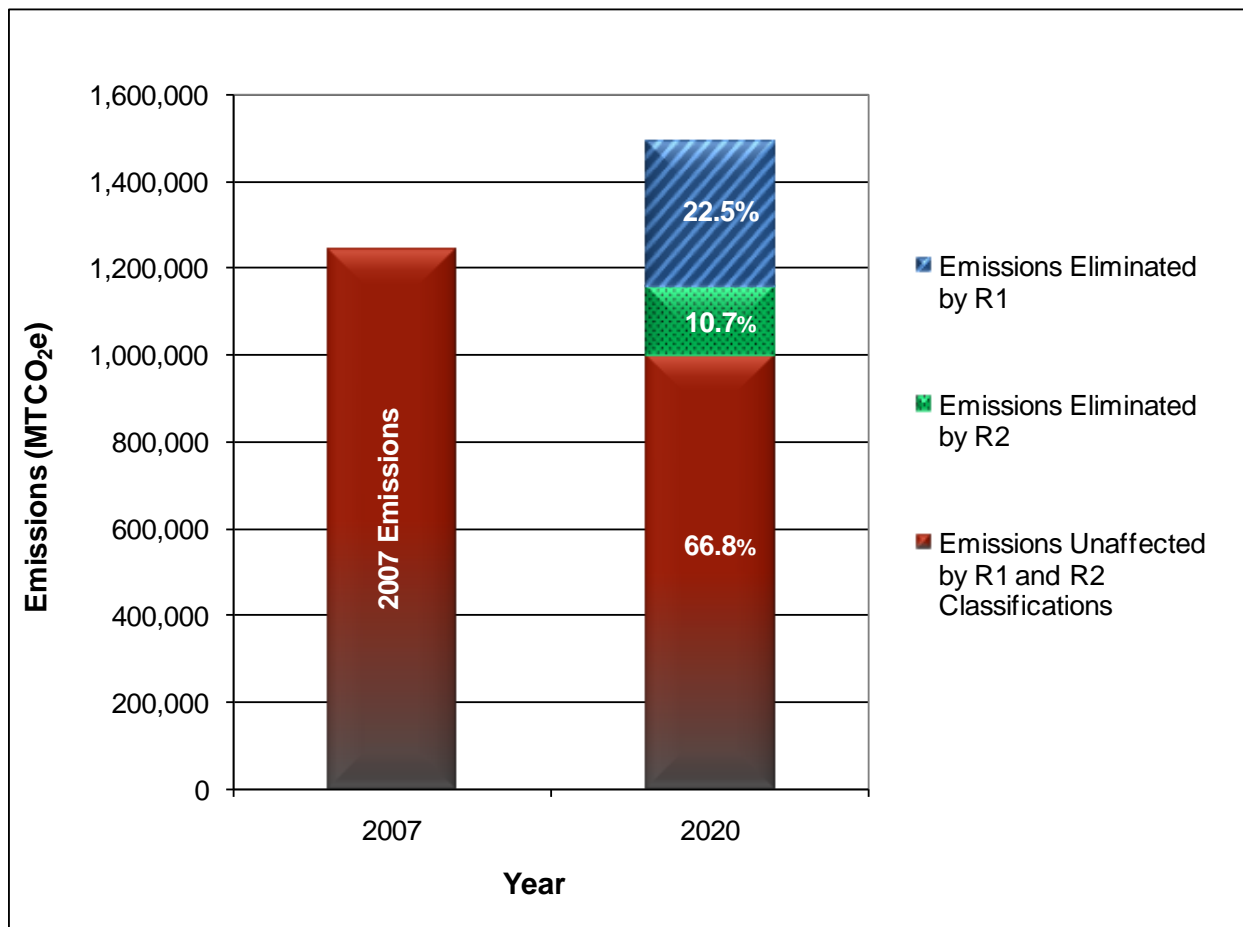
This section provides information on calculations of GHG emission reductions attributable to R1 and R2 measures for building energy use for the County. Total estimated GHG percent reductions and quantities from the reduction measures included in Reduction Scenarios R1 and R2 are presented below in **Table A-18**. Emission reductions for each measure are applied to the 2020 unmitigated projected emissions for the appropriate emission quantity affected by that measure. Reductions attributed to these measures from the 2020 unmitigated building energy use emissions will be 27 percent by year 2020. .

Table A-18: External GHG Emission Reductions from Building Energy Measures

Reduction Classification and Reduction Measure	GHG reductions	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state and regional building energy measures that do not require County action		
RE1B: RPS – 33 percent by 2020	104,236	7.0
R1E2: AB 1109 Residential Lighting	23,473	1.6
R1E3: AB 1109 Commercial/Outdoor Lighting	14,814	1.0
R1E4: Electricity Energy Efficiency (AB 32)	106,925	7.2
R1E5: Natural Gas Energy Efficiency (AB 32)	9,429	0.6
R1E6: Increased Combined Heat and Power (AB 32)	63,881	4.3
R1E7: Industrial Efficiency Measures (AB 32)	12,488	0.8
R2: Existing and new building energy measures that require County action		
R2E1: Residential Energy Efficiency Retrofits	17,350	1.2
R2E2: Commercial Energy Efficiency Retrofits	8,540	0.6
R2E3: Residential Retrofit Renewable Energy Incentives	21,351	1.4
R2E4: Warehouse Renewable Energy Incentive Program	6,786	0.5
R2E5: Solar Hot Water Incentives	11,907	0.8
R2E6: New Residential Energy Efficiency (through DRP)	9,460	0.6
R2E7: New Commercial Energy Efficiency (through DRP)	35,342	2.4
R2E8: New Home Renewable Energy (through DRP)	2,239	0.2
R2E9: New Commercial/Industrial Renewable Energy (through DRP)	25,392	1.7
R2E10: Commercial/Industrial Rehabilitation/Expansion Renewable Energy (through DRP)	21,086	1.4
Total	494,699	33.3
R3: Existing and new building energy measures—reductions not quantified or relied upon to achieve reduction goal		
R3E1: Green Building Development Facilitation and Streamlining		
R3E2: Green Building Training		
R3E3: Community Building Energy Efficiency & Conservation for Existing Buildings		
R3E4: Energy Efficiency Financing		
R3E5: Heat Island Mitigation Plan		

Reduction Classification and Reduction Measure	GHG reductions	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R3E6: Public Education		
R3E7: Cross-Jurisdictional Coordination		
R3E8: Community Alternative Energy Development Plan		
R3E9: Support Utility-Scale Renewable Energy Siting and Transmission Lines		
R3E10: Identify and Resolve Potential Barriers to Renewable Energy Deployment		
R3E11: Solar Ready Buildings Promotion		
R3E12: Renewable Energy Financing		
R3E13: Regional Renewable Energy Collaboration		
R3E14: Accessory Wind Systems		
R3E15: Off-Site Mitigation of GHG Impacts for New Development		

Figure A-5. External Inventory GHG Emission Reductions from Building Energy Measures



With the implementation of the emission reduction measures included in this Plan, the County will reduce building energy emissions by 33 percent from 2020 unmitigated projections. Reduced emissions in 2020 will be approximately 20 percent lower than 2007 emissions.

R1 Building Energy Reduction Measures

This section describes the methodology used to calculate GHG emission reductions for the *existing and proposed* national, state, or regional measures that do not require significant County action and will result in future GHG reductions associated with building energy usage within the County LUA.

R1E1A and R1E1B: Renewable Portfolio Standard for Building Energy Use

Senate Bills (SBs) 1075 (2002) and 107 (2006) created the State's Renewable Portfolio Standard (RPS), with an initial goal of 20 percent renewable energy production by 2010. Executive Order (EO) S-14-08 establishes a RPS target of 33 percent by the year 2020 and requires State agencies to take all appropriate actions to ensure the target is met. The 33 percent RPS by 2020 goal is supported by the California Air Resources Board (CARB), though its feasibility is not certain due to current limitations in production and transmission of renewable energy. Therefore, both RPS goals in 2020 were examined: 20 percent (Reduction Measure R1E1A) and 33 percent (Reduction Measure R1E1B).

SCE is the primary electric utility in the County accounting for 97 percent of electricity provided to the County's LUJ⁸. Because SBC provides the vast majority of power for the region, it was assumed that SCE generation characteristics were adequate to characterize the energy in the totality of the SBC region. This approach obviated the need to analyze the generation characteristics of the lesser energy area providers. SCE's 2007 level of renewable generation (as a percentage of its total portfolio) was approximately 15.8 percent.

Emissions reductions associated with RPS (both the 20 percent and 33 percent RPS goals) were determined by calculating the increase in renewable energy production from SCE's 2007 production level for both R1E1A and R1E1B reduction measures. These increases in renewable energy production result in a GHG emission reduction for electricity within the LUA of five (5) percent (Reduction Measure R1E1A) and 20.4 percent (Reduction Measure R1E1B). All renewable energy sources were assumed to be carbon neutral.⁹

In accordance with CARB protocol in the AB 32 Scoping Plan, reductions from R1 and R2 energy efficiency and renewable energy measures presented below (as applied electricity emissions only) were subtracted from the 2020 unmitigated emissions before applying the RPS (R1E1A, R1E1B) reduction¹⁰. This method avoids double counting of emissions reductions.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Increasing the SCE's renewable portfolio from 15.8 percent to 33 percent results in a decrease in GHG emissions of 20.4 percent.
- Measures R1E2-R1E6 have been implemented.

⁸ As detailed in the External Inventory.

⁹ California Air Resources Board, 2008, pp. 44-46.

¹⁰ California Air Resources Board, 2008a, pp. I-29-30.

This measure would result in a 7.0 percent reduction from total 2020 unmitigated building sector emissions.

R1E2 and R1E3: AB1109 Energy Efficiency Standards for Lighting (Residential and Commercial Indoor and Outdoor Lighting)

Assembly Bill (AB1109) mandated that the California Energy Commission (CEC) on or before December 31, 2008, adopt energy efficiency standards for general purpose lighting. These regulations, combined with other State efforts, shall be structured to reduce State-wide electricity consumption in the following ways:

- R1E2: At least 50 percent reduction from 2007 levels for indoor residential lighting by 2018.
- R1E3: At least 25 percent reduction from 2007 levels for indoor commercial and outdoor lighting by 2018.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The percent electricity use from residential lighting is 20 percent, consistent with a report from the California Energy Commission¹¹.
- The percent electricity use from commercial lighting is 37.14 percent. This percentage is calculated by dividing the emissions from commercial lighting by the total commercial electricity-based emissions in the County's 2007 inventory.
- There was no data available for outdoor industrial lighting use and therefore calculating reductions in outdoor industrial lighting due to AB1109 was not feasible.

Measure R1E2 would result in a ten (10) percent reduction from 2020 unmitigated residential electricity emissions, or a 1.6 percent reduction from total 2020 unmitigated building sector emissions. Measure R1E3 would result in a 9.3 percent reduction from 2020 unmitigated commercial electricity emissions, or a 1.0 percent reduction from total 2020 unmitigated building sector emissions.

R1E4: Electricity Energy Efficiency (AB32)

This measure captures the emission reductions associated with electricity energy efficiency activities included in CARB's AB32 Scoping Plan that are not attributed to other R1 or R2 reductions, as described in this report¹². This measure includes energy efficiency measures that CARB views as crucial to meeting the State-wide 2020 target, and will result in additional emissions reductions beyond those already accounted for in California's Energy Efficiency Standards for Residential and Non-Residential Buildings (Title 24, Part 6 of the California Code of Regulations; hereinafter referred to as, "Title 24 Energy Efficiency Standards"). This measure includes the following strategies:

- "Zero Net Energy" buildings (buildings that combine energy efficiency and renewable generation so that they, based on an annual average, extract no energy from the grid)
- Broader standards for new types of appliances and for water efficiency

¹¹ California Energy Commission, 2004.

¹² California Air Resources Board, 2008b.

- Improved compliance and enforcement of existing standards
- Voluntary efficiency and green building targets beyond mandatory codes
- Voluntary and mandatory whole-building retrofits for existing buildings
- Innovative financing to overcome first-cost and split incentives for energy efficiency, on-site renewables, and high efficiency distributed generation
- More aggressive utility programs to achieve long-term savings
- Water system and water use efficiency and conservation measures
- Additional industrial and agricultural efficiency initiatives
- Providing real time energy information technologies to help consumers conserve and optimize energy performance

By 2020, this requirement will reduce emissions in California by approximately 21.3 MMTCO₂e, representing 17.5 percent of emissions from all electricity in the State¹³.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The percent reduction of the State's emissions from the various energy efficiency measures listed above is equal to the percent reduction of the County's emissions from this measure (17.5 percent).
- The measure includes Title 24 Energy Efficiency Standards updates and energy efficiency retrofits. The County's R2 measures relating to these strategies has been subtracted out to avoid double counting.
- If the County's R2 measures that reduce electricity-related emissions through energy efficiency exceed the magnitude of measure R1E4, then measure R1E4 will have no reduction. If this was the case, then the County is actually going beyond what the State requires.
- Measures R2E1 and R2E2 have been implemented and energy emission reductions from the Development Review Process will approximate the estimated reductions from measures R2E6 and R2E7¹⁴.

The reduction in unmitigated emissions attributed to the AB 32 measure was calculated by applying the percent reduction from California's emissions related to electricity generation (17.5 percent) calculated in the Scoping Plan to the San Bernardino County emissions from electricity use.

This measure would result in a 7.2 percent reduction from total 2020 unmitigated building sector emissions.

R1E5: Natural Gas Energy Efficiency (AB32)

This measure captures the emission reductions associated with natural gas energy efficiency activities included in CARB's AB32 Scoping Plan that are not attributed to other R1 or R2

¹³ California Air Resources Board 2008a, 2009a.

¹⁴ Some of the proposed strategies listed above are included in the R2 measures described below; to avoid double counting, emission reductions (related to electricity) from all R2 energy efficiency measures (R2E1-R2E4) were subtracted from the emission reduction calculated by multiplying the electricity-based emissions by 17.5 percent.

reductions, as described in this report¹⁵. This measure includes energy efficiency measures that CARB views as crucial to meeting the State-wide 2020 target, and will result in additional emissions reductions beyond those already accounted for in California's Energy Efficiency Standards for Residential and Non-Residential Buildings (Title 24, Part 6 of the California Code of Regulations; hereinafter referred to as, "Title 24 Energy Efficiency Standards"). This measure includes the following strategies:

- "Zero Net Energy" buildings (buildings that combine energy efficiency and renewable generation so that they, based on an annual average, extract no energy from the grid)
- Broader standards for new types of appliances and for water efficiency
- Improved compliance and enforcement of existing standards
- Voluntary efficiency and green building targets beyond mandatory codes
- Voluntary and mandatory whole-building retrofits for existing buildings
- Innovative financing to overcome first-cost and split incentives for energy efficiency, on-site renewables, and high efficiency distributed generation
- More aggressive utility programs to achieve long-term savings
- Water system and water use efficiency and conservation measures
- Additional industrial and agricultural efficiency initiatives
- Providing real time energy information technologies to help consumers conserve and optimize energy performance
- By 2020, this requirement will reduce emissions in California by approximately 4.3 MMTCO₂e, representing 6.2 percent of emissions from all natural gas combustion in the State¹⁶.
- The following assumptions were used to calculate emission reductions attributed to this measure:
 - The percent reduction of the State's emissions from the various energy efficiency measures listed above is equal to the percent reduction of the County's emissions from this measure (6.2 percent).
 - The measure includes Title 24 Energy Efficiency Standards updates and energy efficiency retrofits. The County's R2 measures relating to these strategies has been subtracted out to avoid double counting.
 - If the County's R2 measures that reduce natural gas emissions through energy efficiency exceed the magnitude of measure R1E5, then measure R1E5 will have no reduction. In this case the County is actually going beyond what the State requires.
 - Measures R2E1 and R2E2 have been implemented and energy emission reductions from the Development Review Process will approximate the estimated reductions from measures R2E6 and R2E7.

¹⁵ California Air Resources Board, 2008b.

¹⁶ California Air Resources Board 2008a, 2009a.

This measure would result in a 0.6 percent reduction from total 2020 unmitigated building sector emissions.

R1E6: Increased Combined Heat and Power (AB32)

This measure captures the reduction in building electricity emissions associated with the increase of combined heat and power activities, as outlined in CARB's AB32 Scoping Plan. The Scoping Plan suggests that increased combined heat and power systems, which capture "waste heat" produced during power generation for local use, will offset 30,000 GWh State-wide in 2020. Approaches to lowering market barriers include utility-provided incentive payments, a possible CHP portfolio standard, transmission and distribution support systems, or the use of feed-in tariffs. By 2020, this requirement will reduce emissions in California by approximately 6.7 MMTCO₂e, representing 7.6 percent of emissions from all electricity in the State.¹⁷

The following assumptions were used to calculate emission reductions attributed to this measure:

- The percent reduction of the State's emissions from increased combined heat and power is equal to the percent reduction of the County's emissions from this measure (7.6 percent).

This measure would result in a 4.3 percent reduction in total 2020 unmitigated building sector emissions.

R1E7: Industrial Efficiency Measures (AB32)

This measure captures the reduction in industrial building energy emissions associated with the energy efficiency measures for industrial sources included in CARB's AB32 Scoping Plan.

By 2020, this requirement will reduce emissions in California by approximately 1.0 MMTCO₂e, representing 3.9 percent of emissions from all industrial natural gas combustion in the State¹⁸.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The percent reduction of the State's emissions from industrial efficiency measures is equal to the percent reduction of the County's industrial emissions from this measure (3.9 percent).

This measure would result in a 3.9 percent reduction from 2020 unmitigated industrial natural gas emissions, or a 0.8 percent reduction in total 2020 unmitigated building sector emissions.

R2 Building Energy Reduction Measures

This section describes the methodology used to calculate GHG emission reductions for the R2 measures that have been implemented or will be implemented by the County resulting in quantifiable GHG reductions for residential, commercial, or industrial building energy usage.

Each measure accounts for emission reductions achieved with R1 Building Energy measures and any preceding R2 Building Energy measures, thereby eliminating any potential double counting of emission reductions. For example the reductions due to the state Title 24 Energy Efficiency Standards were subtracted from 2020 unmitigated emissions before analyzing the effects of the proposed measures below.

¹⁷ California Air Resources Board 2008a, 2009a.

¹⁸ California Air Resources Board 2008a, 2009a.

As discussed above, the County will also be implementing the DRP that will result in a total reduction of 31 percent of those emissions attributable to the new development that occurs within the County's LUA area, compared to projected 2020 unmitigated emissions. The County's approach will not mandate that new development implement specific energy efficiency features beyond the State's Title 24 or renewable energy measures in order to meet the 31 percent requirement, but it is likely that many new development projects will select these features to achieve their reductions given that they are feasible using current technology and are under the direct control of a project proponent. For purposes of this analysis, Measures R2E6, R2E7, R2E8, R2E9, and R2E10, or their equivalent (in terms of energy savings and GHG emission reductions, are collectively referred to as "DRP Measures"), are assumed to be implemented as part of the Development Review Process. The County is not mandating a specific level of energy efficiency; however, to calculate emission reductions specific assumptions were assumed for each DRP Measures as described below. Many of the DRP Measures, including the specific assumptions used to calculate emissions are feasible and highly cost-effective. Consequently, it is likely that new development will meet or exceed the level of energy efficiency predicted below. These actions would occur *in addition to* all other Building/Energy reduction measures presented in the Building/Energy sector.

GHG emission reductions for the majority of the following measures are estimated based on their estimated energy savings. A description of each measure is followed by the resulting GHG reductions.

R2E1: Residential Energy Efficiency Retrofits

This measure involves a County program for residential energy efficient retrofits. Retrofits would include various energy efficiency upgrades, including improvements to HVAC systems, water heating systems, or the building envelope (windows/insulation). This measure will be implemented through a combination of County permitting for major renovations and incentives for homeowners to voluntarily retrofit their properties. The incentives will include financing mechanisms, such as AB 811 type programs¹⁹, grants - such as Energy Efficiency Conservation Block Grant funding, and, the County's Green County program, for waiving permit fees. The County will also increase community awareness of retrofit potential, engage in efforts to encourage a qualified retrofit workforce and remove regulatory and procedural barriers, if any, to implementing green building practices.

Improving energy efficiency by 15 percent may be achieved through a menu of options including, but not limited to, the following.

- Replace old, inefficient appliances with new, more efficient ones.
- Replace inefficient air conditioning and heating units with more efficient ones.
- Replace old, inefficient insulation and windows with new, efficient insulation and top-quality and insulating windows.
- Install solar panels and solar water heaters.
- Replace inefficient and incandescent lighting with compact fluorescent and LED lighting.

¹⁹ AB 811 financing programs for residential retrofits are currently impracticable due to Fannie Mae and Freddie Mac mortgage constraints. However, if these constraints are removed, then the County intends to create an AB 811 program, likely in concert with a regional or state-wide group of municipalities, for residential retrofits.

- Weatherize existing buildings to improve energy efficiency.

The amount of residences retrofit by 2020 was estimated based on the methodology of the *Green Building in North America* report from the Commission for Environmental Cooperation²⁰. This report examined a “Deep Green” scenario: an aggressive yet technically achievable retrofit scenario based on a “defensible, robust modeling platform.” In this scenario 90 percent of the existing residential buildings in 2005 undergo a retrofit or major renovation by 2030. Using a linear regression to determine their retrofit rate, and then applying this rate to the County’s timespan (2007 to 2020), determines that 47 percent of residential buildings will be retrofit by 2020. Because this measure is voluntary, a reduced penetration rate was also incorporated into the calculation, reducing the percent of residential buildings retrofit from 47 to 20 percent.

- Twenty (20) percent of residential dwellings existing in 2007 will be retrofit or renovated by 2020.
- All residential buildings affected by this measure would be 20 percent more energy efficient, resulting in a 20 percent decrease in energy use and associated GHG emissions.

This measure would result in a 1.2 percent reduction in total 2020 unmitigated building sector emissions.

R2E2: Commercial Energy Efficiency Retrofits

This measure involves a program for commercial energy efficient retrofits. Retrofits would include various energy efficiency upgrades, including improvements to HVAC systems, water heating systems, or the building envelope (windows/insulation). This measure will be implemented through a combination of County permitting for major renovations and incentives for building owners to voluntarily retrofit their commercial properties. The incentives will include the availability of financing mechanisms, such as an AB 811 type program²¹ and Energy Efficiency Conservation Block Grant funding, and the County’s Green County program for waiving permit fees. The County will also increase community awareness of retrofit potential, engage in efforts to encourage a qualified retrofit workforce and remove regulatory and procedural barriers, if any, to implementing green building practices.

Improving energy efficiency may be achieved through a menu of options including, but not limited to, the options listed under measure R2E1 above.

The amount of commercial buildings retrofit by 2020 was estimated based on the methodology of the *Green Building in North America* report from the Commission for Environmental Cooperation²². This report examined a “Deep Green” scenario: an aggressive yet technically achievable retrofit scenario based on a “defensible, robust modeling platform.” In this scenario 90 percent of the existing commercial buildings in 2005 undergo a retrofit or major renovation by 2030. Using a linear regression to determine their retrofit rate, and then applying this rate to the County’s timespan (2007 to 2020), determines that 47 percent of commercial buildings will be retrofit by 2020. Because this measure is voluntary, a reduced penetration rate was also incorporated into the calculation, reducing the percent of residential buildings retrofit from 47 to 20 percent.

²⁰ Commission for Environmental Cooperation 2008.

²¹ Current mortgage constraints with Fannie Mae/ Freddie Mac do not apply to commercial mortgages. As such, the County can pursue establishment of an AB 811-type program upon program adoption.

²² Commission for Environmental Cooperation 2008.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Twenty (20) percent of commercial buildings existing in 2007 will be retrofit or renovated by 2020.
- All commercial buildings affected by this measure would be 20 percent more energy efficient, resulting in a 20 percent decrease in energy use and associated GHG emissions.
- This measure would result in a 0.6 percent reduction in total 2020 unmitigated building sector emissions.

R2E3: Residential Retrofit Renewable Energy Incentives

This measure involves the installation of solar photovoltaic panels, during a retrofit or major renovation of residential dwellings. The retrofit rate for residential buildings was determined using the *Green Building in North America* methodology, as described above for measure R2E1. Incentives are available to homeowners through the California Energy Commission's California Solar Initiative; new incentives would come from renewable energy financing (see discussion of R3E12 below). The County's incentives to a building owner who voluntarily retrofits his building will also include: the availability of financing mechanisms, such as an AB 811 type program²³ and Energy Efficiency Conservation Block Grant funding; incentives from the CEC's Solar Initiative, possible partnership with Southern California Edison and the CPUC, and the County's Green County program, for waiving permit fees. The County will also increase community awareness of retrofit potential, engage in efforts to encourage a qualified retrofit workforce and remove regulatory and procedural barriers, if any, to implementing green building practices.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Twenty (20) percent of residential dwellings existing in 2007 will be retrofit or renovated by 2020.
- Solar energy would reduce the homes projected electricity use by 51 percent.
- Energy emission reductions from the Development Review Process occur consistent with the estimates for strategy R2E6.
- This measure would result in a 1.4 percent reduction in total 2020 unmitigated building sector emissions.

R2E4: Warehouse Renewable Energy Incentive Program

The County will promote and encourage participation in an incentive program, for installation of solar photovoltaic panels on new warehouse development projects. Possible approaches to the incentive program include developing a partnership between Southern California Edison and California Public Utilities Commission, or establishing a separate program through leveraging other private or public funding sources.

This program would require that the solar photovoltaic panels offset at least 50 percent of a warehouse's electricity use.

The following assumptions were used to calculate emission reductions attributed to this measure:

²³ Assuming mortgage financing constraints can be overcome.

- This measure would only affect emissions from commercial warehouse space electricity use. Based on CBECS warehousing data, this was calculated to be 40 percent of the County's external electricity emissions associated with buildings²⁴.
- Twenty-five (25) percent of unmitigated 2020 emissions from commercial warehousing would be affected by this program.
- Installation of solar photovoltaic panels will offset 50 percent of a warehouse's electricity use.
- Reductions consistent with that estimated for strategy R2E7 and measure R2E2 have been implemented.

This program would result in a 0.5 percent reduction in total 2020 unmitigated building sector emissions.

R2E5: Solar Hot Water Incentives

The County will encourage participation in the California Solar Initiative (CSI) Thermal Program established in January 2010 by the California Public Utilities Commission to provide incentives for the installation of solar water heating systems in new and existing homes and business in the territories of Southern California Edison, Southern California Gas Company, and Pacific Gas and Electric Company. In accordance with AB 1470, the statewide incentive program to encourage the installation of 200,000 solar water-heating systems will run through 2017, or until the program funds are exhausted. The County will facilitate participation in this program by providing access to information about the program and waiving permit fees.

The following assumptions were used to calculate emission reductions attributed to this measure:

- This measure would affect all emissions from water heating. However, industrial water heating emissions were not included in this measure due to the lack of a detailed breakdown of emissions by energy usage (e.g., heating, lighting, water heating, etc.) for industrial emissions.
- It was assumed that 20 percent of unmitigated 2020 emissions from water heating would be affected by this program. This should be considered a somewhat conservative estimate; the actual percentage may be higher depending on how successful the measure proves.
- Solar water heating saves, on average, 50 to 80 percent of the energy required for water heating²⁵. For this analysis, it was assumed that this measure would save 65 percent of energy used for water heating.
- Measure R2E1/R2E2 have been implemented and energy emission reductions from the Development Review Process will approximate the estimated reductions from strategy R2E6 and R2E7.

This measure would result in a 0.8 percent reduction in total 2020 unmitigated building sector emissions.

²⁴ Energy Information Administration 2003.

²⁵ U.S. Department of Energy, 2009.

R2E6: Residential Energy Efficiency for New Development (through DRP)

This measure involves mitigation of GHG emissions through the County's Development Review Process (DRP) with the incorporation of energy efficient features in new residential construction. Through the DRP, GHG emissions from new development in the County will be reduced by 31% as compared to 2020 unmitigated emission projections. Since Energy efficiency improvements are one of the most cost-effective methods for new development to achieve GHG emissions reductions, it is expected that energy efficient features will be utilized as a common strategy to achieve the required reductions. A combination of options could be used such as energy efficient appliances, lighting, and HVAC systems; building siting and orientation; energy efficiency windows and insulation; natural shading, skylights, and reflective surfaces. Additional emissions reductions can be achieved through solar panels or solar water heaters beyond what is discussed below under R2E8 and R2E5.

The 2008 Title 24 Energy Efficiency Standards are, according to an estimate from the CEC²⁶, approximately 17 percent more stringent for residential buildings than the 2005 standards. The Big Bold Strategies of the California Energy Efficiency Strategic Plan suggest a target of reaching zero net energy (ZNE) for residential buildings by 2020. Although the California Public Utilities Commission (CPUC) does not detail how this will be possible, the continued increase in stringency of Title 24 Energy Efficiency Standards is said to be of paramount importance towards reaching this goal. The CARB Scoping Plan defines one of the State strategies is to update the Title 24 standards triennially to support this goal.

The following assumptions were used to calculate potential emission reductions:

- All additional building emissions in future years are due to new buildings.
- Energy efficient design, equivalent to 15 percent in excess of the 2008 Title 24 Energy Efficiency Standards, would be implemented for new residential buildings. Fifteen (15) percent is the minimum requirement for several well known programs, including: LEED for Homes, ENERGY STAR, and utility rebate programs.
- Energy efficient designs are assumed to improve 17 percent triennially in 2011, 2014 and 2017.
- New buildings were assigned to the following five groups based on the date of the code under which they are/will be permitted: 2005, 2008, 2011, 2014, and 2017. By creating an average of various increases in stringency in relation to the 2005 standards, it is possible to develop a metric that represents the average reduction due to increases in energy efficiency between 2007 and 2020.

These reductions may be achieved through a menu of options including, but not limited to, the following actions:

- Install energy efficient appliances (such as Energy Star), including dishwashers, water heaters, air conditioning units, heating units, etc.
- Install energy efficient lighting.
- Install solar panels and solar water heaters.

26 Personal communication with the California Energy Commission 2008.

- Site and orient buildings to optimize conditions for natural heating, cooling, and lighting.
- Install top-quality windows and insulation.
- Incorporate natural ventilation in new building design.
- Incorporate natural shading, skylights, and reflective surfaces in new building design.

This measure would result in a 0.5 percent reduction in total 2020 unmitigated building sector emissions.

R2E7: Commercial Energy Efficiency

This measure involves mitigation of GHG emissions through the County's Development Review Process (DRP) with incorporation of energy efficient features in new commercial construction. Through the DRP, GHG emissions from new development in the County will be reduced by 31% as compared to 2020 unmitigated emission projections. Since Energy efficiency improvements are one of the most cost-effective methods for new development to achieve GHG emissions reductions, it is expected that energy efficient features will be utilized as a common strategy to achieve the required reductions.

The 2008 Title 24 Energy Efficiency Standards are, according to an estimate from the CEC²⁷, approximately seven (7) percent more stringent for non-residential buildings than the 2005 standards. The Big Bold Strategies of the California Energy Efficiency Strategic Plan suggest a target of reaching zero net energy (ZNE) for all new commercial buildings by 2030.

The following assumptions were used to calculate emission reductions attributed to this strategy:

- All additional building emissions in future years are due to new buildings.
- Energy efficient design, equivalent to 110 percent in excess of the 2008 Title 24 Energy Efficiency Standards, would be implemented for new commercial buildings. A ten (10) percent margin is aligned with the minimum requirements for LEED New Construction²⁸.
- The non-residential standards were assumed to increase seven (7) percent triennially in 2011, 2014 and 2017.
- New buildings were assigned to the following five groups based on the date of the code under which they are/will be permitted: 2005, 2008, 2011, 2014, and 2017. By creating an average of various increases in stringency in relation to the 2005 standards, it is possible to develop a metric that represents the average reduction due to increases in Title 24 Energy Efficiency Standards between 2007 and 2020.

Exceeding Title 24 requirements by ten (10) percent may be achieved through a menu of options including, but not limited to, the options listed under R2E6 above, as appropriate to commercial buildings. This measure would result in a 2.0 percent reduction in total 2020 unmitigated building sector emissions.

R2E8: New Home Renewable Energy (Through the DRP)

²⁷ Personal communication with the California Energy Commission, 2008.

²⁸ LEED 2009 for New Construction and Major Renovations.

<http://www.usgbc.org/ShowFile.aspx?DocumentID=5546>

This measure involves the mitigation of GHG emissions through the County's Development Review Process (DRP) with the installation of solar panels in new residential construction. Through the DRP, GHG emissions from new development in the County will be reduced by 31% as compared to 2020 unmitigated emission projections. It is expected that renewable energy will often be incorporated into new residential developments to achieve the GHG emission reductions required for the project.

Incentives are available to homebuilders through the California Energy Commission's New Solar Homes Partnership (this program provides rebates to developers of six or more units who offer solar power in 50 percent of new units and is a component of the California Solar Initiative). It is likely that many new residential projects will choose to implement solar photovoltaic measures in order to help achieve their 31 percent requirement through the DRP.

The following assumptions were used to calculate emission reductions attributed to this strategy:

- This strategy would only affect newly built residential buildings.
- Solar photovoltaic panels would be installed on 20 percent of new homes built within the County's LUA area.
- Solar energy would reduce the homes projected electricity use by 51 percent. This is the typical reduction in energy use due to the installation of solar on a New Solar Homes Partnership home²⁹.
- Measure R2E6 has been implemented.

This measure would result in a 0.2 percent reduction in total 2020 unmitigated building sector emissions.

R2E9: New Commercial/Industrial Construction Renewable Energy (through DRP)

This measure involves mitigation of GHG emissions through the County's Development Review Process (DRP) with solar (or other renewable) energy measures incorporated into new construction of commercial, office, or industrial development. Through the County's DRP, GHG emissions from new development in the County will be reduced by 31% as compared to 2020 unmitigated emission projections. It is expected that renewable energy will frequently be incorporated into new commercial and industrial developments to achieve the GHG emission reductions required for the project.

The following assumptions were used to calculate emission reductions attributed to this measure:

- This measure would be adopted by new commercial and industrial projects, except warehousing, which are accounted for in R2E4.
- Projected energy use would be reduced by 15 percent.
- Measure R2E7 has been implemented.

This strategy would result in a 1.7 percent reduction in total 2020 unmitigated building sector emissions.

²⁹ This statistic was based on an unofficial analysis of the New Solar Home Partnership provided by the CEC.

R2E10: Commercial and Industrial Rehabilitation/Expansion Renewable Energy (through the DRP)

This measure involves the installation of solar (or other renewable) energy in commercial and industrial projects requiring discretionary permits for major rehabilitations or expansions (additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) of commercial, office, or industrial development greater than or equal to 25,000 square feet in size. The GHG emissions reductions attributed to this measure will be achieved through the County's DRP.

The retrofit rate for commercial/industrial buildings was determined using the *Green Building in North America* methodology, as described above for measure R2E3 to identify the potential scale of new development that this strategy might apply to.

The following assumptions were used to calculate potential emission reductions attributed to this strategy:

- This measure will be implemented by all commercial and industrial major expansions, except for warehousing, which is accounted for in R2E4.
- The measure will result in incorporating solar (or other renewable) energy generation to provide 15 percent or more of the project's energy needs.
- Twenty (20) percent of commercial buildings existing in 2007 will be retrofit or renovated by 2020.

This action would result in a 1.4 percent reduction in total 2020 unmitigated building sector emissions.

R3 Building Energy Measures

The following list of R3 measures for building energy use were not quantified or relied upon to demonstrate achievement of the proposed County 2020 emissions target. These measures facilitate the success of many of the R2 measures described above and are included in the GHG Reduction Plan.

R3E1: Green Building Development Facilitation and Streamlining

The County will continue its efforts to identify and remove regulatory or procedural barriers to implementing green building practices in the County, such as updating codes, guidelines, and zoning. Through its Green County Program, the County provides permit-related and other incentives for energy efficient building projects. Building permit fees are waived for projects that make an existing home or business more energy-efficient, such as through the installation of solar systems, wind-generated electrical systems, tankless water heaters, or highly energy-efficient heating, ventilation, and air-conditioning (HVAC) systems. Additionally, green projects are given priority in plan review, processing and field inspection services.

While facilitating and streamlining green building development would lead to more green building, and hence emission reductions, quantifying these reductions would require speculative assumptions. This measure's effect is not easy to determine because the exact amount of green building developed depends on a considerable number of factors outside the County's jurisdiction.

R3E2: Green Building Training

The County will encourage and promote a trained and qualified workforce by providing green building information, marketing, training, and technical assistance to property owners, development professionals, schools, and special districts. The County will train all plan review and building inspection staff in green building materials, techniques and practices.

This measure, while educational in scope, would likely lead to emissions reductions but the exact amount of reductions is not able to be quantified without making speculative assumptions. This measure's effect is not easy to determine because the exact amount of green building developed depends on a considerable number of factors outside the County's jurisdiction.

R3E3: Community Building Energy Efficiency & Conservation for Existing Buildings

This measure involves a County energy conservation campaign and partnering with utility companies to promote energy efficiency.

The energy conservation campaign would promote energy conservation through campaigns targeted separately at residents, business, schools and utilities. This might include the following activities:

- Launch an "energy efficiency challenge" campaign for community residents.
- Operate a green business program.
- Distribute free compact fluorescent light (CFL) bulbs and/or fixtures to community members.
- Offer a halogen torchiere lamp exchange to community members.

Partnering with utility companies to promote energy efficiency may include the following:

- *Energy Efficiency Audits.* Promote energy efficiency audits of existing buildings to check, repair, and readjust heating, ventilation, air conditioning, lighting, water heating equipment, insulation and weatherization.
- *Individualized Energy Management Services.* Collaborate with utilities to promote individualized energy management services for large energy users.

These programs are mainly facilitative or educational and, though they may result in further emissions reductions, quantifying these reductions would require speculative assumptions and therefore this measure was not quantified.

R3E4: Energy Efficiency Financing

The County will encourage the availability of appropriate financing mechanisms for energy efficiency projects for existing and new developments including heating, ventilation, air conditioning, lighting, water heating, insulation and weatherization. In addition to the programs described in Measure R2E1, the County will:

- Explore joining the state-wide CaliforniaFIRST program.
- Fund other incentives to encourage the use of energy efficient equipment and lighting.
- Target local funds, including Redevelopment and Community Development Block Grant resources, to assist affordable housing developers in incorporating energy efficient designs and features for low-income housing and retrofits for existing low-income housing.

This measure may lead to emissions reductions but the amount of these reductions is not able to be quantified at this time. The effect of this measure is not easy to determine because the exact amount of energy efficiency investments depends on a considerable number of factors outside the County's jurisdiction. Therefore this measure was not quantified.

R3E5: Heat Island Mitigation Plan

The County will pursue developing a "heat island" mitigation plan including guidelines for cool roofs, cool pavements, and strategically placed shade trees. The guidelines would identify strategies to reduce heat gain for 50 percent of the non-roof impervious site landscape (including roads, sidewalks, courtyards, parking lots, and driveways): shaded (within five [5] years of occupancy); paving materials with a Solar Reflectance Index (SRI) of at least 29; open grid pavement system; parking spaces under cover (defined as underground, under a deck, under a roof, or under a building). Projects using this measure would have a roof used to shade or cover parking with an SRI of at least 29.

This measure would result in lower building energy use due to a lower demand for cooling. However, without knowing the exact makeup of future buildings with these modifications, it is not possible to accurately quantify this measure.

R3E6: Public Education

The County will engage in public outreach to increase community awareness about energy efficiency and emissions reduction programs and incentives. This would educate the local population about energy efficient rebates and incentives available for their residence or type of business.

This measure may result in quantifiable emissions reductions but it is not possible to accurately quantify this measure because its effect on the public is not easily gauged.

R3E7: Cross-Jurisdictional Coordination

The County will coordinate with other local governments, special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop green building policies and programs that are optimized on a regional scale.

This measure may result in quantifiable emissions reductions but it is mainly facilitative in scope and it is not possible to accurately quantify this measure because its exact effect is not easy to determine.

R3E8: Community Alternative Energy Development Plan

The County will explore the possibility of developing an alternative energy plan with Southern California Edison for alternative energy production for the existing built environment which includes identification of appropriate types of alternative energy facilities and potential sites for location in the County.

Developing this plan will aid in the development of alternative energy in the County but it is not possible to accurately quantify this measure because its effect is not easy to determine because alternative energy development depends on a considerable number of factors outside the County's jurisdiction.

R3E9: Support Utility-Scale Renewable Energy Siting and Transmission Lines

The County will pursue identification of possible sites for production of renewable energy using local renewable resources such as solar, wind, small hydro, and, biogas. Geographic Information Systems (GIS) could be used to map and assess local renewable resources, the electric and gas transmission and distribution system, community growth areas anticipated to require new energy services, and other data useful to deployment of renewable technologies. There are likely limited opportunities for small hydropower in the County given the lack of substantial water resources and limited biogas generation opportunities due to the lack of substantial harvestable biomass or suitable growing conditions in much of the County.

Supporting these initiatives will aid in the development of alternative energy in the County but it is not possible to accurately quantify this measure. Its effect is not easy to determine because alternative energy development depends on a considerable number of factors outside the County's jurisdiction.

R3E10: Identify and Resolve Potential Barriers to Renewable Energy Deployment

The County will continue to identify and remove regulatory or procedural barriers to producing renewable energy in building and development codes, design guidelines, and zoning ordinances

Removing these barriers will aid in the development of alternative energy in the County but it is not possible to accurately quantify this measure. Its effect is not easy to determine because alternative energy development depends on a considerable number of factors outside the County's jurisdiction.

R3E11: Solar Ready Buildings Promotion

The County will encourage the construction of new buildings to allow for the easy, cost-effective installation of future solar energy systems. –Solar ready” features should include: proper solar orientation (south facing roof area sloped at 20° to 55° from the horizontal), clear access on the south sloped roof (no chimneys, heating vents, plumbing vents, etc.), electrical conduit installed for solar electric system wiring, plumbing installed for solar hot water system, and space provided for a solar hot water storage tank.

Making buildings –solar ready” will facilitate the installation of solar panels but it is not possible to accurately quantify this measure because the measure would not guarantee the actual installation of new renewable energy. Its effect is not easy to determine because the exact amount of solar panels installed depends on a considerable number of factors outside the County's jurisdiction.

R3E12: Renewable Energy Financing

This measure involves the availability of innovative, low-interest financing for residential and commercial renewable energy. The County will pursue various options for establishing such a financing environment, such as:

- Joining the state-wide California FIRST program.
- Funding other incentive approaches to encourage the use of solar energy in residential and commercial buildings.
- Targeting local funds, including redevelopment and Community Development Block Grant resources, to assist affordable housing developers in incorporating solar PV systems and

solar hot water heaters. Partner with community services agencies.

While financing options will facilitate the installation of renewable energy, it is not possible to accurately quantify this measure. Its effect is not easy to determine because the exact amount of renewable energy installed depends on so many other factors.

R3E13: Regional Renewable Energy Collaboration

The County will explore developing regional collaborations among local governments, special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop renewable energy policies and programs that are optimized on a regional scale.

The effect of this measure is not easy to determine because the exact amount of renewable energy installed depends on a considerable number of factors outside the County's jurisdiction. Hence, it is not possible to accurately quantify this measure.

R3E14: Accessory Wind Energy Systems

The County Development Code provides a uniform and comprehensive set of standards for the placement of accessory wind energy systems on parcels in unincorporated areas of the County in order to encourage the generation of electricity for onsite use, thereby reducing the consumption of electrical power supplied by utility companies. These regulations are intended to facilitate use of wind energy systems and to ensure that accessory wind energy systems are designed and located in a manner that minimizes visual and safety impacts on the surrounding community. (See Chapter 85.18 of the County Development Code).

Supporting these initiatives will aid in the development of alternative energy in the County but it is not possible to accurately quantify this measure. Its effect is not easy to determine because alternative energy development depends on a considerable number of factors outside the County's jurisdiction.

R3E15: Off-Site Mitigation of GHG Impacts for New Development.

The County will pursue development of a policy and/or guidelines for off-site mitigation of GHG impacts from new development projects in accordance with CEQA, including retrofitting off-site buildings to improve energy efficiency. As the DRP already includes a 31 percent reduction requirement for new development, use of off-site mitigation is already accounted for in the assumptions concerning the effect of the DRP overall. Further, it is unknown to what degree new development may rely on off-site mitigation options.

Transportation and Land Use Measures

Regarding land use, the County’s General plan policies, as presented in Appendix C, support infill development, mixed use-development, and transit-oriented growth that will, in time, promote VMT reductions for new development. With the passage of SB 375, there will be opportunities for further transportation reductions in association with long-term regional land use/transportation planning to promote smart growth, mixed use, increased use of transit, reduction in vehicle trips and trip length, and use of alternative transportation. However, given the nature of the County’s land use jurisdiction being located on the periphery of incorporated areas, effective action in this area requires a coordinated planning effort in partnerships with the cities in the County and regional, state, and federal funding sources to identify the truly feasible means for transportation reductions. The County is working with the cities in the County, the San Bernardino Association of Governments (SANBAG), and the Southern California Association of Governments (SCAG) within the SB 375 framework to consider opportunities to support transit-oriented growth, transit linkages, and other land use and transportation improvements over the next decade. The end result of that dialogue between now and 2012, when the new Regional Transportation Plan (RTP) will be adopted, will likely result in the addition of quantifiable reductions beyond those identified in this report for 2020.

The long-term benefit of such land use and transportation planning efforts will be critical to the post-2020 reduction effort and are likely to take until that time to substantially contribute to the overall reduction effort. Accordingly, this reduction plan focuses primarily on transportation measures that can start to reduce emissions in the near-term while the longer-range planning is being completed. As noted in measures R3T1 and R3T4 below and in the General Plan policies noted in Appendix C, the County will be supporting regional action to promote transit and regional land use and transportation planning.

This section provides information on calculations of GHG emission reductions related to R1 and R2 for the transportation sector for the County.

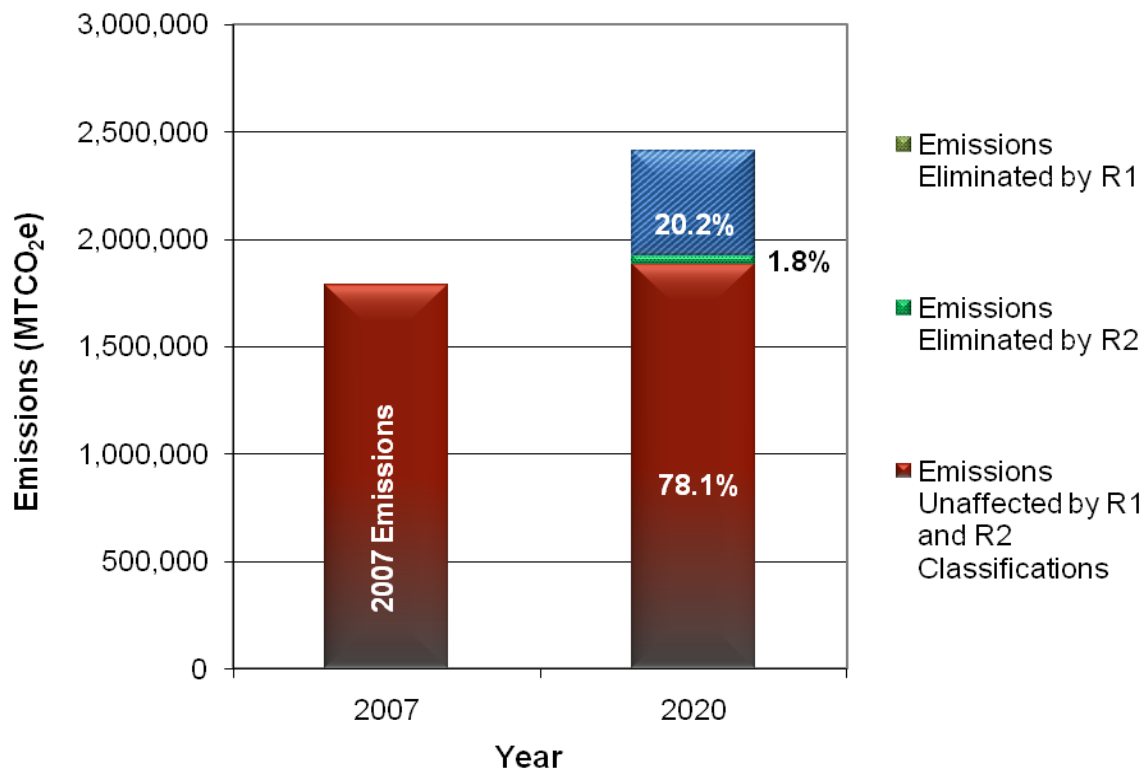
Total estimated GHG percent reductions and quantities from the reduction measures included in Reduction Scenarios R1 and R2 are presented below in **Table A-19**. Emission reductions for each measure are applied to the projected 2020 emissions for the appropriate vehicle type. Total reductions attributed to these measures from the 2020 unmitigated emissions would be approximately 22 percent.

Table A-19. External GHG Emission Reductions from Transportation And Land Use Measures

Reduction Classification and Reduction Measure	GHG Reductions from 2020 unmitigated Transportation Emissions (MTCO ₂ e)	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state and regional transportation measures that do not require County action		
R1T1: California Light-Duty Vehicle GHG Standards: Implement Pavley I Standards	202,569	8.4
R1T2: California Light-Duty Vehicle GHG Standards: Implement Pavley II	29,252	1.2
R1T3: Low Carbon Fuel Standard	161,819	6.7
R1T4: Tire Pressure Program	4,022	0.2

Reduction Classification and Reduction Measure	GHG Reductions from 2020 unmitigated Transportation Emissions (MTCO ₂ e)	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1T5: Low Rolling Resistance Tires	2,194	0.1
R1T6: Low Friction Engine Oils	20,476	0.8
R1T7: Cool Paints and Reflective Glazing	6,509	0.3
R1T8: Goods Movement Efficiency Measures	37,441	1.6
R1T9: Heavy-Duty Vehicle GHG Emission Reduction (Aerodynamic Efficiency)	12,514	0.5
R1T10: Medium-and Heavy-Duty Vehicle Hybridization	7,695	0.3
R1T11: Rule 1192—Clean On-Road Transit Buses	835	0.03
R1T12: Rule 1195—Clean On-Road School Buses	831	0.03
R2: Existing and new transportation measures that require County action		
R2T1: Anti-Idling Enforcement Policy	12,076	0.5
R2T2: Employment Based Trip and VMT Reductions Policy	1,651	0.1
R2T3: Revise Parking Policies	824	0.03
R2T4: Roadway Improvements including Signal Synchronization and Traffic Flow Management	8,230	0.3
R2T5: Expand Renewable Fuel/Low-Emission Vehicle Use	16,295	0.7
R2T6: Ridesharing and Carpooling	798	0.03
R2T7: Bicycle/Pedestrian Infrastructure and Promotion	798	0.03
R2T8: Construct High Occupancy Vehicle (HOV) Lanes	1,594	0.1
Total	528,422	21.9
R3: Existing and new transportation measures—reductions not quantified or relied upon to achieve reduction goal		
R3T1: Public Transit Measures		
R3T2: Financing Mechanisms and Opportunities		
R3T3: Diesel Exhaust Emissions Control Measures		
R3T4: Regional Land Use/Transportation Coordination		
R3T5: Regional Employment Based Trip Reduction Programs.		
R3T6: County Commuter Services Program.		
R3T7: Home Employment.		
R3T8: Intelligent Transportation Systems Applications.		
R3T9: Public Outreach and Educational Programs Relative to Various Modes of Transportation.		
R3T10: Land Use Strategies to Reduce Reliance on Automobile Use		

Figure A-6. External GHG Emission Reductions from Transportation and Land Use Measures



With the implementation of the emission reduction measures included in this Plan, transportation emissions will be reduced by 22 percent from 2020 unmitigated projections. Reduced emissions in 2020 will be approximately 5 percent higher than 2007 emissions.

R1 Transportation and Land Use Measures

This section describes the methodology used to calculate GHG emission reductions for the *existing and proposed* national, state, or regional transportation measures that do not require significant County action and will result in future GHG reductions associated with transportation sector within the County LUA.

RIT1: Assembly Bill 1493: Pavley I

AB1493 (Pavley) required the CARB to adopt regulations that will reduce GHG from automobiles and light-duty trucks by 30 percent below 2002 levels by the year 2016, effective with 2009 models. By 2020, this requirement will reduce emissions in California by approximately 16.4 MMTCO₂e, representing 17.3 percent of emissions from passenger/light-duty vehicles in the State³⁰.

This regulation will result in a 17.3 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 9.3 percent reduction of total 2020 unmitigated on-road transportation emissions.

³⁰ California Air Resources Board 2008a, 2009a.

RIT2: Assembly Bill 1493: Pavley II

California committed to further strengthening the AB1493 standards beginning in 2017 to obtain a 45 percent GHG reduction from 2020 model year vehicles. By 2020, this requirement will reduce emissions in California by approximately 4.0 MMTCO₂e, representing 2.5 percent of emissions from passenger/light-duty vehicles in the State³¹.

This regulation will result in a 2.5 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 1.3 percent reduction of total 2020 unmitigated on-road transportation emissions.

RIT3: Executive Order S-1-07 (Low Carbon Fuel Standard)

The LCFS will require a reduction of at least ten (10) percent in the carbon intensity of California's transportation fuels by 2020. By 2020, this requirement will reduce emissions in California by approximately 15 MMTCO₂e, representing 6.9 percent of emissions from passenger/light-duty vehicles in the State³².

This regulation will result in a 6.9 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 7.4 percent reduction in total 2020 unmitigated on-road transportation emissions.

RIT4: Tire Pressure Program

The AB32 early action measure involves actions to ensure that vehicle tire pressure is maintained to manufacturer specifications. By 2020, this requirement will reduce emissions in California by approximately 0.55 MMTCO₂e, representing 0.3 percent of emissions from passenger/light-duty vehicles in the State.³³

This regulation will result in a 0.3 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 0.18 percent reduction of total 2020 unmitigated on-road transportation emissions.

RIT5: Low Rolling Resistance Tires

This AB32 early action measure would increase vehicle efficiency by creating an energy efficiency standard for automobile tires to reduce rolling resistance. By 2020, this requirement will reduce emissions in California by approximately 0.3 MMTCO₂e, representing 0.2 percent of emissions from passenger/light-duty vehicles in the State³⁴.

This regulation will result in a 0.3 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 0.1 percent reduction of total 2020 unmitigated on-road transportation emissions.

RIT6: Low Friction Engine Oils

This AB32 early action measure would increase vehicle efficiency by mandating the use of engine oils that meet certain low friction specifications. By 2020, this requirement will reduce

³¹ California Air Resources Board 2008a, 2009a.

³² California Air Resources Board 2008a, 2009a.

³³ California Air Resources Board 2008a, 2009a.

³⁴ California Air Resources Board 2008a, 2009a.

emissions in California by approximately 2.8 MMTCO₂e, representing 1.7 percent of emissions from passenger/light-duty vehicles in the State³⁵.

This regulation will result in a 1.7 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 0.9 percent reduction of total 2020 unmitigated on-road transportation emissions.

RIT7: Cool Paints and Reflective Glazing

This AB32 early action measure is based on measures to reduce the solar heat gain in a vehicle parked in the sun. By 2020, this requirement will reduce emissions in California by approximately 0.89 MMTCO₂e, representing 0.6 percent of emissions from passenger/light-duty vehicles in the State³⁶.

This regulation will result in a 0.6 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 0.3 percent reduction of total 2020 unmitigated on-road transportation emissions.

RIT8: Goods Movement Efficiency Measures

This AB32 early action measure targets system wide efficiency improvements in goods movement to achieve GHG reductions from reduced diesel combustion. By 2020, this requirement will reduce emissions in California by approximately 3.5 MMTCO₂e, representing 1.6 percent of emissions from all mobile sources (on-road and off-road) in the State³⁷.

This regulation will result in a 1.6 percent reduction from 2020 unmitigated mobile source emissions.

RIT9: Heavy-Duty Vehicle GHG Emission Reduction (Aerodynamic Efficiency)

This AB32 early action measure would increase heavy-duty vehicle (long-haul trucks) efficiency by requiring installation of best available technology and/or CARB approved technology to reduce aerodynamic drag and rolling resistance. By 2020, this requirement will reduce emissions in California by approximately 0.93 MMTCO₂e, representing 1.9 percent of emissions from heavy-duty vehicles in the State³⁸.

This regulation will result in a 1.9 percent reduction from 2020 unmitigated heavy-duty vehicle emissions and a 0.6 percent reduction of total 2020 unmitigated and on-road transportation emissions.

RIT10: Medium and Heavy-Duty Vehicle Hybridization

The implementation approach for this AB 32 measure is to adopt a regulation and/or incentive program that reduce the GHG emissions of new trucks (parcel delivery trucks and vans, utility trucks, garbage trucks, transit buses, and other vocational work trucks) sold in California by replacing them with hybrids. By 2020, this requirement will reduce emissions in California by approximately 0.5 MMTCO₂e, representing 0.2 percent of emissions from all on-road mobile

³⁵ California Air Resources Board 2008a, 2009a.

³⁶ California Air Resources Board 2008a, 2009a.

³⁷ California Air Resources Board 2008a, 2009a.

³⁸ California Air Resources Board 2008a, 2009a.

sources in the State³⁹. This reduction is also equivalent to a 1.0 percent reduction of emissions from all heavy-duty trucks in the State.

This regulation will result in a 1.0 percent reduction from 2020 unmitigated heavy-duty vehicle emissions and a 0.4 percent reduction from 2020 unmitigated on-road transportation emissions.

Regional Transportation Measures

South Coast Air Quality Management District (SCAQMD) Fleet Rules⁴⁰

The following rules are primarily intended to reduce air toxic and criteria pollutant emissions by requiring low-emitting gasoline/diesel or alternative-fuel vehicles. Alternative-fuel vehicles required by these regulations produce lower GHG emissions than their gasoline and diesel counterparts.

RIT13: SCAQMD Rule 1192: Clean On-Road Transit Buses

This rule requires public transit fleets operating in the SCAQMD's jurisdiction to acquire alternative-fuel heavy-duty vehicles when procuring these vehicles. This rule applies to public transit fleets with 15 or more public transit vehicles or urban buses, operated by government agencies or operated by private entities under contract to government agencies that provide passenger transportation services including intra- and intercity shuttle services⁴¹.

The following assumptions were used to estimate GHG emission reductions associated with this SCAQMD requirement:

- According to the ARB, the transit bus fleet consists of only 22 model years⁴²; consequently, by 2020, approximately 59 percent of the 2007 transit bus fleet will be retired.
- All new transit buses would use compressed natural gas (CNG) instead of diesel fuel. Heavy-duty vehicles running on CNG produced by natural gas from California emit 18.3 percent less GHG emissions than the same vehicles running on LCFS compliant diesel fuel⁴³. Consequently, this rule results in a reduction of 10.8 percent of 2020 unmitigated emissions from buses

This regulation will result in a 0.04 percent reduction from 2020 unmitigated on-road transportation emissions.

RIT14: Rule 1193: SCAQMD Rule 1195: Clean On-Road School Buses

This rule requires public and private school bus fleet operators in the SCAQMD's jurisdiction to acquire alternative-fuel school buses when procuring or leasing new school buses or to retrofit used or existing school buses with a CARB-approved control device for use within the SCAQMD's jurisdiction. This rule applies to school bus fleets with 15 or more school buses⁴⁴.

The following assumptions were used to estimate GHG emission reductions associated with this SCAQMD requirement:

³⁹ California Air Resources Board 2008a, 2009a.

⁴⁰ There are no applicable Mojave Desert Air Quality Management (MDAQMD) regulations pertaining to GHG emission reduction from on-road vehicles.

⁴¹ South Coast Air Quality Management District 2000a

⁴² California Air Resources Board 2002.

⁴³ California Air Resources Board 2008b.

⁴⁴ South Coast Air Quality Management District 2000b

- The school bus fleet is similar to the transit bus fleet, which consists of only 22 model years⁴⁵; consequently, by 2020, approximately 59 percent of the 2007 transit bus fleet will be retired.
- All new school buses would use compressed natural gas (CNG) instead of diesel fuel. Heavy-duty vehicles running on CNG produced by natural gas from California emit 18.3 percent less GHG emissions than the same vehicles running on LCFS compliant diesel fuel⁴⁶. Consequently, this rule results in a reduction of 10.8 percent of 2020 unmitigated emissions from school buses

This regulation will result in a 0.04 percent reduction from 2020 unmitigated on-road transportation emissions respectively.

R2 Transportation and Land Use Measures

This section describes the methodology used to calculate GHG emission reductions for the R2 measures that have been implemented or that will be implemented, resulting in GHG reductions for the transportation sector and require significant County action. The following measures reduce unmitigated vehicle miles traveled (VMT) for the passenger/light-duty sector of transportation 2020 emissions. VMT and GHG emissions scale linearly; for example, a five (5) percent reduction in VMT will result in a five (5) percent reduction in GHG emissions.

Each measure accounts for emission reductions already achieved with R1 transportation and land use measures, and any preceding R2 transportation measures, thereby eliminating any potential double counting of emission reductions. R1 measures that reduce GHG emissions through fuel efficiency improvements for passenger/light-duty vehicles include measures R1T1-R1T7 and R1T11. The emission reductions associated with these R1 measures are subtracted from the 2020 unmitigated emissions before applying additional reductions achieved with R2 measures. In addition, each R2 measure presented below accounts for emission reductions achieved through all relevant preceding R2 measures to avoid double-counting of emission reductions. A description of each measure is followed by the resulting GHG reductions.

R2T1: Anti-Idling Enforcement

The County adopted an anti idling ordinance requiring all discretionary land use projects approved by the County on or after January 15, 2009, and all business establishments that use diesel vehicles or off-road equipment as part of their normal business operations shall adhere to the following measures during their operations to reduce diesel particulate matter emissions from diesel-fueled engines⁴⁷:

- Vehicles/off-road equipment shall not be left idling on site for periods in excess of five (5) minutes.

Although this measure is designed to reduce diesel particulate matter, idling restrictions on diesel vehicles will also result in reduced fuel consumption and GHG reductions. GHG reductions attributed to this restriction were quantified using CARB's methodology for calculating heavy-duty vehicle idling restrictions in California; these reductions only apply to heavy-duty vehicles.

⁴⁵ California Air Resources Board 2002.

⁴⁶ California Air Resources Board 2008b.

⁴⁷ County of San Bernardino 2008

See measure R3T2 for a more detailed discussion of County diesel exhaust emission control measures.

AB32 includes an early action measure to achieve emission reductions by increasing compliance with anti-idling rules, thereby reducing the amount of fuel burned through unnecessary idling. Measures may include enhanced field enforcement of anti-idling regulations, increased penalties for violations of anti-idling regulations, and restriction on registrations of heavy-duty diesel vehicles with uncorrected idling violations. These measures are likely to be carried out by the County or other local entities, and may be supported by the County's anti-idling ordinance. By 2020, 100 percent compliance with the anti-idling rules will reduce emissions in California by approximately 0.7 MMTCO₂e, representing 1.8 percent of emissions from heavy-duty diesel vehicles, or 0.5 percent of emissions from all mobile sources (on-road and off-road) in the State⁴⁸.

This regulation will result in a 1.8 percent reduction from 2020 unmitigated heavy-duty diesel vehicle emissions and a 0.6 percent reduction of total 2020 unmitigated on-road transportation emissions.

R2T2: Employment Based Trip and VMT Reduction Policy

This measure requires creating commuter-choice programs, employer transportation management, guaranteed ride-home programs, and commuter assistance and outreach programs. The County shall evaluate the feasibility of implementing a voluntary trip reduction ordinance that promotes the preparation and implementation of a trip reduction plan (TRP) for large employers (100 employees or more). This ordinance expands upon SCAQMD Rule 2202 (Employee Commute Reduction Program). SCAQMD Rule 2202 requires employers with 250 employees or more to reduce work-related vehicle trips through mandatory average vehicle ridership targets based on employer characteristics. This ordinance will require employers with 100 employees or more in the unincorporated County to implement a TRP with more stringent requirements than SCAQMD's rule. The TRP should include, at a minimum, performance of annual employee commute surveys, marketing of commute alternatives, ride matching assistance, and transit information.

The following assumptions were used to calculate emission reductions attributed to this measure:

- By 2020, this measure would result in a 0.2 percent reduction of passenger/light-duty VMT in the County⁴⁹.
- The magnitude of the reduction in VMT reflects the decentralized and geographically extensive transportation network in the County⁵⁰.
- Measures R1T1-R1T7, R1T11, and R2T1 have been implemented

This measure will result in a 0.1 percent reduction from 2020 unmitigated on-road transportation emissions after accounting for emission reductions attributed to R1T1-R1T7, R1T11, and R2T1.

⁴⁸ California Air Resources Board 2008a, 2009a.

⁴⁹ Greene, D. L., and Shafer, A. 2003.

⁵⁰ Greene, D. L., and Shafer, A. 2003.

R2T3: Preferential Parking Policies This measure involves the County's implementation of a comprehensive parking policy for public and private lots throughout the County that:

- a. Encourages carpooling, shared parking and the use of alternative transportation, including providing parking spaces for carpool vehicles and alternative fuel vehicles at convenient locations accessible by public transportation;
- b. Reduces parking requirements and/or provide for shared parking for special uses such as mixed-use projects, residential developments for senior citizens or projects that are within 0.25 mile of a public transit stops;
- c. Promotes the designation of preferred commercial parking spaces for high-occupancy, car-share, and alternative fuel vehicles;
- d. Encourages larger parking spaces to accommodate vans used for ride-sharing; and
- e. Promotes the use of shade trees, and convenient pedestrian pathways through parking areas.

The following assumptions were used to calculate emission reductions attributed to this measure:

- By 2020, this measure would result in a 0.1 percent reduction of passenger/light-duty VMT in the County⁵¹.
- The magnitude of the reduction in VMT reflects the decentralized and geographically extensive transportation network in the County⁵².
- Measures R1T1-R1T7, R1T11, and R2T1-R2T2 have been implemented.

This measure will result in a 0.04 percent reduction from 2020 unmitigated on-road transportation emissions after accounting for emission reductions attributed to R1T1-R1T7, R1T11, R2T1, and R2T2.

R2T4: Roadway Improvements including Signal Synchronization and Traffic Flow Management

This measure requires modification of arterial roadways to allow more-efficient bus operation, including possible signal preemption, expand signal-timing programs where air quality benefits can be demonstrated, synchronize traffic signals throughout the County and with adjoining cities while allowing free flow of mass transit systems, and require continuous maintenance of the synchronization system. This measure would increase traffic flow and reduce vehicle idling.

The following assumptions were used to calculate emission reductions attributed to this measure:

- This measure would result in a one (1) percent reduction in fuel consumption⁵³.
- Measures R1T1-R1T7, R1T11, and R2T1-R2T4 have been implemented.

This measure will result in a 0.4 percent reduction from 2020 unmitigated on-road transportation emissions after accounting for emission reductions attributed to R1T1-R1T7, R1T11, and R2T1-T4.

⁵¹ Greene, D. L., and Shafer, A. 2003.

⁵² Greene, D. L., and Shafer, A. 2003.

⁵³ HDR Engineering 2009

R2T5: Expand Renewable Fuel/Low-Emission Vehicle Use

The County will collaborate with local and regional governments, businesses and energy purveyors to support expanded use of renewable fuels. Said efforts may include, but are not limited to, the following:

- a. Preferential parking for alternative fuel vehicles;
- b. Collaboration with energy purveyors to provide the necessary facilities and infrastructure to encourage the use of privately owned low or zero-emission vehicles such as electric charging facilities and conveniently located alternative fueling stations; and
- c. Encourage taxi operators to use smaller, more fuel-efficient taxicabs and offer incentives to taxicab owners to use gas-electric hybrid vehicles.

The following assumptions were used to calculate emission reductions attributed to this measure:

- This measure would result in a two (2) percent increase in average MPG passenger/light-duty vehicles by 2020⁵⁴.
- A two (2) percent increase in average MPG passenger/light-duty vehicles would reduce emissions from passenger/light-duty vehicles by two (2) percent.
- Measures R1T1-R1T7, R1T11, and R2T1-R2T4 have been implemented.

This measure will result in a 0.8 percent reduction from 2020 unmitigated on-road transportation emissions after accounting for emission reductions attributed to R1T1-R1T7, R1T11, and R2T1-T5.

R2T6: Increase the Use of Ridesharing.

This measure involves the County's promotion and encouragement of ridesharing as follows:

- a. Exploring financing programs for the purchase or lease of vehicles used in employer ride sharing programs;
- b. Encouraging community car-sharing through employers, such as expanding the existing Commute-Smart measure;
- c. Encouraging community creation of rideshare incentives such as gas cards, carpool awards, educational seminars, commuter-choice programs, commuter-tax benefits, guaranteed ride-home programs, commuter assistance and outreach

The following assumptions were used to calculate emission reductions attributed to this measure:

- By 2020, this measure would result in a 0.1 percent reduction of passenger/light-duty VMT in the County⁵⁵.
- The magnitude of the reduction in VMT reflects the decentralized and geographically extensive transportation network in the County⁵⁶.
- Measures R1T1-R1T7, R1T11, and R2T1-R2T5 have been implemented.

⁵⁴ San Francisco Department of the Environment 2004

⁵⁵ Greene, D. L. and Shafer, A. 2003.

⁵⁶ Greene, D. L. and Shafer, A. 2003.

This measure will result in a 0.04 percent reduction from 2020 unmitigated on-road transportation emissions after accounting for emission reductions attributed to R1T1-R1T7, R1T11, and R2T1-T6.

R2T7: Bicycle/Pedestrian Infrastructure and Promotion

To promote bicycle and pedestrian infrastructure, the County will: 1) require new development, through the development review process, to address and incorporate bicycle/pedestrian facilities where appropriate and require new development to provide bicycle lanes and walking paths near schools with adequate bicycle parking; 2) encourage the development of bicycle stations at intermodal hubs in collaboration with regional transportation providers; 3) establish a network of multi-use trails to facilitate safe and direct off-street bicycle and pedestrian travel, and will require bike racks along these trails at secure, lighted locations; and 4) apply for regional, State, and federal grants for bicycle and pedestrian infrastructure projects, and will consider using development exactions/impact fees, such as the County's Santa Ana River Trail development fee, to provide bicycle and pedestrian facilities.

The following assumptions were used to calculate emission reductions attributed to this measure:

- By 2020, this measure would result in a 0.1 percent reduction of passenger/light-duty VMT in the County⁵⁷.
- The magnitude of the reduction in VMT reflects the decentralized and geographically extensive transportation network in the County⁵⁸.
- Measures R1T1-R1T7, R1T11, and R2T1-R2T6 have been implemented.

This measure will result in a 0.04 percent reduction from 2020 unmitigated on-road transportation emissions after accounting for emission reductions attributed to R1T1-R1T7, R1T11, and R2T1-T7.

R2T8: Support High Occupancy Vehicle (HOV) Lanes

This measure involves the County's support of regional construction of HOV lanes on arterial roadways to encourage carpooling and alternative forms of transportation for commuting, to increase traffic flow and reduce VMT.

The following assumptions were used to calculate emission reductions attributed to this measure:

- By 2020, this measure would result in a 0.2 percent reduction of passenger/light-duty VMT in the County⁵⁹.
- The magnitude of the reduction in VMT reflects the decentralized and geographically extensive transportation network in the County⁶⁰.
- Measures R1T1-R1T7, R1T11, and R2T1-R2T7 have been implemented.

This measure will result in a 0.07 percent reduction from 2020 unmitigated on-road transportation emissions after accounting for emission reductions attributed to R1T1-R1T7, R1T11, and R2T1- R2T7.

⁵⁷ Greene, D. L. and Shafer, A. 2003.

⁵⁸ Greene, D. L., and Shafer, A. 2003.

⁵⁹ Greene, D. L., and Shafer, A. 2003.

⁶⁰ Greene, D. L., and Shafer, A. 2003.

R3 Land Use and Transportation Measures

The following list of R3 measures includes all additional measures considered reasonable but not relied upon to demonstrate achievement of the proposed County 2020 emissions target. All of these measures are considered part of the GHG Reduction Plan.

R3T1: Public Transit Strategies

To promote public transit use, the County will: 1) ensure that new development is designed to make public transit a viable choice for residents and/or the local work force; 2) require that new development incorporate both local and regional transit measures into the project design that promote the use of alternative modes of transportation; and 3) collaborate with regional transit providers to offer public transit incentives, and improve service, safety, customer satisfaction and user-friendliness of mass transit..

These measures could shift VMT from single-occupancy vehicles to public transit vehicles, reducing net VMT and overall GHG emissions from on-road transportation. Public transit measures could reduce VMT by at least 0-2.6 percent⁶¹.

R3T2: Financing Mechanisms and Opportunities

This measure involves the County's promotion and pursuance of financing mechanisms and opportunities including the Federal Energy Efficiency Community Block Grant (EECBG), Measure I Funds through SANBAG, Regional Improvement Program (RIP) funds available under the State Transportation Improvement Program (STIP), the Interregional Improvement Program (IIP), the Regional Transportation Improvement Program through SANBAG and SGAG, the Passenger Rail Short Transportation Plan, the San Bernardino County Public Transit – Human Services Transportation Coordination Plan, and the Transportation Development Act. There are currently numerous financing mechanisms and opportunities available to the County to achieve additional reductions not already included in the R1 or R2 measures above. A summary of these mechanisms is presented in the Implementation section of this report.

R3T3: Diesel Exhaust Emissions Control Measures

The County's diesel exhaust emissions control measures extend beyond the County's idling restriction (measure R2T1) described above. As described in Section 83.01.040 of the County Development Code, the following emissions control measures shall apply to all discretionary land use projects approved by the County on or after January 15, 2009⁶²:

Off-Road Diesel Vehicle/Equipment Operations. All business establishments and contractors that use off-road diesel vehicle/equipment as part of their normal business operations shall adhere to the following measures during their operations in order to reduce diesel particulate matter emissions from diesel-fueled engines:

- Off-road vehicles/equipment shall not be left idling on site for periods in excess of five minutes. The idling limit does not apply to:
 - idling when queuing,
 - idling to verify that the vehicle is in safe operating condition,

⁶¹ Greene, D. L. and Shafer, A. 2003.

⁶² County of San Bernardino 2008

- idling for testing, servicing, repairing or diagnostic purposes,
- idling necessary to accomplish work for which the vehicle was designed (such as operating a crane),
- idling required to bring the machine system to operating temperature, and
- idling necessary to ensure safe operation of the vehicle.
- Use reformulated ultra low-sulfur diesel fuel in equipment and use equipment certified by the U. S. Environmental Protection Agency (EPA) or that pre-dates EPA regulations.
- Maintain engines in good working order to reduce emissions.
- Signs shall be posted requiring vehicle drivers to turn off engines when parked.
- Any requirements or standards subsequently adopted by the South Coast Air Quality Management District, the Mojave Desert Air Quality Management District or the California Air Resources Board.
- Provide temporary traffic control during all phases of construction.
- Onsite electrical power connections shall be provided for electric construction tools to eliminate the need for diesel-powered electric generators, where feasible.
- Maintain construction equipment engines in good working order to reduce emissions. The developer shall have each contractor certify that all construction equipment is properly serviced and maintained in good operating condition.
- Contractors shall use ultra low sulfur diesel fuel for stationary construction equipment as required by Air Quality Management District (AQMD) Rules 431.1 and 431.2 to reduce the release of undesirable emissions.
- Substitute electric and gasoline-powered equipment for diesel-powered equipment, where feasible.

Project Design. Distribution centers, warehouses, truck stops and other facilities with loading docks where diesel trucks may reside overnight or for periods in excess of three hours shall be designed to enable any vehicle using these facilities to utilize on-site electrical connections to power the heating and air conditioning of the cabs of such trucks, and any refrigeration unit(s) of any trailer being pulled by the trucks, instead of operating the diesel engines and diesel refrigeration units of such trucks and trailers for these purposes. This requirement shall also apply to Recreational Vehicle Parks (as defined in Section 810.01.200(k) of this title) and other development projects where diesel engines may reasonably be expected to operate on other than an occasional basis.

These regulations were not quantified because it is difficult to estimate emission reductions from these restrictions beyond what is quantified for measure R2T1.

R3T4: Regional Land Use/Transportation Coordination.

In accordance with SB 375, as Regional Planning Agencies set regional targets for greenhouse gas emissions and create a plan to meet those targets, coordinate with local jurisdictions, the San Bernardino Associated Governments (SANBAG), the Southern California Association of

Governments (SCAG) and the regional transit providers to promote mixed-use development, transit linkages and transit-oriented development in unincorporated portions of the County.

Senate Bill 375 requires California to set regional targets to reduce GHG emissions from passenger vehicles and light duty trucks for 2020 and 2035. ARB has adopted a goal for the SCAG region of reducing 2020 passenger/light duty truck emissions by 8 percent per capita compared to 2005 per capita levels. ARB adopted a condition goal for 2035 of reducing these emissions by 13 percent but the 2035 goal is contingent on further discussion and analysis between ARB and SCAG.

A Sustainable Communities Strategy is in development for the SCAG region. At this time, the exact amount of benefit of potential transportation and land use strategies that might be adopted by San Bernardino County in light of SB 375 are not known. However, the measures in this Plan could help the County meet this regional goal in combination with regional transit implements (see R3T1) pursuant to SB 375.

With the regional planning activities taking place over the next few years, the reduction value of this measure will be quantified as the planning is developed and completed.

R3T5: Regional Employment Based Trip Reduction Programs

The County will continue to support and promote trip reduction programs developed by SANBAG. SANBAG is responsible for efforts throughout San Bernardino County to encourage commuters to carpool, vanpool, use public transit, cycle, or walk to work. This is primarily accomplished by working directly with large and small employers, as well as providing support to commuters who wish to share rides or use alternative forms of transportation. SANBAG operates two programs for individuals and one for employers through which commuters can receive financial incentives by participating in a rideshare program. Option Rideshare is a program that offers commuters financial incentives of up to \$2.00 per day when they use a rideshare mode for three consecutive months. Team Ride is an extension of the initial program that provides discounts and special offers to participants at restaurants and events in both San Bernardino and Riverside Counties. The final program is the Inland Empire Commuter Services Program. This program is designed to help employers develop and maintain a rideshare program through free education and assistance from SANBAG.

The exact amount of participation in this regional program in the future is not known at this time and thus the amount of potential new GHG emissions reductions for this measure beyond other R2 measures was not quantified.

R3T6: County Commuter Services Program

The County's Human Resources Department has operated and will continue to operate an active and effective Commuter Services Program to encourage, coordinate, and reward alternative commuting for more than two decades. The County's Commuter Services Program provides employees with tools to find a carpool partner or vanpool, tips on bicycle commuting, and information on transit. Nearly 4,000 County employees take advantage of this program and enjoy the benefits of alternative commuting.

The exact amount of participation in this County program in the future is not known at this time and thus the amount of potential new GHG emissions reductions for this measure was not quantified.

R3T7: Home Employment

The County will facilitate employment opportunities that minimize the need for private vehicle trips, including:

- a. Encouraging live/work sites, satellite work centers in appropriate locations, and home occupation for low-impact commercial and office uses in residential zones, regulated by the County's Development Code Home Occupation Permit provisions.
- b. Encouraging telecommuting with new and existing employers, through project review and incentives, as appropriate.

The exact amount of participation in this program in the future is not known at this time and thus the amount of potential new GHG emissions reductions for this measure was not quantified.

R3T8: Intelligent Transportation Systems Applications

The County will continue to utilize Intelligent Transportation Systems, which constitute a wide spectrum of techniques and applications that are currently being applied to existing roadways, highways and transit systems to increase their efficiency, safety and ability to relieve congestion. The County is currently employing several types of Intelligent Transportation Systems applications including:

- a. 1-800-COMMUTE telephone line, which provides travel information for highways, transit, rideshare and other commuting alternatives;
- b. Closed-circuit television cameras to help in identifying and responding to accidents more quickly;
- c. Electronic sensors placed in freeways that transmit vehicle counts to a traffic management center and can be used for real-time traffic conditions;
- d. Traffic signal control systems that are synchronized through computer software specifically designed to better monitor and respond to local traffic congestion;
- e. Changeable message signs that alert drivers to possible delays due to accident or congestion and allow for route diversion; and
- f. Smart call boxes that gather traffic count data and transmit this information to traffic management centers and the CHP.

The exact amount of ITS development by 2020 is not known at this time and thus the amount of potential new GHG emissions reductions for this measure was not quantified.

R3T9: Public Outreach and Educational Programs Relative to Various Modes of Transportation

This measure involves the following: 1) The County will continue to implement bicycle safety educational programs to teach drivers and riders the laws, riding protocols, routes, safety tips and emergency maneuvers; and 2) The County will provide educational information about the benefits of and opportunities for public transit and rideshare.

While education and outreach are key element to promoting transit and bicycle use, it is not possible to estimate the amount potential new GHG emissions reductions for this measure beyond other measures in this Plan.

R3T10: Land Use Strategies to Reduce Reliance on Automobile Use

This measure involves the County's actions to promote and adopt land use strategies that decrease reliance on automobile use and enhance non-automotive transportation as follows:

- a. Where appropriate, create and preserve distinct, identifiable neighborhoods whose characteristics support pedestrian travel, especially within, but not limited to, mixed-use and transit-oriented development projects.
- b. Continue to allow site-specific development standards to be implemented for Planned Development projects.
- c. Consider revising the County Development Code where appropriate to allow local-serving businesses, such as childcare centers, restaurants, banks, family medical offices, drug stores, and other similar services near employment centers to minimize midday vehicle use.
- d. Continue to identify and facilitate the inclusion of complementary land uses not already present in the zoning land use districts, such as supermarkets, parks and recreational fields, schools in neighborhoods, and residential uses in business zoning districts, to reduce the vehicle miles traveled and promote bicycling and walking to these uses.
- e. Encourage mixed-use development especially within areas of city's spheres of influence or where the project is located within one-half mile of intermodal hubs and future rail stations.
- f. Continue to provide density bonuses for selected development.
- g. Seek funding to prepare specific plans and related environmental documents to facilitate mixed-use development at selected sites, and allow these areas to serve as receiver sited for transfer of development rights away from environmentally sensitive lands and rural areas outside of developed areas.
- h. Enable the development of mixed-use structures in neighborhood centers that can be adapted to new uses over time with minimal internal remodeling.
- i. Continue to encourage the inclusion of complementary land uses in local zoning districts that allows a mix of uses, such as supermarkets, parks and recreational fields, schools in neighborhoods, and residential uses in business districts to reduce the vehicle miles traveled and promote bicycling and walking to these uses.
- j. Encourage infill development and the creative reuse of brownfield, under-utilized and/or defunct properties within areas of County's spheres of influence.
- k. Consider higher-density development within areas of city's spheres of influence or where the project is located within one-half mile of intermodal hubs and future rail stations.

It is expected that the County will incorporate these different strategies over time in cooperation with other regional entities through planning under SB 375 and of its own accord. Until specific local planning is conducted for target areas, quantification of the GHG reductions of these actions would be premature; as a result reductions from these strategies was not relied upon to demonstrate meeting the external emissions reduction target.

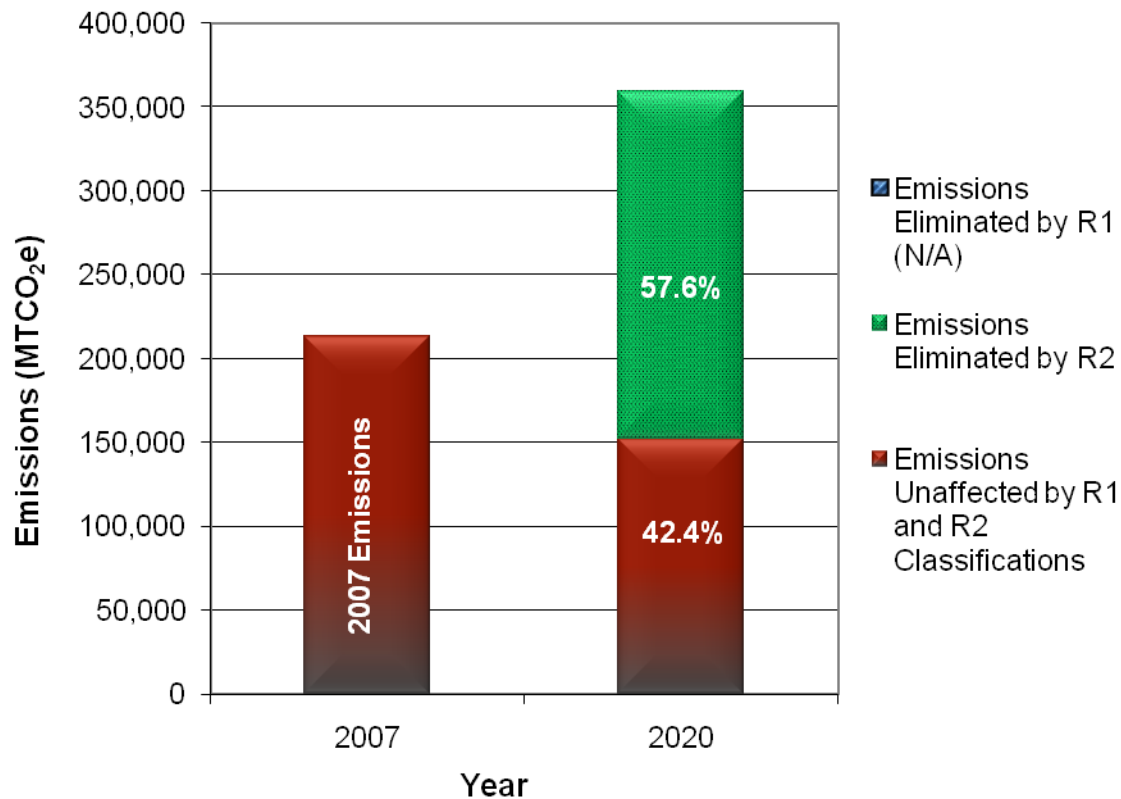
Municipal Solid Waste Management

This section provides information on calculations of GHG emission reductions related to R1 and R2 for municipal solid waste management for the County. Results of the emissions reduction calculations are shown in **Table A-20**. Total reductions attributed to these measures from the 2020 unmitigated emissions are 58 percent.

Table A-20. External GHG Emission Reductions from Waste Measures

Reduction Classification and Reduction Measures	GHG Reductions from 2020 unmitigated Waste Emissions (MTCO ₂ e)	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state and regional waste management measures that do not require County action		
NA		
R2: Existing and new measures that require County action		
R2W1: Increase Methane Recovery at Mid-Valley, Milliken, and Colton Landfills	97,059	27.0
R2W2: Barstow Methane Recovery	37,935 ^a	10.6
R2W3: Landers Methane Recovery	8,471 ^b	2.4
R2W4: Comprehensive Disposal Site Diversion Program	26,390	7.3
R2W5: C&D Recycling Program	295	0.1
R2W6: County Diversion Programs — 75 Percent Goal ^c	4,118	1.1
R2W7: City Diversion Programs— 75 Percent Goal ^c	32,692	9.1
Total	206,959	57.6
R3: Existing and new waste measures – reductions not quantified or relied upon to achieve reduction goal		
R3W1: Install Methane Capture Systems at all Landfills with 250,000 or more Tons of WIP		
R3W2: Financing Mechanisms and Opportunities		
R3W3: Waste Education Program		
R3W4: Additional Landfill Methane Controls		
R3W5: Landfill Gas to Energy Projects		
Notes:		
Reductions for these measures solely represent avoided methane emissions at landfills and assume that all waste reduction measures are implemented in combination.		
^a Attributed to waste in place methane reductions from Barstow as well as new waste planned for Barstow.		
^b Attributed only to existing waste in place at Landers.		
^c Assumes linear growth in diversion beginning in 2009 to reach 75 percent diversion of County-generated waste by 2020.		
^d Assumes linear growth in diversion beginning in 2009 to reach 75 percent diversion of City-generated waste by 2020.		

Figure A-7. External GHG Emission Reductions from Solid Waste/Landfill Measures



With the implementation of the emission reduction measures included in this Plan, Solid Waste/landfill emissions will be reduced by 58 percent from 2020 unmitigated projections. Reduced emissions in 2020 will be approximately 29 percent lower than 2007 emissions.

R1 Waste Measures

The CARB AB32 Scoping Plan recommends three measures for reducing emissions from Municipal Solid Waste at the State level, including: 1) landfill methane control; 2) increase the efficiency of landfill methane capture; and 3) high recycling/zero waste. CARB is in the process of developing a discrete early action program for methane recovery (1), likely to be adopted in early 2010. This measure is expected to result in a 1.0 MMTCO₂e reduction by 2020. Other measures proposed by CARB include increasing efficiency of landfill methane capture (2) and instituting high recycling/zero waste policies (3). Potential reductions associated with these measures are still to be determined. CARB estimates a preliminary one-time cost for adoption of these measures to be approximately \$70 per ton of CO₂ reduced. Capital cost is estimated to be approximately \$3,440,000 and annual operation cost is estimated to be approximately \$706,400 per landfill. Total industry cost estimates will be evaluated further in the staff report for the landfill methane control measure⁶³.

⁶³ Air Resources Board 2008b, 2009b

The County-owned landfills may already meet the majority of the requirements of the proposed landfill regulation. Large landfills such as Landers and Barstow will likely require monitoring and annual review to ensure the proper operation of their methane controls⁶⁴. All other landfills evaluated in the External Inventory also appear to be either meeting the requirements of the landfill methane control measure or are not subject to them, and it is anticipated that this measures will not result in any additional reductions for these landfills. These conclusions should be reassessed after finalization of the proposed landfill regulation.

The high recycling/zero waste measure is expected to result in GHG emissions reductions by reducing the substantial energy use associated with the acquisition of raw materials in the manufacturing stage of a product's life-cycle. As virgin raw materials are replaced with recyclables, a large reduction in energy consumption should be realized. Implementing programs with a systems approach that focus on consumer demand, manufacturing, and movement of products will result in the reduction of GHG emissions and other co-benefits. The potential 2020 GHG emission reductions attributed to this measure are estimated to be nine (9) MMTCO₂e⁶⁵. According to the CARB, some of the GHG "lifecycle" reductions may occur outside of California, making accounting more difficult, and additional research to quantify these emission reductions is needed⁶⁶. Consequently, these reductions are not counted toward the AB 32 goal and were not counted as R1 reductions for the County.

All future emission reductions do not take into account the GHGs associated with recycling or composting the materials that have been diverted from the landfill.

R2 Waste Measures

This section describes the methodology used to calculate GHG emission reductions for those measures that have been implemented or will be implemented; resulting in GHG reductions for the municipal solid waste management sector and require County action. Measures R2W1 and R2W2 below are based on reductions achieved from applying methane recovery technology to specific landfills. Only active landfills with a capacity of greater than three (3) million cubic yards were evaluated because methane recovery at smaller landfills is not likely to be cost-effective. Emission reductions from recovery at the smaller landfills are likely less than five (5) percent of the reductions from recovery at the larger landfills. Measures R2W4 to R2W7 are associated with the displacement of waste prior to landfilling. For these measures, only GHG reductions attributed to avoided methane emissions at the landfill site (rather than emissions associated with all lifecycle stages) are considered for reduction potential in the County's inventory because the emissions occurring at the landfills are under the County's direct control.

Measures R2W4 to R2W7 are associated with the displacement of waste prior to landfilling. For these measures, only GHG reductions attributed to avoided methane emissions from waste in the landfill are considered for reduction potential in the County's inventory because these emissions are completely under the County's control. However, the total lifecycle emissions associated with these measures were also evaluated with the USEPA Waste Reduction Model (WARM) to demonstrate the global reduction potential of these measures. WARM is used to calculate GHG emissions of baseline and alternative waste management practices, including: source reduction, recycling, combustion, composting, and landfilling. The WARM tool's lifecycle approach

⁶⁴ Information received from the County Solid Waste Department

⁶⁵ Air Resources Board 2007.

⁶⁶ Air Resources Board 2008a.

reflects emissions and avoided emissions, both upstream and downstream from the point of use (i.e., when and where the material/product is used). Therefore, the emission factors provided in this tool provide an accounting of the net benefit of these actions to the environment. Emissions factors are based on national averages for each process⁶⁷.

Each measure below accounts for emission reductions already attributed to R1 measures for this sector, and any applicable R2 measures.

R2W1: Increase Methane Recovery at Mid-Valley, Milliken, and Colton Landfills

Mid-Valley, Milliken, and Colton Landfills have the most waste-in-place (WIP) of any landfills under County control. In addition, these three landfills are currently accepting most of the new waste generated by incorporated cities in the County. Consequently, the WIP in these landfills represent the largest sources of methane from the solid waste sector. In 2007, these landfills accepted over one million tons of waste, representing 67 percent of all new waste landfilled in San Bernardino County⁶⁸. Because these landfills are so important to the County's solid waste system, increasing methane recovery at these sites will have the greatest effect on reducing methane emissions from this sector.

This measure requires the County to achieve a methane recovery rate of 95 percent at Mid-Valley and 85 percent at Colton and Milliken Landfills. These landfills currently have methane recovery systems in place⁶⁹. The USEPA recommends using a 75 percent capture rate as a default value for methane recovery systems where the precise capture rate is unknown⁷⁰. Increasing the methane recovery rate will result in methane emission reductions from both WIP and newly landfilled waste. Multiple studies were reviewed to determine the achievable methane recovery rate for current advanced methane control technology for landfills. A 1999 study from the Institute for Environmental Management demonstrated that methane capture effectiveness approached 100 percent at a Yolo County landfill project through the use of a surface membrane cover over porous gas recovery layers operated at a slight vacuum⁷¹. Synthetic/geomembrane final covers have been shown to be very efficient at reducing methane emissions. A 2008 study by the California Integrated Waste Management Board found that they have a high potential for GHG emission reductions⁷², and a 2006 study demonstrated 90 percent recovery⁷³.

A cost and technology feasibility study must be performed to determine the methane capture and destruction rates for any methane controls installed at these landfills. This study is necessary to determine the feasibility of installing methane control technology, and the maximum possible methane recovery rate achievable at each landfill. As discussed above, the methane capture rates used in this analysis reflect relevant studies of similar landfill sites, accepted methodology, and current landfill data.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The methane recovery systems currently in place are assumed to capture 75 percent of emitted methane from all waste currently in place, and all new waste disposed of at Mid-

⁶⁷ Environmental Protection Agency 2008b.

⁶⁸ California Integrated Waste Management Board 2008.

⁶⁹ Environmental Protection Agency 2008c.

⁷⁰ Environmental Protection Agency 1998.

⁷¹ Augenstein 1999.

⁷² California Integrated Waste Management Board 2008b.

⁷³ Spokas et al. 2006; Australian Greenhouse Office 2007.

Valley, Milliken, and Colton Landfills by 2020⁷⁴.

- The recommended methane recovery systems included in this analysis are assumed to capture 95 percent of emitted methane from all WIP and all new waste disposed of at Mid-Valley, and 85 percent of emitted methane from all WIP and all new waste disposed of at Milliken, and Colton Landfills by 2020.

The reductions are estimated at 49,972 MTCO₂e in 2020 from waste already in place at the landfills. The emission reductions associated with new waste added to the landfills result in 47,087 MTCO₂e by 2020. This measure will result in a 27.0 percent reduction from 2020 unmitigated landfill emissions.

R2W2: Install Methane Recovery System at Barstow

Due to the safety issues associated with methane, the California Code of Regulations (CCR), Title 27, Chapter 3, Subchapter 4, Article 6, contains requirements that owners and operators of landfills must monitor and control landfill gas (LFG) (mostly methane) and prevent it from accumulating in enclosed structures and/or migrating offsite. To meet the requirements of Title 27, the County installed methane recovery system at Barstow Landfill 2010⁷⁵.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The methane recovery system is assumed to capture 75 percent of emitted methane from all waste currently in place, and all new waste entering Barstow Landfill by 2020⁷⁶.
- An overall increase of six percent (i.e., 90 to 96 percent) for the delivery of waste to sites with a methane recovery system in place will occur between 2007 and 2020.
- Measure R2W1 has been implemented.

In 2020, the reductions associated with the Barstow site are estimated at 10,970 MTCO₂e from waste already in place at the landfill. The emission reductions associated with new waste result in 37,935 MTCO₂e by 2020. This measure will result in a 10.1 percent reduction from 2020 unmitigated landfill emissions.

R2W3: Install Methane Recovery System at Landers

The County can further reduce emissions by installing a methane recovery system at Landers. Because Landers is scheduled to close by 2013, the waste reduction calculation for this facility is based only on waste currently in place and that a negligible amount of new waste, in relation to the waste in place, would be disposed of at Landers.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The methane recovery system is assumed to capture 75 percent of emitted methane from all waste currently in place⁷⁷.
- In 2020, 96 percent of waste will be disposed of in landfills with methane recovery systems.

⁷⁴ Environmental Protection Agency 1998

⁷⁵ Pers. com. County of San Bernardino Solid Waste Management Department

⁷⁶ Environmental Protection Agency 1998

⁷⁷ Environmental Protection Agency 1998.

In the year 2020, the reductions associated with the Landers site are estimated at 8,471 MTCO₂e. This measure will result in a 2.4 percent reduction from 2020 unmitigated landfill emissions.

A cost and technology feasibility study must be performed to determine the methane capture and destruction rates for any methane controls installed at this landfill. This study is necessary to determine the feasibility of installing methane control technology, and the maximum possible methane recovery rate achievable at the landfill. As discussed above, the methane capture rates used in this analysis reflect relevant studies of similar landfill sites, accepted methodology, and current landfill data.

R2W4: Comprehensive Disposal Site Diversion Program

The County's Comprehensive Disposal Site Diversion Program (CSDSP) recovers "post-diversion" waste for recycling at the landfill. Post-diversion is defined as the waste sent to landfill, after accounting for the County's municipal recycling and composting programs, which are accounted for in the 2020 total waste estimates. This program has been quite successful at increasing waste diversion from landfilling to recycling since its inception in 2006; the County successfully diverted 112,846 tons of waste in fiscal year 2007-2008 fiscal year. By 2020 the CSDSP program will divert an estimated 11 percent of waste arriving at County landfills each year, increasing the current per capita diversion rate from 49 percent to approximately 54.5 percent.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Projected diversion rates grow at a rate of 1.02 percent annually.
- In 2020, 100 percent of new waste will be disposed of in landfills with methane recovery systems (after Measures R2W1 through R2W3 have been implemented).
- Measures R2W1 through R2W3 have been implemented.

As described above, only emission reductions directly attributed to waste diversion from landfills are considered for reduction potential in the County's internal operations inventory. These emission reductions for the County's CSDSP are equivalent to 13,137 MTCO₂e in 2020. However, after implementation of measures R2W1 through R2W3, 100 percent of new waste will be disposed of in landfills with methane recovery systems. This results in additional reductions of 13,253 MTCO₂e in 2020. This measure will result in a 7.3 percent reduction from 2020 unmitigated landfill emissions.

For informational purposes, WARM was used to evaluate total lifecycle emissions associated with this measure. WARM was used to calculate GHG emissions of baseline and alternative waste management practices associated with the CSDSP, including recycling and composting, with San Bernardino County-specific waste disposal totals and appropriate assumptions regarding collection efficiency. Waste disposal categories for San Bernardino County provided by the California Integrated Waste Management Board (CIWMB) in 1999 (CIWMB 1999). The lifecycle reductions associated with the CSDSP program are estimated at 452,508 MTCO₂e for the year 2020. Because many of the processes associated with the waste emissions are not in San Bernardino County and/or are not under County control, the full lifecycle emissions reductions were not counted in the CSDSP reduction measure.

R2W5: Construction and Demolition Debris Diversion

Under AB2176, § 42911, a local agency shall not issue a building permit to a development project unless the development project provides adequate areas for collecting and loading recyclable materials and ensures a minimum diversion of 50 percent of construction and building materials and demolition debris from landfills. In San Bernardino County, existing construction and demolition (C&D) is currently permitted on a case by case basis. Building permits are issued conditionally based on the C&D recycling and waste management plan. Under this plan, a minimum estimate of 50 percent diversion is required as is a detailed diversion plan with the waste hauler identified and a plan verification before every permit is issued. The County could further reduce emissions from construction and demolition waste by increasing the diversion requirements.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Starting in 2009, diversion increases by one (1) percent per year to reach ten (10) percent total diversion in 2020.
- The ten (10) percent C&D diversion target is constant in 2020.
- C&D accounts for approximately 8.5 percent of San Bernardino County's average waste composition⁷⁸.
- On average, the County currently meets the 50 percent requirement for C&D.
- In 2020, 100 percent of waste will be disposed of in landfills with methane recovery systems.
- Measures R2W1 through R2W4 have been implemented.

Diverting an extra ten (10) percent of this C&D waste would result in a reduction of 295 MTCO₂e in 2020. This measure will result in a 0.08 percent reduction from 2020 unmitigated landfill emissions.

For reference, lifecycle emissions were calculated with WARM, using the same methodology and assumptions described for prior measures. Reduction of the full lifecycle emissions would result in a reduction of 64,199 MTCO₂e in 2020.

R2W6: County Diversion Program: 75 percent Diversion Goal

This measure involves the County's commitment to strengthen its Diversion Program to reach a goal of 75% of waste diverted to recycling programs by 2020 through the implementation of one or more of the following measures:

- Expand current waste reduction and recycling plans, including outreach and education programs.
- Encourage businesses in the County to adopt a voluntary procurement standard prioritizing products that have less packaging or are re-usable, recyclable, or compostable; support policies at the State level that provide incentives for efficient product design and for reduced product and packaging waste.
- Increase disposal fees and/or reduce residential pick-up frequency.

⁷⁸ California Integrated Waste Management Board 2007.

- Provide compost bins at no cost.
- Expand list of recyclable materials.
- Provide waste audits.
- Make recycling and composting mandatory at public events.
- Establish an appliance end-of-life requirement.
- For new development, require the use of salvaged and recycled-content materials and other materials that have low production energy costs for building materials, hard surfaces, and non-plant landscaping. Require sourcing of construction materials locally, as feasible. Encourage the use of cement substitutes and recycled building materials for new construction.
- Research, evaluate, and report on best practices, innovations, trends, and developments in waste reduction practices, as relevant to GHG emissions reduction.

It is estimated that the County could achieve a 75 percent diversion rate by 2020, which would be an increase of approximately 25 percent from diversion measures currently underway (i.e., measures R2W3 and R2W4). The County is faced with unique challenges regarding waste diversion targets due to the rural nature of its populated areas and its socioeconomic conditions. Many of the small population centers are spread over a large geographical area in the County. In addition, illegal dumping at landfills has been a problem in the past, and it is anticipated that increasing tipping fees to help achieve the waste diversion goal could also increase the rate of illegal dumping. Given these challenges, the County will need to further assess the feasibility of achieving the 75 percent diversion goal by 2020.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Starting in 2009, diversion increases by two (2) percent per year to reach 75 percent total diversion in 2020.
- In 2020, 100 percent of new waste will be disposed of in landfills with methane recovery systems
- Measures R2W1 through R2W5 have been implemented.
- An additional cumulative 25 percent increase in diversion to achieve a 2020 total diversion goal of 75 percent would result in an additional reduction of 4,118 MTCO₂e in 2020. This measure will result in a 1.1 percent reduction from 2020 unmitigated landfill emissions.
- These estimates do not include reduction in life cycle emissions. For reference, lifecycle emissions were calculated with WARM, using the same methodology and assumptions described for prior measures. Reduction of the full lifecycle emissions would result in a total reduction of 313,514 MTCO₂e in 2020.

R2W7: City Diversion Program: 75 percent Diversion Goal for Incorporated County-Generated Waste

The incorporated areas of the County currently divert approximately 55 percent of generated waste. This measure would result in increasing that diversion percentage to 75 percent. The County will work with the various cities in the County to implement programs to reduce waste

generation and increase waste diversion. Programs that can be implemented to achieve this goal are outlined under measure R2W6.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Starting in 2009, diversion increases by approximately two (2) percent per year to reach 75 percent total diversion in 2020.
- Approximately 94 percent of waste disposed of by the incorporated areas of the County is landfilled within County borders; consequently, 94 percent of emission reductions will occur inside the County, and six (6) percent will occur outside⁷⁹.
- The percentage waste disposal at sites with methane capture in the incorporated County is equal to that for the unincorporated County: 100 percent of new waste will be disposed of in landfills with methane capture.
- Measures R2W1 through R2W6 have been implemented.
- An additional cumulative 20 percent increase in diversion to achieve a 2020 total diversion goal of 75 percent for the incorporated County would result in an additional reduction of 32,692 MTCO_{2e} in 2020. This measure will result in a 9.1 percent reduction from 2020 unmitigated landfill emissions.

R3 Waste Measures

The following list of R3 measures includes all additional measures that were not relied upon to demonstrate achievement of the proposed County 2020 emissions target. These measures are either facilitative in nature or there are methodological issues that prevent their quantification at this time.

R3W1: Install Methane Capture Systems at all Landfills with 250,000 or more Tons of WIP

The County will explore the feasibility of installing methane recovery systems at all landfills with 250,000 or more tons of WIP. The County will also explore the feasibility of providing technical support to encourage the installation of methane recovery systems at private landfills within the County. This includes the following County-owned and private landfills:

- Apple Valley (closed/County)
- Big Bear (closed/County)
- Hesperia (closed/County)
- Yucaipa (closed/County)
- Mitsubishi Cement Plant Cushenbury (active/private)

A cost and technology feasibility study must be performed to determine the potential methane capture and destruction rates for any methane controls installed at these landfills. This study is necessary to determine the feasibility of installing methane control technology, and the maximum possible methane recovery rate achievable at each landfill. It is possible that methane capture and destruction at these landfills is not feasible because smaller landfills are typically remote, have no power supply, and produce poor gas. The systems may need to run off of a

⁷⁹ California Integrated Waste Management Board 1999.

generator and methane flares would likely require additional gas to ensure flare operation and methane destruction.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Each methane control system has an efficiency of 75 percent.

This measure could result in an additional reduction of 14,995 MTCO_{2e} in 2020 and a 4.2 percent reduction from 2020 unmitigated landfill emissions.

Reductions associated with this measure have not been included in the reduction plan because this measure has not been analyzed for cost-effectiveness. In addition, the County does not have jurisdiction to install a methane recovery system at Mitsubishi Cement Plant Landfill but could provide technical support to this landfill owner.

R3W2: Financing Mechanisms and Opportunities

The County will pursue all appropriate grant opportunities to help finance the installation of methane recovery systems and controls, the enhancement of waste diversion programs and public education programs focused on waste stream issues.

While financing is vital to implementing water minimization, methane control and reuse described above, it was not assumed that financing would result in a level of GHG reductions beyond that assumed in the R2 measures described above.

R3W3: Waste Education Program

This measure involves providing public education and publicity about commercial and residential recycling, waste reduction, composting, grass cycling, and waste prevention. This measure would educate the local population about waste management and waste reduction options applicable to both residential and commercial settings. Although the County currently offers community education programs designed to assist residents with waste reduction, recycling and reuse activities, this measure would expand the County's current programs.

This measure is not expected to result in additional emission reductions beyond those already claimed in R2W7, because education programs are relied upon to achieve the 75 percent diversion goal

R3W4: Additional Landfill Methane Controls

The County's Municipal Solid Waste Department is currently in the process of assessing the feasibility of installing additional methane capture systems. The following actions are being considered that could further reduce methane emissions from landfills in the County:

- Use landfill gas extraction system, surface sampling, gas migration probe, and other available to data to get an accurate representation of methane generation at San Bernardino County landfills. This information could be used to accomplish the following:
 - Develop a GHG emission site priority list.
 - Develop strategies based on site priorities.
 - Install additional gas extraction wells as necessary in existing systems.
 - Pursue low tech solution at remote sites that do not have a power source.
- Pursue further study of the chemical reactions of methane gas attenuation as it migrates

through the cover soils at each landfill, and develop low power methods for improving these reactions.

- Work with other agencies that are studying GHG emissions from landfills and develop partnerships where information and approaches are shared.
- Further develop waste disposal alternatives such as recycling, waste-to-energy, aerobic digestion of organic materials, and other actions.

Until the feasibility assessment is complete, the amount of potential GHG reductions from this measure cannot be quantified.

R3W5: Landfill Gas to Energy Projects

The County's Municipal Solid Waste Department currently has Landfill Gas to Energy (LFGE) Projects at the Colton, Mid Valley, and Milliken landfills. These projects have the capacity to generate a combined six (6) MW of renewable electricity, and it is estimated that they have produced over 220 MWh of electricity in the first five (5) years of their operation (all three projects came online in 2003). These projects are funded by the California Energy Commission's Renewable Energy Program. The LFGE projects sell their electricity to Southern California Edison (SCE), where it is distributed throughout the County. This electricity is part of SCE's renewable power portfolio and is therefore already incorporated into the indirect emissions associated with electricity consumption included in this inventory. Consequently, emission reductions directly attributed to offsets in non-renewable energy resulting from these projects have not been included in this emission reduction plan. However, methane captured and combusted to produce electricity has been subtracted from the landfill emissions presented in this inventory.

The County will consider pursuing additional LFGE projects at other landfills where the projects are cost-effective and technologically feasible. Through this measure, these projects would increase the renewable electricity available in the County, reduce GHG emissions associated with non-renewable electricity use, and reduce methane emissions that would otherwise be released into the atmosphere.

Until the feasibility assessment is complete, the amount of potential GHG reductions from this measure cannot be quantified.

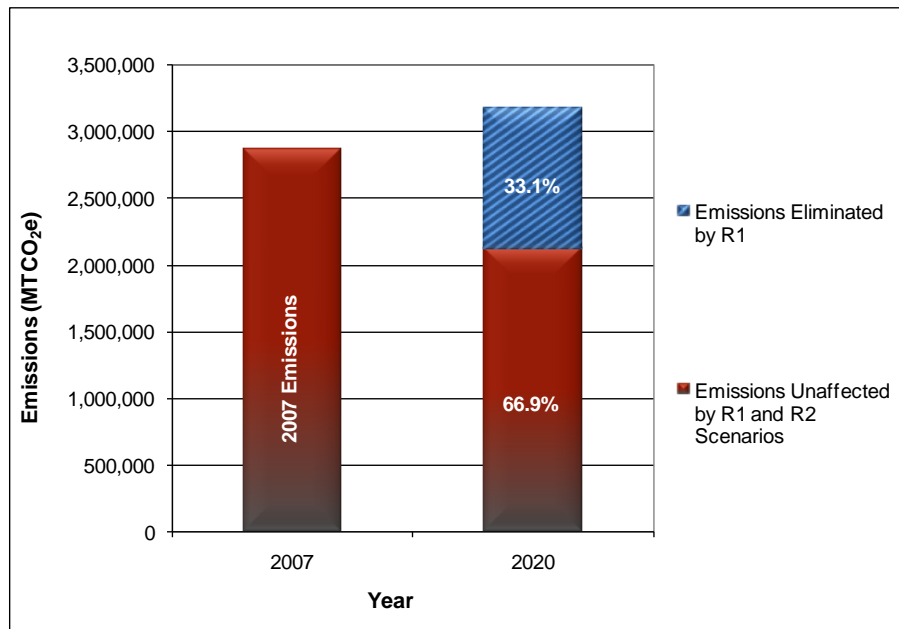
Stationary Source Measures

This section provides information on calculations of GHG emission reductions related to R1 and R2 for industrial fuel combustion for the County. These emission reductions do not include measures that reduce natural gas combustion in the industrial sector; they only include reductions attributed to combustion associated with other fuels, such as diesel and propane, and reduction in fugitive process emissions, such as CO₂ released during cement manufacture. Total estimated GHG percent reductions and quantities from the reduction measures included in Reduction Classifications R1 and R2 are presented below in **Table A-21**.

Table A-21. External GHG Emission Reductions from Stationary Source Measures

Reduction Classification and Reduction Measure	GHG Reductions (MTCO ₂ e)	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state and regional stationary source measures that do not require County action		
R111: Oil and Gas Extraction Combustion Related GHG Emission Reduction	49	0.002
R112: Stationary Internal Combustion Engine electrification	736	0.02
R113: Reduction in Carbon Intensity at Cement Plants (Through Cap and Trade Program)	69,909	2.2
R114: Reduction in Carbon Intensity at Concrete Batch (Through Cap and Trade Program)	732,086	23.1
R115: Waste Reduction in Concrete Use (Through Cap and Trade Program)	246,288	7.8
R2: Existing and new stationary source measures that require County action		
N/A		
Total	1,049,067	33.1

Figure A-8. External GHG Emission Reductions from Stationary Sources



With the implementation of the emission reduction measures included in this Plan, stationary source emissions will be reduced by 33 percent from 2020 unmitigated projections. Reduced emissions in 2020 will be approximately 28 percent lower than 2007 emissions.

R1 Stationary Source Measures

This section describes the methodology used to calculate GHG emission reductions for the *existing and proposed* national, state, or regional industrial fuel combustion measures that will result in future GHG reductions for the stationary source sector and do not require significant County action.

The cement facility reductions evaluated in this plan include reductions in the cement/concrete sector expected due to the state cap and trade program (R1I3, R1I4, R1I5).

R1I1: Oil and Gas Extraction Combustion Related GHG Emission Reduction

This AB 32 measure would reduce combustion emissions from oil and gas extraction. By 2020, this requirement will reduce emissions in California by approximately 1.8 MMTCO_{2e}, representing 13 percent of combustion emissions from oil and gas extraction in the State⁸⁰. San Bernardino County has very little Oil and Gas production and reductions are minor.

This regulation will result in a 13 percent reduction from 2020 unmitigated combustion emissions from oil and gas extraction and a 0.001 percent reduction of total 2020 unmitigated industrial stationary source emissions.

⁸⁰ California Air Resources Board 2008a, 2009a. CARB assumes a 2 percent growth rate in cement production from 2004 (11.92 MMT) to 2020. Projected 2020 emissions were calculated as follows: $0.895 * (11.92) * (1.02)^{16} = 14.65 \text{ MMTCO}_2\text{e}$.

R112: Stationary Internal Combustion Engine Electrification

This AB 32 measure would affect owners and operators of industrial and commercial engines over 50 horsepower used as primary power sources by replacing internal combustion engines with electric motors. By 2020, this requirement will reduce emissions in California by approximately 0.3 MMTCO₂e, representing 0.5 percent of combustion emissions from industrial sources (non-coal) in the State⁸¹.

This regulation will result in a 0.5 percent reduction from 2020 unmitigated combustion emissions from industrial sources and a 0.02 percent reduction of total 2020 unmitigated industrial stationary source emissions.

R113: Reduction in Carbon Intensity for Cement Manufacturing

ARB is planning to implement a cap and trade program that will include the cement sector and will incentivize reduction in carbon intensity in cement manufacturing.

During development of the AB 32 Scoping Plan, ARB originally evaluated an approach to mandate reduction in carbon intensity at cement plants. By 2020, this requirement would have reduced emissions in California by approximately 1.55 MMTCO₂e; representing 10.6 percent of total emissions for California cement plants in 2020⁸². This requirement would have required a carbon intensity standard (CIF) of 0.8 metric ton CO₂ per metric ton of cement used in California. The unmitigated CIF for cement produced in California is 0.895. Reduction of carbon intensity would be through use of alternative fuels or energy efficiency measures. Based on data from ARB, the CIF for cement produced in the County is 0.819, which is slightly above the originally proposed standard.

ARB ultimately decided that reducing greenhouse gas emissions from the wide variety of sources could be best be accomplished through a cap-and-trade program along with a mix of complementary strategies that combine market-based regulatory approaches, other regulations, voluntary measures, fees, policies, and programs. Thus, ARB decided to address cement manufacturing emissions through the cap and trade program instead of via a specific mandate. ARB will monitor cement manufacturing emissions and other emissions to ensure that the State meets the 2020 limit on greenhouse gas emissions. Thus, cap-and-trade will be the first approach to promoting reductions in the cement industry, but ARB will retain the authority (given to it by AB32) to later evaluate whether specific cement industry GHG regulation (such as a cement intensity standard like that mentioned above) should be instituted as a complementary measure. Thus, although it is difficult to precisely predict the changes in the cement carbon intensity that will occur due to cap-and-trade, change something along the lines of that assumed in the original cement intensity standard would be necessary to support reaching the overall AB 32 reduction target.

Thus it was assumed that cap and trade would result in a reduction in cement manufacturing emissions equivalent to that which would have resulted from implementation of a fixed carbon intensity standard which is a 2.3 percent reduction from 2020 unmitigated cement plant emissions and a 2.1 percent reduction of total 2020 unmitigated industrial stationary source emissions.

⁸¹ California Air Resources Board 2008a, 2009a.

⁸² California Air Resources Board 2008a, 2009a.

RII4: Reduction in Carbon Intensity for Concrete Batch Plants

CARB is planning to implement a cap and trade program that will include the concrete sector and will incentivize reduction in carbon intensity for concrete production.

During development of the AB 32 Scoping Plan, ARB originally evaluated an approach to mandate reduction in carbon intensity at concrete batch plants. By 2020, this requirement would have reduced emissions in California by approximately 3.3 MMTCO₂e; representing 22.3 percent of total emissions for California cement plants in 2020⁸³. This measure would have required a CIF of 0.6 metric ton CO₂ per metric ton of cementitious material used. As noted above, ARB had originally proposed a separate CIF for cement produced in California of 0.8. Further reductions in the CIF for concrete batch plants can be achieved by using alternative fuels, increasing energy efficiency in the cement production process, or by adding materials such as supplementary cementitious materials (SCMs) to replace cement in the concrete blend.

As noted above, ARB decided to include the concrete sector in the cap and trade program instead of proposing a fixed CIF standard for concrete production. ARB will monitor concrete production emissions and other emissions to ensure that the State meets the 2020 limit on greenhouse gas emissions. Thus, cap-and-trade will be the first approach to promoting reductions in concrete production, but ARB will retain the authority (given to it by AB32) to later evaluate whether specific regulation (such as a cement intensity standard like that described above) should be instituted as a complementary measure. Thus, although it is difficult to precisely predict the changes in the concrete production carbon intensity that will occur due to cap-and-trade, change something along the lines of that assumed in the carbon intensity standard would be necessary to support reaching the overall AB 32 reduction target.

Thus it was assumed that cap and trade would result in a reduction in cement manufacturing emissions equivalent to that which would have resulted from implementation of a fixed carbon intensity standard which would result in a 25.0 percent reduction from 2020 unmitigated cement plant emissions and a 21.8 percent reduction of total 2020 unmitigated industrial stationary source emissions.

RII5: Waste Reduction in Concrete Use

As noted, above, CARB is planning to implement a cap and trade program that will include the cement sector and will incentivize reduction in carbon intensity for cement production.

During development of the AB 32 Scoping Plan, ARB originally evaluated an approach to mandate waste reduction for cement production. This measure would reduce emissions from cement production at cement plants in California. By 2020, this requirement would have reduced emissions in California by approximately 1.2 MMTCO₂e; representing eight (8) percent of emissions from cement production in the State⁸⁴. According to the ARB, approximately five (5) to eight (8) percent of concrete made in California each year is returned to the cement plant waste. This measure requires a 100 percent reduction in wasted cement, which is equivalent to an eight (8) percent reduction in cement manufacturing.

As noted above, ARB decided to include the cement sector in the cap and trade program instead of proposing a fixed waste reduction mandate. ARB will monitor cement manufacturing

⁸³ California Air Resources Board 2008a, 2009a.

⁸⁴ California Air Resources Board 2008a, 2009a.

emissions and other emissions to ensure that the State meets the 2020 limit on greenhouse gas emissions. Thus, cap-and-trade will be the first approach to promoting reductions in cement production, but ARB will retain the authority (given to it by AB32) to later evaluate whether specific regulation (such as a waste reduction mandate described above) should be instituted as a complementary measure. Thus, although it is difficult to precisely predict the changes in the cement carbon intensity that will occur due to cap-and-trade, change something along the lines of that assumed in the originally proposed waste reduction measure would be necessary to support reaching the overall AB 32 reduction target.

Thus it was assumed that cap and trade would result in a reduction in cement manufacturing emissions equivalent to that which would have resulted from implementation of a waste reduction mandate which would result in an eight (8) percent reduction from 2020 unmitigated cement plant emissions and a 7.2 percent reduction of total 2020 unmitigated industrial stationary source emissions.

R2 Stationary Source Measures

There are currently no R2 measures that were evaluated for industrial fuel combustion, because the County may have limited control over this sector, other than its land use authority over new Stationary Source development projects. Emission reductions related to new stationary source development will be accomplished through the County's DRP.

R3 Stationary Source Measures

No R3 measures are identified for this sector.

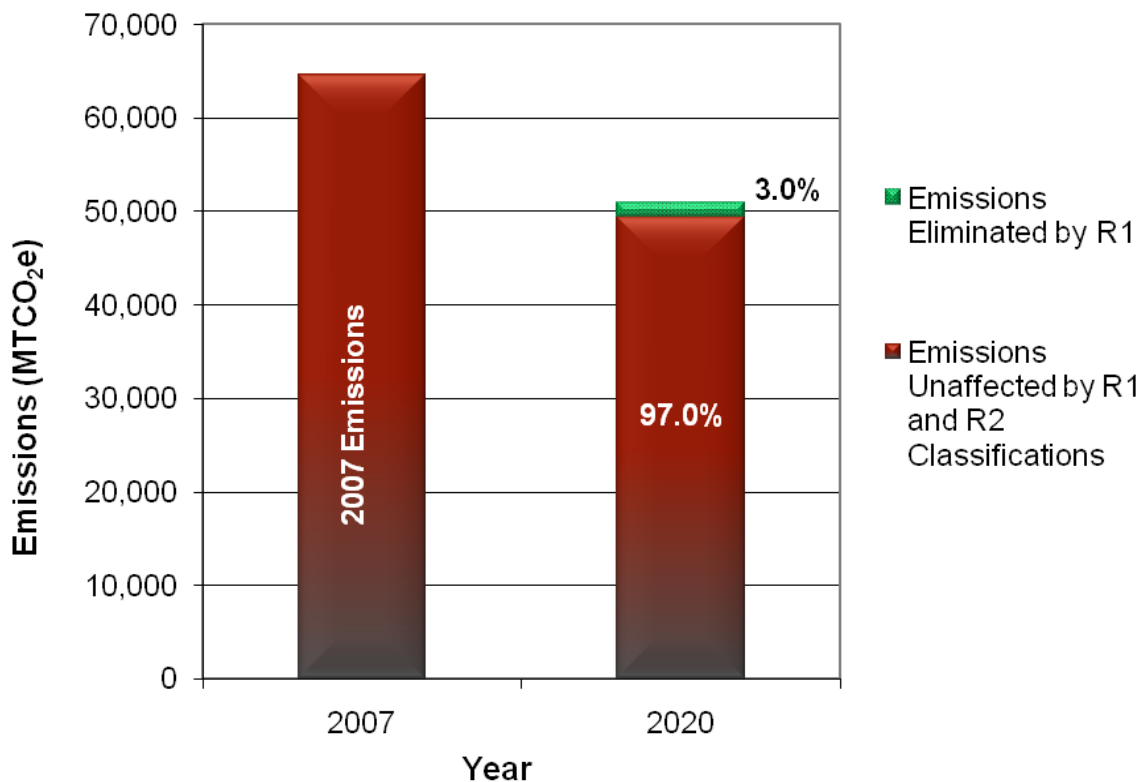
Agriculture

This section provides information on calculations of GHG emission reductions related to R1 and R2 for agriculture in the County. Total estimated GHG percent reductions and quantities from the reduction measures included in Reduction Classifications R1 and R2 are presented below in **Table A-22**. Emission reductions for each measure are applied to the projected 2020 unmitigated emissions for the appropriate emissions source. Total reductions attributed to these measures from the 2020 unmitigated emissions would be three (3) percent.

Table A-22. External Emission Reductions from Agriculture Measures

Reduction Classification and Reduction Measure	GHG Reductions (MTCO ₂ e)	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state and regional stationary source measures that do not require County action		
R1A1: Methane Capture at Large Dairies	1,531	3.0
R2: Existing and new agriculture measures that require County action		
NA		
Total	1,531	3.0

Figure A-9. External GHG Emission Reductions from Agriculture Measures



2020 unmitigated emissions estimates from agriculture show a decrease in emissions from 2007. This is a result of decreasing agricultural activity in the County. The 2020 mitigated agriculture emissions will be approximately 24 percent lower than 2007 emissions.

R1 Agriculture Measures

This section describes the methodology used to calculate GHG emission reductions for the *existing and proposed* national, state, or agriculture measures that will result in future GHG reductions for the agricultural sector and do not require significant County action.

RIA1: Methane Capture at Large Dairies

This is an AB 32 voluntary measure to encourage the installation of methane digesters to capture methane emissions at large dairies. By 2020, this requirement will reduce emissions in California by approximately one (1) MMTCO₂e, representing 7.8 percent of CH₄ and N₂O emissions from manure management and enteric fermentation at dairies in the State⁸⁵.

This regulation will result in a 7.8 percent reduction from 2020 unmitigated CH₄ and N₂O emissions from manure management and enteric fermentation at dairies and a three (3) percent reduction of total 2020 unmitigated agricultural emissions.

R2/R3 Agricultural Measures

There are currently no R2 or R3 measures that were evaluated for agriculture, because the County may have limited control over this sector, other than its land use authority over new agricultural development projects. Emission reductions related to new agricultural development will be accomplished through the County's DRP.

⁸⁵ California Air Resources Board 2008a, 2009a.

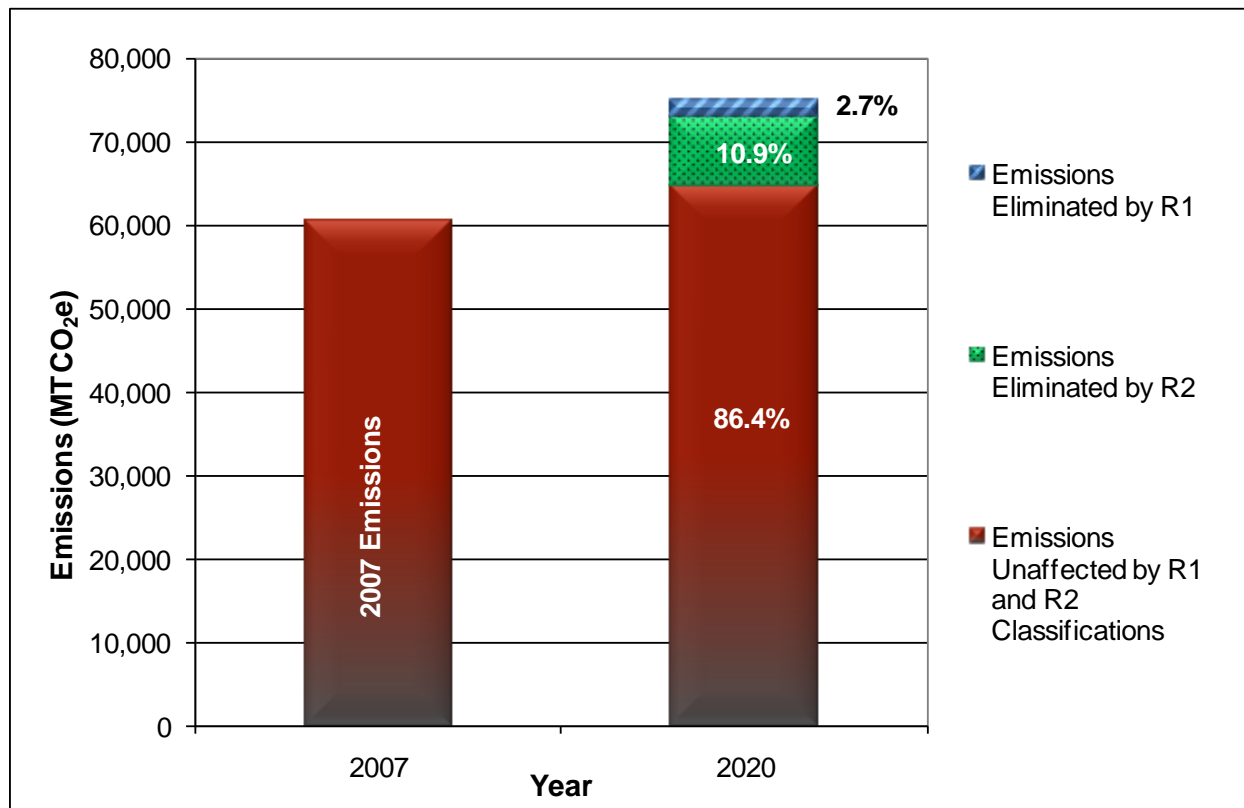
Water Conservation Measures

This section provides information on calculations of GHG emission reductions related to R1 and R2 measures for water conservation. Because reduction of water use reduces water conveyance as well as water treatment, measures in this sector reduce emissions from both the water conveyance and wastewater treatment sectors.

Table A-23. External GHG Emission Reductions from Water Supply Measures

Reduction Classification and Reduction Measure	GHG Reductions (MTCO ₂ e)	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state and regional water supply measures that do not require County action		
R1WC1: Renewable Portfolio Standard (33 percent by 2020)	2,007	15.2 (water conveyance)
R2: Existing and new water supply measures that require County action*		
R2WC1: Per Capita Water Use Reduction	2,228	
Electricity within County	2,241	20.0 (water conveyance)
Electricity outside of County	1,109	20.0 (water conveyance)
Wastewater Treatment Fuel Combustion		0.03 (industrial fuel combustion)
Wastewater Fugitive Emissions	2,608	
Subtotal	8,186	7.3 (wastewater fugitive emission)
Total	10,193	13.6
R3: Existing and new water supply measures—reductions not quantified or relied upon to achieve reduction goal		
R3WC1: Manage Storm Water Runoff		
R3WC2: Conservation Areas		
R3WC3: Financing Mechanisms and Opportunities		
* Reductions assume measure will effect water importation from the State Water Project only. The County's mandatory influence is for new development; impact on existing development must come through voluntary measures in cooperation with water providers.		

Figure A-10. External GHG Emission Reductions from Water Conservation Measures



With the implementation of the emission reduction measures included in this Plan, emissions from water supply and treatment emissions will be reduced approximately 14 percent from 2020 unmitigated projections. Reduced emissions in 2020 will be approximately 8 percent higher than 2007 emissions.

R1 Water Conservation Measures

SB X7 7 (Steinberg) of 2009 mandates a reduction in per capita urban water use by 20 percent compared to current conditions. This mandate applies specifically to urban water retailers with more than 3,000 connections. Although this is a state mandate, in order to achieve substantial per capita water use reductions, the implementation of this mandate will be at the local level and the County can play a substantive role in helping to promote water conservation. As such, GHG reductions related to water conservation are quantified as a R2 measure.

CARB outlines six water-related measures that total 4.8 MMTCO₂e in reductions by 2020 at the state level. These measures are partly included in the energy efficiency measure outlined in the Scoping Plan. According to CARB, reductions associated with these measures may already be incorporated into the unmitigated 2020 forecast; therefore, they were not included in the Scoping Plan as reductions attributed to the State-wide 2020 goal. CARB plans to work with the appropriate agencies to determine whether these emission reductions are additional to the reductions already accounted for in the Scoping Plan⁸⁶.

⁸⁶ California Air Resources Board 2008a, 2009a.

R1WC1: Renewable Portfolio Standard (33 percent by 2020) Related to Water Supply and Conveyance

This measure would increase electricity production from eligible renewable power sources to 33 percent by 2020. By 2020, this requirement will reduce emissions from electricity used for water supply and conveyance in California by approximately 21.3 MMTCO₂e, representing 15.2 percent of emissions from electricity generation (in-State and imports). This reduction has been counted separately from emission reductions associated with electricity use in the County as a result of implementation of the Renewable Portfolio Standard (see Measure R1E1B). This regulation will result in a 15.2 percent reduction from 2020 unmitigated indirect electricity emissions from imported water supply and conveyance, or a total of 2,007 metric tons of CO₂e.

R2 Water Conservation Measures

This section describes the methodology used to calculate GHG emission reductions for the R2 measures that will result in future GHG reductions from water conservation. Total estimated GHG percent reductions and quantities from the reduction measures are presented below in **Table A-23**. Total reductions attributed to these measures from the 2020 unmitigated GHG emissions inventory are approximately 10,193 metric tons of CO₂e.

R2WC1: Per Capita Water Use Reduction

The County will support the achievement of the 20 percent per capita water use goal, with the County’s implementation of multiple reduction measures. These measures include, but are not limited to, the following (these measures have not been quantified individually, because doing so will require additional research into the feasibility of implementation and cost-effectiveness for each of the measures):

Reduction Strategies

- a. **County Water Efficient Landscape Ordinance.** In 2007, the County adopted a landscape ordinance that provided for the conservation and protection of water resources through the efficient use of water, appropriate use of plant materials suitable for climate and location, and regular maintenance of landscaped areas. On February 8, 2011, the Board of Supervisors adopted a comprehensive landscaping ordinance (Development Code Sections 83.10.010 et seq.) whose provisions meet or exceed the water conservation requirements development by the Department of water resources pursuant to Government Code Sections 64491 et seq. The County landscaping ordinance implements standards that manage outdoor water use through various conservation measures which include using a water budget and low impact development design strategies such as impervious surface reduction, pollution prevention measures to reduce the introduction of pollutants to the environment, and other integrated practices to reduce and cleanse runoff. This Legislative effort is aimed at meeting interdisciplinary goals such as protecting the County’s limited water supply, groundwater recharge, and storm water management.
- b. **Water Conservation Ordinance.** The County’s Special District Division manages and operates County Service Areas 42 (Ore Grande), 64 (Spring Valley Lake, Victorville) and 70, Improvement Zones CG (Cedar Glen), F (Little Morongo, near Yucca Valley), J (Oak Hills), W-1 (Landers), W-3 (Hacienda) and W-4 (Pioneer Town), that provide water services to county residents. In response to drought conditions that existed within these county service areas and improvement zones (Districts), the Board of Supervisors, acting in its capacity as

the governing body of the Districts, adopted ordinance No. SD 90-11, to preserve the water supply in those Districts. This water conservation ordinance prohibits excessive landscape watering, watering during peak daylight hours, watering non-permeable surfaces, excessive water use for noncommercial washing, water use resulting in run-off, and water leaks. The ordinance also requires efficient use of water for construction activities, low-flow toilets and showerheads for all new construction, the use of drought-tolerant plants and efficient landscape watering for all new development, pool covers, water conservation signage at hotels, and recycling of water used for cooling systems.

- c. **County Water Conservation Programs.** San Bernardino is implementing water conservation programs through public education and by partnering with conservation organizations to promote water conservation, highlighting specific water-wasting activities, such as watering non-vegetated surfaces and uncontrolled run-off, and using water to clean sidewalks. The Green County Initiatives program helps cities implement sustainable policies to reduce greenhouse gas emissions and conserve water. One such program is the Facilities Management Demonstration Garden, where the County is using water efficient landscaping to reduce its carbon footprint and water consumption. .
- d. **Collaboration with Water Purveyors.** The County will collaborate with water purveyors to implement and promote conservation programs and actions including:
 - o Water audit programs that offer free water audits to single family, multi-family, large landscape accounts and commercial customers; and
 - o Programs to install ultra-low-flush toilets in commercial, industrial and institutional facilities
- e. **Recycled Water Use.** The County will establish programs and policies to increase the use of recycled water which may include the following actions :
 - o Produce and promote the use of municipal wastewater and gray water that can be used for agricultural; industrial and irrigation purposes, including grey water systems for residential irrigation;
 - o Inventory potential non-potable uses of water for potential substitution by recycled and/or gray water;
 - o Assess feasibility of producing and distributing recycled water for groundwater replenishment;
 - o Collaborate with responsible agencies to encourage the use of recycled water where cost and energy efficiencies for its production, distribution and use are appropriate.
- f. **Water efficiency Training and Education.** The County will encourage water efficiency training and certification for irrigation designers and installers, property managers.

This measure will reduce emissions associated with electricity consumption for water conveyance and wastewater treatment. This measure was separated into three sub-measures for quantification purposes as described below.

Electricity Use Inside County Borders

The following assumptions were used to calculate emission reductions associated with electricity use inside the County for water conveyance attributed to this measure:

- Water treatment and distribution in Southern California require approximately 111 kWh and 1,272 kWh per million gallons⁸⁷.
- This measure would result in a 20 percent reduction in water treatment and distribution
- Projected water supply and electricity emission factors used for 2020 unmitigated emission estimates described in the water conveyance and buildings sections of the External Inventory.

This measure is estimated to result in a reduction from 2020 unmitigated total emissions of 2,228 metric tons of CO₂e.

Electricity Use Outside County Borders

The following assumptions were used to calculate emission reductions associated with electricity use outside the County for water conveyance attributed to this measure:

The following assumptions were used to calculate emission reductions attributed to this measure:

- This measure would result in a 20 percent reduction in imported water.
- All imported water reductions are from the SWP, because the SWP has much higher embodied electricity emission factors per unit of water than the MWD.

This measure is estimated to result in a reduction from 2020 unmitigated total emissions of 2,241 metric tons of CO₂e after accounting for emission reductions attributed to R1WC1.

Industrial Fuel Combustion

This measure would also reduce emissions associated with fuel combustion for wastewater treatment. These emission reductions are achieved in the industrial fuel combustion sector, and do not overlap with reductions from electricity use (inside or outside the County) or fugitive emissions from wastewater (see below).

The following assumptions were used to calculate emission reductions attributed to this measure:

- In 2020, 36.7 percent of water supplied to the County will be processed as wastewater.
- This measure would result in a 7.3 percent reduction in water treatment and distribution (20 percent of 36.7 percent).
- The 7.3 percent is applied to the fuel combustion emissions associated with wastewater treatment.

This measure is estimated to result in a 0.03 percent reduction from total 2020 unmitigated industrial stationary source emissions which is a reduction of 1,109 metric tons of CO₂e.

Wastewater Treatment Processes

This measure would also reduce fugitive emissions associated with wastewater treatment processes due to a reduction in water use.

The following assumptions were used to calculate emission reductions attributed to this measure:

- In 2020, 36.7 percent of water supplied to the County will be processed as wastewater.

⁸⁷ California Energy Commission 2006.

- This measure would result in a 7.3 percent reduction in water treatment and distribution (20 percent of 36.7 percent).
- The 7.3 percent is applied to the fugitive methane emissions associated with wastewater treatment.

This measure is estimated to result in a reduction from 2020 unmitigated total emissions of 2,608 metric tons of CO₂e.

R3 Water Conservation Measures

The following measures could help to further conserve water and thus further reduce associated GHG emissions related to water conveyance and treatment.

R3WC1: Manage Storm Water Runoff

Implement low-impact development practices that maintain the existing hydrologic character of the site to manage storm water, reduce potential treatment, and protect local groundwater supplies.

While reducing stormwater runoff can help to indirectly reduce water treatment emissions, the amount of potential benefit has not been quantified at this time due to the inability to make predictions of exact amount of on-the-ground implementation that may occur by 2020.

R3WC2: Conservation Areas

Preserve existing land conservation areas for watershed protection to protect water quality (reduces water treatment energy use), and protect local water supplies (reduces imported water energy use). Protection of conservation areas can also provide carbon sequestration benefits, particularly in forested areas.

The exact benefits to carbon sequestration (compared to an unmitigated 2020 scenario) were not quantified due to the difficulty in predicting the specific location of conservation areas. Without knowing the areas of future conservation, the carbon sequestration benefits cannot be estimated.

R3WC3: Financing Mechanisms and Opportunities

There are currently multiple financing mechanisms and opportunities available to the County for implementing any of the above R2 measures or additional measures not evaluated in this analysis. Relevant mechanisms are described in the Implementation section of this report.

While financing is vital to implementing water conservation measures described above, it was not assumed that financing would result in a level of GHG reductions beyond that assumed in measure R2WC1.

Wastewater Treatment

This section provides information on calculations of GHG emission reductions related to R1 and R2 for wastewater treatment fugitive emissions for the County.

R1 Wastewater Treatment Measures

There are currently no R1 measures that were evaluated for Wastewater Treatment due to lack of State regulations in this sector.

R2/R3 Wastewater Treatment Measures

There are currently no R2 or R3 measures that were evaluated for Wastewater Treatment emissions because the County may have limited control over this sector. Emission reductions have not been quantified due to a lack of required modeling data, uncertainly associated with the County's jurisdictional control over a GHG source, or a lack of appropriate protocols required for quantification at the County level.

Natural Resource Conservation

As noted in the External Inventory, the loss of natural land covers, particularly forested or woodland areas, can result in loss of their carbon sequestration value.

R1 Natural Resource Conservation Measures

There are currently no R1 measures that were evaluated for Natural Resource Conservation due to lack of State regulations in this sector.

R2 Natural Resource Conservation Measures

There are currently no R2 measures that were evaluated for Natural Resource Conservation because the County may have limited control over this sector. Emission reductions have not been quantified due to a lack of required modeling data, uncertainly associated with the County's jurisdictional control over a GHG source, or a lack of appropriate protocols required for quantification at the County level.

R3 Natural Resource Conservation Measures

The following list of R3 measures includes additional measures that were considered reasonable, but were not relied upon to demonstrate achievement of the proposed County 2020 emissions target.

For each R3 measure below, it is unknown how much land and what types of tree species will be affected by 2020. The identity and quantity of additional vegetation to be planted in the County is not known. Because this information is unavailable, calculation of the carbon sequestering potential of this land-cover is not possible without more specific data. In addition, it is difficult to determine the effect of removing vegetation on the natural progression of sequestration rates for different land types. For these reasons, estimates of CO₂ release due to land clearing and the subsequent sequestration when portions of that land are replanted were not quantified without in-depth on-site evaluation.

R3NR1: Conservation Areas (Same as R3WC3)

Preserve existing land conservation areas (especially forested areas, oak woodlands, and wetlands) that provide carbon sink benefits.

Until specific areas of conservation are identified, the amount of potential GHG reductions (compared to an unmitigated scenario in which these areas would be otherwise developed) from this measure cannot be quantified.

R3NR2: Compensation for Loss of Sequestration

As part of Development Review, the County will consider requiring project-level compensation for loss of sequestration value through requirements for on-site and off-site tree planting and/or funding for restoration of forested areas, woodlands, and wetlands.

The amount of potential sequestration loss by 2020 has not been estimated to the difficulty in estimating which areas will actually be developed in the next ten years. Thus, the amount of compensation cannot be estimated at this time.

R3NR3: Urban Forestry

Evaluate the feasibility of substantially expanding tree planting in the County, including evaluation of potential carbon sequestration from different tree species, potential reductions of building energy from shading, and GHG emissions associated with pumping of water used for irrigation. Implement an urban forestry program if GHG emissions reductions exceed GHG emissions associated with implementation and water use.

Until the feasibility assessment is completed, the amount of potential GHG reductions from this measure cannot be quantified.

List of Preparers

This analysis was a collaborative effort of San Bernardino County, ICF International and PBS &J. The key personnel involved are noted below.

ICF International

Working with the County, ICF developed the Internal GHG emissions inventory, forecasting, and quantification of reduction measures presented in this appendix. The following ICF personnel were involved in this analysis.

- Rich Walter, Project Director
- Rebecca Rosen, Technical Director
- Tony Held, Senior Reviewer
- Brian Schuster, Lead Technical Analyst
- Phil Groth, Building Energy Analyst
- Aaron Burdick, Building Energy Analyst
- Carrah Bullock, Technical Analyst
- John Durnan, Graphic Artist
- Ralph Torrie, Former Project Director

San Bernardino County

San Bernardino County staff provided direction on the overall program, input on current County programs, data for the GHG inventory, and worked with multiple County departments to develop and evaluate the GHG reduction program. The following County staff and consultants were the primary staff involved in this effort for the County:

- Christine Kelly, Director, Land Use Services Department
- Doug Feremenga, Project Manager
- Chris Warrick, Senior Planner
- Robin Cochran, Deputy County Counsel
- Staff from various County departments
- Randy Scott, Consultant to the County
- Michael Hendrix, Atkins, Consultant to the County
- Jim Squire, Former Assistant Director, Land Use Services Department
- Julie Rynerson-Rock, Former Land Use Services Director

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APPENDIX B

APPENDIX B - Internal Inventory/Reduction Plan Methodology

Prepared By:

ICF INTERNATIONAL

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Introduction

This section provides information and supporting material regarding the calculations of greenhouse gas (GHG) emissions for the San Bernardino County (County) Internal Inventory as well as data collection efforts for County emission sources included in the Internal Inventory.

The California Air Resources Board's (CARB) Local Government Protocol (LGOP) was followed in developing this Inventory and Reduction Plan. The Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (2006,) the U.S. Environmental Protection Agency (USEPA) Inventory (2007, 2008, 2009a, 2009b) protocols, and the California Climate Action Registry (CCAR) General Reporting Protocol (2009b) were also followed.

The Internal Inventory utilizes an “operational control approach,” as defined in the LGOP, to set the inventory’s organizational boundaries (CARB, 2008):

Operational Control Approach: A local government has operational control over an operation if the local government has the full authority to introduce and implement its operating policies at the operation. One or more of the following conditions establishes operational control:

- *Wholly owning an operation, facility, or source*
- *Having the full authority to introduce and implement operational and health, safety and environmental policies*

This approach is corroborated by the “operational control approach,” as defined in the World Resources Institute (WRI)/World Business Council on Sustainable Development (WBCSD) GHG Protocol (WRI/WBCSD 2004). In this context, the County’s Internal Inventory will include 100 percent of the GHG emissions from County activities over which it has operational control. This approach was selected because it most accurately accounts for GHG emissions from the County’s operations. **Table B-1** below summarizes the treatment in this inventory of the various facets of San Bernardino County’s internal organization.

Table B-1. County Organizational Boundaries

Business Activity	Included in Organizational Boundary?	Reason
Facilities—Owned	Yes	County exercises operational control over these premises, and, therefore, all facilities are included within the organizational boundary.
Facilities— Leased	Yes	
Vehicle Fleet	Yes	County exercises operational control over these fleets, and, therefore, all County fleets are included within the organizational boundary.
Outdoor Lighting	Yes	County exercises operational control over these operations, and, therefore, all operations are included within the organizational boundary.
Water Pumping and Water Treatment	Yes	County exercises operational control over these operations, and, therefore, all operations are included within the organizational boundary.
Solid Waste Management	Yes	County exercises operational control over these operations, and, therefore, all operations are included within the organizational boundary.

The Internal Inventory includes an analysis of the emissions for the County’s fiscal year ending June 30th 2007 (hereafter referred to as the “2007” inventory, or “Current” inventory, for the Internal Inventory) because it is the most recent year for which complete and accurate data could be obtained. The data in the Current year inventory is based on information gathered from the various County departments, the County General Plan, California Integrated Waste Management Board (CIWMB), and USEPA, as described below. The Internal Inventory also includes a 2020 inventory, an unmitigated projection based on current energy consumption and unit emission rates adjusted by sector specific growth rates [referred to as “2020 unmitigated”]. **Table B-2** presents the emissions sectors included in the Internal Inventory, the data source for each emission sector, and the methodology for projecting emissions to 2020.

Table B-2. Internal Inventory Data Sources and Methodology

Sector	Emission Sources	Source of Data	Projection Methodology Sources
County Facilities	Electricity consumption Natural gas consumption Other fuel consumption by type (natural gas, LPG, fuel oil, diesel, gasoline, etc.)	County electricity and natural gas records	County Detention Planning Report County Space Planning Report
Water Pumping and treatment	Electricity consumption Natural gas consumption	County electricity and natural gas records	County Detention Planning Report County Space Planning Report
Outdoor Lighting	Electricity consumption	County electricity records	County Public Works Department forecasts
County Fleet	On-road vehicles fuel combustion Off-road vehicles and equipment fuel combustion	County fleet records	County Fleet Management forecasts
Landfill Waste	Methane emissions from landfilled waste	County Solid Waste records	County Solid Waste Management forecasts
Employee Commute	On-road vehicles fuel combustion	County Commute survey	County Space Planning Report
Water Conveyance	Indirect electricity emissions for water supply and irrigation infrastructure	CEC	County General Plan growth forecasts

These emissions are separated by scope as follows. Scope 1, 2, and 3 emissions were quantified and included in the Internal Inventory.

Scope 1:

- Emissions from fuels consumed at all the County facilities (e.g. natural gas)
- Emissions from fuels consumed for water pumping and treatment (e.g. natural gas)
- Methane emissions from solid waste management
- Emissions from fuels consumed by all the County fleet vehicles

Scope 2:

- Emissions associated with purchased electricity used at all the County facilities
- Emissions associated with purchased electricity used for water pumping and treatment

Scope 3:

- Emissions from fuels consumed by County employee commute travel

Internal Inventory Emissions Calculation and Data Collection Methodology

Calculation Approach

During the County’s data collection process, ICF International compiled the appropriate emission factors for each of the sources identified for the Internal Inventory.

For electricity consumption, the Southern California Edison GHG emission factor was applied to determine GHG emissions for all of San Bernardino County’s locations as this factor was the most specific factor publicly available. All other emissions were calculated based on global emission factors provided in the 2008 LGOP (CARB 2008).

As different units are often provided for energy consumption (i.e., therms, MBtus, m³, ft³), data for all energy was converted to a single metric (Terajoules) before calculating metric tons carbon dioxide equivalent (MTCO₂e) using the above-mentioned emission factors.

Emission Factors used in the analysis and appropriate references are summarized in **Table B-3** below.

Table B-3. GHG Emission Factors

Fuel	Emission Factor	Source
Compressed Natural Gas (CNG) (Vehicle)	0.054 Kg CO ₂ /Standard Ft ³	USEPA Inventory of Greenhouse Gas Emissions and Sinks 1990–2006 (2008a)
Motor Gasoline (Vehicle)	8.81 Kg CO ₂ /U.S. gal	Provided in the California Local Government Operations Protocol (CARB et al. 2008)
Propane (Vehicle)	5.74 Kg CO ₂ /U.S. gal	
Diesel (Vehicle)	10.15 Kg CO ₂ /U.S. gal	
Natural Gas	0.0546 Kg CO ₂ / Standard Ft ³	
	0.1 g NO ₂ /MMBTU	
	5 g CH ₄ /MMBTU	
Electricity	290.87 kg CO ₂ /MWh	CCAR (2009a) Public Reports and USEPA eGrid2007 (2005 data) (2009)
	2.04 kg NO ₂ /GWh	
	13.88 kg CH ₄ /GWh	

The global warming potentials (GWPs) of the GHGs for a 100-year timeframe are used to express the total GHG emissions on a CO₂-equivalent (CO₂e) basis¹. The concept of GWP is used to compare different GHGs to each other by expressing them on the same basis, in this case in terms of CO₂-equivalence.

¹ The GWPs of CO₂, CH₄, and N₂O are 1, 21, and 310, respectively.

2020 Unmitigated Emission Projections

The 2020 unmitigated projection is used in the GHG Reduction Plan to aid in target setting and future monitoring of emission reductions. The 2020 unmitigated projections are developed based on current energy consumption and growth rates provided by various County reports and County employees. Specific assumptions associated with growth rates are provided in Table B-4.

Table B-4. 2020 Unmitigated Internal GHG Emissions Projection Assumptions

Emission Source	Percent Annual Increase	Assumption Source
Detention facilities	4.0	County Detention Planning Report
All other facilities	2.0	County Space Planning Report
Sheriff's Vehicle fleet	2.0	County Sheriff's Department
All other Vehicle fleet	1.0	County Fleet Management Dept.
Streetlights	1.0	County Public Works Dept.
Landfill Waste	1.1	County Waste Management Dept.
Water Pumping and Treatment	4.6	Unincorporated County Population Growth
Employee Commute	2.0	County Space Planning Report

Overall, County emissions projections increase over time under the unmitigated scenario due to the anticipated growth in population resulting in greater requirements from County operations and subsequent energy consumption. The projections developed for the energy-related emissions from County facilities and fleets (Table B-4 above) provide a pragmatic outlook to the unmitigated scenario.

The employee commute was projected to increase at a level of two percent annually based on expected growth described in the 2004 County Final Master Space Plan.

The landfill emission projections were developed under the assumption of an annual waste-to-landfill increase of 1.1 percent, as provided by County Solid Waste Management Department. In addition, the County's Solid Waste Management Division expects that the quantity of waste sent to landfills with methane recovery systems in place is expected to rise such that, by 2020, 90 percent of new waste would be sent to landfills with a methane recovery system. As such, waste emissions will not necessarily increase linearly with the growth in new waste, but will also depend upon the landfill controls.

Energy Use in County Facilities

Energy use in County-owned and leased buildings is the second largest component of the County's Internal Inventory, accounting for approximately 19 and 16 percent of the Internal Inventory in 2007 and 2020 respectively (see Tables B-13 and B-14).

Unmitigated 2020 emissions were projected using a four percent annual growth rate for the electricity and natural gas consumption from detention facilities and two percent annual growth rate for all other facilities.²

Data Collection

The primary sources of GHG emissions from buildings are the electricity consumed and the natural gas combusted onsite. Obtaining data on the County's electricity and natural gas consumption (as well as costs) was the primary target for the data collection efforts. In addition, the following County data was also obtained whenever possible:

- Building area (square footage)
- Approximate age of building / year of construction
- Number of occupants
- Number of floors
- Number of indoor parking spaces
- Annual hours of operation
- Retrofit history
- Facility condition index
- Anticipated disposal or demolition before 2020
- Any other information that might impact current or future energy usage

County Facilities Management Department

Building energy use data was included in a cost spreadsheet provided by the County's Facilities Management Department. In addition to cost data for approximately 188 County utility accounts, the cost spreadsheet also contains electricity (in kWh) and natural gas (in therms) consumption data for those accounts. A total of 188 accounts were included in this data set covering all County owned or leased buildings under Facility Management control.

Data was collected from the Computer Aided Facilities Management (CAFM) database, which contains information regarding all buildings owned or leased by the County. The CAFM output includes building addresses, square footage, functional description, and functional use codes.

County Special Districts Department

County Special Districts Department provided information, including electricity consumption and natural gas consumption and cost data, for all County Board of Supervisors-governed Special District facilities as well as supplemental information for a limited number of those facilities. A total of 86 facilities were included in this data set.

County Fire Stations

Utility data for County fire stations was obtained from the County Fire Department and the County's Chief Administrative Office. Bear Valley Electric, Southern California Edison

² County of San Bernardino 2004, Final Master Space Plan.

(SCE), and the City of Needles Utility Services provided electricity use data. No natural gas usage data was available. A total of 65 facilities were included in this data set. Data was available for 58 of these facilities.

County Libraries

Information provided from the County Libraries included electricity and natural gas consumption and cost data for 21 facilities.

Arrowhead Regional Medical Center

Information provided by the Arrowhead Regional Medical Center (ARMC) included electricity and natural gas consumption for the ARMC.

Leased Buildings

The County has 239 leased buildings, the majority of which are “full-service” leases (i.e., the landlord pays the utility bills). Due to the difficulty in obtaining historical energy use data from the County’s 190 landlords, energy use associated with these leased buildings was estimated using the Commercial Buildings Energy Consumption Survey’s (CBECS) electricity and natural gas energy intensity for office space based on leased building size (square footage) as a benchmark.

Emissions Calculations

It is important to note the distinction between direct and indirect emissions. Direct emissions are those that are produced at the source of consumption, while indirect emissions are those produced somewhere other than the point of consumption. Electricity consumption produces GHG emissions indirectly (at a generator’s facility), whereas fuels used for heating and hot water produce GHG emissions at the point of consumption. To calculate GHG emissions, state-specific emission factors for electricity use and global emission factors for fuel use (natural gas) were applied to site-specific utility consumption data provided by San Bernardino County and applied to calculate carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) emissions.

Electricity is generated using coal, natural gas, oil, nuclear, hydro, and other renewable energy such as wind and solar photovoltaics. Each of these sources contributes a different amount of GHGs per kWh of electricity produced, with coal creating the most GHG (per kWh) and (most) renewables and nuclear emitting almost no GHG. The extent to which each one of these sources contribute power to a specific grid determines the average emission factor for electricity delivered to customers within that grid.

The general formulae are:

$$MTCO_{2e} = kWh \text{ per year} * MTCO_{2e}/kWh$$

$$MTCO_{2e} = standard \text{ ft}^3 \text{ natural gas per year} * MTCO_{2e}/standard \text{ ft}^3 \text{ natural gas}$$

County facilities are characterized exclusively within this inventory by the emissions associated with electricity and natural gas. Other County operations characterized by their electricity consumption include water pumping and sanitation facilities as well as outdoor park lighting. Energy consumption could not be further disaggregated beyond the facility level for all County operations due to data limitations. In addition, for facilities that

perform water pumping and water sanitation, it was assumed that all of the energy consumption at these facilities consists of these energy intensive processes.

Emissions for County facilities and County-operated outdoor lighting (including park lighting, traffic lights, and flashers as well as streetlight operations) were calculated with the equation listed above.

These energy-use related emissions are presented in **Table B-5** and **Figure B-1**. The primary sources of GHG emissions from buildings are the electricity consumed and the natural gas combusted on site.

Table B-5. Internal Energy Use–Related GHG Emissions for 2007 and 2020 unmitigated

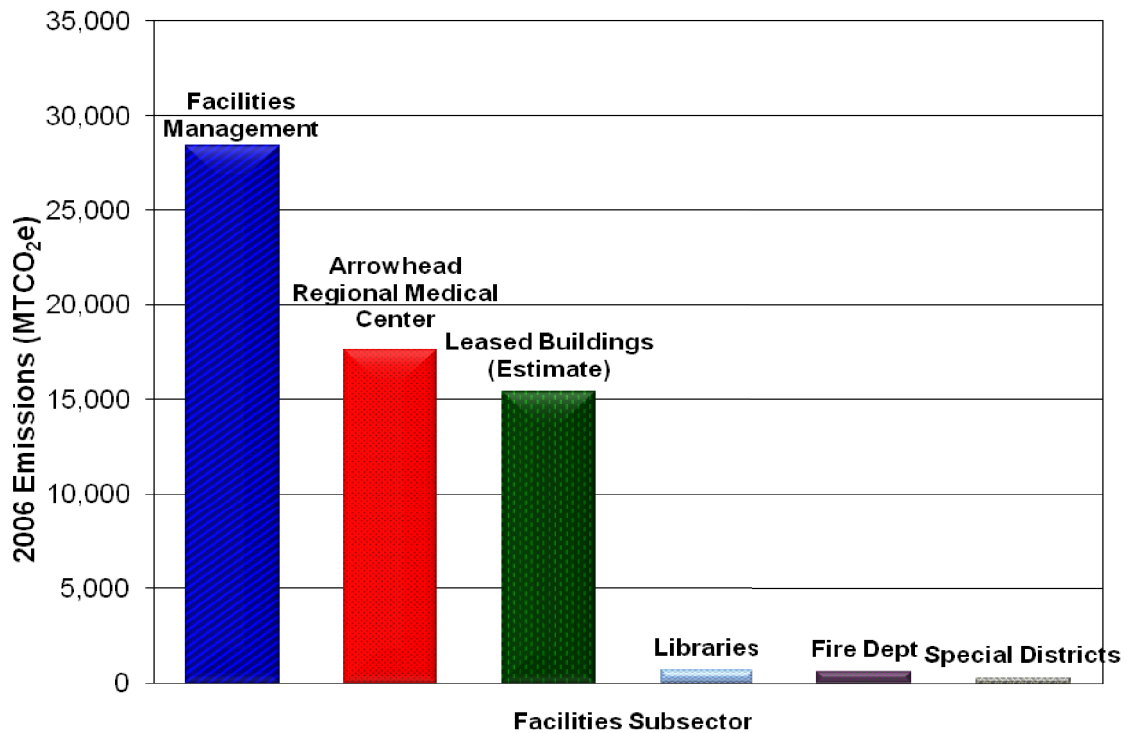
Data Source	2007 Emissions (MTCO₂e)	2020 Unmitigated Emissions (MTCO₂e)
Facilities Management	28,391	50,325
ARMC ¹	17,639	17,639
Leased Buildings ²	15,418	15,418
Libraries	667	667
Fire Department	589	589
Special Districts Department	277	277
Total	62,981	84,915

¹ Arrowhead Regional Medical Center

² Estimated based on Commercial Building Energy Consumption Survey average electricity and natural gas energy intensity for office space, using building size as a benchmark

Electricity and natural gas use data was collected for the County’s facilities, leased buildings, libraries, special districts, fire stations, and Arrowhead Regional Medical Center (ARMC). County Facilities Management Department (which oversees detention facilities, airport facilities, courthouses, sheriff facilities, and County government complexes) is responsible for the management of most County facilities and is, therefore, the largest emissions contributor (i.e., 45 percent in 2007 and 59 percent in 2020 unmitigated). Emissions associated with the Arrowhead Medical Center are the largest for a single facility in 2007 and 2020 unmitigated.

Figure B-1. Internal Energy Use–Related 2007 GHG Emissions



County Vehicle Fleet

Transportation activities account for one-third of U.S. CO₂ emissions or 1,861 MMTCO₂e.³ Greenhouse gas emissions from the vehicle fleet represent the third largest component of the County’s internal total emissions.

Fuel combustion for on- and off-road vehicles and equipment in the County Vehicle Fleet resulted in 34,957 MTCO₂e in 2007 and 42,526 MTCO₂e in 2020, accounting for approximately ten (10) and eight (8) percent of the internal inventory for 2007 and 2020 unmitigated, respectively.

Data Collection

The primary source of GHG emissions from vehicles is the combustion of fuels such as gasoline and diesel. Obtaining data on fuel consumption and cost was the primary target for the data collection efforts. In addition, the following data was obtained whenever possible:

- Vehicle type, class, size information
- Expected retirement or disposal year, if known
- Vehicle model year

³ US EPA, 2008a.

- Fuel type for each vehicle (gasoline/diesel/propane/natural gas)
- Total vehicle miles traveled (VMT) in base year
- Annual capital expenditure schedule for vehicle fleet
- Off-road equipment and fuel consumption
- Programs for fuel switching, fleet downsizing, etc.
- Projection data on the size and composition of the County vehicle fleet in 2020
- Any other information that might impact current or future fuel usage

County Fleet Management Department

Data obtained from the County Fleet Management Department on the motor pool and non-motor pool vehicles includes vehicle composition, as well as the number of low emission vehicles (LEV) or ultra low emission vehicles (ULEV) in the fleet; percent breakdown by vehicle type, age, cost; projected disposal date; total annual fleet VMT; average annual and monthly miles per vehicle; capital expenditure; cost of fuel (total, per vehicle, per mile, and per gallon); fuel switching; fleet size projection; and fuel type and consumption.

County Fire Department

The County Fire Department (County Fire) provided a list of vehicles by type, purchase price, fuel type, and estimated retirement year. County Fire has not tracked fuel use in the past and is just now starting a manual tracking system. County Fire provided fuel consumption data for diesel, unleaded, unleaded plus, supreme, and propane for multiple department accounts.

County Public Works Department / Flood Control District

Vehicle fleet information was obtained for the Flood Control District portion of the County's Public Works Department, included a list of vehicles by type, model year, fuel consumption, and annual costs (such as operating, maintenance, repair, and fuel costs). Information on all County Public Works Department off-road vehicles and equipment, including generators, was also obtained. Additional information received includes total consumption for compressed natural gas (CNG), diesel, and unleaded gasoline fuels.

County Sheriff's Department

The County Sheriff's Department provided county fuel pump cost and consumption data; a catalogue of the sheriff's fleet by year, make, model, type and fuel; total fuel consumption and cost (for diesel and gasoline); information regarding Flex-Fuel vehicles; engine downsizing; and fleet growth.

Emissions Calculations

Emissions from fleet vehicles result from the combustion of fuel. San Bernardino County provided fuel consumption data for its various fleets in order to calculate associated Scope 1 emissions. The general formula to calculate emissions from vehicles is:

$$MTCO_2e = Volume\ of\ fuel\ consumed * MTCO_2e/volume$$

Table B-6 summarizes the 2007 fleet profile of County-owned vehicles in five (5) general departments: fire, fleet motor pool, fleet non-motor pool, sheriff, and public works/flood

control. The vehicle types include heavy duty, passenger/light duty (sedans, vans, motorcycles, and light-duty trucks), medium-duty trucks, and other (construction equipment, marine vehicles, and other). As shown here, the majority of the fleet is comprised of sedans, light-duty trucks, and vans. The largest fleets are the County and Sheriff's motor pools. Table B-6 also includes waste haulers; the waste hauler fleet is composed of multiple subcontracted fleets. All waste hauler fleet calculations are based on available data, which is not inclusive of all subcontractors. The vehicle mix for the contracted waste hauler fleet was not available.

Table B-6. County Vehicle Fleet Profile for 2007

Vehicle Type	County Fire	Fleet Department: Motor Pool	Fleet Department: Non-Motor Pool	Sheriff's Department	Flood Control District	Waste Haulers¹	Total
<i>Passenger/Light Duty</i>							
Light-duty trucks	200	593	104	300	103	–	1,300
Sedans	51	747	43	637	1	–	1,479
Vans	1	341	58	114	6	–	520
Motorcycles	–	–	–	85	–	–	85
<i>Medium/Heavy Duty</i>							
Medium Duty	37	7	20	20	–	–	84
Heavy Duty	172	–	19	35	40	53	319
<i>Other</i>							
Construction	11	–	3	14	52	–	80
Marine	5	–	–	17	1	–	23
Other	175	–	3	55	21	–	254
Total	652	1,688	250	1,277	224	53	4,144

Table B-7 presents the total GHG emissions from each vehicle type for 2007 and 2020 (unmitigated). Vehicle fleet GHG emissions are listed by general vehicle class. GHG emissions were estimated based on fuel consumption of vehicles within each class for all fleets. Fuel consumption by vehicle type was not available for either the Fire or Sheriff's department, so total GHG emissions for these fleets were apportioned based on the percent composition of each vehicle type in each fleet. For example, passenger/light-duty vehicles comprise approximately 39 percent of the County Fire vehicle fleet, so 39 percent of County Fire GHG emissions were assigned to passenger/light vehicles for that fleet.

Table B-7. Emissions for 2007 and Projected for 2020 Unmitigated by Vehicle Type

Vehicle Type	2007 Emissions (MTCO₂e)	2020 Unmitigated Emissions (MTCO₂e)¹	Percentage of Fleet Emissions
Passenger/light-duty ²	24,997	30,818	73
Medium-duty ³	689	828	2
Heavy-duty ⁴	1,883	2,229	5
Waste Haulers ⁴	4,964	5,706	13
Other ⁵	2,425	2,945	7
Total	34,957	42,526	100

¹ 2020 unmitigated emissions were projected using a two (2) percent growth for the Sheriff fleet and one (1) percent for all other fleets

² Gross weight 0–8,500 lbs (sedans, pick-up trucks, SUVs, and vans).

³ Gross weight 8,500–14,000 lbs (large pickups and SUVs [Ford F450, F550, Dodge Ram 2500, etc.]).

⁴ Gross weight 14,000+ lbs (fire trucks, dump trucks, semi-trucks, water trucks, flatbed trucks, etc). Waste haulers are heavy-duty vehicles.

⁵ Includes construction equipment, marine vehicles, stationary engines, and off-road equipment

Solid Waste/Landfills

The landfills owned and operated by the County contain waste that has been generated by the entire County population over a long historical period; the oldest landfill site opened in 1949. Landfill emissions differ from County energy use and fleet emissions since the waste in the landfills was primarily generated by County residents and not by County employees or direct County operations. Due to the County's waste management authority, the County is responsible for emissions related to landfill waste it did not create. As such, landfill emissions are the dominant GHG emission type in the County Internal Inventory for 2007, accounting for approximately 61 percent of the emissions. Because County-wide waste is managed under County operations, there is significant potential for reducing these emissions through landfill gas recovery and related electricity generation.

Landfill emissions from landfills owned and operated by the County account for approximately 61 and 66 percent of the Internal Inventory in 2007 and 2020 unmitigated. These emissions are a subset of the Landfill Emissions reported in the External Inventory, which includes all landfills in the unincorporated area. The County operates six (6) active landfills and maintains 15 closed landfill sites; the County's Solid Waste Management Department (SWMD) is responsible for the management of all 21 landfills. Emissions for each landfill in the Internal Inventory are slightly different than emissions presented in the External Inventory because the emissions presented below are for the FY 06/07, not calendar year 2007. Landfill data was provided by the County SWMD, the USEPA, and the California Integrated Waste Management Board (CIWMB).

Data Collection

Solid Waste Management Division

The primary source of GHG emissions from landfills is direct methane emissions from waste decomposition. Obtaining data on landfill size was the primary target for the data collection efforts. In addition, the following data was obtained whenever possible:

- Landfill details
 - Open and close dates
 - Capacity
 - Current and projected volume and composition of waste received
 - Tipping fees
 - Estimated accumulated waste-in-place
- Methane Recovery system details
 - Quantity recovered
 - Energy recovery system present
 - Revenue generated
- Information related to recycling and composting programs
- San Bernardino County Internal Waste Generation
 - Volume and composition
 - Treatment and storage options
 - Disposal fees
 - Current and proposed waste reduction programs

The County provided three key measurements for all County-operated solid waste management facilities: total tonnage, annual projected estimates, and methane recovery measures. Additional Waste data is available publicly through the CIWMB website, which provides waste-in-place tonnage for all active landfills, total available capacity, and waste composition details. The County also provided waste-in-place data for closed landfills under County control. Landfill age and closure dates, waste-in-place estimates, and methane recovery information was used to calculate methane emissions from landfills owned by the County.

County Facilities Internal Waste

The organic waste produced by County operations contributes to methane emissions at County owned and operated landfills. This source of emissions is much smaller, however, than the methane generated from the cumulative waste-in-place at those landfills, the majority of which results from waste deposited by the community. The County does not currently track internal waste production. The County contracts with various companies who have individual pick-up costs, a diverse range of bin sizes, and an unknown mix of waste compositions. It is also unknown how full bins are at scheduled pick-up times.

Because data was unavailable and the total expected emissions were determined to be inconsequential to internal County operations, the County's internal production of waste is not specifically included in the Internal Inventory, though the emissions from this waste are accounted for in the total emissions associated with County owned and operated landfills.

Emissions Calculations

The 2020 unmitigated GHG emissions were projected through a first-order kinetics method based on:

- current waste in landfills from prior years (i.e., waste-in-place), and
- projected new waste generated between 2007 and 2020.

Total County landfill methane emissions are 206,817 MTCO₂e in 2007 and 342,479 MTCO₂e in 2020, accounting for approximately 61 and 66 percent of the internal inventory in the respective years. **Table B-8** presents landfill emissions for 2007 and 2020 unmitigated.

Table B-8. Internal Solid Waste Emissions for 2007 and 2020 Unmitigated

Landfill Site	Landfill Status	2007 Emissions (MTCO ₂ e)	2020 Unmitigated Emissions (MTCO ₂ e)
County-Owned Landfills			
Victorville	Active	19,853	17,730
Barstow	Active	18,265	14,626
Colton	Active	26,393	21,619
Mid-Valley	Active	44,358	39,563
Landers	Active	13,494	11,294
San Timoteo	Active	22,145	18,480
Apple Valley	Closed	3,619	2,735
Baker	Closed	63	47
Big Bear	Closed	4,581	3,462
Hesperia	Closed	5,386	4,071
Lenwood-Hinkley	Closed	937	708
Milliken	Closed	31,999	24,184
Morongo Valley	Closed	817	617
Phelan	Closed	2,604	1,968
Trono-Argus	Closed	468	354
Twenty-Nine Palms	Closed	2,676	2,022
Yermo	Closed	236	178
Lucerne Valley	Closed	687	519
Needles	Closed	1,506	1,138
Newberry	Closed	557	421
Yucaipa	Closed	6,173	4,666
New Waste to landfill with methane recovery	NA	NA	119,131
New Waste to landfill without methane recovery	NA	NA	52,947
Total		206,817	342,480

Employee Commute

There are over 17,000 County employees. The average employee commute distance is approximately 17 miles per trip. **Figure B-2** below shows San Bernardino County one-way employee commute distances, including the number of employees commuting at each distance based on the 2008 employee survey report. As shown, a significant fraction of employees commute more than 20 miles one way. Specifically, the 50 percent VMT point is approximately a one-way reported distance of 25 miles (**Figure B-3**). The data in these figures highlight the potential to achieve GHG emission reductions through additional employee commute measures targeted specifically at employees with these large commute distances.

Data Collection

The County provided the employee commute annual plan, which is developed based on a requirement by South Coast Air Quality Management District (SCAQMD). This annual commuter report is compiled and submitted to the SCAQMD by the County's Human Resources Department. County Human Resources provided the annual report for 2007, training material, and individual employee commute distances for 2008.

SCAQMD requires that all County-operated facilities with greater than 250 employees implement an employee commute program; this program is then monitored through an annual survey and report. In 2007 San Bernardino County operated eight (8) sites with greater than 250 employees (regulated sites). Combined, the eight sites represent 9,267 employees. The 2007 annual survey was used to provide site-specific disaggregated transportation modes and number of trips. The annual report did not include trip distance; trip distance was estimated based on the raw data collected for the 2008 survey (2007 data was not available). The average distance traveled by mode was applied across all sites. An estimate of total employment in 2007 was provided by Human Resources, and average fuel consumption by type for regulated sites was used to develop a fuel consumption estimate for non-regulated County employees.

Emissions Calculations

Total number of trips by mode was determined across all modes of transportation based on the employee commute survey for all regulated sites. The general average distance traveled by mode was applied across all sites. The average fuel consumption by type for regulated sites was used to develop a fuel consumption estimate for non-regulated County employees.

The general formula is:

*Transportation emissions (by vehicle type) (tonnes CO_{2e}) = Average distance traveled to and from office by mode * number of working days in a year * t CO_{2e} / mile*

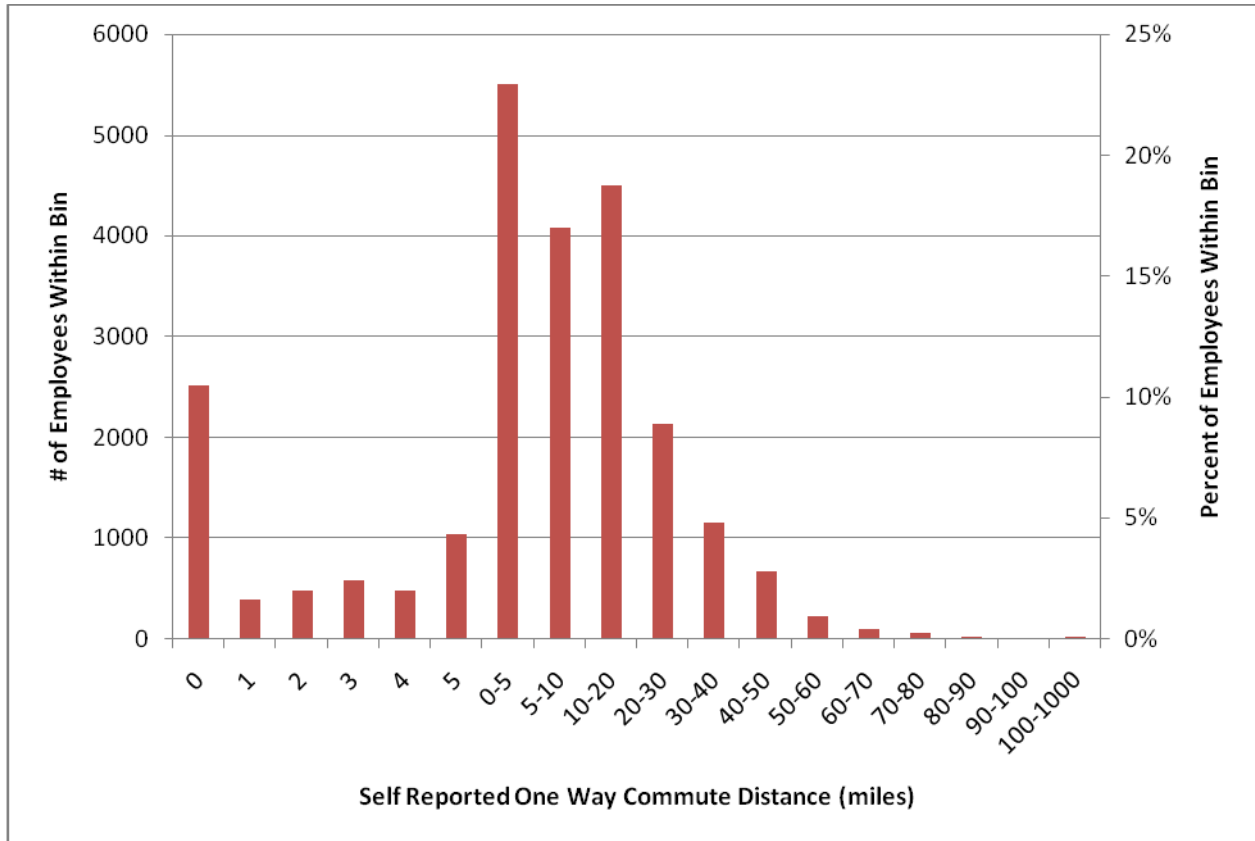
Fuel combustion for on-road vehicles due to employee commutes is the fourth largest component of the Internal Inventory accounting for 32,000 MTCO_{2e} and 43,000 MTCO_{2e} for year 2007 and 2020 unmitigated GHG emissions, respectively. These GHG emissions represent ten (10) percent and eight (8) percent of the County's GHG emission inventory for the year 2007 and 2020 unmitigated, respectively. These emissions are presented in **Table B-9**. Employee commute emissions are based on data in the County's annual 2008 employee survey report.

Table B-9. Internal GHG Emissions for Employee Commutes for 2007 and 2020 Unmitigated

Sector	2007 Emissions (MTCO ₂ e)	2020 Unmitigated Emissions (MTCO) ¹
Employee Commute	32,490	42,869

The total employee VMT was projected to increase at a level of two (2) percent annually based on expected growth described in the 2004 County Final Master Space Plan⁴.

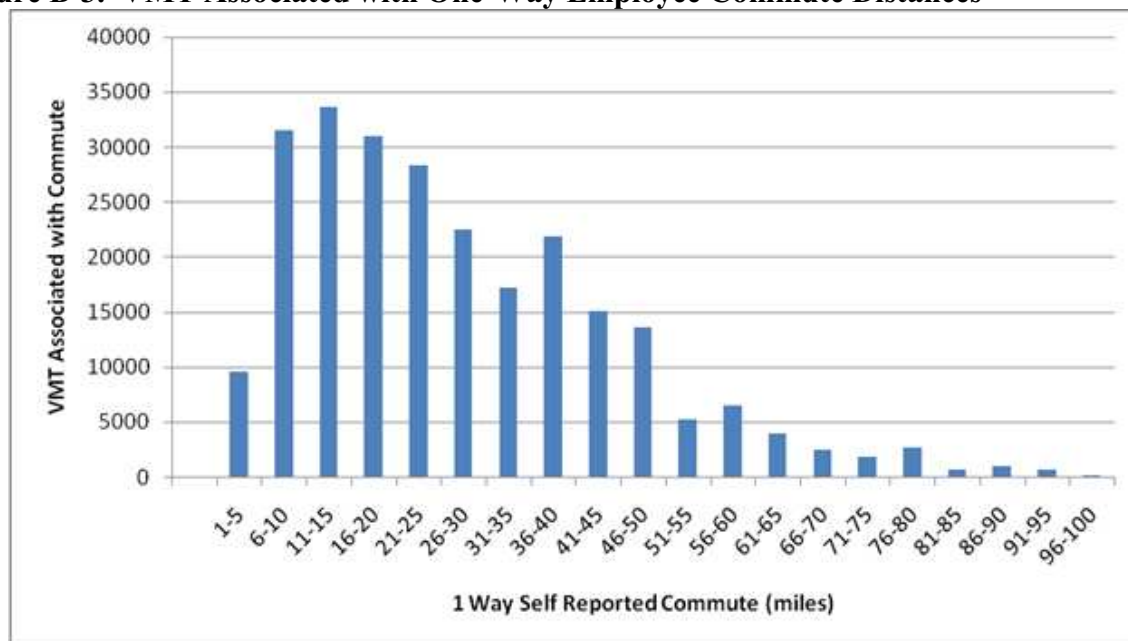
Figure B-2. San Bernardino County One-Way Employee Commute Distances (2008)



Based on 2008 Annual Employee Commute Survey

⁴ Recent growth forecasts provided by the County indicate that these projections may have changed (Stanley R. Hoffman Associates, 2009, Revised General Plan projections for the Unincorporated San Bernardino County) These projections were not updated, however, because specific information regarding the County operations and employee employment for future years was not provided.

Figure B-3. VMT Associated with One-Way Employee Commute Distances



Based on 2008 Annual Employee Commute Survey

Water Pumping and Water Treatment

Water pumping and water treatment are electricity-intensive operations and can contribute significantly to a municipal GHG inventory. County contracts out a large portion of the water pumping and treatment required by the County. Consequently, the associated emissions are not included in the internal component of the County inventory.

Data Collection

County-operated water treatment and sewage facilities are managed by County Special Districts Department, which provided total fuel consumption for all County Special Districts facilities. It was assumed that all electricity and fuel consumption for water pumping facilities were attributed to the actual water pumping process. Although there may be other small energy requirements within these facilities, it was determined that the energy requirements are completely dominated by water pumping. Consequently, all energy consumption at these facilities is assumed to be attributed to water pumping and treatment requirements.

Energy consumption for water pumping and treatment accounts for approximately one (1) percent of the Internal Inventory in 2007 and 2020. Water pumping and water treatment are electricity-intensive operations and can contribute significantly to a GHG inventory. San Bernardino County contracts out a large portion of the water pumping and treatment required by the County, and therefore the associated emissions are not included in the internal component of the County inventory. Electricity consumption for water pumping and water treatment was provided by the County.

GHG emissions from water pumping and water treatment are presented in **Table B-10**.

Table B-10. Internal GHG Emissions for Water Pumping/Treatment for 2007 and 2020 Unmitigated

Sector	2007 Emissions (MTCO ₂ e)	2020 Unmitigated Emissions (MTCO ₂ e)
Water Pumping and Treatment	2,192	4,114

Outdoor Lighting

Energy consumption for outdoor lighting (streets and traffic lights only) is the smallest component of the Internal Inventory accounting for approximately 0.1 percent of the 2007 and 2020 unmitigated inventories. The County is responsible for street and traffic lighting only within the County land-use authority (LUA) area; most outdoor lighting found within the greater County boundaries is managed outside of these LUA areas (within the incorporated cities). Therefore, though presented below, outdoor lighting energy consumption does not comprise a large proportion of the overall County internal inventory. Electricity consumption data for outdoor lighting was provided by the County.

GHG emissions from outdoor lighting are presented in **Table B-11**.

Table B-11. Internal GHG Emissions for Outdoor Lighting for 2007 and 2020 Unmitigated

Sector	2007 Emissions (MTCO ₂ e)	2020 Unmitigated Emissions (MTCO ₂ e)
Outdoor Lighting (flashers, park lighting, traffic and street lights)	276	317

Data Collection

Traffic Lights and Flashers

Total electricity expenses from traffic lighting were provided by the County Public Works Department. However, because traffic lights are invoiced individually, obtaining a full set of invoices was determined to be overly cumbersome, and an annual estimate was provided instead, based on one (1) month's energy consumption⁵. The County Public Works Department also provided traffic light equipment details and retrofit data.

Street Lighting

The majority of street lighting in the County is managed by the incorporated cities. Total Electricity consumption from street lighting under County control was provided by County Special Districts Department. The annual sum of energy consumption from street lighting was included with the building energy data provided by County Special Districts Department.

Park Lighting

Park lighting is the third source of outdoor lighting identified by the County. County-operated parks are managed within two departments, Special Districts and Regional Parks.

⁵ Annual energy consumption is not expected to vary significantly over time; most lights maintained by the cities are traffic lights which have consistent schedules.

Outdoor lighting energy consumption was included with the energy consumption for facilities located within the parks.

Data Gap Analysis

Data gaps are expected in initial GHG Inventories; an integral component of an initial inventory is the identification of these gaps in order to develop more robust inventories in the future. Although the internal inventory is comprehensive, subsequent versions of the inventory may address the data gaps presented below.

CAFM Database

Building area data was provided through the CAFM database. Energy consumed per square foot or “energy intensity” is a key metric used to understand energy consumption trends. Unfortunately, in CAFM individual facilities are sometimes monitored through multiple building codes, or multiple buildings are serviced by an individual meter. As the meters cannot consistently be mapped directly to one (1) building, it is difficult to analyze energy intensity. Having been released in July 2008, the CAFM database is still in the early stages of development. Some data fields (e.g. *parking spaces*, *employee headcount*, and *number of floors*) are not yet consistently populated, and additional features, such as the ability to access 3D architectural diagrams through the database, are still under development.

A more accurate analysis for building energy intensity can be made by incorporating CAFM into all County departments and by integrating energy consumption data within CAFM itself. Integrating electricity consumption into CAFM would ensure that each meter could be traced to a specific CAFM ID, thereby eliminating the current hurdle of synching multiple databases together using imperfect correlation techniques caused by the meter/building code discrepancies described above. By facilitating benchmarking of energy intensity, the County will be better able to track the progress of energy efficiency improvements to County buildings.

Recommendation

Energy consumption data should be integrated into the CAFM database in order to more accurately track the energy intensity of County facilities. This will require greater coordination on the development of the CAFM database between County departments and facility managers. The database should be accessible to all facility managers who track energy consumption with the appropriate quality assurance and quality control measures to ensure data accuracy.

Emissions from Hydrofluorocarbons

Hydrofluorocarbons (HFCs) are typically used as refrigerants in air-conditioning and refrigeration systems. HFCs tend to have very high global warming potentials; therefore, small amounts of HFCs leaked to the atmosphere result in significant contributions in terms of MTCO₂e. No data was provided by County for HFC releases as there was no process in place to capture such data in 2007.

Recommendation

A pilot study could be undertaken to look closely at refrigerant replacement in the oldest and largest chiller/heating, ventilation, and air conditioning (HVAC) equipment. This

detailed study would evaluate the refrigerants used against all the reportable types and determine if emissions from refrigerant leakage were *de minimus*.

Emissions from Facility Waste

Facility waste (Municipal Solid Waste or MSW) is taken to landfills, where anaerobic decomposition processes emit methane. There was no waste data available that could allow for extrapolation to all County facilities.

Recommendation

Emissions from facility waste should be included as part of the overall facility-based GHG inventory. Data required are the amounts of waste generated per year from each facility, including a characterization of the waste stream profile (percentage paper, organics, plastics, metals, and so on). Waste audits could be performed on a sample of facilities, and data could then be extrapolated to determine an estimate for waste at all facilities. In addition to waste generation data, the County should also track and report volume of material recycled.

Process and Fugitive Emissions from Wastewater Treatment

Information on process and fugitive emissions related to water treatment facilities was unavailable and could therefore not be included within the inventory. As the County contracts out most water treatment it was assumed that these emissions would be *de minimus* in comparison to the overall inventory.

Recommendation

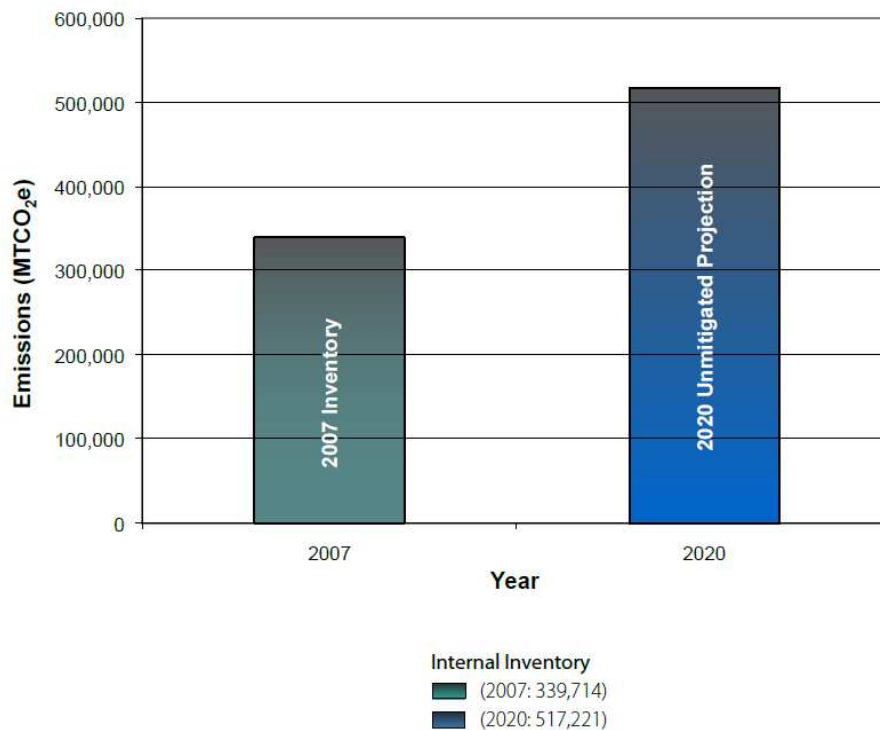
It is possible to estimate these emissions based on population served and general technology in place. Estimates can be determined based on the methodology provided in the Local Government Operations Protocol (LGOP).

According to the LGOP, emissions assumed to be less than five (5) percent of overall emissions can be considered *de minimus* and therefore calculations are not required in order to meet compliance with the protocol. As noted, emission data gaps fall within this expected range of less than five (5) percent of total emissions; therefore, the 2007 inventory meets the requirements of the LGOP. However, as the intended purpose of the inventory is to develop a baseline from which a target and reduction plan can be assessed; future inventories could include all potential sources of emissions in order to capture as many mitigation opportunities as are available.

Internal Inventory Results Summary

Internal Inventory Results Direct GHG emissions for County operations for 2007 and 2020 are presented in **Figure B-4**. As discussed previously, 2007 GHG emissions were calculated based on the most recently available datasets and 2020 GHG emissions are based on unmitigated projections of County operations. These future emissions were not adjusted to reflect recent legislation that will result in statewide GHG emissions reductions. The distribution of these emissions by major sector for 2007 is presented in **Figure B-5**.

Figure B-4. Internal Inventory of GHG Emissions from County Operations (2007–2020)



Current (2007) Internal GHG Emissions

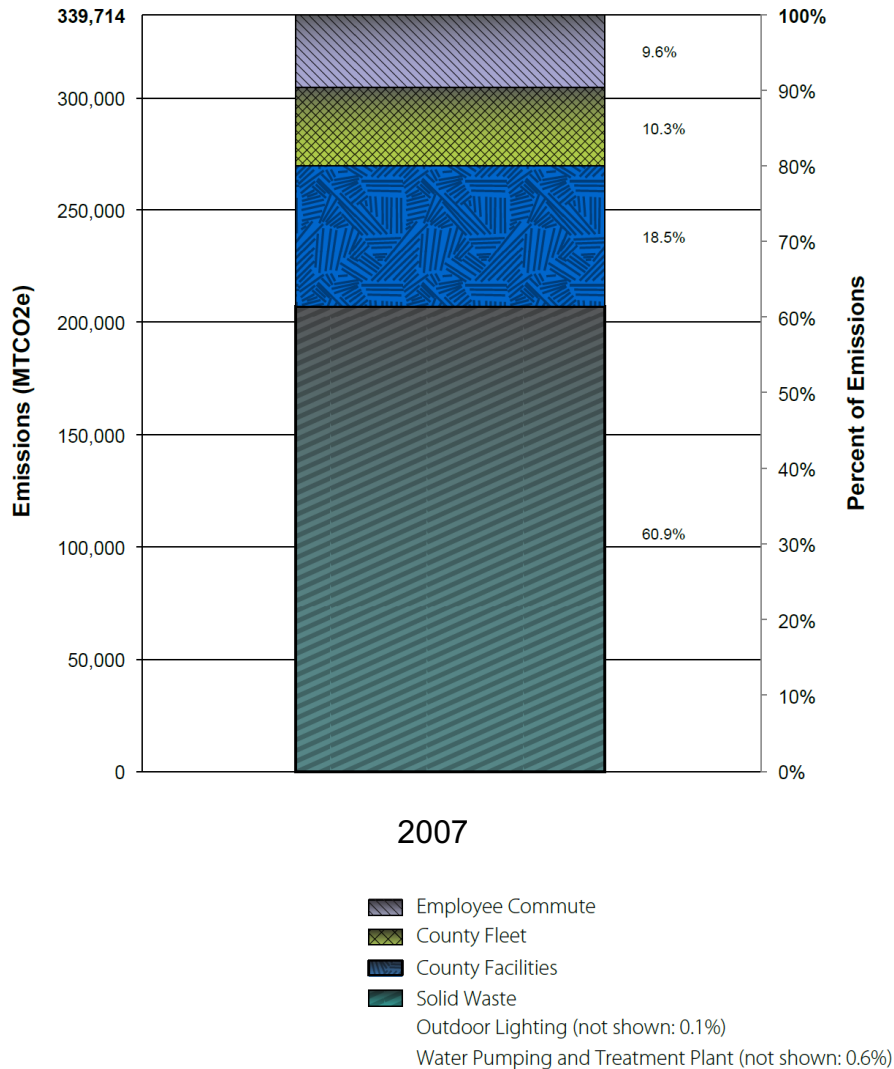
The County’s Current Internal Inventory is presented in **Table B-13** and **Figure B-5**. The largest source of GHG emissions is methane from waste management (approximately 61 percent). The next largest sector is electricity and natural gas consumption by County-owned and leased facilities (approximately 19 percent). In order of decreasing magnitude, the remaining sectors are County vehicle fleet emissions (approximately ten percent), employee commute emissions (approximately ten percent), water pumping and treatment facilities (approximately one percent) under County jurisdiction, and streetlights (approximately one-tenth of a percent).

The waste emissions from County-owned landfills are under the direct control of the County and, therefore, included in the Internal Inventory. Unlike most of the energy-related emissions (which are associated with the activities of the County government’s operations), the landfill emissions are a result of waste that has been generated by the entire San Bernardino population (incorporated and unincorporated areas) since the landfills were first opened. As a result, the waste emissions are significant and dominate other sectors in the internal inventory. **Figure B-5** graphically demonstrates this fact.

Table B-13. County Internal Emissions Summary for 2007 (MTCO₂e)

Sector	2007	
	Emissions	Percent
Solid Waste/landfills	206,817	60.88
County Facilities	62,981	18.54
County Vehicle Fleet	34,958	10.29
Employee Commute	32,490	9.56
Water Pumping and Treatment	2,192	0.65
Outdoor Lighting (street and traffic lights only)	276	0.08
Total	339,714	100

Figure B-5. County 2007 Internal Emissions by Sector (MTCO₂e)



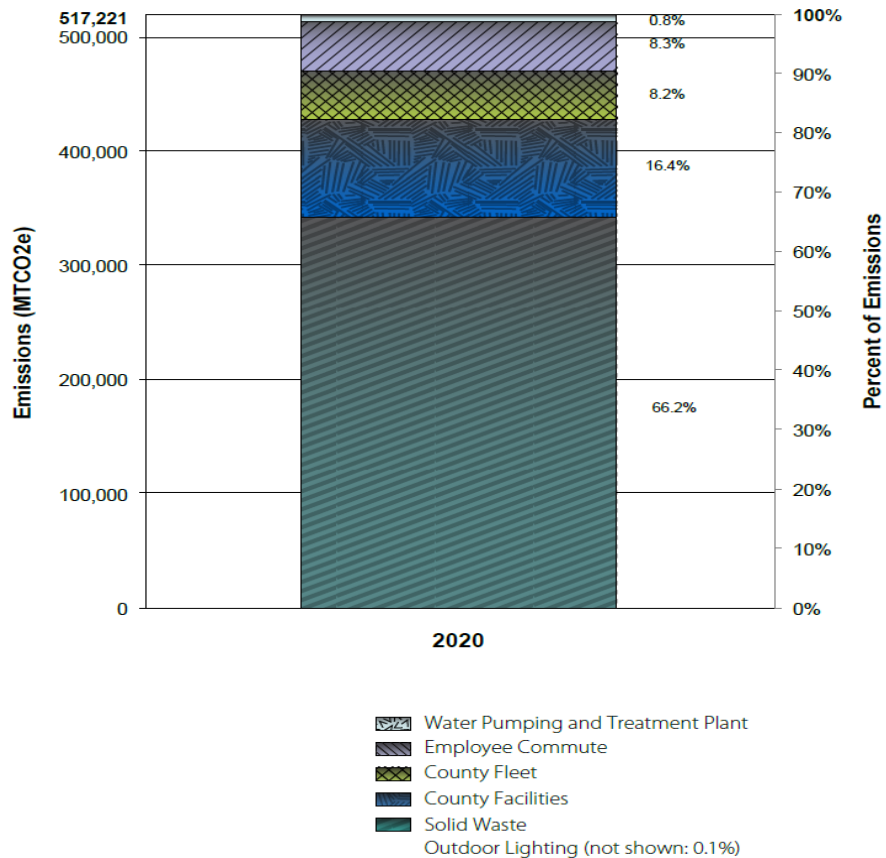
Projected (2020) Internal GHG Emissions

Unmitigated emission projections for 2020 are listed in **Table B-14** and presented in **Figure B-6** below. Unmitigated projections for 2020 are based on current energy consumption and unit emission rates adjusted by sector-specific growth rates provided by the County’s General Plan, County departments’ reports, and employee surveys, as well as information provided by County staff.

Table B-14. County 2020 Unmitigated Internal Emissions Summary (MTCO₂e)

Sector	2020	
	Emissions	Percent
Solid Waste/landfills	342,480	66.22
County Facilities	84,915	16.42
County Vehicle Fleet	42,526	8.22
Employee Commute	42,869	8.29
Water Pumping and Treatment	4,114	0.80
Outdoor Lighting (street and traffic lights only)	317	0.06
Total	517,221	100

Figure B-6. County 2020 Internal Emissions by Sector



Internal Reduction Plan

Emissions Reduction Methodology

Introduction

Appendix B provides information on calculations of GHG emission reductions related to Reduction Classifications 1, 2, and 3 (R1, R2 and R3), defined below, for the County operations. Emission reductions are defined in relation to the 2020 unmitigated emissions for the County's internal operations.

Emission reductions for the R1 measures were based on CARB methodology, as presented in the AB 32 Scoping Plan. In certain cases, CARB's calculations were modified to better estimate reductions for the County's operations, as described below. R2 measures were calculated using County-specific assumptions, where available, and custom methodologies for each sector of emission reductions presented below. The reduction methodologies for each emissions sector are based on a combination of widely accepted protocols established by USEPA, CCAR, CARB, and other relevant protocols, as appropriate, or on scientific studies. The following section presents the major assumptions and calculation methodologies used to estimate emission reductions for the Internal Reduction Plan.

Definition of Reduction Measure Classifications

Reduction Classification 1 (R1) includes all adopted, implemented, and proposed state and regional measures that will result in quantifiable GHG reductions for the County's internal operations. These measures may require County action to achieve the GHG reductions, but that action is limited and compulsory.

Reduction Classification 2 (R2) includes all quantifiable measures currently implemented or that will be implemented by the County, as well as any additional quantifiable measures that require County action and could further reduce the GHG emissions for the County's operations. R2 also includes any federal, state, and regional measures that require substantial action by the County to achieve the expected GHG reductions.

Reduction Classification 3 (R3) includes all other measures currently implemented or that will be implemented by the County, which were not quantified, but are included in the County's GHG Plan. These measures are either facilitative in nature or there are methodological issues that prevent their quantification.

Overall Internal Reductions

The 2007 GHG emissions level, the 2020 goal, and unmitigated emission projections for 2020 are presented in **Figure B-7**.

Figure B-7. Internal 2007, 2020 Unmitigated, and 2020 Emissions with Reduction Goal

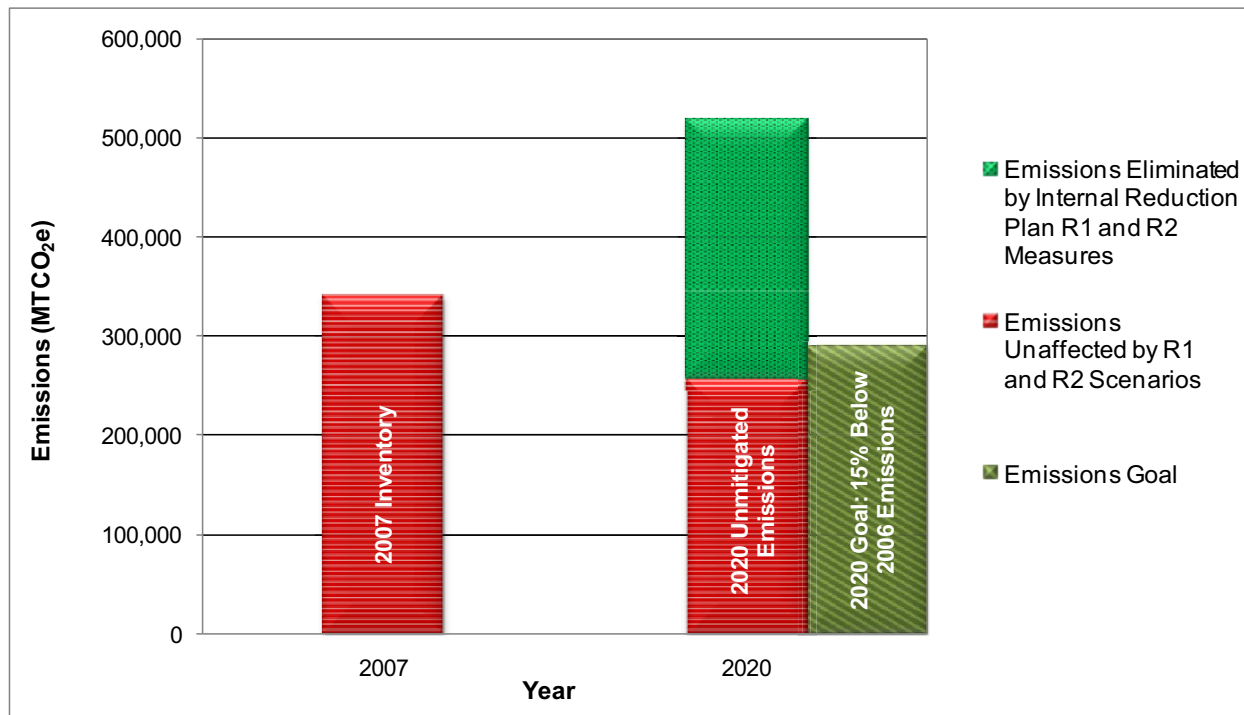


Figure B-7 also shows 2020 emissions after taking into account the reduction measures described in the sections below. Together, the sum of these reduction measures achieves more emissions reductions than necessary to meet the 2020 emissions target. The majority of these reduction measures are R2 measures, requiring County action to achieve the associated emissions reductions.

Evaluation of Concurrent Mitigation Measures

Several of the measures listed below were evaluated in combination with other measures. This is the case for measures that strengthen existing measures or for measures that rely on the implementation of specific measures before additional reductions can be achieved. In some cases, when considered independently, these measures might have resulted in greater emission reductions than when considered in combination. Where applicable, measures considered in combination are noted below.

Building/Energy Measures

This section describes the methodology used to calculate GHG emission reductions for the *existing and proposed* state, regional, and County building/energy measures that will result in future GHG reductions for the County's building usage.

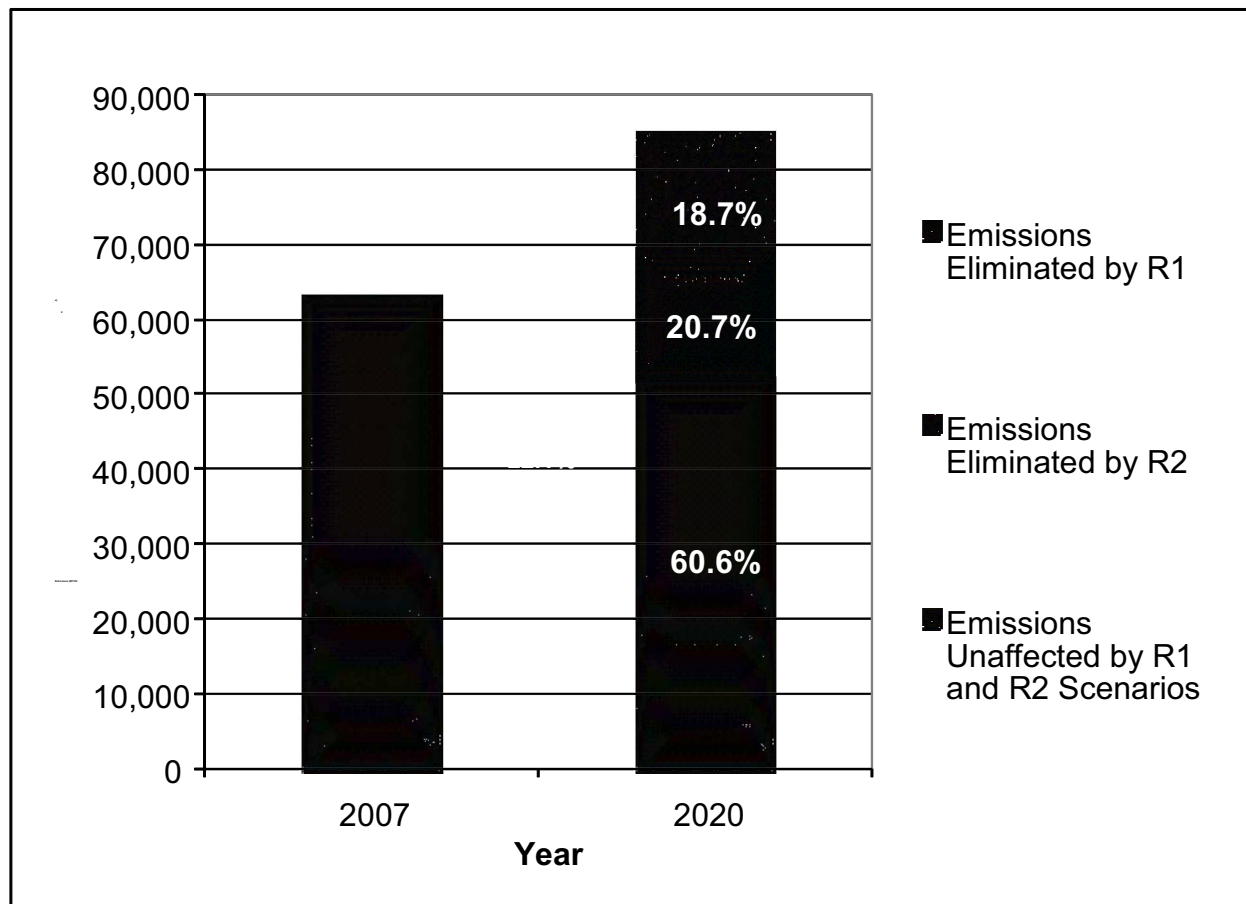
These measures and their associated emission reductions are shown below in **Table B-15**. Emission reductions in 2020 associated with each measure were calculated from the projected 2020 unmitigated emissions for the County internal buildings sector, assuming a continuation of the 2006 building energy usage composition (i.e., 73 percent from electricity and 27 percent from natural gas).

Table B-15. Internal (INT) GHG Emission Reductions from Building/Energy Measures

Reduction Classification and Reduction Measures	GHG Reductions (MTCO _{2e})	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state building energy measures that do not require County action		
R1E1-INT: Renewable Portfolio Standard (33 percent) ¹	8,258	9.7
R1E2-INT: AB 1109 Energy Efficiency Standards for Lighting	5,338	6.3
R1E3-INT: Title 24 standards for Non-Residential Buildings	2,296	2.7
R2: Existing and new building energy measures that require County action		
R2E1-INT: LEED Silver for New County Buildings	2,076	2.4
R2E2-INT: Retrofit Existing Buildings	1,566	1.8
R2E3-INT: Increase Use of Combined Heat and Power Systems	4,666	5.5
R2E4-INT: Office Equipment Procurement Standard	2,307	2.7
R2E5-INT: Leasing Procurement Standards	3,084	3.6
R2E6-INT: Install solar and other renewable energy sources on County Buildings	3,604	4.2
R2E7-INT: HVAC Retrofit Program	66	0.1
R2E8-INT: Solar PV Installation Projects	174	0.2
Total	33,435	39.4
R3: Existing and new building energy measures – reductions not quantified or relied upon to achieve reduction goal		
R3E1-INT: Utilize Incentives Offered by Southern California Edison Partnership		
R3E2-INT: Benchmark Existing Buildings		
R3E3-INT: Link Utility Payment/Energy Usage Data into the Computer Aided Facilities Management Database		
R3E4-INT: Train County Employees on Energy Efficiency and Conservation		
R3E5-INT: Apply Energy Saving Design Features		
R3E6-INT: Contracting Practices		
R3E7-INT: Small Tools and Equipment Use		

¹ This analysis incorporates the California Air Resources Board's adopted Renewable Portfolio Standard (RPS) goal of 33 percent, set forth in Executive Order S-14-08. This order states that 33 percent of energy used in California will be derived from renewable sources by the year 2020. The 33 percent RPS goal by year 2020 is considered by many to be a very aggressive goal that may not be met since it is possible that many energy providers will not meet the more modest RPS goal of 20 percent by 2010. If the more modest 20 percent RPS goal is used for this analysis, anticipated GHG emission reductions associated with this measure are 3,087 MTCO_{2e} in 2020.

Figure B-8. Internal GHG Emission Reductions from Building/Energy Measures



With the implementation of the emission reduction measures included in this Plan, the County will reduce building/energy emissions by 39 percent from 2020 unmitigated projections (19 percent and 21 percent eliminated by R1 and R2 measures respectively) such that reduced emissions in 2020 would be approximately 18 percent lower than 2007 emissions.

RI Building/Energy Measures

This section describes the existing or proposed state emission reduction measures for building energy efficiencies that will result in GHG reductions for County building usage, but do not require County action. The description of each measure is followed by the percent reduction in GHG from 2020 unmitigated for each measure.

RIE1A-INT and RIE1B-INT: Renewable Portfolio Standard for Building Energy Use

Senate Bills (SBs) 1075 (2002) and 107 (2006) created the state’s Renewable Portfolio Standard (RPS), with an initial goal of 20 percent renewable energy production by 2010. Executive Order (EO) S-14-08 establishes a RPS target of 33 percent by the year 2020 and requires state agencies to take all appropriate actions to ensure the target is met. EO S-21-09 directs the California Air Resources Board (CARB) to adopt regulations to increase the RPS to 33 percent by 2020. The 33 percent RPS by 2020 goal is supported by CARB, though its feasibility is not certain due to current limitations in production and transmission of renewable

energy. Therefore, both RPS goals in 2020 were examined: 20 percent (Reduction Measure R1E1A-INT) and 33 percent (Reduction Measure R1E1B-INT).

Southern California Edison (SCE) is the primary electric utility in the County accounting for 97 percent of electricity provided to the County's LUA area.⁶ Since SCE provides the vast majority of power for the region, it was assumed that SCE generation characteristics were adequate to characterize the energy in the totality of the County's LUA area. This approach obviated the need to analyze the generation characteristics of the lesser energy area providers. SCE's 2007 level of renewable generation (as a percentage of its total portfolio) was 15.8 percent.

Emissions reductions associated with RPS (both the 20 percent and 33 percent RPS goals) were determined by calculating the increase in renewable energy production from SCE's 2007 production level for both R1E1A-INT and R1E1B-INT reduction measures. These increases in renewable energy production result in a GHG emission reduction of five (5) percent (Reduction Measure R1E1A-INT) and 20 percent (Reduction Measure R1E1B-INT). All renewable energy sources were assumed to be carbon neutral.⁷

In accordance with CARB protocol in the Assembly Bill (AB) 32 Scoping Plan, reductions from R1 and R2 energy efficiency and renewable energy measures presented below (as applied electricity emissions only) were subtracted from the 2020 unmitigated emissions before applying the RPS (R1E1A-INT, R1E1B-INT) reduction.⁸ This method avoids double counting of emissions reductions.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Increasing the SCE's renewable portfolio from 15.8 to 33 percent will cause a decrease in GHG emissions of 20 percent.
- Measures R1E2-INT, R1E3-INT, and R2E1-INT–R2E8-INT have been implemented.

This measure would result in a 10 percent reduction in total 2020 unmitigated emissions for County facility emissions.

R1E2-INT: AB 1109 Energy Efficiency Standards for Lighting (Residential and Commercial Indoor and Outdoor Lighting)

AB 1109 mandates that the California Energy Commission (CEC), on or before December 31, 2008, adopt energy efficiency standards for general purpose lighting. These regulations, combined with other state efforts, shall be structured to reduce statewide electricity consumption in the following ways:

- At least 50 percent reduction from 2007 levels for indoor residential lighting by 2018.
- At least 25 percent reduction from 2007 levels for indoor commercial and outdoor lighting by 2018.

The following assumptions were used to calculate emission reductions attributed to this measure:

⁶ As detailed in the External Inventory.

⁷ California Air Resources Board Proposed Scoping Plan, pp. 44-46.

⁸ CARB 2008a, pp. I-29–30.

-
- The percent electricity use from lighting in County-owned buildings is consistent with average usage in the California End Use Survey (CEUS). According to this survey, lighting accounts for 34.5 percent of a typical commercial building's electricity use—28.7 percent due to interior lighting and 5.8 percent due to exterior lighting.⁹
 - All 2020 unmitigated emissions from electricity use (73 percent of total 2020 unmitigated County facility emissions) are affected by this measure.
 - Energy savings of 25 percent associated with AB 1109 will yield an equivalent GHG emission reduction of 25 percent.

This measure would result in a 6 percent reduction in total 2020 unmitigated County facility emissions.

R1E3-INT: Title 24 Standards—Non-Residential Buildings

Title 24 Building Energy Efficiency standards increase in stringency on a triennial basis. The 2008 Title 24 standards have been released and are, according to an estimate from the CEC, approximately seven (7) percent more stringent for non-residential buildings. The Big Bold Strategies of the California Energy Efficiency Strategic Plan suggest a target of reaching zero net energy (ZNE) for all new commercial buildings by 2030; although the California Public Utilities Commission (CPUC) does not detail how this will be possible, the continued increase in stringency of Title 24 standards is said to be of paramount importance towards reaching this goal.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The reduction in emissions from 2020 unmitigated emissions levels was calculated assuming that all new emissions come from newly built County-owned buildings.
- It was assumed that standards would increase seven (7) percent triennially.
- New buildings were broken down and labeled into five (5) groups according to the date of the code under which they are/will be permitted: 2005, 2008, 2011, 2014, and 2017.
- The ratio of owned buildings increased from 2007 to 2020, and this change was also accounted for in the five (5) groups described above.

This measure would result in a 3 percent reduction in total 2020 unmitigated County facility emissions.

R2 Building/Energy Measures

This section describes the existing or proposed County Building Energy measures that will result in quantifiable GHG emission reductions and the methodology used to calculate the reductions. A description of each measure is followed by the resulting GHG reductions.

Each measure takes into account appropriate emission reductions achieved with R1 building/energy measures and any appropriate preceding R2 building/energy measures, thereby eliminating any potential “double-counting” of emission reductions. For example the reductions due to Title 24 Energy Efficiency Standards were subtracted from 2020 unmitigated emissions before analyzing the effects of the proposed Leadership in Energy and

⁹ California End Use Survey: <<http://capabilities.itron.com/CeusWeb/chart.aspx>>.

Environmental Design (LEED) Silver for new buildings requirement, increased use of CHP systems, and the installation of renewable energy/solar on County buildings measures.

R2E1-INT: Leadership in Energy and Environmental Design (LEED) Silver for New County Buildings

The County currently implements a policy that requires construction of new buildings over 5,000 square feet and major renovations of existing buildings to be certified as LEED Silver *whenever fiscally sensible*. The minimum level of energy performance to acquire the LEED Silver rating is 14 percent above code for newly constructed buildings (seven [7] percent for retrofits).

The following assumptions were used to calculate emission reductions attributed to this measure:

- This measure would only affect buildings owned by the County, which represent 75.5 percent of total 2020 unmitigated county facility emissions.
- Buildings would be built to the minimum energy performance for LEED Silver of 14 percent above code.
- It was assumed that energy performance gains from LEED Silver *retrofits* would be captured within other measures (i.e. retro-commissioning and AB1109). Retrofits were; therefore, not included in these calculations in order to avoid possible double counting issues.
- Energy savings of 14 percent associated with LEED silver requirements will yield an equivalent GHG emission reduction of 14 percent.
- Measure R1E3-INT has been implemented.

This measure would result in a 2 percent reduction in total 2020 unmitigated County facility emissions.

R2E2-INT: Retrofit Existing Buildings

This measure requires retrofit of a portion of the County's buildings that existed in 2007. Analysis shows a median retrofit cost of \$0.27 per square foot, energy savings of 15 percent, and a simple payback period of 0.7 years.¹⁰

The following assumptions were used to calculate emission reductions attributed to this measure:

- Only buildings existing in 2007 and owned by the County will be retrofitted
- Due to the fact that not all buildings are large enough or suitable for retrofit, 25 percent of the County-owned buildings would be retrofitted by 2020. This is considered to be a conservative estimate, taking into account the fraction of owned buildings for which this measure is feasible and potential overlap with emission reductions associated with the LEED measure (R2E1-INT) above.
- Energy savings of 15 percent associated with the retrofit process will yield an equivalent GHG emission reduction of 15 percent at each building site.

¹⁰ The Cost-Effectiveness of Commercial-Building Commissioning, LBNL: <<http://eetd.lbl.gov/emills/PUBS/Cx-Costs-Benefits.html>>.

-
- Measures R1E2-INT and R2E3-INT have been implemented.

This measure would result in a 2 percent reduction in total 2020 unmitigated County facility emissions.

R2E3-INT: Increase Use of Combined Heat and Power Systems

This measure requires the installation of combined heat and power systems on a limited number of County-owned buildings. Combined heat and power (CHP) systems utilize waste heat created during distributed power generation to provide heat locally. This technology lowers energy needed for heating and hence also lowers the GHG emissions associated with this heating.

R2E3-INT captures the reduction in building electricity emissions associated with the increase of combined heat and power activities, as outlined in CARB's AB 32 Scoping Plan. The Scoping Plan suggests that increased combined heat and power systems, which capture "waste heat" produced during power generation for local use, will offset 30,000 gigawatt hours (GWh) statewide in 2020. Approaches to lowering market barriers include utility-provided incentive payments, a possible CHP portfolio standard, transmission and distribution support systems, or the use of feed-in tariffs. By 2020, this requirement will reduce emissions in California by approximately 6.7 MMTCO₂e, representing 7.6 percent of emissions from all electricity in the state.¹¹

- Future CHP feasibility is highly dependent upon natural gas prices since they are directly proportional to payback periods. A feasibility study commissioned by the CEC suggests that CHP will have a significant place in the utilities' loading order.¹² The exact feasibility for the County is difficult to predict at this point due to uncertainties in future natural gas prices as well as an uncertain future regulatory framework. Nevertheless, a substantial, yet conservative, estimate of reduction is calculated based on the following assumptions:
 - CHP systems reduce GHG emissions by 30 percent, as shown by a typical run of the USEPA's CHP Emissions Calculator¹³.
 - CHP would be installed at the Arrowhead Regional Medical Center.
 - Measures R1E3-INT, R2E1-INT and R2E2-INT have been implemented.

This measure would result in a 5 percent reduction in total 2020 unmitigated County facility emissions.

R2E4-INT: Office Equipment Procurement Standard

This measure requires that all office equipment purchased for County facilities will be ENERGY STAR rated.

The following assumptions were used to calculate emission reductions attributed to this measure:

- All 2007 office equipment would be replaced by 2020.
- The procurement standard only affects emissions from electricity use in owned and leased

¹¹ California Air Resources Board 2008a, 2009a.

¹² California Energy Commission, Assessment of California Combined Heat and Power Market, p. xii.

¹³ <http://www.epa.gov/chp/documents/chp_emissions_calc.xls>.

buildings.

- Office equipment accounts for 7.1 percent of the average commercial building's electricity use.¹⁴
- ENERGY STAR office equipment would reduce, on average, 50 percent of energy consumption from currently used office equipment.¹⁵
- Energy savings of 53 percent associated with ENERGY STAR office equipment will yield an equivalent GHG emission reduction of 53 percent.

This measure would result in a 3 percent reduction in total 2020 unmitigated County facility emissions.

R2E5-INT: Leasing Procurement Standard

This measure requires that buildings leased by the County have at least 20 percent lower energy intensity than leased buildings in 2007. The proposed leasing procurement standard requires benchmarking for any buildings being considered for lease by the County. Benchmarking is the process of creating a measure of a building's energy intensity, expressed in kilowatt hours (kWh) per square foot and cubic feet natural gas per square foot. The leasing procurement standard will require that all buildings leased by the County have an energy intensity that is at least 20 percent lower than the 2007 energy intensity of 14.6 kWh/square foot and 14.2 cubic feet natural gas per square foot.

The following assumptions were used to calculate emission reductions attributed to this measure:

- This measure would only affect 2020 unmitigated emissions from leased buildings.
- A 20 percent reduction in energy intensity for leased building energy use will yield an equivalent GHG emission reduction of 20 percent.

This measure would result in a 4 percent reduction in total 2020 unmitigated County facility emissions.

R2E6-INT: Install Solar and Other Renewable Energy Sources on County Buildings

This measure requires installation of renewable energy sources on a portion of County-owned buildings. The installation of renewable energy sources will lower the amount of fossil fuel energy used by the County and emitted as indirect emissions by the County's main utility, Southern California Edison. Currently the most convenient source for localized renewable energy generation is solar photovoltaic panels, which will likely constitute most of the County's renewable installations. Other sources such as geothermal or small-scale wind power may be utilized as well contingent upon local conditions and the availability of future technologies.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Renewables would offset ten (10) percent of the County's 2020 unmitigated emissions from owned buildings. This conservative estimate reflects the difficulty in financing

¹⁴ California End Use Survey: <<http://capabilities.itron.com/CeusWeb/chart.aspx>>.

¹⁵ ENERGY STAR office equipment uses 30–75 percent less energy than conventional equipment (Energy Star 2009).

small-scale renewable projects as well as the fact that not all County buildings are suitable for renewable energy development.

- This reduction would only affect emissions from electricity use.
- Renewable sources are carbon neutral.
- Measures R1E2-INT, R1E3-INT, R2E1-INT–R2E5-INT, R2E7-INT, and R2E8-INT, have been implemented.

This measure would result in a 4 percent reduction in total 2020 unmitigated County facility emissions.

R2E7-INT: HVAC Retrofit Program

The County-wide HVAC retrofit program involves the installation of variable frequency drives (VFD), economizers, and controls to various mechanical systems. The buildings included in the program are: County Government Center, Old Hall of Records, Library Administration and Regional Youth Education Facility (RYEF). Funding for this Program will be obtained through an Energy Efficiency Conservation Block Grant from the federal government.

The following assumptions were used to calculate emission reductions attributed to this measure:

- This measure will result in an average annual energy savings of 276,678 kWh.

This measure would result in a 0.1 percent reduction in total 2020 unmitigated County facility emissions.

R2E8-INT: Solar Photovoltaic Installation Projects

The County's Program for installing solar photovoltaic panels on County-owned buildings has identified two (2) specific buildings suitable for renewable energy generation. These systems have been sized and funding has been applied for through the Energy Efficiency Conservation Block Grant Program. The following sites have been chosen: the High Desert Government Complex (286 kW) and the Joshua Tree New County Building (115 kW).

The following assumptions were used to calculate emission reductions attributed to this measure:

- These two (2) projects are assumed to result in an average annual energy savings of 707,176 kWh.

This measure would result in a 0.2 percent reduction in total 2020 unmitigated County facility emissions.

R3 Building/Energy Measures

This section describes the reduction measures for building/energy R3 that were not quantified or relied upon to achieve the County's reduction target. The description of each measure is followed by a discussion of the basis for non-quantification.

R3E1-INT: Utilize Incentives Offered by Southern California Edison Partnership

This measure involves taking advantage of SCE partnership rebates (available until December 2011):

- Heating, Ventilating, and Air Conditioning (HVAC) and RCx = \$0.24/kWh

-
- Motors/VFDs/Compressors/Others = \$0.18/kWh
 - Lighting = \$0.15/kWh

This measure was not quantified because savings obtained through taking advantage of these incentives are included in the retro-commissioning and AB1109 measures already quantified.

R3E2-INT: Benchmark Existing Buildings

This measure involves the County's use of ENERGY STAR Portfolio Manager to benchmark County-owned buildings. Portfolio Manager helps track and assess energy and water consumption within individual buildings as well as across your entire building portfolio. Portfolio Manager will be used to rate the County's buildings' energy performance compared to similar buildings, set investment priorities, and verify and track progress of improvement projects.

Benchmarking would not directly result in emissions reductions and therefore was not quantified. Emissions reductions from existing building energy efficiency are already captured in the retro-commissioning and AB 1109 measures quantified above.

R3E3-INT: Link Utility Payment/Energy Usage Data into the Computer Aided Facilities Management Database

This measure involves linking the utility payment database [Blind Identification Database System or ("BIDS")] and other data sources for energy usage data with the newly developed Computer Aided Facilities Management (CAFM) database to greatly enhance the County's energy usage data tracking and facilitate energy analysis on all County buildings.

Linking these data sources will not result in actual GHG emissions reductions, and therefore this measure was not quantified.

R3E4-INT: Educate County Employees on Energy Efficiency and Conservation

This measure involves institutionalizing energy efficiency and conservation practices within the County with the training of County employees. This includes training for facility managers and architecture and engineering personnel on energy efficient building science as well as training on energy conservation to all County employees.

This measure does not directly result in quantifiable emissions reductions and therefore was not analyzed in the section above.

R3E5-INT: Apply Energy Saving Design Features

This measure involves the County's use of energy saving design features such as the following:

- East–west long axis oriented buildings
- Operable external shading devices on south facing facades
- Double skin facades
- Shade trees
- Inclusion of Atria in design—internal green wall
- Tightly sealed buildings to prevent air leakage with energy recovery ventilation
- Enhanced roof insulation

-
- Centralized heating and cooling
 - Chilled ceiling and chilled beam cooling
 - Floor radiant cooling
 - Sensible heat exchangers
 - Vacuum insulated panels in doors

Energy savings from such design features are already included in the LEED Silver for New Construction measure, which captures the energy savings from these design features. Additional energy savings are captured in the ramping up of Title 24 standards.

R3E6-INT Contracting Practices that Encourage GHG Emission Reduction

The County will establish bidding standards and contracting practices that encourage GHG emissions reduction, including preferences or points for the use of low or zero emissions equipment, recycled materials, and provider implementation of other green management practices.

R3E7-INT Small Tools and Equipment Associated with Building Use

The County will install outdoor electrical outlets on buildings to support the use of electric lawn and garden equipment, and other tools that would otherwise be run with small gas engines or portable generators.

Fleet/Fuels Measures

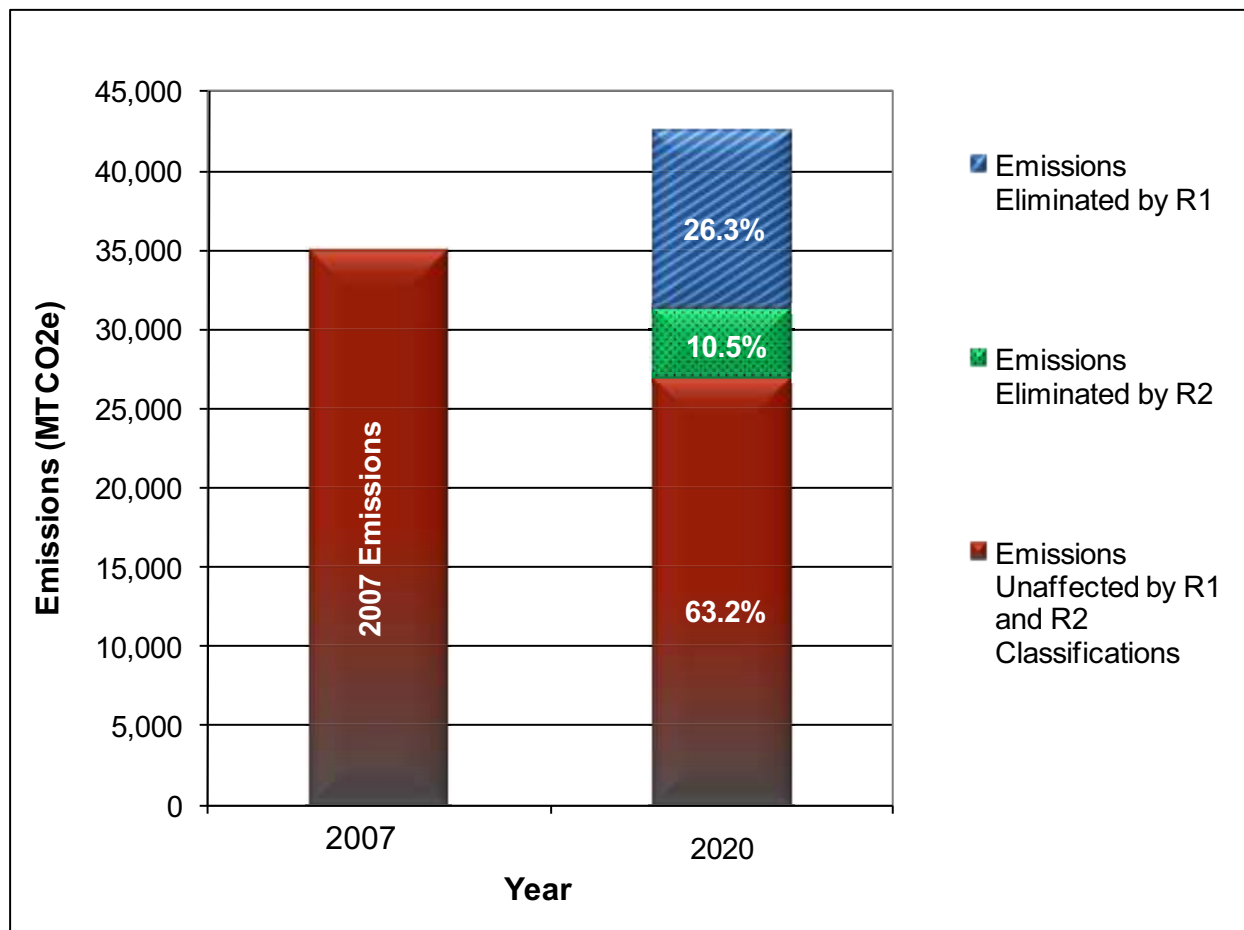
This section describes the methodology used to calculate GHG emission reductions for the *existing and proposed* state, regional or County transportation measures that will result in future GHG reductions. The total estimated GHG reductions from the reduction measures included in Reduction Classifications R1 and R2 are presented below in **Table B-16**. Emission reductions for each measure are applied to the projected 2020 unmitigated emissions for the appropriate vehicle type. The total reduction attributed to these measures is in the amount of 16,027 MTCO₂e, which is a 38 percent reduction from the total 2020 unmitigated vehicle fleet emissions.

Table B-16. Internal GHG Emission Reductions from Vehicle/Fuels Measures

Reduction Classification and Reduction Measure	GHG Reductions (MTCO ₂ e)	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state and regional transportation measures that do not require County action		
R1F1-INT: Assembly Bill 1493 (Pavley I) California Light-Duty Vehicle GHG Standards	5,328	12.5
R1F2-INT: Assembly Bill 1493 (Pavley II) California Light-Duty Vehicle GHG Standards	769	1.8
R1F3-INT: Executive Order S-1-07 (Low Carbon Fuel Standard)	2,946	6.9
R1F4-INT: Tire Pressure Program	106	0.2
R1F5-INT: Low Rolling Resistance Tires	31	0.1
R1F6-INT: Low Friction Engine Oils	539	1.3
R1F7-INT: Cool Paints and Reflective Glazing	171	0.4
R1F8-INT: Heavy-Duty Vehicle GHG Emission Reduction (Aerodynamic Efficiency)	153	0.4
R1F9-INT: Medium-and Heavy-Duty Vehicle Hybridization	82	0.2
R1F10-INT: Rule 1191—Clean On-Road Light- and Medium-Duty Public Fleet Vehicles	80	0.2
R1F11-INT: Rule 1193—Clean On-Road Residential and Commercial Refuse Collection Vehicles	856	2.0
R1F12-INT: Rule 1196—Clean On-Road Heavy-Duty Public Fleet Vehicles	118	0.3
R2: Existing and new vehicle fleet measures that require County action		
R2F1a-INT: Current fleet turnover	1,831	4.3
R2F1b-INT: Replace All Passenger/Light-Duty Vehicles by 2020	2,600	6.1
R2F2-INT: Replace All Medium and Heavy-duty Vehicles by 2020	36	0.1
Total	15,647	37
R3: Existing and new vehicle fleet measures—reductions not quantified or relied upon to achieve reduction goal		
R3F1-INT: Implement Accelerated Vehicle Fleet Turnover for “Other “ Vehicles		
R3F2-INT: Use Hybrid/ULEV Vehicles		
R3F3-INT: Implement Early Tire Inflation Program		

Reduction Classification and Reduction Measure	GHG Reductions (MTCO ₂ e)	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R3F4-INT: Implement Anti-Idling Measures		
R3F5-INT: Implement Smart Driving Policy		
R3F6-INT: Implement Vehicle Maintenance Program		
R3F7-INT: Senate Bill 375, Statutes 2008		
R3F8-INT: California's Low-Emission Vehicle (LEV) Program		
R3F9-INT: Zero Emission Vehicle (LEV) Regulations		
R3F10-INT: Fleet and Equipment Management and Monitoring		

Figure B-9. Internal Emission Reductions from Vehicle/Fuels Measures



With the implementation of the emission reduction measures included in this Plan, the County will reduce vehicle fleet emissions by 37 percent (26 percent and 11 percent emissions eliminated by R1 and R2 measures, respectively) from 2020 unmitigated projections. Reduced emissions in 2020 would be approximately 23 percent lower than 2007 emissions.

RI Fleet/Fuels Measures

This section describes the existing or proposed state emission reduction measures that will result in GHG reductions for the County transportation fleet, but do not require County action. The description of each measure is followed by the percent reduction in GHG from 2020 unmitigated for each measure.

RIF1-INT: Assembly Bill 1493: (Pavley I) California Light-Duty Vehicle GHG Standards

AB 1493 (Pavley) required the CARB to adopt regulations that will reduce GHG from automobiles and light-duty trucks by 30 percent below 2002 levels by the year 2016, effective with 2009 models. By 2020, this requirement will reduce emissions in California by approximately 16.4 MMTCO₂e, representing 17.3 percent of emissions from passenger/light-duty vehicles in the state.¹⁶ Manufacturers have flexibility in meeting these standards through a combination of reducing tailpipe emissions of GHGs and implementing systems to mitigate fugitive emissions of hydrofluorocarbons (HFCs) from vehicle air conditioning systems. The emission standards become increasingly more stringent through the 2016 model year.¹⁷ The regulations were adopted by CARB in their final form on August 4, 2005, pursuant to AB 1493 signed into law in 2002. Enactment of this regulation in California requires a waiver from the USEPA that was granted in 2009.

This regulation will result in a 17 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 12 percent reduction of total 2020 unmitigated fleet emissions.

RIF2-INT: Assembly Bill 1493: (Pavley II) California Light-Duty Vehicle GHG Standards

California committed to further strengthening the AB 1493 standards beginning in 2017 to obtain a 45 percent GHG reduction from 2020 model year vehicles. By 2020, California is committed to implement revised, more stringent GHG emission limits (the Pavley Phase 2 rules). California's requirements would reduce California GHG emissions by 31.7 MMTCO₂e in 2020, 69 percent more than the 18.8 MMTs reductions under the federal rules in that year. By 2020, this requirement will reduce emissions in California by approximately 4.0 MMTCO₂e, representing 2.5 percent of emissions from passenger/light-duty vehicles in the state.¹⁸

This regulation will result in a 2 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 2 percent reduction of total 2020 unmitigated fleet emissions .

RIF3-INT: Executive Order S-1-07 (Low Carbon Fuel Standard)

EO S-1-07, the Low Carbon Fuel Standard (LCFS), was issued on January 18, 2007. The LCFS will require a reduction of at least ten (10) percent in the carbon intensity of California's transportation fuels by 2020. CARB identified the LCFS as an early action item with a regulation to be adopted and implemented by 2010. The CARB AB 32 Scoping Plan estimates that the LCFS will result in a 15 MMTCO₂e reduction in California by 2020, representing 6.9 percent of emissions from all carbon-based fuels consumed for transportation in the state.¹⁹

This regulation will result in a 7 percent reduction from total 2020 unmitigated fleet emissions .

¹⁶ California Air Resources Board 2008a, 2009.

¹⁷ California Air Resources Board 2002.

¹⁸ California Air Resources Board 2008a, 2009.

¹⁹ California Air Resources Board 2008a, 2008b.

R1F4-INT: Tire Pressure Program

The Tire Pressure Strategy was identified as one of the AB 32 Early Actions. While current federal law requires auto manufacturers to install tire pressure monitoring systems in all new vehicles beginning September 1, 2007, owners of older vehicles will lack this important tool to help them reduce their climate change emissions. The strategy involves actions to ensure that vehicle tire pressure is maintained to manufacturer specifications. Specifically, the strategy seeks to ensure that tire pressure in older vehicles is monitored by requiring that tires be checked and inflated at regular service intervals. One potential approach would be to require all vehicle service facilities, such as dealerships, maintenance garages, and Smog Check stations, to check and properly inflate tires. It is also anticipated that signage at fueling stations would clearly indicate the availability of compressed air at no charge. CARB is currently investigating various options to ensure that tire pressures in older vehicles are also properly maintained.²⁰ By 2020, this requirement will reduce emissions in California by approximately 0.55 MMTCO₂e, representing 0.3 percent of emissions from passenger/light-duty vehicles in the state.²¹

This regulation will result in a 0.3 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 0.2 percent reduction of total 2020 unmitigated fleet emissions.

R1F5-INT: Low Rolling Resistance Tires

This measure would increase vehicle efficiency by creating an energy efficiency standard for automobile tires to reduce rolling resistance. A reduction in GHG emissions results from reduced fuel use. CARB staff estimates that reducing the rolling resistance of tires by ten (10) percent results in a two (2) percent increase in fuel efficiency. For the tire tread program, a two-phased approach is needed, beginning with data gathering and education, followed by the development and adoption of tire rolling resistance standards.²² By 2020, this requirement will reduce emissions in California by approximately 0.3 MMTCO₂e, representing 0.2 percent of emissions from passenger/light-duty vehicles in the state.²³

This regulation will result in a 0.1 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 0.07 percent reduction of total 2020 unmitigated fleet emissions.

R1F6-INT: Low Friction Engine Oils

This AB 32 early action measure would increase vehicle efficiency by mandating the use of engine oils that meet certain low friction specifications. Engine oil formulations can impact a vehicle's GHG emissions, because the more easily the internal parts of the engine move, the more efficiently the engine will run. This, in turn, reduces the engine load and fuel used. CARB estimates a 2 percent efficiency increase based on results from research studies. CARB estimates the efficiency will be achieved in about 85 percent of vehicles comprising the light-duty fleet. The California 2020 GHG emissions inventory from light-duty vehicles is 160.8 MMTCO₂e for all fuels. Entities that could be affected by the low friction engine oils measure, depending on the point of regulation, include lube oil manufacturers, automobile manufacturers, and auto-repair shops.²⁴ By 2020, this requirement will reduce emissions in California by

²⁰ California Air Resources Board 2007b, 2007c, 2008d.

²¹ California Air Resources Board 2008a, 2009.

²² California Air Resources Board 2007c, 2008e.

²³ California Air Resources Board 2008a, 2009.

²⁴ California Air Resources Board 2008e, 2007c.

approximately 2.8 MMTCO₂e, representing 1.7 percent of emissions from passenger/light-duty vehicles in the state²⁵.

This regulation will result in a 2 percent reduction from 2020 unmitigated passenger/light-duty vehicle emissions and a 1 percent reduction of total 2020 unmitigated fleet emissions.

RIF7-INT: Cool Paints and Reflective Glazing

Cool Paints was identified as an AB 32 Early Action strategy, to be in place no later than January 1, 2010. This strategy is based on measures to reduce the solar heat gain in a vehicle parked in the sun. A cooler interior would make drivers less likely to activate the air conditioner, which increases CO₂ emissions. Potential approaches include reformulation of paint to reflect near-infrared sunlight, parked car ventilation, and solar reflective window glazing. It is expected that cool paints, together with reflective glazing, will reduce the soak temperature of the typical vehicle parked in the sun by five (5) to ten (10) degrees Celsius.²⁶ By 2020, this requirement will reduce emissions in California by approximately 0.89 MMTCO₂e, representing 0.6 percent of emissions from passenger/light-duty vehicles in the state.²⁷

This regulation will result in a 0.6 percent reduction from 2020 unmitigated passenger/light duty vehicle emissions and a 0.4 percent reduction of total 2020 unmitigated fleet emissions.

RIF8-INT: Heavy-Duty Vehicle GHG Emission Reduction (Aerodynamic Efficiency)

This measure would increase heavy-duty vehicle (long-haul trucks) efficiency by requiring installation of best available technology and/or CARB-approved technology to reduce aerodynamic drag and rolling resistance. The estimated fuel reduction nationwide is approximately 615 million gallons of diesel which results in a GHG emissions reduction of 6.4 MMTCO₂e by 2020.²⁸ By 2020, this requirement will reduce emissions in California by approximately 0.93 MMTCO₂e, representing 1.9 percent of emissions from heavy-duty vehicles in the state.²⁹

This regulation will result in a 2 percent reduction from 2020 unmitigated heavy-duty vehicle emissions and a 0.4 percent reduction of total 2020 unmitigated fleet emissions.

RIF9-INT: Medium- and Heavy-Duty Vehicle Hybridization

Hybrid electric technology offers the potential to significantly reduce GHG emissions and improve fuel efficiency. Hybrid technology provides the greatest benefit when used in vocational applications that have significant urban, stop-and-go driving, idling, and power take-off operations in their duty cycle. Such applications include parcel delivery trucks and vans, utility trucks, garbage trucks, transit buses, and other vocational work trucks. These entities may be affected by this measure. The implementation approach for this measure is to adopt a regulation and/or incentive program that reduces the GHG emissions of these types of new trucks sold in California. This measure has the potential to reduce diesel combustion by 500,000 gallons per day and reduce GHG emissions by 0.5 MMTCO₂e in 2020, representing 0.2 percent

²⁵ California Air Resources Board 2008a, 2009.

²⁶ California Air Resources Board 2007b, 2007c, 2008d.

²⁷ California Air Resources Board 2008a, 2009.

²⁸ California Air Resources Board 2008b, 2008e.

²⁹ California Air Resources Board 2008a, 2009.

of emissions from all on-road mobile sources in the state.³⁰ This reduction is also equivalent to a one (1) percent reduction of emissions from all heavy-duty trucks in the state.

This regulation will result in a one (1) percent reduction from 2020 unmitigated heavy-duty vehicle emissions; a 0.2 percent reduction from total 2020 unmitigated fleet emissions.

Regional Transportation Measures: South Coast Air Quality Management District (SCAQMD) Fleet Rules

The following rules are primarily intended to reduce air toxic and criteria pollutant emissions by requiring low-emitting gasoline/diesel or alternative-fuel vehicles. Alternative-fuel vehicles required by these regulations produce lower GHG emissions than their gasoline and diesel counterparts.

RIF10-INT: SCAQMD Rule 1191: Clean On-Road Light- and Medium-Duty Public Fleet Vehicles

This rule requires public fleets in the SCAQMD's jurisdiction that are operating passenger car, light-duty truck, or medium-duty vehicle fleets to acquire low-emitting gasoline or alternative-fuel vehicles when procuring new vehicles of these types. This rule applies to government agencies or special districts with 15 or more non-exempt vehicles. Unlike Pavley, this rule applies to medium- as well as light-duty vehicles (emergency vehicles are exempt).

The following assumptions were used to estimate GHG emission reductions associated with this SCAQMD requirement:

- The GHG standards for new passenger car, light-duty truck, or medium-duty vehicles acquired by the County are consistent with Pavley I and II regulations. Even though the Pavley regulations apply to passenger cars and light-duty trucks, the SCAQMD requirements are sufficiently stringent so as to be considered equivalent standards for medium-duty vehicles.
- 56 percent of medium-duty vehicles are subject to this rule (emergency vehicles are exempt).
- 86 percent of all medium-duty vehicles would be turned over to new vehicles by 2020.

This regulation will result in a 10 percent reduction of 2020 unmitigated medium-duty vehicle emissions and a 0.2 percent reduction of total 2020 unmitigated fleet emissions.

RIF11-INT: Rule 1193: Clean On-Road Residential and Commercial Refuse Collection Vehicles

For public and private solid waste collection fleets, this rule requires fleet operators to acquire alternative-fuel refuse collection heavy-duty vehicles when procuring these vehicles for use within the SCAQMD's jurisdiction. This rule applies to government agencies or private entities with 15 or more solid waste collection vehicles.

The following assumptions were used to estimate GHG emission reductions associated with this SCAQMD requirement:

- The average fuel economy of garbage trucks in the United States in 2001 was 2.8 miles per

³⁰ California Air Resources Board 2008a, 2009.

gallon (mpg).³¹

- 82 percent of refuse collection vehicles will be retired by 2020 (same turnover assumed for all heavy-duty vehicles) and these fleets will grow 1 percent per year.
- All new refuse collection vehicles would use compressed natural gas (CNG) instead of diesel fuel. Heavy-duty vehicles running on CNG produced by natural gas from California emit 18.3 percent less GHG emissions than the same vehicles running on LCFS compliant diesel fuel.³²
- This regulation results in a 15 percent reduction of 2020 unmitigated refuse vehicle emissions and a 2 percent of total 2020 unmitigated fleet emissions.

R1F12-INT: Rule 1196: Clean On-Road Heavy-Duty Public Fleet Vehicles

To reduce air toxic and criteria pollutant emissions, this rule requires public fleets in the SCAQMD's jurisdiction operating heavy-duty vehicle fleets to acquire alternative-fuel, dual-fuel, or dedicated gasoline heavy-duty vehicles when procuring or leasing these vehicles for use within the SCAQMD's jurisdiction. This rule applies to government agencies, special districts, and school districts with 15 or more heavy-duty vehicles (emergency vehicles are exempted).

The following assumptions were used to estimate GHG emission reductions associated with this SCAQMD requirement:

- The 35.3 percent of non-waste hauler heavy-duty vehicles in the County's fleet are subject to this rule (fire department vehicles excluded).
- Since 82 percent of heavy-duty vehicles in the fire department fleet will be retired by 2020, it was assumed that 82 percent of all heavy-duty vehicles would be retired by 2020.
- All new heavy-duty vehicles would use CNG instead of diesel fuel.
- Heavy-duty vehicles running on CNG produced by natural gas from California emit 18.3 percent less GHG emissions than the same vehicles running on LCFS compliant diesel fuel.³³
- This regulation results in a 5 percent reduction of 2020 unmitigated emissions from heavy-duty vehicles and a 0.3 percent of total 2020 unmitigated fleet emissions.

R2 Fleet/Fuels Measures

This section describes the existing and new County emission reduction measures that will result in quantifiable GHG reductions for the County transportation fleet, and require County action.

Transportation Fleet Background

Several County agencies maintain and operate their own vehicle fleet, including the following: Fleet Management Department (Motor Pool and Non Motor Pool), County Fire Department, Public Works/Flood Control, Sheriff's Department, Solid Waste and Special Districts. A more detailed description of the operations of these departments is provided below, with a description of implemented or proposed GHG reduction measures provided by each department/district, where applicable:

³¹ INFORM 2003.

³² California Air Resources Board 2008c.

³³ California Air Resources Board 2008c.

Fleet Management Department (Motor Pool and Non Motor Pool). The Fleet Management Department provides vehicles, equipment, and services to the officials and employees of the County. Services include the acquisition, maintenance, repair, modification, and disposal of vehicles and other related equipment. [It should be noted that the County Fire Department, Sheriff's Department and Special Districts are authorized to operate their respective fleets independent of Fleet Management.] Fleet Management also operates a motor pool, which has ownership and/or maintenance responsibility for approximately 1,700 automobiles, vans, pick-up trucks, and various specialty vehicles assigned to County departments. The motor pool coordinates the collection and distribution of replacement, fuel, maintenance, repair, and other operational costs of fleet vehicles. The Fleet Management Department measures include:

- Replace sedans with hybrids (*in process*). There are currently over 100 hybrid sedans and sports utility vehicles (SUVs) (six [6] percent of the County's 1,688 vehicles). Hybrids are purchased any time a sedan is replaced (with some exceptions), and in many cases when an SUV is replaced. When it is not feasible to purchase a hybrid vehicle, the vehicle purchased will have the lowest emissions rating possible for that type of vehicle.
- Acquire ultra low emission vehicle (ULEV) vehicles when feasible (*in process*). A total of 44 percent of the fleet is ULEV.
- Purchase electric vehicles to replace conventional fuel vehicles (*in process*). Nine (9) electric vehicles have been purchased for evaluation to replace nine (9) conventionally powered vehicles. If successful, more will be purchased.
- Expand fleet of electric carts (*in process*). A fleet of electric carts is currently used for transportation in and around large County facilities.
- Replace all conventional fueled vehicles with hybrids, electric vehicles, and other viable alternative fuel vehicles³⁴ by 2020 (*in process*). Every year, 1/6th of the sedan fleet is replaced.
- Participate in a plug-in hybrid project with the SCAQMD (*proposed*).
- Install global positioning systems (GPS) in all new vehicles (with some exceptions) to monitor mpg, idle time, and emission status (*proposed*).
- Develop a policy to reduce excessive idling (*proposed*).

County Fire Department (County Fire). County Fire is currently responsible for approximately 652 vehicles, of which 461 are passenger/light duty vehicles. There are currently no existing GHG reduction measures for the Fire Department.

County Public Works/Flood Control (Flood Control District). The Flood Control district is responsible for 234 vehicles, of which 108 are passenger/light duty-vehicles. County Public Works/Flood Control District measures include the use more CNG and liquefied petroleum gas (LPG) fuels in place of diesel and gasoline (*proposed*).

³⁴ Compressed natural gas (CNG), liquefied petroleum gas (LPG), and propane are currently not used and are unsuitable for the Fleet Management Department.

County Sheriff's Department (Sheriff's Department). The Sheriff's Department is responsible for approximately 1,277 vehicles, of which 1,136 are passenger/light duty vehicles. The Sheriff's Department measures include:

- Use more Flex-Fuel vehicles (*in process*) (currently all 2007 and 2008 Ford Crown Victoria's and 2008 Chevrolet Tahoe 4x4's are Flex Fuel vehicles).
- Downsize V-8 and V-6 vehicles to smaller vehicles equipped with 4 cylinder engines, where feasible (*proposed*).
- Use alternative-fuel vehicles to replace older, less fuel efficient vehicles (*proposed*).
- Implement a new fleet management program to assist in "right sizing" the fleet: comparing the fleet to number of employees (*proposed*).

Solid Waste (Waste Haulers). The waste hauler fleet is currently contracted out to multiple waste collection companies. There are no existing GHG reduction measures for these vehicles.

R2F1-INT: Implement Accelerated Vehicle Fleet Turnover for Passenger/Light-duty Vehicles

This measure requires the County to implement an accelerated fleet turnover rate for the County's passenger/light-duty vehicles fleet which will reduce GHG emissions faster than implementation of Pavley I and II measures.

The following information was provided by the County and used to estimate GHG emission reductions associated with these requirements:

- Motor pool vehicles are replaced about every six (6) years. Fire Department vehicles are replaced about every ten (10) years. Consequently, by 2020, the entire motor pool fleet will be composed of model year vehicles 2015 or newer, and Fire Department vehicles will be 2011 or newer.
- The County provided an estimated model year for each vehicle in the Motor Pool and fire department. This information was used to determine an average fuel economy for passenger/light-duty vehicles in these two fleets. As a result, the average passenger/light-duty fuel economy of the motor pool and County Fire Department fleets in 2020 will be approximately 39.9 mpg.

The following assumptions were used to estimate GHG emission reductions associated with these requirements:

- A correction factor was used to account for life-cycle emissions associated with the manufacture of cars that would replace the additional turned-over vehicles as a result of this measure. According to a Berkeley Institute of Transportation Studies report on life-cycle vehicle emissions, life-cycle GHG emissions for the manufacture of cars are eight (8)–15 percent larger than vehicle operation for autos (sedans, SUVs, and pickups).³⁵ Since the CARB considers life-cycle GHG emissions for calculation of emission reductions, this factor was assumed to be included in CARB's projected emission reductions in the R1 measures listed above. All vehicles in the 2020 unmitigated scenario meet the 2002 model year California fleet wide fuel economy of 25.1 mpg.³⁶

³⁵ Chester 2008.

³⁶ California Air Resources Board 2008f.

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- All new vehicles meet the Pavley standard for the model year of the new vehicle. The model year for all new vehicles is equal to the year those vehicles were replaced (i.e., vehicles replaced in 2016 will be replaced with model year 2016 vehicles meeting the 2016 Pavley standard).³⁷
 - The average fleet fuel economy for model year 2020 vehicles is 42.5 mpg.³⁸
 - The ratios of the 2002 fleet wide fuel economy to the 2020 fleet wide fuel economies were multiplied by 2020 unmitigated emissions to determine GHG reductions from this measure.

Implementation of Pavley I and II measures in the R1 classification lead to an emission reduction of 6,098 MTCO₂e (described in R1).

This accelerated vehicle turnover measure results in an additional reduction of 4,534 MTCO₂e by 2020, broken out by measures R2F1a-INT and R2F1b-INT below. The associated percent emission reductions due to this measure are approximately 15 percent of 2020 unmitigated emissions for passenger/light-duty vehicles, or 11 percent of total 2020 unmitigated fleet emissions.

R2F1a-INT: Current County Turnover Rate

R2F1-INT, subpart (a) requires continuation of the County’s current vehicle turnover rate, resulting in a turn over all of the Passenger/Light-Duty Vehicles in the Motor Pool and 50 percent of the Fire Department Fleets by 2020. It was assumed that there would be R1 unmitigated turnover for the remaining fleets (Public Works, Sheriff, Special districts, Waste Haulers, and Non Motor Pool). All replaced vehicles should be the most efficient vehicles available where practicable to achieve the maximum GHG reductions.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Measures R1F1-INT and R1F2-INT have been implemented.

The reductions attributed to the County’s current fleet turnover policy are 1,831 MTCO₂e for 2020, or 4 percent of 2020 unmitigated passenger/light-duty vehicle emissions.

R2F1b-INT: Replacement of All Passenger/Light-Duty Vehicles by 2020

R2F1, subpart (b) requires County replacement of 100 percent of its passenger/light-duty vehicles by the year 2020. All replaced vehicles should be the most efficient vehicles available where practicable to achieve the maximum GHG reductions. This measure will result in GHG reductions beyond the County’s current turnover as described in measure R2F1a-INT.

Implementation of this measure will result in the County retiring vehicles earlier than planned. These vehicles may be transferred or sold to users who will continue to operate the vehicles, resulting in additional GHG emissions. The destination and future use of retired vehicles is unknown, and it is anticipated that whoever acquires these vehicles is likely replacing an older, less fuel efficient vehicle. In addition, buyers would likely be buying and operating vehicles regardless of the County’s fleet turnover measure. Consequently, GHG emissions from third-party operation of retired County vehicles were not quantified.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Measures R1F1-INT and R1F2-INT have been implemented.

³⁷ California Air Resources Board 2008f.

³⁸ California Air Resources Board 2008f.

Additional GHG reductions attributed to this measure are 2,600 MTCO₂e for 2020, or 8.4 percent of 2020 unmitigated passenger/light-duty vehicle emissions, which equals approximately 6 percent of the 2020 unmitigated fleet emissions.

This measure will replace approximately 1,451 passenger/light-duty vehicles by 2020. Due to fleet growth, there will be approximately 95 new vehicles by 2020. According to the CARB, 1.3 million vehicles will be replaced annually. By meeting the Pavley I or II regulations, this will save California approximately \$11,058 million dollars by 2020.³⁹ Although the initial cost of the vehicles is higher, the savings in fuel outweigh the capital costs. Consequently, it is likely that this measure will result in cost savings for the County.

R2F2-INT: Replace All Medium- and Heavy-Duty Vehicles by 2020

This measure requires that the County replace its medium- and heavy-duty vehicle fleet (excluding County Fire vehicles) with new vehicles by 2020. GHG reductions were calculated for implementation of R1F14-INT and R1F13-INT (SCAQMD Fleet Rules 1191 and 1196) for these replaced vehicles.

These reductions depend upon the assumptions discussed in Section 2 for R1F5:

- 100 percent of vehicles subject to Rules 1191 and 1196 will be retired by 2020.
- The GHG standards for new medium-duty vehicles acquired by the County are consistent with Pavley I and II regulations. Even though the Pavley regulations apply to passenger cars and light-duty trucks, the SCAQMD requirements are sufficiently stringent so as to be considered equivalent standards for medium-duty vehicles.
- All new heavy-duty vehicles will use CNG.
- CNG vehicles emit 18.3 percent less GHG emissions than the same vehicles running on LCFS-compliant diesel fuel. A total of 35.3 percent of the total heavy-duty vehicles in the County's fleet are subject to this rule (94 vehicles excluding those in the fire department).
- Measures R1F11-INT and R1F12-INT have been implemented.

Total reductions from this measure are 36 MTCO₂e for 2020, or 0.1 percent of total 2020 unmitigated fleet emissions.

This measure will replace approximately 17 heavy-duty diesel vehicles with CNG vehicles by 2020. According to the USEPA, liquefied natural gas (LNG) and CNG heavy-duty trucks can cost an additional \$30,000 to \$50,000, or ten (10)–20 percent more than comparable diesel trucks/buses, but CNG costs less per gallon than diesel fuel.⁴⁰ According to a study by TIAX, post 2010, natural gas refuse haulers, transit buses, and short-haul trucks will have lower life-cycle costs to comparable diesel vehicles when oil prices are greater than \$31 per barrel (in 2005 dollars).⁴¹ Consequently, it is likely that this measure will not increase costs for the County.

R3 Fleet/Fuels Measures

This section describes R3 measures for Fleet/Fuel that were not quantified or relied upon to achieve the County's 2020 reduction target. These measures are either facilitative in nature or there are methodological issues that prevent their quantification.

³⁹ California Air Resources Board 2008b.

⁴⁰ Environmental Protection Agency 2002a, 2002b; UNEP 2007.

⁴¹ TIAX 2005.

R3F1-INT: Implement Accelerated Vehicle Fleet Turnover for “Other” Vehicles

In addition to retiring all passenger/light-duty, medium-duty, and heavy-duty vehicles by 2020 as described in measures R2F1-INT and R2F2-INT, the County will replace vehicles classified as “other” when feasible and appropriate . Other vehicles include off-road vehicles, construction equipment, marine vehicles, and stationary engines (i.e., generators). These vehicles could be replaced by those with cleaner-burning diesel engines or alternative fueled engines.

Because this measure is defined as where feasible and appropriate (and thus the exact amount of turnover cannot be estimated with accuracy), this measure was not quantified or relied upon to meet the reduction target.

R3F2-INT: Use Hybrid/ULEV Vehicles

The County will replace retired vehicles with hybrid electric vehicles and/or ULEV that are 50 percent cleaner than average new model cars, when feasible and appropriate.

Because this measure is defined as where feasible and appropriate (and thus the exact amount of turnover cannot be estimated with accuracy), this measure was not quantified or relied upon to meet the reduction target.

R3F3-INT: Implement Early Tire Inflation Program

This measure involves the County’s implementation of an Early Tire Inflation Program. Per CARB’s Tire Inflation Program, the strategy involves actions to ensure that vehicle tire pressure is maintained to manufacturer specifications. Specifically, the strategy seeks to ensure that tire pressure in older vehicles is monitored by requiring that tires be checked and inflated at regular service intervals. One potential approach would be to require all vehicle service facilities to check and properly inflate tires. It is also anticipated that signage at fueling stations clearly indicate the availability of compressed air at no charge. In addition, the purchase of low rolling resistance tires can help improve fuel efficiency.⁴²

This measure facilitates local implementation of state measure R1F4-INT. To avoid double-counting, no additional reductions were quantified for this measure.

R3F4-INT: Implement Anti-Idling Enforcement

Per CARB’s Anti-Idling Enforcement, the strategy guarantees emission reductions as claimed by increasing compliance with anti-idling rules, thereby reducing the amount of fuel burned through unnecessary idling. Measures may include enhanced field enforcement of anti-idling regulations, increased penalties for violations of anti-idling regulations, and restriction on registrations of heavy-duty diesel vehicles with uncorrected idling violations. Reducing idle time saves fuel, engine wear, and money. As an additional benefit, enforcement of anti-idling rules can reduce noise pollution.⁴³

The County’s anti-idling Ordinance prohibits diesel-fueled vehicles and off-road equipment from idling for periods in excess of five minutes, the County will implement additional measures for its internal operations such as the following measures, (with certain exemptions, such as emergency situations):

- Place all-weather idle-free stickers on both inside and outside of every County vehicle.

⁴² California Air Resources Board 2007b, 2008e.

⁴³ California Air Resources Board 2007b, 2008e.

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- Place signs and messages in highly visible areas detailing the anti-idling policy.
 - Idle times beyond three (3) minutes are prohibited.
 - Install on-board computers to track idling time and fuel consumption.
 - Leave personal voice-mail messages and send emails notifying employees of the idle-free campaign.
 - Follow up with each driver to give feedback regarding idle statistics from the on-board computers.
 - Offer an incentive program rewarding drivers who reduce fuel consumption by limiting idling.

Data did not exist to identify the specific amount of idling in 2007 associated with County vehicles. As such, reductions possible with this measure were not quantified.

R3F5-INT: Implement Smart Driving Policy

This measure involves the County's implementation of a Smart Driving policy incorporating measures such as the following, with certain exemptions (such as emergency situations): Potential savings in fuel economy reported by the USEPA are presented in parentheses.⁴⁴

- Change gears between 2,000 and 2,500 rotations per minute (rpm) and use the highest gear possible.
- Reduce average speed/observe speed limit; driving at 70 mph uses around 15 percent more fuel than at 50 mph (seven [7]–23 percent).
- Avoid unnecessary acceleration, braking, and aggressive driving (five [5]—33 percent).
- Install mpg computers in cars to alert drivers.
- Use auxiliary equipment (AC, heater) selectively (AC use can reduce mileage by up to 20 percent).
- Switch off the engine whenever it is safe to do so.
- Remove unnecessary cargo from the car to reduce weight (one [1]–two [2] percent per 100 lbs).
- Reduce aerodynamic drag whenever possible (close windows or remove roof racks).
- Use cruise control wherever possible when available.

Data did not exist to quantify driving parameters for County vehicles in 2007. As such, reductions possible with this measure were not quantified.

R3F6-INT: Implement Vehicle Maintenance Program

This measure involves implementation of a County Maintenance program incorporating the following practices. Potential savings in fuel economy reported by the USEPA are presented in parentheses.⁴⁵

- Use recommended motor oil (one [1]–two [2] percent).

⁴⁴ Environmental Protection Agency 2008b.

⁴⁵ USEPA 2008b.

-
- Frequent tune-ups (four [4] percent per tune-up).
 - Replace air filters (ten [10] percent for replacing a clogged filter).
 - Maintain proper tire pressure (three [3] percent).
 - Maintain Air Conditioning system.

The EPA estimates are broad overall averages. Estimating reductions from this measure would require quantification of the specific maintenance profiles of the existing fleet and data was not available to support such an analysis. As such, reductions for this measure were not quantified.

R3F7-INT: Senate Bill 375, Statutes of 2008

SB 375 aims to coordinate land use planning, regional transportation planning, and funding priorities in order to help California meet the GHG reduction goals established in AB32. SB 375 requires regional transportation plans, developed by Metropolitan Planning Organizations (MPOs), to incorporate a Sustainable Communities Strategy (SCS) in their regional transportation plans that will achieve GHG emission reduction targets set by CARB. SB 375 includes provisions for streamlined CEQA review for some infill projects such as transit-oriented development. The Southern California Association of Governments (SCAG) has initiated early planning toward development of a SCS to promote regional reduction of VMT. As discussed in Appendix A regarding the External Reduction Plan, San Bernardino County will participate with other cities in the County, and with SANBAG and SCAG in the development of the SCS.

This plan may result in additional VMT reductions associated with County operations, but it is premature at this time to quantify the potential benefits until the SCS is further developed and analyzed by SCAG.

R3F8-INT: California's Low-Emission Vehicle (LEV) Regulations

Following a November 5, 1998, hearing, CARB amended California's Low-Emission Vehicle (LEV) regulations. The new amendments, known as LEV II, will advance the state's clean air goals through improved emission reduction standards for automobiles. LEV II regulations, running from 2004 through 2010, represent continuing progress in emission reductions. As the state's passenger vehicle fleet continues to grow and more SUVs and pickup trucks are used as passenger cars rather than work vehicles, the new, more stringent LEV II standards are necessary for California to meet federally-mandated clean air goals outlined in the 1994 State Implementation Plan (SIP).⁴⁶ LEV regulations have the potential to reduce GHG emissions as well as criteria pollutants, since meeting emission reduction standards will likely include the use of alternative fuels. (Note: This measure is a State, rather than a County action measure.)

In combination with the R1 and R2 measures described above, it is difficult to identify the additional marginal benefit of the LEV regulations above the rest of the reduction plan. As such, reductions possible with this measure were not quantified to avoid double-counting.

R3F9-INT: Zero Emission Vehicle (ZEV) Program

The goal of the CARB's Zero Emission Vehicle (ZEV) program is to evolve the California passenger car fleet into a fleet where vehicles have no tailpipe emissions. The ZEV program continues to push the development of clean vehicles and supports the vision needed to meet California's longer-term environmental goals. The original ZEV program required that ten

⁴⁶ California Air Resources Board 2008h, 2008i.

(10) percent of new vehicle sales by large manufacturers have zero emissions, starting with 1998 models. The CARB modified the program in 1998 and 2001 to allow up to 60 percent of the requirement to be met with vehicles having extremely low emissions and specific attributes. In 2009 up to 85 percent of the requirements may be met with low emissions and specific attributes vehicles.⁴⁷ ZEV regulations have the potential to reduce GHG emissions as well as criteria pollutants, since meeting emission reduction standards will likely include the use of alternative fuels. (Note: This measure is a State rather than a County action measure.)

In combination with the R1 and R2 measures described above, it is difficult to identify the additional marginal benefit of the ZEV regulations above the rest of the reduction plan. As such, reductions possible with this measure were not quantified to avoid double-counting.

R3F10-INT: Fleet and Equipment Management and Monitoring.

The County will implement the following fleet and equipment management programs, where feasible and appropriate:

- A fleet management program to assist in “rightsizing” the fleet; comparing the fleet to the number of employees.
- Global Positioning Systems (GPS) installation in all new vehicles (with some exceptions) to monitor mpg, idling time, and emission status.

While this measure will help to develop the data needed to support continuing improvement in fleet efficiency, the measure itself would not result in specific emissions reductions and thus no quantification can be provided.

⁴⁷ California Air Resources Board 2007d, 2008j.

Solid Waste/Landfills

This section describes the methodology used to calculate GHG emission reductions for the *existing and proposed* state, regional or County solid waste measures that will result in future GHG reductions. The total estimated GHG reductions from the reduction measures included in Reduction Classifications R1 and R2 are presented below in **Table B-17** and amount to 206,959 MTCO_{2e}, a 60 percent reduction in total 2020 unmitigated solid waste emissions.

Table B-17. Internal GHG Emission Reductions from Waste Measures

Reduction Classification and Reduction Measures	GHG Reductions (MTCO _{2e})	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state and regional waste management measures that do not require County action		
NA		
R2: Existing and new measures that require County action		
R2W1-INT: Increase Methane Recovery at Mid-Valley, Milliken, and Colton Landfills	97,059	28.3
R2W2-INT: Barstow Methane Recovery	37,935 ^a	11.1
R2W3-INT: Landers Methane Recovery	8,471 ^b	2.5
R2W4-INT: Comprehensive Disposal Site Diversion Program	26,390	7.7
R2W5-INT: C&D Recycling Program	295	0.1
R2W6-INT: County Diversion Programs—75 Percent Goal ^c	4,118	1.2
R2W7-INT: City Diversion Programs—75 Percent Goal ^c	32,692	9.5
Total	206,959	60.4
R3: Existing and new waste measures—reductions not quantified or relied upon to achieve reduction goal		
R3W1-INT: Install Methane Capture Systems at all Landfills with 250,000 or more Tons of WIP		
R3W2-INT: Financing Mechanisms and Opportunities		
R3W3-INT: Waste Education Program		
R3W4-INT: Additional Landfill Methane Controls		
R3W5-INT: Landfill Gas to Energy Projects		

Notes:

Reductions for these measures solely represent avoided methane emissions at landfills and assume that all waste reduction measures are implemented in combination.

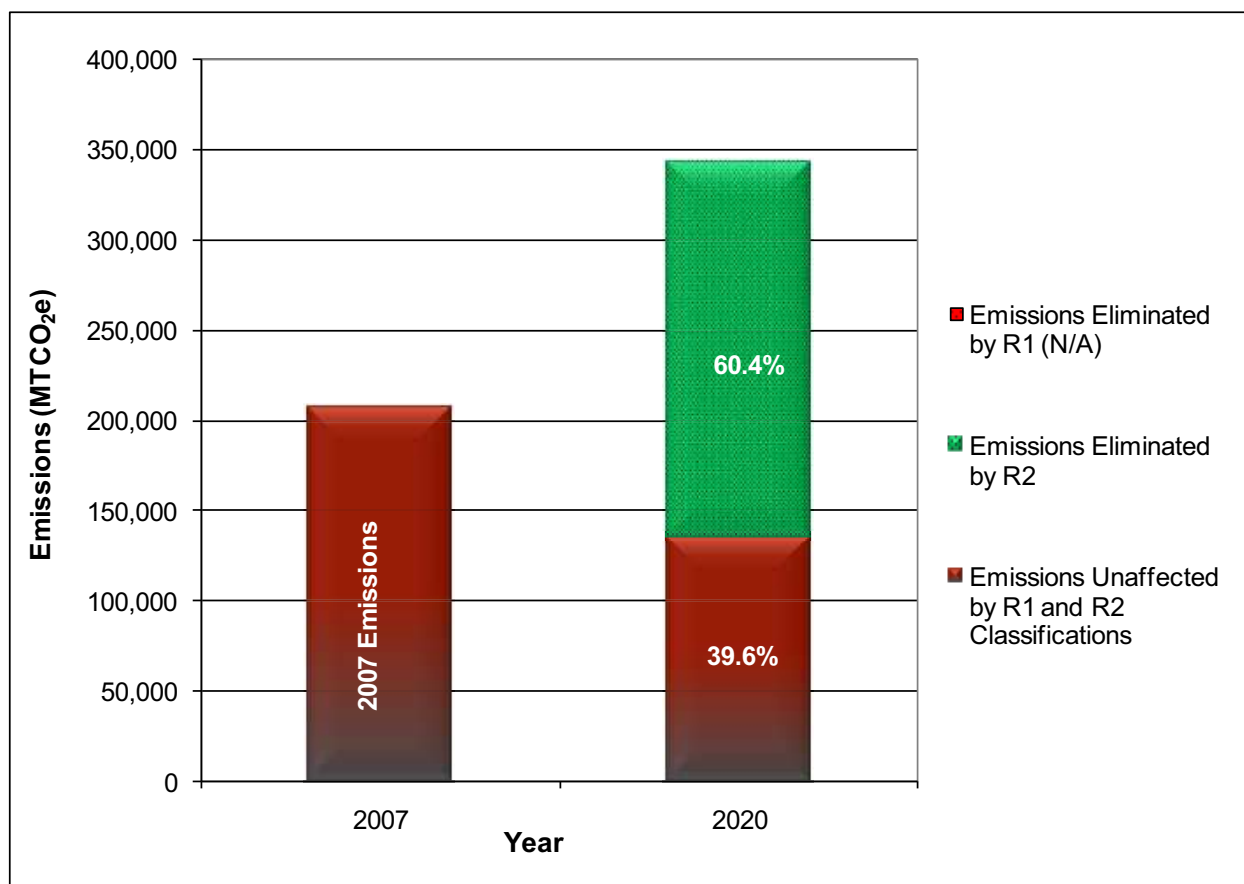
^a Attributed to waste in place methane reductions from Barstow as well as new waste planned for Barstow.

^b Attributed only to existing waste in place at Landers.

^c Assumes linear growth in diversion beginning in 2009 to reach 75 percent diversion of County-generated waste by 2020.

^d Assumes linear growth in diversion beginning in 2009 to reach 75 percent diversion of City-generated waste by 2020.

Figure B-10. Internal GHG Emission Reductions from Solid Waste Measures



With the implementation of the emission reduction measures included in this Plan, the County will reduce landfill emissions by 60 percent (all from R2 measures) from 2020 unmitigated projections. Reduced emissions in 2020 will be approximately 34 percent lower than 2007 emissions.

R1 Waste Measures

The CARB AB32 Scoping Plan recommends three measures for reducing emissions from Municipal Solid Waste at the State level, including: 1) landfill methane control; 2) increase the efficiency of landfill methane capture; and 3) high recycling/zero waste. CARB is in the process of developing a discrete early action program for methane recovery (1), likely to be adopted in early 2010. This measure is expected to result in a 1.0 MMTCO_{2e} reduction by 2020. Other measures proposed by CARB include increasing efficiency of landfill methane capture (2) and instituting high recycling/zero waste policies (3). Potential reductions associated with these measures are still to be determined. CARB estimates a preliminary one-time cost for adoption of these measures to be approximately \$70 per ton of CO₂ reduced. Capital cost is estimated to be approximately \$3,440,000 and annual operation cost is estimated to be approximately \$706,400 per landfill. Total industry cost estimates will be evaluated further in the staff report for the landfill methane control measure⁴⁸.

⁴⁸ Air Resources Board 2008b, 2009b

The County-owned landfills may already meet the majority of the requirements of the proposed landfill regulation. Large landfills such as Landers and Barstow will likely require monitoring and annual review to ensure the proper operation of their methane controls⁴⁹. All other landfills evaluated in the External Inventory also appear to be either meeting the requirements of the landfill methane control measure or are not subject to them, and it is anticipated that this measures will not result in any additional reductions for these landfills. These conclusions should be reassessed after finalization of the proposed landfill regulation.

The high recycling/zero waste measure is expected to result in GHG emissions reductions by reducing the substantial energy use associated with the acquisition of raw materials in the manufacturing stage of a product's life-cycle. As virgin raw materials are replaced with recyclables, a large reduction in energy consumption should be realized. Implementing programs with a systems approach that focus on consumer demand, manufacturing, and movement of products will result in the reduction of GHG emissions and other co-benefits. The potential 2020 GHG emission reductions attributed to this measure are estimated to be nine MMTCO₂e⁵⁰. According to the CARB, some of the GHG "lifecycle" reductions may occur outside of California, making accounting more difficult, and additional research to quantify these emission reductions is needed⁵¹. Consequently, these reductions are not counted toward the AB 32 goal and were not counted as R1 reductions for the County.

All future emission reductions do not take into account the GHGs associated with recycling or composting the materials that have been diverted from the landfill.

R2 Waste Measures

This section describes the methodology used to calculate GHG emission reductions for those measures that have been implemented or will be implemented; resulting in GHG reductions for the municipal solid waste management sector and require County action. Measures R2W1-INT and R2W2-INT below are based on reductions achieved from applying methane recovery technology to specific landfills. Only active landfills with a capacity of greater than three (3) million cubic yards were evaluated because methane recovery at smaller landfills is not likely to be cost-effective. Emission reductions from recovery at the smaller landfills are likely less than five (5) percent of the reductions from recovery at the larger landfills. Measures R2W4-INT to R2W7-INT are associated with the displacement of waste prior to landfilling. For these measures, only GHG reductions attributed to avoided methane emissions at the landfill site (rather than emissions associated with all lifecycle stages) are considered for reduction potential in the County's inventory because the emissions occurring at the landfills are under the County's direct control.

Measures R2W4-INT to R2W7-INT are associated with the displacement of waste prior to landfilling. For these measures, only GHG reductions attributed to avoided methane emissions from waste in the landfill are considered for reduction potential in the County's inventory because these emissions are completely under the County's control. However, the total lifecycle emissions associated with these measures were also evaluated with the USEPA Waste Reduction Model (WARM) to demonstrate the global reduction potential of these measures. WARM is used to calculate GHG emissions of baseline and alternative waste management practices,

⁴⁹ Information received from the County Solid Waste Department

⁵⁰ Air Resources Board 2007.

⁵¹ Air Resources Board 2008a.

including: source reduction, recycling, combustion, composting, and landfilling. The WARM tool's lifecycle approach reflects emissions and avoided emissions, both upstream and downstream from the point of use (i.e., when and where the material/product is used). Therefore, the emission factors provided in this tool provide an accounting of the net benefit of these actions to the environment. Emissions factors are based on national averages for each process⁵².

Each measure below accounts for emission reductions already attributed to R1 measures for this sector, and any applicable R2 measures.

R2W1-INT: Increase Methane Recovery at Mid-Valley, Milliken, and Colton Landfills

Mid-Valley, Milliken, and Colton Landfills have the most waste-in-place (WIP) of any landfills under County control. In addition, these three landfills are currently accepting most of the new waste generated by incorporated cities in the County. Consequently, the WIP in these landfills represent the largest sources of methane from the solid waste sector. In 2007, these landfills accepted over one million tons of waste, representing 67 percent of all new waste landfilled in San Bernardino County⁵³. Because these landfills are so important to the County's solid waste system, increasing methane recovery at these sites will have the greatest effect on reducing methane emissions from this sector.

This measure requires the County to achieve a methane recovery rate of 95 percent at Mid-Valley and 85 percent at Colton and Milliken Landfills. These landfills currently have methane recovery systems in place⁵⁴. The USEPA recommends using a 75 percent capture rate as a default value for methane recovery systems where the precise capture rate is unknown⁵⁵. Increasing the methane recovery rate will result in methane emission reductions from both WIP and newly landfilled waste. Multiple studies were reviewed to determine the achievable methane recovery rate for current advanced methane control technology for landfills. A 1999 study from the Institute for Environmental Management demonstrated that methane capture effectiveness approached 100 percent at a Yolo County landfill project through the use of a surface membrane cover over porous gas recovery layers operated at a slight vacuum⁵⁶. Synthetic/geomembrane final covers have been shown to be very efficient at reducing methane emissions. A 2008 study by the California Integrated Waste Management Board found that they have a high potential for GHG emission reductions⁵⁷, and a 2006 study demonstrated 90 percent recovery⁵⁸.

A cost and technology feasibility study must be performed to determine the methane capture and destruction rates for any methane controls installed at these landfills. This study is necessary to determine the feasibility of installing methane control technology, and the maximum possible methane recovery rate achievable at each landfill. As discussed above, the methane capture rates used in this analysis reflect relevant studies of similar landfill sites, accepted methodology, and current landfill data.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The methane recovery systems currently in place are assumed to capture 75 percent of

⁵² Environmental Protection Agency 2008b.

⁵³ California Integrated Waste Management Board 2008.

⁵⁴ Environmental Protection Agency 2008c.

⁵⁵ Environmental Protection Agency 1998.

⁵⁶ Augenstein 1999.

⁵⁷ California Integrated Waste Management Board 2008b.

⁵⁸ Spokas et al. 2006; Australian Greenhouse Office 2007.

emitted methane from all waste currently in place, and all new waste disposed of at Mid-Valley, Milliken, and Colton Landfills by 2020⁵⁹.

- The recommended methane recovery systems included in this analysis are assumed to capture 95 percent of emitted methane from all WIP and all new waste disposed of at Mid-Valley, and 85 percent of emitted methane from all WIP and all new waste disposed of at Milliken and Colton Landfills by 2020.

The reductions are estimated at 49,972 MTCO₂e in 2020 from waste already in place at the landfills. The emission reductions associated with new waste added to the landfills result in 47,087 MTCO₂e by 2020. This measure will result in a 28 percent reduction from 2020 unmitigated landfill emissions.

R2W2-INT: Install Methane Recovery System at Barstow

Due to the safety issues associated with methane, the California Code of Regulations (CCR), Title 27, Chapter 3, Subchapter 4, Article 6, contains requirements that owners and operators of landfills must monitor and control landfill gas (LFG) (mostly methane) and prevent it from accumulating in enclosed structures and/or migrating offsite. To meet the requirements of Title 27, the County installed a methane recovery system at Barstow Landfill in 2010.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The methane recovery system is assumed to capture 75 percent of emitted methane from all waste currently in place, and all new waste entering Barstow Landfill by 2020⁶⁰.
- An overall increase of six (6) percent (i.e., 90 to 96 percent) for the delivery of waste to sites with a methane recovery system in place will occur between 2007 and 2020.
- Measure R2W1 has been implemented.

In 2020, the reductions associated with the Barstow site are estimated at 10,970 MTCO₂e from waste already in place at the landfill. The emission reductions associated with new waste result in 37,935 MTCO₂e by 2020. This measure will result in a 11 percent reduction from 2020 unmitigated landfill emissions.

R2W3-INT: Install Methane Recovery System at Landers

The County can further reduce emissions by installing a methane recovery system at Landers. Because Landers is scheduled to close by 2013, the waste reduction calculation for this facility is based only on waste currently in place and that a negligible amount of new waste, in relation to the waste in place, would be disposed of at Landers.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The methane recovery system is assumed to capture 75 percent of emitted methane from all waste currently in place⁶¹.
- In 2020, 96 percent of waste will be disposed of in landfills with methane recovery systems.

⁵⁹ Environmental Protection Agency 1998

⁶⁰ Environmental Protection Agency 1998

⁶¹ Environmental Protection Agency 1998.

In the year 2020, the reductions associated with the Landers site are estimated at 8,471 MTCO₂e. This measure will result in a 2 percent reduction from 2020 unmitigated landfill emissions.

A cost and technology feasibility study must be performed to determine the methane capture and destruction rates for any methane controls installed at this landfill. This study is necessary to determine the feasibility of installing methane control technology, and the maximum possible methane recovery rate achievable at the landfill. As discussed above, the methane capture rates used in this analysis reflect relevant studies of similar landfill sites, accepted methodology, and current landfill data.

R2W4-INT: Comprehensive Disposal Site Diversion Program

The County's Comprehensive Disposal Site Diversion Program (CSDSP) recovers "post-diversion" waste for recycling at the landfill. Post-diversion is defined as the waste sent to landfill, after accounting for the County's municipal recycling and composting programs, which are accounted for in the 2020 total waste estimates. This program has been quite successful at increasing waste diversion from landfilling to recycling since its inception in 2006; the County successfully diverted 112,846 tons of waste in fiscal year 2007-2008 fiscal year. By 2020 the CSDSP program will divert an estimated 11 percent of waste arriving at County landfills each year, increasing the current per capita diversion rate from 49 percent to approximately 54.5 percent.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Projected diversion rates grow at a rate of 1.02 percent annually.
- In 2020, 100 percent of new waste will be disposed of in landfills with methane recovery systems (after Measures R2W1-INT through R2W3-INT have been implemented).
- Measures R2W1-INT through R2W3-INT have been implemented.

As described above, only emission reductions directly attributed to waste diversion from landfills are considered for reduction potential in the County's internal operations inventory. These emission reductions for the County's CSDSP are equivalent to 13,137 MTCO₂e in 2020. However, after implementation of measures R2W1 through R2W3, 100 percent of new waste will be disposed of in landfills with methane recovery systems. This results in additional reductions of 13,253 MTCO₂e in 2020. This measure will result in a 8 percent reduction from 2020 unmitigated landfill emissions.

For informational purposes, WARM was used to evaluate total lifecycle emissions associated with this measure. WARM was used to calculate GHG emissions of baseline and alternative waste management practices associated with the CSDSP, including recycling and composting, with San Bernardino County-specific waste disposal totals and appropriate assumptions regarding collection efficiency. Waste disposal categories for San Bernardino County provided by the California Integrated Waste Management Board (CIWMB) in 1999 (CIWMB 1999). The lifecycle reductions associated with the CSDSP program are estimated at 452,508 MTCO₂e for the year 2020. Because many of the processes associated with the waste emissions are not in San Bernardino County and/or are not under County control, the full lifecycle emissions reductions were not counted in the CSDSP reduction measure.

R2W5-INT: Construction and Demolition Debris Diversion

Under AB2176, § 42911, a local agency shall not issue a building permit to a development project unless the development project provides adequate areas for collecting and loading

recyclable materials and ensures a minimum diversion of 50 percent of construction and building materials and demolition debris from landfills. In San Bernardino County, existing construction and demolition (C&D) is currently permitted on a case by case basis. Building permits are issued conditionally based on the C&D recycling and waste management plan. Under this plan, a minimum estimate of 50 percent diversion is required as is a detailed diversion plan with the waste hauler identified and a plan verification before every permit is issued. The County could further reduce emissions from construction and demolition waste by increasing the diversion requirements.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Starting in 2009, diversion increases by one (1) percent per year to reach ten (10) percent total diversion in 2020.
- The ten (10) percent C&D diversion target is constant in 2020.
- C&D accounts for approximately 8.5 percent of San Bernardino County's average waste composition⁶².
- On average, the County currently meets the 50 percent requirement for C&D.
- In 2020, 100 percent of waste will be disposed of in landfills with methane recovery systems.
- Measures R2W1 through R2W4 have been implemented.

Diverting an extra ten (10) percent of this C&D waste would result in a reduction of 295 MTCO₂e in 2020. This measure will result in a 0.08 percent reduction from 2020 unmitigated landfill emissions.

For reference, lifecycle emissions were calculated with WARM, using the same methodology and assumptions described for prior measures. Reduction of the full lifecycle emissions would result in a reduction of 64,199 MTCO₂e in 2020.

R2W6-INT: County Diversion Program: 75 percent Diversion Goal for Unincorporated County-Generated Waste

This measure involves the County's commitment to strengthen its Diversion Program to reach a goal of 75 percent of waste diverted to recycling programs by 2020 through the implementation of one or more of the following measures:

- Expand current waste reduction and recycling plans, including outreach and education programs.
- Encourage businesses in the County to adopt a voluntary procurement standard prioritizing products that have less packaging or are re-usable, recyclable, or compostable; support policies at the State level that provide incentives for efficient product design and for reduced product and packaging waste.
- Provide waste audits.
- Make recycling and composting mandatory at public events.
- For new development, require the use of salvaged and recycled-content materials and other materials that have low production energy costs for building materials, hard surfaces, and

⁶² California Integrated Waste Management Board 2007.

non-plant landscaping. Require sourcing of construction materials locally, as feasible. Encourage the use of cement substitutes and recycled building materials for new construction.

- Research, evaluate, and report on best practices, innovations, trends, and developments in waste reduction practices, as relevant to GHG emissions reduction.

It is estimated that the County could achieve a 75 percent diversion rate by 2020, which would be an increase of approximately 25 percent from diversion measures currently underway (i.e., measures R2W3-INT and R2W4-INT). The County is faced with unique challenges regarding waste diversion targets due to the rural nature of its populated areas and its socioeconomic conditions. Many of the small population centers are spread over a large geographical area in the County. In addition, illegal dumping at landfills has been a problem in the past, and it is anticipated that increasing tipping fees to help achieve the waste diversion goal could also increase the rate of illegal dumping. Given these challenges, the County will need to further assess the feasibility of achieving the 75 percent diversion goal by 2020.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Starting in 2009, diversion increases by two (2) percent per year to reach 75 percent total diversion in 2020.
- In 2020, 100 percent of new waste will be disposed of in landfills with methane recovery systems
- Measures R2W1-INT through R2W5-INT have been implemented.
- An additional cumulative 25 percent increase in diversion to achieve a 2020 total diversion goal of 75 percent would result in an additional reduction of 4,118 MTCO₂e in 2020. This measure will result in a 1 percent reduction from 2020 unmitigated landfill emissions.
- These estimates do not include reduction in life cycle emissions. For reference, lifecycle emissions were calculated with WARM, using the same methodology and assumptions described for prior measures. Reduction of the full lifecycle emissions would result in a total reduction of 313,514 MTCO₂e in 2020.

R2W7-INT: City Diversion Program: 75 percent Diversion Goal for Incorporated County-Generated Waste

The incorporated areas of the County currently divert approximately 55 percent of generated waste. This measure would result in increasing that diversion percentage to 75 percent. The County will continue to work with the various cities in the County to implement programs to reduce waste generation and increase waste diversion. Programs that can be implemented to achieve this goal are outlined under measure R2W6.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Starting in 2009, diversion increases by approximately two (2) percent per year to reach 75 percent total diversion in 2020.
- Approximately 94 percent of waste disposed of by the incorporated areas of the County is landfilled within County borders; consequently, 94 percent of emission reductions will

occur inside the County, and six (6) percent will occur outside⁶³.

- The percentage waste disposal at sites with methane capture in the incorporated County is equal to that for the unincorporated County: 100 percent of new waste will be disposed of in landfills with methane capture.
- Measures R2W1-INT through R2W6-INT have been implemented.
- An additional cumulative 20 percent increase in diversion to achieve a 2020 total diversion goal of 75 percent for the incorporated County would result in an additional reduction of 32,692 MTCO₂e in 2020. This measure will result in a 9 percent reduction from 2020 unmitigated landfill emissions.

R3 Waste Measures

The following list of R3 measures includes all additional measures that were not relied upon to demonstrate achievement of the proposed County 2020 emissions target. These measures are either facilitative in nature or there are methodological issues that prevent their quantification at this time.

R3W1-INT: Install Methane Capture Systems at all Landfills with 250,000 or more Tons of WIP

The County will explore the feasibility of installing methane recovery systems at all landfills with 250,000 or more tons of WIP. The County will also explore the feasibility of providing technical support to encourage the installation of methane recovery systems at private landfills within the County. This includes the following County-owned and private landfills:

- Apple Valley (closed/County)
- Big Bear (closed/County)
- Hesperia (closed/County)
- Yucaipa (closed/County)
- Mitsubishi Cement Plant Cushenbury (active/private)

A cost and technology feasibility study must be performed to determine the potential methane capture and destruction rates for any methane controls installed at these landfills. This study is necessary to determine the feasibility of installing methane control technology, and the maximum possible methane recovery rate achievable at each landfill. It is possible that methane capture and destruction at these landfills is not feasible because smaller landfills are typically remote, have no power supply, and produce poor gas. The systems may need to run off of a generator and methane flares would likely require additional gas to ensure flare operation and methane destruction.

The following assumptions were used to calculate emission reductions attributed to this measure:

- Each methane control system has an efficiency of 75 percent.

This measure could result in an additional reduction of 14,995 MTCO₂e in 2020 and a 4 percent reduction from 2020 unmitigated landfill emissions.

⁶³ California Integrated Waste Management Board 1999.

Reductions associated with this measure have not been included in the reduction plan because this measure has not been analyzed for cost-effectiveness. In addition, the County does not have jurisdiction to install a methane recovery system at Mitsubishi Cement Plant Landfill but could provide technical support to this landfill owner.

R3W2-INT: Financing Mechanisms and Opportunities

The County will pursue all appropriate all grant opportunities to help finance the installation of methane recovery systems and controls, the enhancement of waste diversion programs and public education programs focused on waste stream issues.

While grant funding is an essential strategy to funding reductions, it does not in and of itself result in actual reductions. Thus, no quantification of this measure was completed.

R3W3-INT: Waste Education Program

This measure involves providing public education and publicity about commercial and residential recycling, waste reduction, composting, grass cycling, and waste prevention. This measure would educate the local population about waste management and waste reduction options applicable to both residential and commercial settings. Although the County currently offers community education programs designed to assist residents with waste reduction, recycling and reuse activities, this measure would expand the County's current programs.

This measure is not expected to result in additional emission reductions beyond those already claimed in R2W7-INT, because education programs are relied upon to achieve the 75 percent diversion goal.

R3W4-INT: Additional Landfill Methane Controls

The County's Municipal Solid Waste Department is currently in the process of assessing the feasibility of installing additional methane capture systems. The following actions are being considered that could further reduce methane emissions from landfills in the County:

- Use landfill gas extraction system, surface sampling, gas migration probe, and other available to data to get an accurate representation of methane generation at San Bernardino County landfills. This information could be used to accomplish the following:
 - ❑ Develop a GHG emission site priority list.
 - ❑ Develop strategies based on site priorities.
 - ❑ Install additional gas extraction wells as necessary in existing systems.
 - ❑ Pursue low tech solution at remote sites that do not have a power source.
- Pursue further study of the chemical reactions of methane gas attenuation as it migrates through the cover soils at each landfill, and develop low power methods for improving these reactions.
- Work with other agencies that are studying GHG emissions from landfills and develop partnerships where information and approaches are shared.
- Further develop waste disposal alternatives such as recycling, waste-to-energy, aerobic digestion of organic materials, and other actions.

Additional landfill methane controls are still being considered. At present, the specific controls have not been determined. Thus, no quantification of this measure was completed. As additional controls are implemented, the County intends to quantify their effectiveness in future GHG inventories.

R3W5-INT: Landfill Gas to Energy Projects

The County's Municipal Solid Waste Department currently has Landfill Gas to Energy (LFGE) Projects at the Colton, Mid Valley, and Milliken landfills. These projects have the capacity to generate a combined six (6) MW of renewable electricity, and it is estimated that they have produced over 220 MWh of electricity in the first five (5) years of their operation (all three projects came online in 2003). These projects are funded by the California Energy Commission's Renewable Energy Program. The LFGE projects sell their electricity to Southern California Edison (SCE), where it is distributed throughout the County. This electricity is part of SCE's renewable power portfolio and is therefore already incorporated into the indirect emissions associated with electricity consumption included in this inventory. Consequently, emission reductions directly attributed to offsets in non-renewable energy resulting from these projects have not been included in this emission reduction plan. However, methane captured and combusted to produce electricity has been subtracted from the landfill emissions presented in this inventory.

The County will consider pursuing additional LFGE projects at other landfills where the projects are cost-effective and technologically feasible. Through this measure, these projects would increase the renewable electricity available in the County, reduce GHG emissions associated with non-renewable electricity use, and reduce methane emissions that would otherwise be released into the atmosphere.

Additional LFGE efforts are still under consideration. Thus, no quantification of this measure was completed. As additional LFGE efforts are implemented, the County intends to quantify their effectiveness in future GHG inventories.

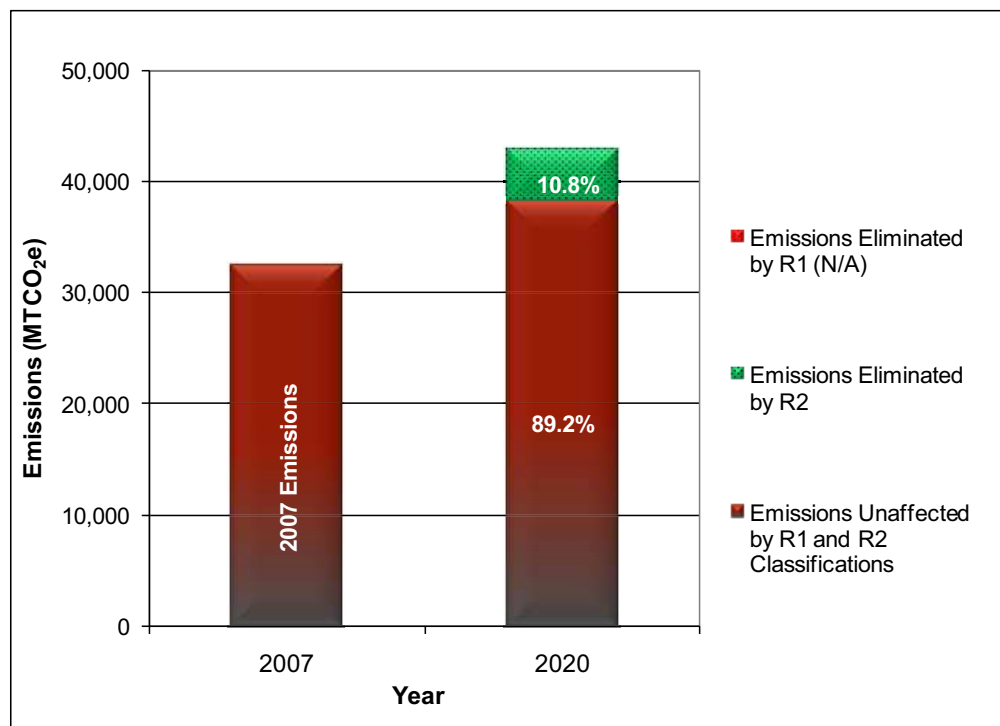
Employee Commute

This section describes the methodology used to calculate GHG emission reductions related to R2 for employee commute for the County. Total reductions from all employee commute measures are shown in **Table B-18**. The total reduction attributable to these measures is 4,651 MTCO₂e, an 11 percent reduction in total 2020 unmitigated employee commute emissions.

Table B-18. Internal GHG Emission Reductions from Employee Commute Measures

Reduction Classification and Reduction Measure	GHG Reductions (MTCO ₂ e)	
	Emission Reduction from 2020 Unmitigated	Percent Reduction from 2020 Unmitigated
R1: Existing and proposed state employee commute measures that do not require County action		
N/A		
R2: Existing and new employee commute measures that require County action		
R2EC1-INT: Expand Vanpool Program	2,201	5.1
R2EC2-INT: Increase the Use of Ridesharing as an Alternative to Single Occupancy Driving	860	2.0
R2EC3-INT: Increase Bicycling and Walking	753	1.8
R2EC4-INT: Increase the Use of Public Transit as an Alternative to Driving	138	0.3
R2EC5-INT: Increase Use of Clean Air Vehicles	699	1.6
Total	4,651	10.8
R3: Existing and new employee commute measures—reductions not quantified or relied upon to achieve reduction goal		
R3EC1-INT: Telecommuting, compressed Work Week		

Figure B-11. Internal GHG Emission Reductions from Employee Commute Measures



With the implementation of the Employee Commute measures included in this Plan, the County will reduce employee commute by 11 percent emissions (all due to R2 measures) from 2020 unmitigated projections. The reduction that will result from R1 measures related to vehicle standards are evaluated and calculated in Appendix A.

R1 Employee Commute Measures

There are currently no R1 measures that were evaluated for employee commute, since potential federal, state, or regional measures relate to vehicle standards and are captured separately in an evaluation of external passenger vehicle emissions.

R2 Employee Commute Measures

This section describes the existing or new County emissions reduction measures that will result in GHG reductions relating to employee commute, which will require County action. The description of each measure is followed by the percent reduction in GHG from the 2020 unmitigated emission inventory. A description of each measure is followed by the resulting GHG reductions.

All quantifiable GHG reduction options available to the County have been included under R2 since each of these reduction opportunities requires County action. Measures R2EC1-INT through R2EC4-INT below are based on reductions achieved through implementation of commuter-based programs involving ridesharing, carpooling, mass transit, and alternative modes of transportation. Assumptions listed below refer to emissions reductions for 2020.

R2EC1-INT: Expand Vanpool Program

This measure requires strengthening and expanding the County's current vanpool programs. In 2007, the County operated over 25 vanpools. According to a study of Los Angeles area employee commute trip reduction programs, the most effective strategy to reduce employee vehicle trips is to offer financial incentives to employees, such as vanpool fare subsidies.⁶⁴ Other ways to expand the vanpool programs include adding additional vanpools, expanding the number of work sites where the vanpools operate, offering greater flexibility in vanpool scheduling (i.e., allowing commuters to vanpool on the week days of their choice or allowing unscheduled use of vanpools), implementing vanpool education and rewards programs, and offering premium quality vanpool service options (such as high-quality vans, workstations, complimentary newspapers, drinks, etc.).⁶⁵

GHG emission reductions associated with this measure are based on a study of 1,110 Los Angeles area employee commute trip reduction programs. Since the majority of these programs are within Los Angeles County, the effectiveness of these measures was adjusted to be applicable to San Bernardino County based on commute statistics for each county.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The effectiveness of this measure is estimated to be 131 percent of that reported for Los Angeles County, due to the higher rate of workers carpooling in San Bernardino County (in 2000, Los Angeles County had an 11 percent carpool/vanpool rate while San Bernardino County had a 14 percent carpool/vanpool rate).⁶⁶

⁶⁴ Cambridge Systematics 1994.

⁶⁵ Victoria Transport Policy Institute 2008.

⁶⁶ U.S. Census Bureau 2007.

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- This measure would result in a 7.1 percent reduction in drive-alone work trips (scaled up from 5.4 percent for Los Angeles).

This measure results in a 5 percent reduction of 2020 unmitigated employee commute emissions.

R2EC2-INT: Increase the Use of Ridesharing as an Alternative to Single Occupancy Driving

This measure requires creating new or strengthening existing rideshare and carpool programs. According to a study of Los Angeles area employee commute trip reduction programs, the most effective strategy to reduce employee vehicle trips is to offer financial incentives to employees.⁶⁷ This measure could be implemented through rideshare incentives such as gas cards, carpool awards, educational seminars, commuter-choice programs, commuter-tax benefits, guaranteed ride-home programs, commuter assistance and outreach, and parking incentives. Other reductions in VMT and commute trips could be obtained through encouragement of telecommuting and compressed work weeks.

GHG emission reductions associated with this measure are based on a study of 1,110 Los Angeles area employee commute trip reduction programs. Since the majority of these programs are within Los Angeles County, the effectiveness of these measures was adjusted to be applicable to San Bernardino County based on commute statistics for each county.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The effectiveness this measure is estimated to be 85 percent of that reported for Los Angeles County, due to the lower rate of workers using alternative modes of transportation in San Bernardino County (in 2000, 23 percent of workers in Los Angeles County took public transit, carpooled, or walked/biked while 20 percent of workers in San Bernardino County did the same).⁶⁸
- This measure would result in a 3.5 percent reduction in drive-alone work trips (scaled down from 4.1 percent for Los Angeles).

This measure results in a two (2) percent reduction of 2020 unmitigated employee commute emissions.

R2EC3-INT: Increase Bicycling and Walking

This measure requires creating walking and bicycling incentives. According to a study of Los Angeles area employee commute trip reduction programs, the most effective strategy to reduce employee vehicle trips is to offer financial incentives to employees.⁶⁹ Biking/walking incentives can include “bike-to-work week,” monetary awards, bicycle parking and storage, marketing promotion, and parking incentives. The County can further encourage bicycling and walking by creating education programs, cycling maps, and reimbursing employee cycling mileage expenses.

GHG emission reductions associated with this measure are based on a study of 1,110 Los Angeles area employee commute trip reduction programs. Since the majority of these programs are within Los Angeles County, the effectiveness of these measures was adjusted to be applicable to San Bernardino County based on commute statistics for each county.

The following assumptions were used to calculate emission reductions attributed to this measure:

⁶⁷ Cambridge Systematics 1994.

⁶⁸ U.S. Census Bureau 2007.

⁶⁹ Cambridge Systematics 1994.

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- The effectiveness this measure is estimated to be 80 percent of that reported for Los Angeles County, due to the lower rate of workers walking or biking in San Bernardino County (in 2000, Los Angeles County had a 5 percent walking/biking rate while San Bernardino County had a 4 percent walking/biking rate).⁷⁰
 - This measure would result in a 2.1 percent reduction in drive-alone work trips (scaled down from 2.7 percent for Los Angeles).

This measure results in a two (2) percent reduction of 2020 unmitigated employee commute emissions.

R2EC4-INT: Increase the Use of Public Transit as an Alternative to Driving

This measure requires creating new or strengthening existing public transit incentives. According to a study of Los Angeles area employee commute trip reduction programs, the most effective strategy to reduce employee vehicle trips is to offer financial incentives to employees.⁷¹ Incentives include bus/rail/vanpool subsidies, free transit passes, parking incentives, commuter assistance and outreach, and marketing promotion. The County can further encourage transit use by improving rider information and education, creating park-and-ride facilities, providing transit maps and guides, and providing transit pass discounts.

GHG emission reductions associated with this measure are based on a study of 1,110 Los Angeles area employee commute trip reduction programs. Since the majority of these programs are within Los Angeles County, the effectiveness of these measures was adjusted to be applicable to San Bernardino County based on commute statistics for each county.

The following assumptions were used to calculate emission reductions attributed to this measure:

- The effectiveness this measure is estimated to be 20 percent of that reported for Los Angeles County, due to the lower rate of workers using mass transit in San Bernardino County (in 2000, Los Angeles County had a 7 percent transit use rate while San Bernardino County had a 1.5 percent transit use rate).⁷²
- This measure would result in a 0.6 percent reduction in drive-alone work trips (scaled down from 3.1 percent for Los Angeles).

This measure results in a 0.3 percent reduction of 2020 unmitigated employee commute emissions.

R2EC5-INT: Increase Use of Clean Air Vehicles

This measure requires implementing commuter assistance, outreach, and educational programs focused on encouraging employees to purchase hybrids and alternative fueled vehicles, and implementing parking incentives and marketing promotion. It would also require developing electric vehicle charging stations at County facilities to encourage use of plug-in hybrids and electric vehicles.

The following assumptions were used to calculate emission reductions attributed to this measure:

- It was assumed that a two (2) percent improvement in total commuter vehicle efficiency

⁷⁰ U.S. Census Bureau 2007.

⁷¹ Cambridge Systematics 1994.

⁷² U.S. Census Bureau 2007.

would occur.⁷³

- Measures R2EC1-INT through R2EC4-INT have been implemented.

This measure results in a 2 percent reduction of 2020 unmitigated employee commute emissions.

R3 Employee Commute Measures

This section describes R3 measures for Fleet/Fuel that were not quantified or relied upon to achieve the County's 2020 reduction target.

R3EC1-INT: Telecommuting, compressed work week.

This measure involves the County efforts to reduce emissions by encouraging telecommuting, compressed work weeks, and off-peak work hours, where appropriate.

At this time, the exact employee participant rates in the various components of this measure are unknown. Thus, no quantification of this measure was completed. Future inventories should capture the success in both R2 and R3 commute measures.

R3EC2-INT: County Commuter Services Program

The County's Human Resources Department has operated and will continue to operate an active and effective Commuter Services Program to encourage, coordinate, and reward alternative commuting for more than two decades. The County's Commuter Services Program provides employees with tools to find a carpool partner or vanpool, tips on bicycle commuting, and information on transit. Nearly 4,000 County employees take advantage of this program and enjoy the benefits of alternative commuting.

The exact amount of participation in this County program in the future is not known at this time and thus the amount of potential new GHG emissions reductions for this measure was not quantified.

Carbon Sequestration Measures

This section describes reduction measures related to Carbon Sequestration. These measures are classified as R3 measures and they were not quantified or relied upon to achieve the County's reduction target. These measures are either facilitative in nature or there are methodological issues that prevent their quantification at this time.

Carbon Sequestration – R3 County Measures

R3CS1-INT: Tree Management

The County will maintain and increase its tree inventory, and coordinate tree maintenance responsibilities with all responsible departments, consistent with best management practices.

The precise amount and type of new tree planting has not been determined at this time and thus no quantification of this measure has been completed at this time.

R3CS2-INT: Landscaping

The County will evaluate existing landscaping and options to convert reflective and impervious surfaces to landscaping and will install or replace vegetation with drought-tolerant, low

⁷³ San Francisco Department of the Environment 2004.

maintenance native species or edible landscaping that can also provide shade and reduce heat-island effects.

The precise amount of landscaping replacement has not been determined at this time and thus no quantification of this measure has been completed at this time.

List of Preparers

This analysis was a collaborative effort of San Bernardino County, ICF International and PBS &J. The key personnel involved are noted below.

ICF International

Working with the County, ICF developed the Internal GHG emissions inventory, forecasting, and quantification of reduction measures presented in this appendix. The following ICF personal were involved in this analysis.

- Rich Walter, Project Director
- Rebecca Rosen, Technical Director
- Tony Held, Senior Reviewer
- Brian Schuster, Lead Technical Analyst
- Phil Groth, Building Energy Analyst
- Aaron Burdick, Building Energy Analyst
- Carrah Bullock, Technical Analyst
- John Durnan, Graphic Artist
- Ralph Torrie, Former Project Director

San Bernardino County

San Bernardino County staff provided direction on the overall program, input on current County programs, and data for the GHG inventory. Multiple County departments were also involved in the development and evaluation of the GHG emissions reduction program. The following County staff and consultants were the primary staff involved in this effort for the County:

- Jim Squire, Assistant Director, Land Use Services Department
- Doug Feremenga, Project Manager
- Chris Warrick, Senior Planner
- Robin Cochran, Deputy County Counsel
- Randy Scott, Consultant to the County
- Michael Hendrix, Atkins, Consultant to the County
- Julie Rynerson-Rock, Former Land Use Services Director

However, this analysis could not have been completed without the many contributions of staff in County departments including the following:

- Land Use Services Department,
- Fleet Management Department

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- Waste Management Department,
 - Facilities Management Department,
 - Public Works Department/Flood Control District,
 - County Sheriff's Department,
 - County Fire Department,
 - Special Districts Department,
 - Regional Parks Department,
 - Human Resources Department, and the
 - Chief Administrator's office.

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APPENDIX C

RELEVANT (EXISTING) SAN BERNARDINO COUNTY GENERAL PLAN POLICIES

Ref #	Proposed Measures	Relevant (Existing) San Bernardino County General Plan Policies
ENERGY EFFICIENCY AND RENEWABLE ENERGY		
R2E1 R2E2 R2E3 R2E4 R2E5 R2E6 R2E7 R2E8 R2E9 R2E10 R3E1 R3E2 R3E3 R3E4 R3E8 R3E9 R3E10 R3E11 R3E12 R3E13 R3E14 R3E15	Green Building	<p>CO 8.5 There are unique climatic and geographic opportunities for energy conservation and small-scale alternative energy systems in each of the County's three geographic regions; therefore, the County shall:</p> <ol style="list-style-type: none"> a. Implement land use and building controls and incentives to ensure energy-efficient standards in new developments that comply with California energy regulations as minimum requirements. b. Quantify local climate variations and in each climatic region require energy conservation systems in new construction. c. Fully enforce all existing residential and commercial California Energy Commission energy conservation standards. <p>CO 8.6 Fossil-fuels combustion contributes to poor air quality. Therefore, alternative energy production and conservation will be required, as follows:</p> <ol style="list-style-type: none"> a. New developments will be encouraged to incorporate the most energy-efficient technologies that reduce energy waste by weatherization, insulation, efficient appliances, solar energy systems, reduced energy demand, efficient space cooling and heating, water heating, and electricity generation. b. All new subdivisions for which a tentative map is required will provide, to the extent feasible, for future natural heating or cooling opportunities in the subdivision. This can be accomplished by design of lot size and configuration for heating or cooling from solar exposure or shade and breezes, respectively. <p>H 2.10 Encourage the use of energy conservation features in residential construction, remodeling, and existing homes.</p> <p>Programs:</p> <p>CO 8.8 Promote energy-efficient design features, including appropriate site orientation, use of lighter-color roofing and building materials, and use of deciduous shade trees and windbreak trees to reduce fuel consumption for heating and cooling.</p>
R3E1 R3E2 R3E4	Green Building Facilitation, Streamlining, and Training	<p>See policies above such as CO 8.6, CO 8.8, and H2.10 that promote energy-efficiency measures.</p>
R2E1	Community Building	<p>H 2.9 Continue the Insulation and Weatherization Program for eligible households.</p>

Ref #	Proposed Measures	Relevant (Existing) San Bernardino County General Plan Policies
	<p>Energy Efficiency and Conservation for Existing Buildings</p>	<p>Programs: Provide labor and materials to insulate and weatherize the homes of eligible low-income households.</p> <p>H 2.10 Encourage the use of energy conservation features in residential construction, remodeling, and existing homes.</p> <p>Programs: Help publicize energy conservation opportunities Southern California Edison offers, such as replacing old refrigerators, weatherproofing, energy-efficient lighting, cooling (evaporating coolers), and interruptible service.</p> <p>CO 8.9 Promote the use of automated time clocks or occupant sensors to control central heating and air conditioning.</p>
R3E4	<p>Energy Efficiency Financing</p>	<p>H 2.9 Continue the Insulation and Weatherization Program for eligible households.</p> <p>Programs: Provide labor and materials to insulate and weatherize the homes of eligible low-income households.</p> <p>CO 4.5 Reduce emissions through reduced energy consumption.</p> <p>Programs: Implement programs to phase in energy conservation improvements through the annual budget process.</p>
R3E5	<p>Heat Island Mitigation Plan</p>	<p>CO 8.5 There are unique climatic and geographic opportunities for energy conservation and small-scale alternative energy systems in each of the County's three geographic regions; therefore, the County shall:</p> <ul style="list-style-type: none"> a. Implement land use and building controls and incentives to ensure energy-efficient standards in new developments that comply with California energy regulations as minimum requirements. b. Quantify local climate variations and in each climatic region require energy conservation systems in new construction. c. Fully enforce all existing residential and commercial California Energy Commission energy conservation standards. <p>CO 8.8 Promote energy-efficient design features, including appropriate site orientation, use of lighter-color roofing and building materials, and use of deciduous shade trees and windbreak trees to reduce fuel consumption for heating and cooling.</p>
R3E2 R3E6	<p>Public Education</p>	<p>H 2.10 Encourage the use of energy conservation features in residential construction, remodeling, and existing homes.</p> <p>Programs: Help publicize energy conservation opportunities Southern California Edison offers, such as replacing old refrigerators, weatherproofing, energy-efficient lighting, cooling (evaporating coolers), and interruptible service.</p>

Ref #	Proposed Measures	Relevant (Existing) San Bernardino County General Plan Policies
R3E8	<p>Community Alternative Energy Development Plan</p>	<p>CO 8.2 Conserve energy and minimize peak-load demands through the efficient production, distribution, and use of energy.</p> <p>Programs: The County will promote the education of its residents about utility energy conservation programs, including the California Energy Commission 20/20 Housing Advisory Commission recycling program, White Roof, and Solar Roof Initiatives.</p> <p>CO 8.3 Assist in efforts to develop alternative energy technologies that have minimum adverse effects on the environment, and explore and promote new opportunities for the use of alternative energy sources.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. Encourage and assist in the location of manure recycling and energy conversion operations. 2. To reduce future demand on energy sources, all new subdivisions for which a tentative map is required will provide, to the extent feasible, for future natural heating or cooling opportunities in the subdivision. 3. For all new subdivisions for which a tentative map is required, a condition of approval will be the dedication of easements across adjacent parcels or units for the purpose of ensuring access to solar energy. 4. Encourage methanol production from biomass, wastes, natural gas, or coal to provide a cleaner substitute liquid fuel for automobiles, trucks, and electric generators. 5. All County facilities, actions, and policies will provide good examples of the best available technologies and methods for minimizing energy consumption and waste.
R3E9	<p>Renewable Energy and Transmission Siting</p>	<p>CO 4.12 Provide incentives to promote siting or use of clean-air technologies (such as fuel-cell technologies, renewable energy sources, ultraviolet coatings, and hydrogen fuel).</p> <p>CO 8.1 Maximize the beneficial effects and minimize the adverse effects associated with siting major energy facilities. The County will site energy facilities equitably to minimize net energy use and consumption of natural resources, and avoid inappropriately burdening certain communities. Energy planning should conserve energy and reduce peak-load demands, reduce natural resource consumption, minimize environmental impacts, and treat local communities fairly in providing energy efficiency programs and siting energy facilities.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. Monitor federal and state activity, including their review of proposed facilities, new legislation, new funding sources, and technological advances in the energy and telecommunications fields. 2. Develop a system to provide energy providers with detailed information of proposed residential, commercial, and industrial

Ref #	Proposed Measures	Relevant (Existing) San Bernardino County General Plan Policies
		<p>developments as early as possible so that all necessary permits can be obtained and schedules met.</p> <ol style="list-style-type: none"> 3. Require undergrounding of new and existing transmission lines when feasible. 4. Assist in the development and use of new designs for major transmission line towers that are aesthetically compatible with the environment from a close viewing distance. 5. Because land uses adjacent to utility corridors must be compatible, the County will approve only those secondary uses within corridors that are compatible with adjacent land uses. 6. Include the location of underground pipelines and the type of fuel being carried in the pipelines on the Infrastructure Maps. 7. The County shall consult with the major electric utilities regarding the location of undergrounding of new and existing transmission lines, and consider the undergrounding of distribution lines when feasible and as determined by California state regulatory processes. 8. The County shall consult with electric utilities during planning of construction of their major transmission line towers to ensure that they are aesthetically compatible with the surrounding environment. <p>CO 9.2 The County will work with utilities and generators to maximize the benefits and minimize the impacts associated with siting major energy facilities. It will be the goal of the County to site generation facilities close to end-users to minimize net energy use and natural-resource consumption, and avoid inappropriately burdening certain communities.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. Monitor federal and state activity, including their review of proposed facilities, new legislation, new funding sources and technological advances in the energy and telecommunications fields. 2. Develop a system to provide affected communities with detailed information about proposed facilities as early as possible. 3. The County will consult with the major electric utilities regarding the undergrounding of new and existing transmission lines when feasible and as determined by California state regulatory processes. 4. The County will consult with electric utilities during the construction of their major transmission-line towers to ensure that they are aesthetically compatible with the surrounding environment. 5. Because land uses adjacent to utility corridors must be compatible, the County will approve only those secondary land uses within corridors that are compatible with adjacent land uses. 6. Include the locations of underground pipelines and the types of fuels being carried in the pipelines on the Infrastructure Maps.
R3E10	<p>Remove Barriers to Renewable Energy Development</p>	<p>CO 8.3 Assist in efforts to develop alternative energy technologies that have minimum adverse effects on the environment, and explore and promote new opportunities for the use of alternative energy sources.</p> <p>Programs: All County facilities, actions, and policies will provide good examples of the best available technologies and methods for minimizing</p>

Ref #	Proposed Measures	Relevant (Existing) San Bernardino County General Plan Policies
R2E3 R2E4 R2E8 R2E9 R2E10 R3E12	Residential/Commercial Renewable Energy Program	<p>energy consumption and waste.</p> <p>CO 8.3 Assist in efforts to develop alternative energy technologies that have minimum adverse effects on the environment, and explore and promote new opportunities for the use of alternative energy sources.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. For all new subdivisions for which a tentative map is required, a condition of approval will be the dedication of easements across adjacent parcels or units for the purpose of ensuring access to solar energy. 2. All County facilities, actions, and policies will provide good examples of the best available technologies and methods for minimizing energy consumption and waste.
R3E12	Renewable Energy Financing	<p>CO 8.3 Assist in efforts to develop alternative energy technologies that have minimum adverse effects on the environment, and explore and promote new opportunities for the use of alternative energy sources.</p>
R3E13	Regional Renewable Energy Collaboration	<p>CO 8.2 Conserve energy and minimize peak-load demands through the efficient production, distribution, and use of energy.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. Work with other governmental agencies, utility companies, and the private sector to achieve energy conservation and the use of alternative energy resources and technologies. 2. Actively participate and represent the County in the development and implementation of standards and regulations under the jurisdiction of the State of California and the Federal Government. <p>CO 8.3 Assist in efforts to develop alternative energy technologies that have minimum adverse effects on the environment, and explore and promote new opportunities for the use of alternative energy sources.</p>

WASTE MEASURES	
<p>R2W4 R2W5 R2W6 R2W7 R3W1</p>	<p>Waste Minimization and Diversion</p> <p>CO 8.7 Utilize source reduction, recycling and other appropriate measures to reduce the amount of solid waste disposed of in landfills.</p> <p>CI 14.1 Utilize a variety of feasible processes, including source reduction, transfer, recycling, land filling, composting, and resource recovery, to achieve an integrated and balanced approach to solid-waste management.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. Seek federal and state funds for projects utilizing resource and material recovery processes. 2. Participate in resource and material recovery studies. 3. Continue recycling operations at County landfills; and expand recycling operations to other landfills or resource recovery facilities. <p>CI 14.2 Explore the feasibility and environmental impacts of reopening inactive landfills where there is useful capacity remaining.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. Develop and implement methods to reduce the amount of wood and yard wastes being placed in landfills. 2. Assist the private sector wherever possible with developing methods for the reuse of inert materials (concrete, asphalt, and other building-material wastes) that use valuable landfill space. 3. Establish recycling programs; including those for household hazardous waste. 4. Limit or restrict incompatible land uses that might encroach waste-disposal facilities. 5. Continue to map the precise locations of all waste sites (existing, inactive, and closed) on the County's automated mapping system and create a database with information about air, soil, and water contamination and the types of wastes disposed of at each site. 6. Seek public involvement in the development of regional solid waste management recommendations. 7. Coordinate with cities and other affected agencies in seeking additional disposal capacity.

<p>R2W1 R2W2 R2W3 R3W3 R3W4 R3W5</p>	<p>Reduce Methane Emissions</p>	<p>CI 14.1 Utilize a variety of feasible processes, including source reduction, transfer, recycling, land filling, composting, and resource recovery to achieve an integrated and balanced approach to solid waste management.</p> <p>Programs: 1. Seek federal and state funds for projects utilizing resource and material recovery processes. 2. Participate in resource and material recovery studies.</p> <p>CO 8.3 Assist with efforts to develop alternative energy technologies that have minimum adverse effects on the environment, and explore and promote new opportunities for the use of alternative energy sources.</p> <p>Programs: 1. Encourage and assist with the location of manure recycling and energy conversion operations. 2. Encourage methanol production from biomass, wastes, natural gas, or coal to provide a cleaner substitute liquid fuel for automobiles, trucks, and electric generators. 3. All County facilities, actions, and policies will provide good examples of the best available technologies and methods for minimizing energy consumption and waste.</p>
<p>R3W3</p>	<p>Waste Minimization Public Education and Outreach</p>	<p>CI 14.4 Initiate educational and other programs to reduce waste generation, increase diversion of solid waste away from landfills, promote recycling, and identify new facilities for waste disposal in the County.</p> <p>D/CI 3.2 To discourage indiscriminate dumping in various areas in the desert, the County Solid Waste Management Division shall continue to provide educational programs regarding locations, days and hours of operation, recycling, free dump days, and other useful information that will keep the public informed about proper solid waste disposal and locations for household hazardous waste drop-off facilities.</p>
<p>WATER MEASURES</p>		
<p>R3WC1 R3WC2 R3WC3 R3WC4</p>	<p>Water Conservation</p>	<p>CI 11.9 Encourage water conservation, replenishment programs, and water sources in areas that have difficulty obtaining timely or economical water service from existing potential suppliers, or that have water quality or quantity problems.</p> <p>D/CI 3.1 The County Land Use Services Department shall promote water and soil conservation through a variety of measures: a. Require native and drought tolerant landscaping or xeriscape to reduce watering needs, or retain native vegetation; b. Promote use of water-efficient irrigation practices for all landscaped areas; c. Minimize use of irrigated landscape areas in commercial landscapes; encourage soil conservation methods for weed abatement that also limit fugitive dust. d. Provide educational materials regarding native desert plant protection ordinances and protected wildlife.</p>

		<p>D/CI 3.4 Where Commercial/Industrial/Multiple Family Residential uses are required through the Conditional Use Permit process to have landscaped areas, the following standards shall apply:</p> <ul style="list-style-type: none"> a. Landscaping will consist of native or drought-tolerant plants capable of surviving the desert environment and climate with a minimum of maintenance and supplemental watering. The use of turf shall be minimized. A list of plants determined capable of meeting these criteria is available. Other plants may be considered on their merits in meeting these criteria. Determination of plant species suitability will be made upon submission of project plans. b. A maximum of 10 percent of the project parcel shall be retained in planted landscaped areas in the interest of water conservation. Additional areas may include natural undeveloped and undisturbed areas that have sufficient native or compatible vegetation to promote a vegetated desert character and water conservation. All required vegetation shall be continuously maintained in a good condition. A landscape and irrigation plan shall be submitted and reviewed with any discretionary review request that proposes to install landscaping. c. Open space areas that are not to be left in a natural state will be landscaped with plants and vegetation in compliance with landscaping standards listed above. <p>D/CI 3.5 Encourage the adoption and implementation of a water conservation ordinance by each water service agency in the region. The goal is to minimize water use and extend the date at which utilization of State Project Water is required.</p> <p>D/CI 3.6 Require subdivisions in the region to have all common landscaping be consistent with xeriscape design, incorporating drought-tolerant plants as determined by the County and the water supply agency during review of landscape plans.</p> <p>D/CI 3.7 Encourage the use of ultra-low-flush (ULF) toilets in areas with water-supply limitations because their use at locations where septic tanks are acceptable can actually enhance septic tank operational efficiency.</p> <p>D/CI 3.8 The County shall require use of drip irrigation systems or systems of equivalent efficiency for all landscaping at commercial and industrial facilities and all common areas of residential developments. The County shall encourage the use of similar systems on individual residential lots.</p> <p>D/CI 3.9 The County shall encourage the use of pervious paving materials on all commercial, industrial, and institutional parking areas, where feasible. Large parking areas should consider using landscape as depressions to receive and percolate runoff as an alternative.</p> <p>CO 5.3 The County will promote water conservation and maximize the use of existing water resources by promoting activities/measures that facilitate the reclamation and reuse of water and wastewater.</p> <p>Programs:</p> <p>1. The County may require water reclamation systems and the use of reclaimed wastewater and other non-potable water to the maximum</p>
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		<p>extent feasible for:</p> <ol style="list-style-type: none"> a. Agricultural uses, b. Industrial uses, c. Recreational uses, d. Landscape irrigation, and e. Groundwater recharge projects. <ol style="list-style-type: none"> 2. Apply water conservation and water reuse (reclamation) measures that are consistent with County, state, and/or federal policies and regulations on wastewater. 3. Encourage the responsible authority to develop new and strengthen existing conservation and reclamation programs to reduce water consumption and prevent loss or waste of water. 4. Encourage water agencies to use pricing as a conservation tool and to require water audits to ensure the effectiveness of and continued compliance with water conservation measures.
R3WC1	<p>Manage Storm Water Runoff</p>	<p>CI 13.2 Promote the implementation of low-impact design principles to help control the quantity and improve the quality of urban runoff. These principles include:</p> <ol style="list-style-type: none"> a. Minimize changes in hydrology and pollutant loading; ensure that post-development runoff rates and velocities from a site do not adversely impact downstream erosion and stream habitat; minimize the quantity of stormwater directed to impermeable surfaces; and maximize percolation of stormwater into the ground where appropriate. b. Limit disturbance of natural waterbodies and drainage systems; conserve natural areas; protect slopes and channels; c. Preserve wetlands, riparian corridors, and buffer zones; establish reasonable limits on the clearing of vegetation from the project site; d. Establish development guidelines for areas particularly susceptible to erosion and sediment loss; e. Require incorporation of structural and non-structural best management practices to mitigate projected increases in pollutant loads and flows. <p>D/CI 2.1 Retain the natural channel bottom for all storm water drainage facilities and flood control channels when such facilities are required for a specific development. This protects wildlife corridors and prevents loss of critical habitat in the region.</p> <p>M/CI 4.1 Retain the natural channel bottom for all storm water drainage facilities and flood control channels when such facilities are required for a specific development. <u>This protects wildlife corridors and prevents loss of critical habitat in the region.</u></p>
R3WC2	<p>Conservation Areas</p>	<p>CI 11.10 Because recharge of groundwater basins is vital to the supply of water in the County, and because these areas can function only when retained in open space, the County will consider retaining existing groundwater recharge and storm flow retention areas as open space lands.</p> <p>M/OS 1.2 The County shall work with the U.S. Forest Service to explore land exchange opportunities that would provide additional areas for open space, recreational opportunities and watershed protection, and offer the County first right of refusal on lands available for</p>

		exchange before offering them to the general public.
		S 2.4 <u>Protect vital groundwater resources and other natural resources from contamination for present and future beneficial uses.</u>
		TRANSPORTATION/LAND USE MEASURES
R2T2	Vehicle Miles Traveled (VMT) Reduction (Also see subjects below; these policies relate to land use planning and vehicle-miles-traveled reductions in general)	CI 1.1 The County's comprehensive transportation system will be developed according to the Circulation Policy Map (the Circulation Element Map), which outlines the ultimate multi-modal (non-motorized, highway, and transit) system to accommodate the County's mobility needs and provides the County's objectives to be achieved through coordination and cooperation between the County and the local municipalities in the County, adjacent counties and cities within those counties, the California Department of Transportation (Caltrans), and San Bernardino Associated Governments (SANBAG).
R2T3		CI 2.2 Coordinate financial plans for transportation system improvements with other agencies and jurisdictions in the County.
R2T4		CI 2.3 Where appropriate, jointly fund studies and improvements to the transportation system, with cities and other public agencies and developers.
R2T6		CI 2.6 Seek grant funding for transportation system improvements, as appropriate.
R2T7		CI 2.7 Coordinate with Caltrans, SANBAG, the Southern California Association of Governments (SCAG) and other agencies regarding transportation system improvements in the County's Measure I and other adopted Capital Improvement Programs.
R3T1		CI 3.1 Encourage the reduction of automobile usage through various incentive programs.
R3T4		Programs:
R3T5		1. Promote and institute incentive programs for the use of alternative transportation modes, such as County-sponsored vanpools, flexible working hours and alternate (for example, 4-day) workweeks.
R3T6		2. Provide a pattern of land use designations, along with appropriate development standards, that facilitates development of local retail uses near residential uses, consistent with Smart Growth and New Urbanism Concepts in new development to reduce the number of automobile trips by providing neighborhood shopping facilities and connectivity through pedestrian and bicycle paths.
R3T7		3. Promote and encourage the design and implementation of land uses, development standards, and capital improvement programs that maximize the use of public transit facilities and programs, and the availability of local retail uses accessible to local residents bywalking or biking to reduce dependence on the automobile.
R3T8	4. Work with regional agencies (SCAG, Caltrans, SANBAG) to develop ridesharing programs, facilities, and various modes of public transit (local and rapid bus, Metrolink, and high-speed trains).	
R3T9	5. Designate existing Park and Ride facilities on the General Plan Circulation Maps, work with Caltrans to identify appropriate future	
R3T10		

	<p>Park-and-Ride facilities, and develop a program to acquire and develop sites for such facilities in areas where there is an identified need.</p> <p>CI 4.2 To reduce the dependence on automobiles for local trips, integrate transportation and land use planning at the community and regional levels by promoting TOD, where appropriate and feasible.</p> <p>Programs: Encourage mixed-use and transit oriented design, where applicable. The integration of mixed-use and transit design could reduce the use of automobiles, but the extent of the benefits and remaining impacts might nonetheless require independent traffic impact analysis and environmental impact assessment.</p> <p>CI 4.5 Coordinate with local and regional transportation agencies and cities to plan and construct new multi-modal transportation facilities on the basis of this General Plan that are consistent throughout the neighboring jurisdictions.</p> <p>ED 10.1 Encourage a variety of industries to locate in the County, including commercial/professional office uses and “clean,” high-technology industries that provide high-skill/high-wage job opportunities.</p> <p>H 11.6 Throughout the County, continue to encourage mixed-use development through the planned development process that includes dense, multiple-family residential development and clustered, single-family residential development, and other uses that provide convenient shopping and employment opportunities close to major transportation corridors.</p> <p>Programs: Continue to reduce the length and number of vehicle trips, encourage use of public transportation, reduce vehicle emissions, and provide for a variety of lifestyle choices located convenient to travel requirements.</p> <p>LU 5.1 When a change in permitted land use(s) is proposed, review development applications to ensure that housing and employment opportunities (current and projected) are located close to each other, acknowledging housing and employment opportunities within both unincorporated County areas and cities.</p> <p>LU 6.1 Mixed-use developments will be encouraged in unincorporated areas of the County for projects that have adequate acreage to accommodate different land uses while providing buffers and other mechanisms to minimize or avoid land use conflicts.</p> <p>LU 9.2 Discourage leap-frog development and urban sprawl by restricting the extension or creation of new urban services or special districts to areas that cannot be sustained in a fiscally responsible manner.</p>
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<p>R3T1 R3T8 R3T9</p>	<p>Transit Measures</p>	<p>H 1.1.6 Throughout the County, continue to encourage mixed-use development through the planned development process that includes dense, multiple-family residential development and clustered single-family residential development, and other uses that provide convenient shopping and employment opportunities close to major transportation corridors.</p> <p>Programs: Continue to reduce the length and number of vehicle trips, encourage use of public transportation, reduce vehicle emissions, and provide for a variety of lifestyle choices located convenient to travel requirements.</p> <p>CI 3.1 Encourage the reduction of automobile usage through various incentive programs.</p> <p>Programs: 1. Provide a pattern of land use designations, along with appropriate development standards, that facilitates development of local retail uses near residential uses, consistent with Smart Growth and New Urbanism Concepts in new development to reduce the number of automobile trips by providing neighborhood shopping facilities and connectivity through pedestrian and bicycle paths. 2. Promote and encourage the design and implementation of land uses, development standards, and capital improvement programs that maximize the use of public transit facilities and programs, and the availability of local retail uses accessible to local residents by walking or biking to reduce dependence on automobiles. 3. Work with regional agencies (SCAG, Caltrans, SANBAG) to develop ridesharing programs, facilities, and various modes of public transit (local and rapid bus, Metrolink, and high-speed trains). 4. Designate existing Park-and-Ride facilities on the General Plan Circulation Maps, work with Caltrans to identify appropriate future Park-and-Ride facilities, and develop a program to acquire and develop sites for such facilities in areas where there is an identified need.</p> <p>CI 4.2 To reduce dependence on automobiles for local trips, integrate transportation and land use planning at the community and regional levels by promoting TOD, where appropriate and feasible.</p> <p>Programs: Encourage mixed-use and transit-oriented design, where applicable. The integration of mixed-use and transit design could reduce the use of automobiles, but the extent of the benefits and remaining impacts might nonetheless require independent traffic impact analysis and environmental impact assessment.</p> <p>CI 4.5 Coordinate with local and regional transportation agencies and cities to plan and construct new multi-modal transportation facilities on the basis of this General Plan that are consistent throughout the neighboring jurisdictions.</p>
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R2T2 R2T6 R2T8 R3T5 R3T6	Ridesharing and Carpooling	<p>ED 15.1 Facilitate economic development that will improve the overall jobs/housing balance in the major planning regions of the County, including a Mag-Lex/high-speed rail system that links San Bernardino County with other parts of the region.</p> <p>CI 3.1 Encourage the reduction of automobile usage through various incentive programs.</p> <p>Programs:</p> <ol style="list-style-type: none"> Promote and institute incentive programs for the use of alternative transportation modes, such as County sponsored vanpools, flexible working hours, and alternate (for example, 4-day) workweeks. Designate existing Park-and-Ride facilities on the General Plan Circulation Maps, work with Caltrans to identify appropriate future Park-and-Ride facilities, and develop a program to acquire and develop sites for such facilities in areas where there is an identified need. <p>M/CI 1.10 Support the development of park-and-ride transit service in the mountain communities.</p> <p>M/CI 1.11 When population and residential densities permit or warrant, develop shuttle services from residential neighborhoods to recreational areas and major commercial centers.</p>
R2T2	Employee Vehicle Miles Traveled Reduction Programs	<p>CI 3.1 Encourage the reduction of automobile usage through various incentive programs.</p> <p>Programs:</p> <ol style="list-style-type: none"> Promote and institute incentive programs for the use of alternative transportation modes, such as County sponsored vanpools, flexible working hours and alternate (for example, 4-day) workweeks. Work with regional agencies (SCAG, Caltrans, SANBAG) to develop ridesharing programs, facilities, and various modes of public transit (local and rapid bus, Metrolink, and high-speed trains). Designate existing Park-and-Ride facilities on the General Plan Circulation Maps, work with Caltrans to identify appropriate future Park-and-Ride facilities, and develop a program to acquire and develop sites for such facilities in areas where there is an identified need. <p>CI 15.1 Maximize the use of telecommunications to reduce transportation and land use demands.</p>
R2T5	Expand Renewable Fuel Use	<p>CO 4.10 Support the development of alternative fuel infrastructure that is publicly accessible.</p>

R2T3	Revise Parking Policies	<p>CO 4.6 Provide incentives such as preferential parking for alternative-fuel vehicles (such as compressed natural gas or hydrogen).</p> <p>CO 4.7 Encourage special event center operators to provide discounted transit passes with event tickets or offer discounted on-site parking for carpooling patrons (for two or more persons per vehicle).</p> <p>CO 4.11 Establish programs for priority or free parking on County streets or in County parking lots for alternative fuel vehicles.</p> <p>M/CI 2.2 Reevaluate the parking requirements in the Development Code to ensure that excessive parking is not required, to address options for shared parking, covered parking, and other parking alternatives.</p> <p>M/OS 2.6 Where appropriate, require pedestrian walkways in commercial, industrial, and major multiple family residential developments.</p> <p>M/OS 2.7 Provide pedestrian linkages between adjacent commercial areas and adjoining residential areas to encourage foot traffic and reduce automobile trips.</p>
R2T4 R3T8	Roadway Modifications, Signalization, and Flow Management	<p>CO 8.4 Minimize energy consumption attributable to transportation in the County.</p> <p>CI 5.2 Protect and increase the designed roadway capacity of all vehicular thoroughfares and highways.</p> <p>Programs: Use existing and develop new innovative traffic engineering practices to increase roadway capacity and safety, such as synchronize signals.</p> <p>CO 8.4 Minimize energy consumption attributable to transportation in the County.</p>
R2T7	Bicycle/ Pedestrian Infrastructure and Promotion	<p>CI 6.1 Require safe and efficient pedestrian and bicycle facilities in residential, commercial, industrial, and institutional developments to facilitate access to public and private facilities and to reduce vehicular trips. Install bicycle lanes and sidewalks on existing and future roadways, where appropriate and as funding is available (see Figure 2-11A through Figure 2-11C of the Circulation and Infrastructure Background Report).</p> <p>CO 8.4 Minimize energy consumption attributable to transportation in the County.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. Minimize the need to use automobiles and limit distance traveled by establishing mixed land uses and clustering development in nodes. 2. Through the land use zoning districts, encourage residences to be located near neighborhood commercial centers in new developments to encourage walking to nearby shops. 3. Encourage the development of recreation facilities in neighborhoods in new developments.

	<p>4. Amend the Development Code to require new subdivisions to provide bicycle facilities consistent with the County bikeway master plan.</p> <p>5. Provide appropriate facilities for safe bicycle and motorcycle parking in sites having high potential for bicycle and motorcycle traffic, such as apartments, condominiums, recreation facilities, shopping centers, offices, and industrial complexes.</p> <p>OS 2.1 Provide a regional trail system and rest areas to furnish continuous interconnecting trails that serve major populated areas of the County and existing and proposed recreation facilities through the regional trail system. The purpose of the County regional trails system will be to provide major backbone linkages to which community trails might connect. The provision and management of community and local trails will not be the responsibility of the regional trail system.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. Provide equestrian, bicycling, and pedestrian staging areas consistent with the master plan of regional trails and the trail route and use descriptions shown in Figures 2-11A through 2-11C of the Circulation Background Report. 2. Work with local, state, and federal agencies, interest groups, and private landowners to promote an interconnecting regional trail system and to secure trail access through purchase, easements, or other means. <p>OS 2.2 Utilize public funding mechanisms whenever possible to protect and acquire land for open space uses.</p> <p>Programs:</p> <ol style="list-style-type: none"> 1. Actively seek state, federal, and private grants for the purpose of financing open space and trail acquisition, construction, and operation. 2. Use general funds, user fees, proceeds from concession operations, and other available sources to finance open space and trail acquisition, construction, and operation. 3. Include open space and trail acquisition and development in the County's Capital Improvement Programs. <p>CI 6.1 Require safe and efficient pedestrian and bicycle facilities in residential, commercial, industrial, and institutional developments to facilitate access to public and private facilities and to reduce vehicular trips. Install bicycle lanes and sidewalks on existing and future roadways, where appropriate and as funding is available (see Figure 2-11A through Figure 2-11C of the Circulation and Infrastructure Background Report).</p> <p>M/OS 2.3 In the communities of Lake Gregory, Lake Arrowhead, Grass Valley Lake, Fawnskin, and Big Bear City, establish a system of bicycle and hiking routes connecting major activity centers, where feasible.</p> <p>M/OS 2.4 Develop a system of bicycle routes to link new and existing residential areas with major activity and commercial centers.</p> <p>M/OS 2.5 Encourage the addition of bicycle routes whenever existing highways are widened or significant lengths of highways are improved.</p>
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		<p>M/OS 2.6 Where appropriate, require pedestrian walkways in commercial, industrial, and major multiple family residential developments.</p> <p>M/OS 2.7 Provide pedestrian linkages between adjacent commercial areas and adjoining residential areas to encourage foot traffic and reduce automobile trips.</p> <p>M/ED 1.6 Encourage the creation of hiking and biking trails as tourist attractions.</p> <p>V/OS 1.1 Develop a plan to obtain, develop, and maintain hiking trails and pedestrian walkways between communities and neighborhoods in the Valley area.</p>
R2T1	Anti-Idling	CO 8.4 Minimize energy consumption attributable to transportation in the County.
R3T4 R3T9	Regional Land Use/Transportation Coordination	<p>CI 1.1 The County's comprehensive transportation system will be developed according to the Circulation Policy Map (the Circulation Element Map), which outlines the ultimate multi-modal (non-motorized, highway, and transit) system to accommodate the County's mobility needs and provides the County's objectives to be achieved through coordination and cooperation between the County and local municipalities in the County, adjacent counties and cities in those counties, Caltrans, and SANBAG.</p> <p>CI 2.2 Coordinate financial plans for transportation system improvements with other agencies and jurisdictions in the County.</p> <p>CI 2.3 Where appropriate, jointly fund studies and improvements to the transportation system with cities and other public agencies and developers.</p> <p>CI 2.6 Seek grant funding for transportation system improvements, as appropriate.</p> <p>CI 2.7 Coordinate with Caltrans, SANBAG, SCAG, and other agencies regarding transportation system improvements in the County's Measure I and other adopted Capital Improvement Programs.</p> <p>ED 10.1 Encourage a variety of industries to locate in the County, including commercial/professional office uses and "clean," high-technology industries that provide high-skill/high-wage job opportunities.</p> <p>LU 5.1 When a change in permitted land use(s) is proposed, review development applications to ensure that housing and employment opportunities (existing and projected) are close to each other, acknowledging housing and employment opportunities in both unincorporated County areas and cities.</p>

		<p>LU 6.1 Mixed-use developments will be encouraged in unincorporated areas of the County for projects that have adequate acreage to accommodate different land uses while providing buffers and other mechanisms to minimize or avoid land use conflicts.</p> <p>LU 9.2 Discourage leap-frog development and urban sprawl by restricting the extension or creation of new urban services or special districts to areas that cannot be sustained in a fiscally responsible manner.</p>
AGRICULTURAL AND RESOURCE CONSERVATION MEASURES		
R3NR1 R3NR2	Conservation Areas and Compensation	<p>LU 7. The distribution of land uses will be consistent with the maintenance of environmental quality, conservation of natural resources, and the preservation of open spaces.</p> <p>M/CO 2. Maintain the health and vigor of the forest environment.</p> <p>M/LU 1.10 In the Mountain Region of the County, utilize construction techniques for single family homes that will preserve the forest character of the region by minimizing disruption of land and vegetation during construction.</p>
R3NR3	Urban Forestry	<p>CO 8.8 Promote energy-efficient design features, including appropriate site orientation, use of lighter-color roofing and building materials, and use of deciduous shade trees and windbreak trees to reduce fuel consumption for heating and cooling.</p>

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APPENDIX D

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT INVENTORY

APPENDIX D - SCAQMD Inventory

Overview

As part of the process of preparing its GHG Reduction Plan, the County of San Bernardino (County) requested South Coast Air Quality Management District (SCAQMD) to assist with the County's effort to identify and inventory GHG emissions. In response to the County's request, SCAQMD prepared inventories for the years 1990, 2007, and 2020 dated May 2009, and revised December 2010 ("SCAQMD Inventory"). A summary of the SCAQMD data collection methodology and findings is presented below. The County also retained ICF International to assist with the preparation of the GHG Reduction Plan, as well as a detailed inventory for the emissions generated by community activities and its own government operations. A summary of the inventories prepared by ICF International is presented below and are fully set forth in **Appendices A and B**, to this Plan.

SCAQMD Inventory

The SCAQMD Inventory included emissions within the entire County area ("Countywide.") The SCAQMD Inventory can be found in Appendix D. The Countywide emissions are not broken out by incorporated or unincorporated area. SCAQMD scaled the Countywide emissions to the County's land use authority (LUA) area, using the ratio of the population (14.6 percent) in the LUA area to that of the entire County. The base year for SCAQMD's Countywide and LUA area GHG inventories is 2002. This base year inventory was projected to future years using the socioeconomic forecasts provided by Southern California Association of Governments (SCAG) for the 2007 Air Quality Management Plan (AQMP). SCAQMD's 1990 inventory was prepared by backcasting, using the same SCAG and AQMP growth factors used to project the 2020 emissions forecast. The SCAQMD 1990 Countywide Inventory was 27 MMTCO_{2e}. The SCAQMD Inventory estimates for 1990 emissions in the unincorporated County were 2.96 MMTCO_{2e}, for 2007 emissions were 3.93 MMTCO_{2e} and forecasted 2020 emissions would be 5.02 MMTCO_{2e}.

SCAQMD emissions data for several emissions categories was included in the External Inventory prepared by ICF International. These categories include on- and off-road transportation, stationary sources, agriculture, and miscellaneous sources. These emissions sectors were scaled by either the ratio of population or natural gas usage in the LUA area to that of the entire County (see Appendix A for further discussion). Together, these emissions sources constitute 32 percent and 35 percent of the External Inventory for 2007 and 2020 (unmitigated) respectively.

There are several notable differences between the SCAQMD Inventory and the External Inventory prepared by ICF International in the methodology used to develop the two inventories. The SCAQMD Inventory was conducted to report emissions that occur within the County and followed the protocols for mandatory reporting of greenhouse gas emissions found in Title 17,

California Code of Regulations Sections 95100–95133. In contrast, the External Inventory prepared by ICF international and relied upon in this Plan was prepared to support GHG reduction quantification and planning, and, as such, follows inventory protocols including the LGOP, CCAR guidance, and USEPA (2007, 2008, 2009a, 2009b). **Table D-1** presents a comparison between the SCAQMD Inventory and the External Inventory in this Plan.

Table D-1. SCAQMD and ICF International External Inventory Comparisons (MMTCO₂e)

Sector	2007		2020	
	SCAQMD Inventory	ICF International Inventory	SCAQMD Inventory	ICF International Inventory
Total GHG emissions	3.93	6.25	5.02	7.59

The following major differences between the two (2) inventories are noted:

- *Electricity*: The SCAQMD Inventory included all emissions associated with generation of electricity within the County. The ICF International External Inventory, included indirect¹ emissions associated with the consumption of electricity within the County, regardless of where the generation of electricity occurred. This approach is consistent with IPCC, CARB, and CCAR inventory protocols and was used for this Plan because accounting for electricity consumption allows one to evaluate the potential effects of different approaches to promoting energy efficiency and alternative energy sources on reducing GHG emissions.
- *Landfills*: The SCAQMD Inventory included both landfill methane emissions as well as CO₂ emissions from landfill flaring in the County inventory. The ICF International External Inventory included landfill methane emissions but excluded CO₂ emissions from landfill flaring, consistent with applicable protocols, since CO₂ from flaring is biogenic in origin, and thus its generation at the landfill does not represent a net increase in atmospheric concentration (IPCC 2006; CARB et al. 2008).
- *Cement plants*: There are four (4) cement plants located in the County and three (3) are located inside the County’s LUA area. These three (3) cement plants represent over 50 percent of cement plant-related emissions in the County. The SCAQMD Inventory included fuel combustion for cement plants in the entire County and scaled these emissions by the ratio of the population in the LUA area to that of the entire County to estimate emissions for the LUA area only. The ICF International External Inventory includes both cement plant fuel combustion and fugitive emissions of CO₂ from chemical reactions that occur during the production of cement for the three (3) cement plants in the County’s LUA area. These emissions are specific to the facilities in the LUA area.

¹GHG emissions are categorized as either *direct* (emissions that occur at the end use such as natural gas combustion for building heating) or *indirect* (emissions that result from consumption at the end use but occur at another location such as emissions from electricity).

- *1990 inventory year:* Although the SCAQMD Inventory includes a Countywide emissions inventory for 1990 based on backcasted growth factors provided by SCAG, this Plan does not use that 1990 emissions estimate for purposes of calculating the County's 2020 GHG emissions reduction goal. The SCAQMD Inventory found that 1990 emissions for the land use jurisdiction were approximately 18 percent less than the 2007 emissions estimated by SCAQMD. It should be noted that the SCAQMD 1990 and 2007 inventories are based on a backcast and forecast, respectively, from a 2002 inventory, and thus there is some uncertainty in the prevision of comparison of the 1990 and 2007 emissions levels. In addition, the SCAQMD Inventory methodology differs from that used in this report, particularly as it relates to electricity emissions and landfill emissions. Thus, strict comparison of the two (2) inventories is not appropriate.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

**Greenhouse Gas (GHG) Inventories
for the County of San Bernardino**

**Technical Document: Methodology, Assumptions,
Data Sources and Inventory**

**May 2009
(Revised December 2010)**

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PREFACE

This document summarizes the collaborative effort of staffs at the South Coast Air Quality Management District (SCAQMD), Mojave Desert Air Quality Management District (MDAQMD), the County of San Bernardino (County) and their consultants, to develop greenhouse gas (GHG) inventories for the County for the years 1990, 2007 and 2020. The purpose of this document is to outline the methods and assumptions used, the sources of data, the limitations of the estimates, and a summary of the inventories developed, by major source category. This approach largely relies on the same inventory methodology used to develop the latest Air Quality Management Plan (i.e., 2007 AQMP) and represents one approach for developing a GHG emissions inventory. There are other appropriate methodologies and protocols that can be used. This document may be useful to other cities or counties that are developing GHG inventories.

BACKGROUND

The County is in the process of preparing a GHG Reduction Plan that will quantify emissions over which the County has discretionary land use or internal operational control, set a reduction target, and develop quantifiable mitigation measures to reduce those emissions. The County requested that SCAQMD assist with its effort to identify and inventory GHG emissions.

As part of a settlement agreement with the California Attorney General (hereafter, settlement agreement), the County of San Bernardino agreed that its GHG Plan would include the following:

- (1) Inventories for 1990, existing emissions, and 2020; and,
- (2) A target for reduction of the GHG emissions related to the County's discretionary land use decisions and internal county operations.

The County agreed to provide 1990 emissions for the entire County; however, the other two inventories were to include only areas under the County's discretionary land use authority and the County's internal operations. The County cannot regulate projects within boundaries of the incorporated cities, land managed by the federal government such as those lands under the Bureau of Land Management (BLM), and military bases and installations. Public utilities and railroads are generally not subject to the County's land use jurisdiction. Water districts/agencies are also not subject to the County's land use jurisdiction; however, private water companies generally are. Figure C-1 in Appendix C shows the map provided by the County, which depicts incorporated and unincorporated portions of the County, as well as federal and state lands within the County.

EMISSION INVENTORY METHODOLOGY

Introduction

The methodology used for developing this GHG inventory is primarily consistent with the SCAQMD 2007 Air Quality Management Plan (AQMP) inventory method, which utilized 2002 data as the base year. Since the County is located in two air basins (the South Coast and the Mojave Desert Air Basins), the data collected and developed by the MDAQMD was combined with the SCAQMD data. San Bernardino County staff also provided additional data to augment the AQMP inventory, such as electricity consumption² and dairy activity³. The following sections describe the key elements of the County GHG inventories.

Source Categories

As described below, the GHG inventory has four major categories: stationary sources, on-road mobile sources, off-road mobile sources, and electricity usage.

Stationary sources: The stationary source emissions are grouped into two categories - point sources and area sources. Point source emissions are from facilities having one or more pieces of equipment registered and permitted with SCAQMD (e.g. power plants and manufacturing facilities). SCAQMD is able to collect facility emission-related information from the larger of these facilities. Area source emissions are from numerous smaller facilities (e.g., gas stations, and restaurants) or the source of emissions (e.g., consumer products and architectural coatings), for which locations may not be specifically identified.

For the stationary point and area source inventory, SCAQMD staff used the 2007 AQMP base year inventory (2002 data) stationary source emission inventory for the portion of San Bernardino County under SCAQMD jurisdiction. SCAQMD staff obtained the 2002 point and area source emission inventory for the Mojave Desert portion of San Bernardino County from the MDAQMD. The carbon dioxide (CO₂), nitrous oxide (N₂O), and methane (CH₄) emissions for both stationary point and area sources associated with fuel combustion sources were calculated using the actual reported fuel consumption by fuel type, CO₂, N₂O, and CH₄ default Emission Factors (EFs), and fuel High Heating Values (HHVs). Default EFs were developed using Tables 3, 4, and 6 of the California Air Resources Board (CARB) Regulation for the Mandatory Reporting of GHG Emissions. The HHVs of the fuels were taken from AP-424. For non-combustion sources, the CH₄ emissions were estimated utilizing the Total Organic Gases

² Obtained from the California Energy Commission

³ Obtained from the San Bernardino County Department of Agriculture, Weights, and Measures, June 2008

⁴ EPA 1995: AP-42: Compilation of Air Pollutant Emission Factors, Fifth Edition, Volume I: Stationary Point and Area Sources, Appendix A: Miscellaneous Data & Conversion Factors

(TOG) emissions and CARB speciation profiles used for the 2007 AQMP. Once the 2002 GHG emissions inventory was developed, it was backcasted to year 1990 and projected to future years using growth factors provided by Southern California Association of Governments (SCAG) for the 2007 AQMP.

The following sections provide additional information on inventory development for sub-categories.

Agriculture

The County Department of Agriculture, Weights and Measures provided emissions estimates for livestock-dairy and manure management for the year 1990, which were added to the stationary and area source inventory under the major source category titled “Miscellaneous Processes, Farming Operations”, with EIC 620. Details for dairy manure methane emissions, digestive methane emissions, N₂O emissions from manure management and a summary of dairy emissions are provided in Appendix D. Growth projections for the agriculture sector for the County provided by SCAG were used to estimate emissions for the years 2007 and 2020. The CH₄ emissions for all other sources under farming operations (i.e. Livestock-Broilers, Layers, Turkeys, etc.) were calculated using the TOG emissions and CARB speciation profiles. N₂O emissions were estimated using the dairy N₂O emissions and ratio of the CH₄ emissions of each source to the Dairy category.

The 2002 GHG emissions from prescribed burning under the agricultural burning category with EIC 670 were calculated using the actual burning activities as reported in the 2002 emissions inventory and their associated EFs⁵.

Landfills

The 2002 GHG emissions from landfill sources under the waste disposal category were estimated using the 2002 annual emission data as reported by these sources, CARB default EFs, and fuel HHVs.

On-road mobile sources: The CARB EMFAC2007 V2.3 mobile source emissions model is the source of the 2007 AQMP emission estimates for on-road motor vehicles. The California Department of Transportation (Caltrans), the Department of Motor Vehicles (DMV), and SCAG supply CARB with the data necessary to develop the on-road mobile source emissions inventory. The EMFAC2007 model contains an output for CO₂ and CH₄ emissions for specified inventory years. SCAQMD staff calculated N₂O emissions based on CARB's

⁵ EFs were developed using Andreae and Merlet report titled “Emission of Trace Gases and Aerosols from Biomass Burning, Global Biogeochemical Cycles”, 2001, and CARB report on “Emission Factors for Open Burning of Agricultural Residues”, August 2000

methodology (i.e., vehicle miles traveled and CARB N₂O emission factors which are a function of vehicle type, model year, and fuel type). Currently, this model does not have data regarding natural gas vehicles and therefore, they are not included in this analysis.

Off-road mobile sources: Mobile sources not included in the on-road mobile source emissions inventory are considered as off-road mobile sources. CARB uses the OFFROAD Model to estimate emissions for more than one hundred off-road equipment types, including recreational vehicles, pleasure craft, and construction equipment. The emissions from ships, aircraft, locomotives and cargo handling equipment at marine ports or intermodal facilities are not included in the current OFFROAD Model. Therefore, the emissions from these categories need to be calculated using other category-specific models. Aircraft⁶ emissions were calculated using fuel consumption provided by CARB and default EFs.

Locomotive emissions were estimated using an alternative approach. Staff used the CARB's statewide locomotive GHG emissions and the carbon monoxide (CO) ratio of the County to the state to estimate the emissions for this category. A different methodology should be considered as the GHG inventory is updated in the future. Emissions from Cargo Handling Equipment (CHE) associated with the locomotives were calculated by first estimating the CHE statewide CO₂ emissions for the years 1990, 2002, 2007 and 2020 using CARB 2004 CHE population activity, horse power, CO₂ EF, and growth factors. The growth factors were developed based on the 2004, 2010, and 2020 CHE population activities and interpolation and extrapolation. Then, the County CO₂ emissions were estimated using the CO ratio of the County to the state. The N₂O and CH₄ emissions from this category were assumed to be negligible. The emissions from ships and commercial boats, and associated with marine ports were not applicable to San Bernardino County as these operations did not take place in this region.

Electricity usage: In order to account for GHG emissions that occurred due to consumption of electricity within the County regardless of where the emissions were generated, the County provided SCAQMD staff with the actual electricity usage for residential and non-residential sectors for the years 1996 and 2005 (see Appendix B). Estimates of electricity usage for both residential and non-residential sectors for the years 1990, 2007 and 2020 were derived based on the County's population and employment growth relative to the years 1996 or 2005 using the least squares straight line equation. Emission factors for electricity generation were as reported to the California Climate Action Registry for the Southern California Edison (SCE) service territory. These electricity usage emissions are presented for reference purposes only and were not added to the

County inventories, since they partially overlap with the in-County power plant emissions.

Pollutants

For purpose of the County GHG inventories, only three major pollutants were included: CO₂, CH₄, and N₂O. These emissions are typically reported in millions of metric tons (MMT) of carbon dioxide equivalents (CO₂E), which is the amount of CO₂ that would give the same global warming potential as a given amount of another GHG. For example, methane (CH₄) is a GHG which has a higher global

⁶ Based on the San Bernardino County Department of Airports, there are six airports that are operated by the County; Apple Valley, Baker, Barstow-Daggett, Chino, Needles, and Twentynine Palms. Further information (location, etc) about these airports can be accessed at: <http://www.sbcounty.gov/airports>

warming potential than CO₂. To convert a metric ton of methane to a metric ton of CO₂E, a factor of 21 is used (consistent with ARB's GHG inventory development, based on the second assessment report (1996) of the International Panel on Climate Change (IPCC)).

Inventory Projection/Backcast

The most recently prepared complete stationary source emissions inventory for the County was the one for the year 2002. Therefore, the stationary source inventories for the years 1990, 2007 and 2020 were forecasted and backcasted from the 2002 inventory using the same growth surrogates and SCAG growth factors as used in the 2007 AQMP, Appendix III, Tables 2-2 through 2-7 for the SCAB portion of the County. The selection of the surrogate by which emission growth is projected depends on the type of activity. Generally these surrogates include employment growth, industry output growth, etc. The growth factors for the Mojave Desert portion of the County are consistent with the attainment demonstration used in the MDAQMD Federal 8-hour Ozone Attainment Plan, July 2008. The on-road and off-road GHG inventories were developed for all the above years using the CARB EMFAC2007 and 2007 OFFROAD models. The CARB models contain emission reductions from all rules adopted by 2007.

SUMMARY OF SAN BERNARDINO GHG INVENTORIES

In addition to the year 2002, GHG emissions inventories were developed for the years 1990, 2007 and 2020, as described in the following sections. For 2007 and 2020, the settlement agreement required inventories of emissions related to internal County operations and the County's discretionary land use decisions. To estimate the areas under the County's discretionary land use authority, the County provided a map showing these areas and also provided the 2007 population data from the Department of Finance for the unincorporated areas of the County (see Appendix E). Figure C-1 in Appendix C shows the map provided by the County, which depicts incorporated and unincorporated portions of the County, as well as federal and state lands within the County. To determine the portion of GHG emissions attributable to the County, SCAQMD staff excluded the emissions from the operations that were not subject to the County's land use jurisdiction such as utilities, railroads, and military aircraft and proportioned the remaining County-wide GHG emissions inventory based upon the population residing in the unincorporated area of the County. The percentage of population in the unincorporated areas compared to the total County population was calculated to be 14.6% (based on the 2007 California Department of Finance Projections) which was used to derive the GHG emissions. Therefore, after exclusion of the emissions associated with utilities, railroads, and military aircraft, the County-wide inventory shown in Table 1 was multiplied by 0.146 to estimate the GHG emissions from unincorporated portions of the County (see Table 2).

Table 1 summarizes the applicable inventories by milestone year by major source category. This information is for the County as a whole. The inventory in Table 1 includes all sources regardless of whether the County has authority to control the emissions.

Table 1*
CO₂E Inventory for Entire San Bernardino County, MMT

	Category	1990	2002	2007	2020
Mobile On-Road	All	8	10	11	15
Mobile Off-Road	Locomotives	1	1	1	1
	Aircraft	0	0	0	1
	Other	0	1	1	1
Stationary	Utilities	3	3	4	5
	Landfills	1	1	1	1
	Other	12	10	10	12
Total		25	25	28	36
Electricity Usage		2	4	5	6

Table 2 shows the inventories for unincorporated areas of the County for the years 1990, 2002, 2007 and 2020.

Table 2*
CO₂E Inventory for Unincorporated Areas of the County, MMT

	1990	2002	2007	2020
Mobile On-Road	1.15	1.47	1.64	2.19
Mobile Off-Road	0.12	0.14	0.15	0.22
Stationary	1.34	1.35	1.48	1.74
Total	2.61	2.96	3.27	4.15
Electricity Usage	0.35	0.53	0.66	0.87

*Values in the total may be slightly off due to rounding to the nearest ton.

**The values in Table 2 are generated by multiplying the values in Table 1 (excluding the emissions from utilities, railroads, and military aircraft) by 0.146.

The following figures, Figures 1 through 3, show the relative contribution of each of these major categories to the County inventories for each of the key years selected. As shown in Figures 1 through 3, the mobile source category (on-road and off-road) contributes 37% and 50% of the total County GHG emissions in 1990 and 2020, respectively. This is consistent with the statewide inventory for which the mobile sources are the largest contributor, with 35% in 1990 and 38% in 2002 to 2004 average emissions of the state's total GHG emissions. The projected contribution of mobile sources increases slightly over this time period. These projected emissions do

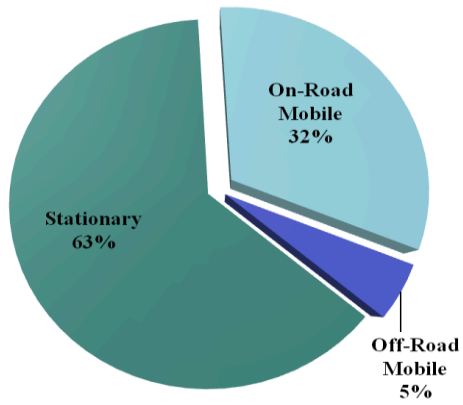
not account for potential reduction measures due to implementation of the AB 32 Scoping Plan, future AQMPs, or County reduction measures.

Tables A-1 through A-5 in Appendix A provide more detailed inventories by major source category for the years 1990, 2002, 2007 and 2020. The categorization is consistent with the AQMP inventory. The GHG emissions are presented in terms of tons per year (TPY) and Million Metric Tons (MMT) of CO₂E. The emission values are rounded off to the nearest ton and therefore zero values range from 0.00 to 0.49. Table A-5 shows the daily fuel consumption by major source category by fuel type in 2002, which forms the basis for combustion-related GHG emission estimates.

Discussion

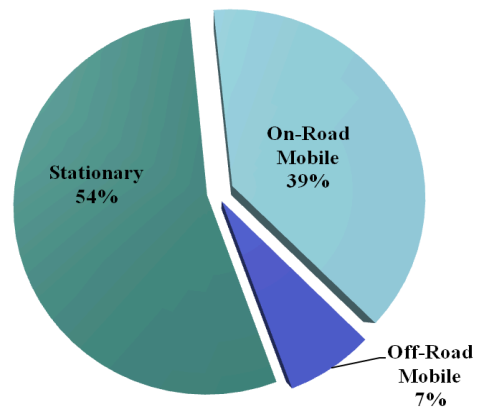
The SCAQMD staff believes the GHG emissions inventory developed for San Bernardino County represents a first of its kind bottom-up GHG inventory at a local level. The inventory methodology is primarily based on the methodology used to develop the SCAQMD 2007 AQMP, and is consistent with the State Implementation Plan (SIP) approach, such that it can be easily integrated with the local SIP planning process. The methodology outlined in this document takes advantage of years of technical improvements for criteria pollutant inventories and the benefits of extensive public review and agency oversight. Enhancements were made to GHG inventories regarding indirect emissions (i.e., electricity consumption). As additional technical information and standardized GHG inventory protocols endorsed by CARB become available over time, the GHG inventories can be further enhanced by including additional pollutants, improved methodology or better emission factors.

Figure 1
1990 San Bernardino County Inventory



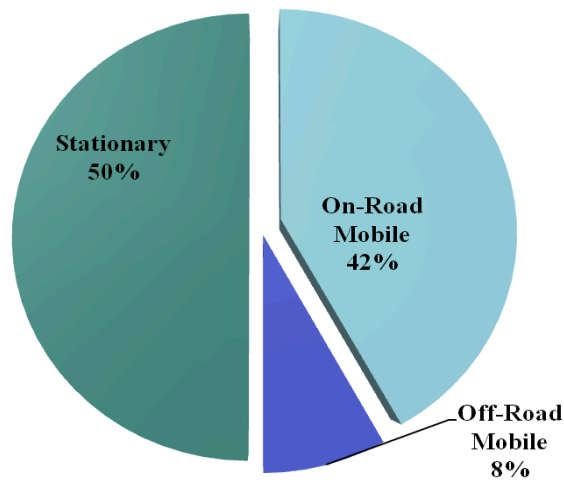
TOTAL= 25 MMT CO₂E

Figure 2
2007 San Bernardino County Inventory



TOTAL= 28 MMT CO₂E

Figure 3
2020 San Bernardino County Inventory



TOTAL= 36 MMT CO₂E

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APPENDIX A
GHG Emissions per Major Source Categories

Table A-1, 1990 GHG Emissions Per Major Source Category For San Bernardino County

CODE	Source Category	Emissions (TPY)			MMT
		CO ₂	N ₂ O	CH ₄	CO ₂ E7
Fuel Combustion					
10	Electric Utilities	3,629,749	22	158	3
20	Cogeneration	1,751,372	28	187	2
30	Oil and Gas Production (Combustion)	2,087	0	0	0
40	Petroleum Refining (Combustion)	0	0	0	0
50	Manufacturing and Industrial	1,841,904	5	37	2
52	Food and Agricultural Processing	29,040	0	1	0
60	Service and Commercial	5,158,079	20	125	5
99	Other (Fuel Combustion)	198,642	1	8	0
Total Fuel Combustion		12,610,872	76	517	12
Waste Disposal					
110	Sewage Treatment	151,342	0	3	0
120	Landfills	625,649	1	11,026	1
130	Incineration	14,724	0	8	0
199	Other (Waste Disposal)	0	0	6,884	0
Total Waste Disposal		791,715	1	17,921	1
Cleaning and Surface Coatings					
210	Laundering	0	0	0	0
220	Degreasing	0	0	0	0
230	Coatings and Related Processes	2,589	0	52	0
240	Printing	0	0	0	0
250	Adhesives and Sealants	0	0	0	0
299	Other (Cleaning and Surface Coatings)	0	0	5	0
Total Cleaning and Surface Coatings		2,589	0	56	0
Petroleum Production and Marketing					
310	Oil and Gas Production	0	0	0	0
320	Petroleum Refining	0	0	0	0
330	Petroleum Marketing	0	0	1,866	0
399	Other (Petroleum Production and Marketing)	0	0	0	0
Total Petroleum Production and Marketing		0	0	1,866	0
Industrial Processes					
410	Chemical	0	0	33	0
420	Food and Agriculture	0	0	1	0
430	Mineral Processes	11,390	0	87	0
440	Metal Processes	0	0	0	0
450	Wood and Paper	0	0	0	0
460	Glass and Related Products	0	0	0	0
470	Electronics	0	0	0	0
499	Other (Industrial Processes)	0	0	10	0
Total Industrial Processes		11,390	0	131	0
Solvent Evaporation					
510	Consumer Products	0	0	0	0
520	Architectural Coatings and Related Solvent	0	0	0	0
530	Pesticides/Fertilizers	0	0	0	0
540	Asphalt Paving/Roofing	0	0	6	0

$$7 \text{ MMTCO}_2\text{E} = [\text{CO}_2 \text{ (TPY)} \times 1 + \text{N}_2\text{O (TPY)} \times 310 + \text{CH}_4 \text{ (TPY)} \times 21] \times 0.9072/1,000,000$$

Total Solvent Evaporation		0	0	6	0
Miscellaneous Processes					
610 Residential Fuel Combustion	2,125,406	4	36	2	
620 Farming Operations	0	67	52,668	1	
630 Construction and Demolition	0	0	0	0	
640 Paved Road Dust	0	0	0	0	
645 Unpaved Road Dust	0	0	0	0	
650 Fugitive Windblown Dust	0	0	0	0	
660 Fires	0	0	5	0	
670 Waste Burning and Disposal	2,887	9	67	0	
680 Utility Equipment	0	0	0	0	
690 Cooking	0	0	77	0	
699 Other (Miscellaneous Processes	0	0	0	0	
Total Miscellaneous Processes	2,128,293	80	52,853	3	
On-Road Motor Vehicles					
710 Light Duty Passenger Auto (LDA)	2,836,050	428	1135	3	
722 Light Duty Trucks 1 (T1 : up to 3750 lb.)	777,450	171	405	1	
723 Light Duty Trucks 2 (T2 : 3751-5750 lb.)	1,076,750	245	427	1	
724 Medium Duty Trucks (T3 : 5751-8500 lb.)	350,400	55	131	0	
732 Light Heavy Duty Gas Trucks 1 (T4 : 8501-10000 lb.)	354,050	36	161	0	
733 Light Heavy Duty Gas Trucks 2 (T5 : 10001-14000 lb.)	105,850	10	66	0	
734 Medium Heavy Duty Gas Trucks (T6 : 14001-33000 lb.)	73,000	5	131	0	
736 Heavy Heavy Duty Gas Trucks ((HHDGT > 33000 lb.)	25,550	3	40	0	
742 Light Heavy Duty Diesel Trucks 1 (T4 : 8501-10000 lb.)	7,300	0	0	0	
743 Light Heavy Duty Diesel Trucks 2 (T5 : 10001-14000 lb.)	29,200	0	0	0	
744 Medium Heavy Duty Diesel Truck (T6 : 14001-33000 lb.)	222,650	1	4	0	
746 Heavy Heavy Duty Diesel Trucks (HHDDT > 33000 lb.)	2,343,300	6	172	2	
750 Motorcycles (MCY)	14,600	11	62	0	
760 Diesel Urban Buses (UB)	18,250	0	0	0	
762 Gas Urban Buses (UB)	3,650	0	0	0	
770 School Buses (SB)	21,900	0	4	0	
776 Other Buses (OB)	7,300	0	4	0	
780 Motor Homes (MH)	40,150	3	15	0	
Total On-Road Motor Vehicles	8,307,400	977	2,756	8	
Other Mobile Sources					
810 Aircraft	233,779	2	10	0	
820 Trains	606,400	15	47	1	
830 Ships and Commercial Boats	0	0	0	0	
840 Recreational Boats	95,353	22	412	0	
850 Off-Road Recreational Vehicles	7012	11	99	0	
860 Off-Road Equipment	488,440	33	423	0	
870 Farm Equipment	56,703	0	18	0	
890 Fuel Storage and Handling	0	0	0	0	
895 Truck Stops	0	0	0	0	
Total Other Mobile Sources	1,487,685	83	1,010	1	
Total Stationary Sources	15,544,859	158	73,351	16	
Total On-Road Vehicles	8,307,400	977	2,756	8	
Total Other Mobile	1,487,685	83	1,010	1	
Total Anthropogenic	25,339,944	1,218	77,117	25	

Table A-2, 2002 GHG Emissions Per Major Source Category For San Bernardino County

CODE	Source Category	Emissions (TPY)			MMT
		CO ₂	N ₂ O	CH ₄	CO ₂ E
Fuel Combustion					
10	Electric Utilities	3,213,931	21	151	3
20	Cogeneration	1,784,526	28	188	2
30	Oil and Gas Production (Combustion)	2,087	0	0	0
40	Petroleum Refining (Combustion)	0	0	0	0
50	Manufacturing and Industrial	2,692,610	7	53	2
52	Food and Agricultural Processing	32,099	0	1	0
60	Service and Commercial	3,814,762	12	84	4
99	Other (Fuel Combustion)	186,028	1	8	0
Total Fuel Combustion		11,726,042	70	485	11
Waste Disposal					
110	Sewage Treatment	96,116	0	2	0
120	Landfills	838,672	1	6,874	1
130	Incineration	29,791	0	10	0
199	Other (Waste Disposal)	0	0	8,274	0
Total Waste Disposal		964,578	2	15,160	1
Cleaning and Surface Coatings					
210	Laundering	0	0	0	0
220	Degreasing	0	0	0	0
230	Coatings and Related Processes	4,655	0	52	0
240	Printing	0	0	0	0
250	Adhesives and Sealants	0	0	0	0
299	Other (Cleaning and Surface Coatings)	0	0	10	0
Total Cleaning and Surface Coatings		4,655	0	62	0
Petroleum Production and Marketing					
310	Oil and Gas Production	0	0	0	0
320	Petroleum Refining	0	0	0	0
330	Petroleum Marketing	0	0	2,015	0
399	Other (Petroleum Production and Marketing)	0	0	0	0
Total Petroleum Production and Marketing		0	0	2016	0
Industrial Processes					
410	Chemical	0	0	67	0
420	Food and Agriculture	0	0	2	0
430	Mineral Processes	21,635	0	110	0
440	Metal Processes	0	0	0	0
450	Wood and Paper	0	0	0	0
460	Glass and Related Products	0	0	0	0
470	Electronics	0	0	0	0
499	Other (Industrial Processes)	0	0	16	0
Total Industrial Processes		21,635	0	194	0
Solvent Evaporation					
510	Consumer Products	0	0	0	0
520	Architectural Coatings and Related Solvent	0	0	0	0

530	Pesticides/Fertilizers	0	0	0	0
540	Asphalt Paving/Roofing	0	0	6	0
Total Solvent Evaporation		0	0	6	0
Miscellaneous Processes					
610	Residential Fuel Combustion	1,518,936	3	26	1
620	Farming Operations	0	22	17,011	0
630	Construction and Demolition	0	0	0	0
640	Paved Road Dust	0	0	0	0
645	Unpaved Road Dust	0	0	0	0
650	Fugitive Windblown Dust	0	0	0	0
660	Fires	0	0	6	0
670	Waste Burning and Disposal	16,498	49	56	0
680	Utility Equipment	0	0	0	0
690	Cooking	0	0	107	0
699	Other (Miscellaneous Processes)	0	0	0	0
Total Miscellaneous Processes		1,535,434	74	17,206	2
On-Road Motor Vehicles					
710	Light Duty Passenger Auto (LDA)	3,580,650	219	624	3
722	Light Duty Trucks 1 (T1 : up to 3750 lb.)	1,182,600	157	175	1
723	Light Duty Trucks 2 (T2 : 3751-5750 lb.)	1,755,650	271	285	2
724	Medium Duty Trucks (T3 : 5751-8500 lb.)	1,069,450	109	146	1
732	Light Heavy Duty Gas Trucks 1 (T4 : 8501-10000 lb.)	197,100	26	40	0
733	Light Heavy Duty Gas Trucks 2 (T5 : 10001-14000 lb.)	47,450	6	11	0
734	Medium Heavy Duty Gas Trucks (T6 : 14001-33000 lb.)	32,850	5	22	0
736	Heavy Heavy Duty Gas Trucks ((HHDGT > 33000 lb.)	21,900	4	15	0
742	Light Heavy Duty Diesel Trucks 1 (T4 : 8501-10000 lb.)	3,650	0	4	0
743	Light Heavy Duty Diesel Trucks 2 (T5 : 10001-14000 lb.)	32,850	0	0	0
744	Medium Heavy Duty Diesel Truck (T6 : 14001-33000 lb.)	313,900	1	4	0
746	Heavy Heavy Duty Diesel Trucks (HHDDT > 33000 lb.)	2,445,500	6	106	2
750	Motorcycles (MCY)	10,950	7	29	0
760	Diesel Urban Buses (UB)	21,900	0	0	0
762	Gas Urban Buses (UB)	7,300	1	0	0
770	School Buses (SB)	36,500	0	0	0
776	Other Buses (OB)	10,950	1	4	0
780	Motor Homes (MH)	47,450	6	7	0
Total On-Road Motor Vehicles		10,818,600	818	1,471	10
Other Mobile Sources					
810	Aircraft	197,782	2	8	0
820	Trains	825,780	21	65	1
830	Ships and Commercial Boats	0	0	0	0
840	Recreational Boats	117,413	29	285	0
850	Off-Road Recreational Vehicles	8,979	18	58	0
860	Off-Road Equipment	643,510	37	274	1
870	Farm Equipment	55,955	0	15	0
890	Fuel Storage and Handling	0	0	0	0
895	Truck Stops	0	0	0	0
Total Other Mobile Sources		1,849,418	106	705	2
Total Stationary Sources		14,252,345	146	35,129	14
Total On-Road Vehicles		10,818,600	818	1,471	10
Total Other Mobile		1,849,418	106	705	2
Total Anthropogenic		26,920,364	1,071	37,305	25

Table A-3, 2007 GHG Emissions Per Major Source Category For San Bernardino County

CODE	Source Category	Emissions (TPY)			MMT
		CO ₂	N ₂ O	CH ₄	CO ₂ E
Fuel Combustion					
10	Electric Utilities	3,983,087	23	165	4
20	Cogeneration	1,802,031	28	189	2
30	Oil and Gas Production (Combustion)	2,087	0	0	0
40	Petroleum Refining (Combustion)	0	0	0	0
50	Manufacturing and Industrial	3,129,100	8	61	3
52	Food and Agricultural Processing	36,285	0	1	0
60	Service and Commercial	3,816,449	12	81	4
99	Other (Fuel Combustion)	187,158	1	8	0
Total Fuel Combustion		12,956,195	72	504	12
Waste Disposal					
110	Sewage Treatment	91,015	0	2	0
120	Landfills	997,181	2	7,633	1
130	Incineration	40,267	0	11	0
199	Other (Waste Disposal)	0	0	9,358	0
Total Waste Disposal		1,128,463	2	17,005	1
Cleaning and Surface Coatings					
210	Laundering	0	0	0	0
220	Degreasing	0	0	0	0
230	Coatings and Related Processes	6,973	0	61	0
240	Printing	0	0	0	0
250	Adhesives and Sealants	0	0	0	0
299	Other (Cleaning and Surface Coatings)	0	0	14	0
Total Cleaning and Surface Coatings		6,973	0	75	0
Petroleum Production and Marketing					
310	Oil and Gas Production	0	0	0	0
320	Petroleum Refining	0	0	0	0
330	Petroleum Marketing	0	0	2,026	0
399	Other (Petroleum Production and Marketing)	0	0	0	0
Total Petroleum Production and Marketing		0	0	2,026	0
Industrial Processes					
410	Chemical	0	0	99	0
420	Food and Agriculture	0	0	2	0
430	Mineral Processes	29,842	0	118	0
440	Metal Processes	0	0	0	0
450	Wood and Paper	0	0	0	0
460	Glass and Related Products	0	0	0	0
470	Electronics	0	0	0	0
499	Other (Industrial Processes)	0	0	17	0
Total Industrial Processes		29,842	0	236	0
Solvent Evaporation					
510	Consumer Products	0	0	0	0
520	Architectural Coatings and Related Solvent	0	0	0	0
530	Pesticides/Fertilizers	0	0	0	0

540	Asphalt Paving/Roofing	0	0	7	0
Total Solvent Evaporation		0	0	7	0
Miscellaneous Processes					
610	Residential Fuel Combustion	1,540,926	3	26	1
620	Farming Operations	0	15	11,793	0
630	Construction and Demolition	0	0	0	0
640	Paved Road Dust	0	0	0	0
645	Unpaved Road Dust	0	0	0	0
650	Fugitive Windblown Dust	0	0	0	0
660	Fires	0	0	6	0
670	Waste Burning and Disposal	255,207	765	91	0
680	Utility Equipment	0	0	0	0
690	Cooking	0	0	119	0
699	Other (Miscellaneous Processes)	0	0	0	0
Total Miscellaneous Processes		1,796,133	783	12,035	2
On-Road Motor Vehicles					
710	Light Duty Passenger Auto (LDA)	3,686,500	247	391	3
722	Light Duty Trucks 1 (T1 : up to 3750 lb.)	1,036,600	97	110	1
723	Light Duty Trucks 2 (T2 : 3751-5750 lb.)	2,164,450	189	208	2
724	Medium Duty Trucks (T3 : 5751-8500 lb.)	1,547,600	84	128	1
732	Light Heavy Duty Gas Trucks 1 (T4 : 8501-10000 lb.)	237,250	14	22	0
733	Light Heavy Duty Gas Trucks 2 (T5 : 10001-14000 lb.)	47,450	3	4	0
734	Medium Heavy Duty Gas Trucks (T6 : 14001-33000 lb.)	29,200	3	11	0
736	Heavy Heavy Duty Gas Trucks ((HHDGT > 33000 lb.)	14,600	2	11	0
742	Light Heavy Duty Diesel Trucks 1 (T4 : 8501-10000 lb.)	62,050	0	0	0
743	Light Heavy Duty Diesel Trucks 2 (T5 : 10001-14000 lb.)	40,150	0	4	0
744	Medium Heavy Duty Diesel Truck (T6 : 14001-33000 lb.)	386,900	1	4	0
746	Heavy Heavy Duty Diesel Trucks (HHDDT > 33000 lb.)	2,748,450	7	102	2
750	Motorcycles (MCY)	29,200	16	66	0
760	Diesel Urban Buses (UB)	18,250	0	0	0
762	Gas Urban Buses (UB)	10,950	1	0	0
770	School Buses (SB)	43,800	0	0	0
776	Other Buses (OB)	14,600	1	4	0
780	Motor Homes (MH)	58,400	6	4	0
Total On-Road Motor Vehicles		12,176,400	672	1,066	11
Other Mobile Sources					
810	Aircraft	238,344	2	10	0
820	Trains	920,958	23	72	1
830	Ships and Commercial Boats	0	0	0	0
840	Recreational Boats	143,843	37	237	0
850	Off-Road Recreational Vehicles	11,279	22	77	0
860	Off-Road Equipment	704,410	40	219	1
870	Farm Equipment	54,546	0	11	0
890	Fuel Storage and Handling	0	0	0	0
895	Truck Stops	0	0	0	0
Total Other Mobile Sources		2,073,379	124	626	2
Total Stationary Sources		15,917,605	857	31,888	15
Total On-Road Vehicles		12,176,400	672	1,066	11
Total Other Mobile		2,073,379	124	626	2
Total Anthropogenic		30,167,385	1,653	33,580	28

Table A-4, 2020 GHG Emissions Per Major Source Category For San Bernardino County

CODE	Source Category	Emissions (TPY)			MMT
		CO ₂	N ₂ O	CH ₄	CO ₂ E
Fuel Combustion					
10	Electric Utilities	4,955,987	24	181	5
20	Cogeneration	1,800,825	28	189	2
30	Oil and Gas Production (Combustion)	2,087	0	0	0
40	Petroleum Refining (Combustion)	0	0	0	0
50	Manufacturing and Industrial	4,085,956	10	78	4
52	Food and Agricultural Processing	46,801	0	1	0
60	Service and Commercial	3,875,062	12	83	4
99	Other (Fuel Combustion)	191,502	1	8	0
Total Fuel Combustion		14,958,220	76	540	14
Waste Disposal					
110	Sewage Treatment	114,895	0	2	0
120	Landfills	1,357,810	2	9,417	1
130	Incineration	61,969	0	15	0
199	Other (Waste Disposal)	0	0	11,187	0
Total Waste Disposal		1,534,674	3	20,622	2
Cleaning and Surface Coatings					
210	Laundering	0	0	0	0
220	Degreasing	0	0	0	0
230	Coatings and Related Processes	10,709	0	84	0
240	Printing	0	0	0	0
250	Adhesives and Sealants	0	0	0	0
299	Other (Cleaning and Surface Coatings)	0	0	22	0
Total Cleaning and Surface Coatings		10,709	0	106	0
Petroleum Production and Marketing					
310	Oil and Gas Production	0	0	0	0
320	Petroleum Refining	0	0	0	0
330	Petroleum Marketing	0	0	2,058	0
399	Other (Petroleum Production and Marketing)	0	0	0	0
Total Petroleum Production and Marketing		0	0	2,059	0
Industrial Processes					
410	Chemical	0	0	166	0
420	Food and Agriculture	0	0	2	0
430	Mineral Processes	46,989	0	149	0
440	Metal Processes	0	0	0	0
450	Wood and Paper	0	0	0	0
460	Glass and Related Products	0	0	0	0
470	Electronics	0	0	0	0
499	Other (Industrial Processes)	0	0	24	0
Total Industrial Processes		46,989	0	341	0
Solvent Evaporation					
510	Consumer Products	0	0	0	0
520	Architectural Coatings and Related Solvent	0	0	0	0
530	Pesticides/Fertilizers	0	0	0	0

540	Asphalt Paving/Roofing	0	0	9	0
Total Solvent Evaporation		0	0	9	0
Miscellaneous Processes					
610	Residential Fuel Combustion	2,050,359	4	35	2
620	Farming Operations	0	9	6,957	0
630	Construction and Demolition	0	0	0	0
640	Paved Road Dust	0	0	0	0
645	Unpaved Road Dust	0	0	0	0
650	Fugitive Windblown Dust	0	0	0	0
660	Fires	0	0	6	0
670	Waste Burning and Disposal	255,207	765	81	0
680	Utility Equipment	0	0	0	0
690	Cooking	0	0	150	0
699	Other (Miscellaneous Processes)	0	0	0	0
Total Miscellaneous Processes		2,305,566	778	7,229	2
On-Road Motor Vehicles					
710	Light Duty Passenger Auto (LDA)	4,602,650	129	150	4
722	Light Duty Trucks 1 (T1 : up to 3750 lb.)	1,339,550	51	47	1
723	Light Duty Trucks 2 (T2 : 3751-5750 lb.)	2,810,500	101	120	3
724	Medium Duty Trucks (T3 : 5751-8500 lb.)	1,971,000	49	77	2
732	Light Heavy Duty Gas Trucks 1 (T4 : 8501-10000 lb.)	357,700	8	11	0
733	Light Heavy Duty Gas Trucks 2 (T5 : 10001-14000 lb.)	76,650	2	4	0
734	Medium Heavy Duty Gas Trucks (T6 : 14001-33000 lb.)	47,450	2	4	0
736	Heavy Heavy Duty Gas Trucks ((HHDGT > 33000 lb.)	21,900	1	4	0
742	Light Heavy Duty Diesel Trucks 1 (T4 : 8501-10000 lb.)	69,350	0	4	0
743	Light Heavy Duty Diesel Trucks 2 (T5 : 10001-14000 lb.)	51,100	0	0	0
744	Medium Heavy Duty Diesel Truck (T6 : 14001-33000 lb.)	525,600	2	0	0
746	Heavy Heavy Duty Diesel Trucks (HHDDT > 33000 lb.)	4,288,750	11	47	4
750	Motorcycles (MCY)	54,750	20	77	0
760	Diesel Urban Buses (UB)	25,550	0	0	0
762	Gas Urban Buses (UB)	10,950	1	0	0
770	School Buses (SB)	58,400	0	0	0
776	Other Buses (OB)	21,900	0	0	0
780	Motor Homes (MH)	83,950	4	0	0
Total On-Road Motor Vehicles		16,417,700	381	544	15
Other Mobile Sources					
810	Aircraft	573,241	5	24	1
820	Trains	1,143,196	29	89	1
830	Ships and Commercial Boats	0	0	0	0
840	Recreational Boats	225,110	47	146	0
850	Off-Road Recreational Vehicles	17,991	37	120	0
860	Off-Road Equipment	871,085	40	135	1
870	Farm Equipment	50,921	0	4	0
890	Fuel Storage and Handling	0	0	0	0
895	Truck Stops	0	0	0	0
Total Other Mobile Sources		2,881,544	158	519	3
Total Stationary Sources		18,856,158	856	30,905	18
Total On-Road Vehicles		16,417,700	381	544	15
Total Other Mobile		2,881,544	158	519	3
Total Anthropogenic		38,155,402	1,395	31,967	36

Table A-5, 2002 Daily Fuel Consumption Per Major Source Category For San Bernardino County

CODE	Source Category	Natural Gas (mmscf)	LPG/ Propane/ Butane (1000 gal)	Diesel/ Distillate Oil (1000 gal)	Gasoline (1000 gal)	Landfill Gas (mmscf)	Digester Gas (mmscf)	Residual Fuel Oil (1000 gal)	Jet Fuel (1000 gal)	Bituminous (Tons)	CNG (1000 gal)
Fuel Combustion											
10	Electric Utilities	103.39	0.00	0.03	0.00	0.00	0.03	0.00	0.00	1071.17	0.00
20	Cogeneration	14.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1744.53	0.00
30	Oil and Gas Production (Combustion)	0.00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00
40	Petroleum Refining (Combustion)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	Manufacturing and Industrial	103.63	40.67	67.28	0.11	0.00	0.00	0.41	0.00	0.00	0.00
52	Food and Agricultural Processing	1.32	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	Service and Commercial	131.07	39.27	166.13	27.06	0.00	0.73	0.00	1.01	0.00	0.00
99	Other (Fuel Combustion)	0.00	0.00	38.09	0.00	1.32	1.25	0.00	0.00	0.00	0.00
	Total Fuel Combustion	353.81	79.94	272.12	27.76	1.32	2.01	0.41	1.01	2815.70	0.00
Waste Disposal											
110	Sewage Treatment	0.00	0.00	0.04	0.00	0.00	6.92	0.00	0.00	0.00	0.00
120	Landfills	0.00	0.00	0.00	0.00	83.38	0.00	0.00	0.00	0.00	0.00
130	Incineration	1.28	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
199	Other (Waste Disposal)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Waste Disposal	1.28	0.00	0.04	0.00	83.38	6.99	0.00	0.00	0.00	0.00
Cleaning and Surface Coatings											
210	Laundry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
220	Degreasing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
230	Coatings and Related Processes	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
240	Printing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250	Adhesives and Sealants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
299	Other (Cleaning and Surface Coatings)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Cleaning and Surface Coatings	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Petroleum Production and Marketing											
310	Oil and Gas Production	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
320	Petroleum Refining	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

330	Petroleum Marketing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
399	Other (Petroleum Production and Marketing)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Petroleum Production and Marketing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Industrial Processes																		
410	Chemical	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
420	Food and Agriculture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
430	Mineral Processes	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
440	Metal Processes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
450	Wood and Paper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
460	Glass and Related Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
470	Electronics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
499	Other (Industrial Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Industrial Processes	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Solvent Evaporation																		
510	Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
520	Architectural Coatings and Related Solvent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
530	Pesticides/Fertilizers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
540	Asphalt Paving/Roofing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Solvent Evaporation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Miscellaneous Processes																		
610	Residential Fuel Combustion	66.94	7.10	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
620	Farming Operations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
630	Construction and Demolition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
640	Paved Road Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
645	Unpaved Road Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
650	Fugitive Windblown Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
660	Fires	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
670	Waste Burning and Disposal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
680	Utility Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
690	Cooking	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
699	Other (Miscellaneous Processes)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Miscellaneous Processes	66.94	7.10	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	On-Road Motor Vehicles																		
710	Light Duty Passenger Auto (LDA)	0.00	0.00	2.94	1036.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
722	Light Duty Trucks 1 (T1 : up to 3750 lb.)	0.00	0.00	13.05	330.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

723	Light Duty Trucks 2 (T2 : 3751-5750 lb.)	0.00	0.00	1.71	507.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
724	Medium Duty Trucks (T3 : 5751-8500 lb.)	0.00	0.00	0.83	307.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
732	Light Heavy Duty Gas Trucks 1 (T4 : 8501-10000 lb.)	0.00	0.00		59.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
733	Light Heavy Duty Gas Trucks 2 (T5 : 10001-14000 lb.)	0.00	0.00		14.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
734	Medium Heavy Duty Gas Trucks (T6 : 14001-33000 lb.)	0.00	0.00		10.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
736	Heavy Heavy Duty Gas Trucks (HHDDGT > 33000 lb.)	0.00	0.00		8.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
742	Light Heavy Duty Diesel Trucks 1 (T4 : 8501-10000 lb.)	0.00	0.00	0.74		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
743	Light Heavy Duty Diesel Trucks 2 (T5 : 10001-14000 lb.)	0.00	0.00	7.94		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
744	Medium Heavy Duty Diesel Truck (T6 : 14001-33000 lb.)	0.00	0.00	77.50		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
746	Heavy Heavy Duty Diesel Trucks (HHDDT > 33000 lb.)	0.00	0.00	602.82		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
750	Motorcycles (MCY)	0.00	0.00	0.00	6.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
760	Diesel Urban Buses (UB)	0.00	0.00	5.81		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
762	Gas Urban Buses (UB)	0.00	0.00	0.00	2.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
770	School Buses (SB)	0.00	0.00	8.55	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
776	Other Buses (OB)	0.00	0.00	1.79	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
780	Motor Homes (MH)	0.00	0.00	1.47	12.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total On-Road Motor Vehicles	0.00	0.00	725.15	2,299.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Other Mobile Sources													
810	Aircraft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
820	Trains	0.00	0.00	201.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
830	Ships and Commercial Boats	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
840	Recreational Boats	0.00	0.00	0.92	47.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
850	Off-Road Recreational Vehicles	0.00	0.00	0.00	5.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
860	Off-Road Equipment	0.00	0.00	143.94	24.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.34
870	Farm Equipment	0.00	0.00	13.81	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
890	Fuel Storage and Handling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
895	Truck Stops	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Other Mobile Sources	0.00	0.00	360.07	77.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.34
	Total Stationary Sources	423.21	87.04	272.88	27.76	84.70	9.00	0.41	1.01	2815.70	0.00	0.00	0.00	0.00
	Total On-Road Vehicles	0.00	0.00	725.15	2299.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Other Mobile*	0.00	0.00	360.07	77.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.34
	Total Anthropogenic	423.21	87.04	1,358.10	2,404.62	84.70	9.00	0.41	52.18	2,815.70	0.00	0.00	0.00	9.34

APPENDIX B

GHG EMISSIONS FROM ELECTRICITY USAGE

Table B-1
1996 San Bernardino County GHG Emissions from Electricity Usage*

Emissions from Electricity Usage are derived from the following equation:

$$\text{Emissions}_{(\text{elec})} (\text{TPY}) = ((\text{Annual Consumption} \times \text{Emission Factor})/2000^*)$$

To convert from TPY to Million Metric Tons (MMT multiply TPY by (0.9072/1,000,000))

	Annual Electrical Consumption (MWh)	Emission Factor**			CO ₂ TPY	CH ₄ TPY	N ₂ O TPY	CO ₂ E MMT***
		CO ₂ lbs/MWh	CH ₄ lbs/MWh	N ₂ O lbs/MWh				
Residential	3,537,000	640	0.0067	0.0037	1,131,840	11.85	6.54	1.03
Non-Residential	6,822,000				2,183,040	22.85	12.62	1.98
Total	10,359,000				3,314,880	34.70	19.16	3.01

*The activity data was provided by the San Bernardino County (Obtained from the California Energy Commission)

**Emission Factor for electricity usage as reported to California Climate Action Registry for Southern California Edison.

***CO₂ equivalent conversion factors are from Table 2 of CARB's regulation for Mandatory Reporting of GHG emissions.

Table B-2
2005 San Bernardino County GHG Emissions from Electricity Usage

Emissions from Electricity Usage are derived from the following equation:

$$\text{Emissions}_{(\text{elec})} (\text{TPY}) = ((\text{Annual Consumption} \times \text{Emissions Factor})/2000^*)$$

To convert from TPY to Million Metric Tons (MMT multiply TPY by (0.9072/1,000,000))

	Annual Electrical Consumption (MWh)	Emission Factor**			CO ₂ TPY	CH ₄ TPY	N ₂ O TPY	CO ₂ E MMT***
		CO ₂ lbs/MWh	CH ₄ lbs/MWh	N ₂ O lbs/MWh				
Residential	5,208,000	640	0.0067	0.0037	1,666,560	17.45	9.63	1.51
Non-Residential	9,551,000				3,056,320	32.00	17.67	2.78
Total	14,759,000				4,722,880	49.44	27.30	4.29

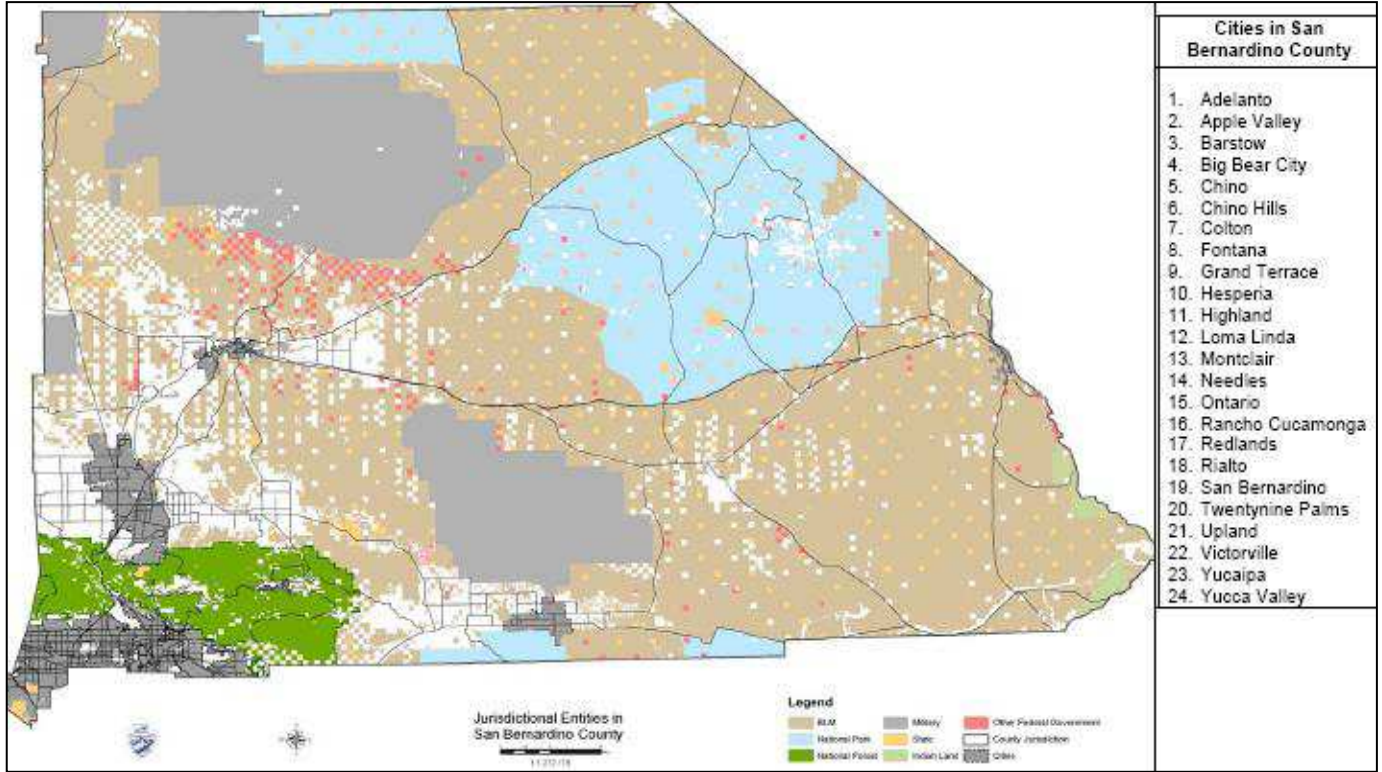
*The activity data was provided by the San Bernardino County

**Emission Factor for electricity usage as reported to California Climate Action Registry for Southern California Edison.

***CO₂ equivalent conversion factors are from Table 2 of CARB's regulation for Mandatory Reporting of GHG emissions.

APPENDIX C

Figure C-1, San Bernardino County Land Use Map



Source: San Bernardino County Land Use Services Department, 2009

APPENDIX D

DAIRY, MANURE AND DIGESTIVE METHANE INVENTORY DOCUMENTATION

Table D-1
1990 San Bernardino County Dairy GHG Emissions Summary*

Total Milk Cows	Total Calves	Total Acres	Total Methane Emissions (MT/yr)	Total N ₂ O Emissions (MT/yr)	CO ₂ E (MT/yr)
188,000	152,000	5,425	41,562.0	52.9	889,192

*The data was provided by the San Bernardino County Department of Agriculture, Weights and Measures, June 2008

**Table D-2
1990 San Bernardino County Dairy GHG Manure Methane Emissions**

Animal	Head	Typical Animal Mass* (lbs)	Total Animal Mass (kg)	kg VS**/1000 kg Animal Mass/day	Total VS Produced (kg/yr)	Max. Methane Produced per kg of VS (m3/kg)	Methane Conversion Factor	Total Annual Methane Emissions (m3/yr)	Total Annual Methane Emissions (MT/yr)	Methane (lbs/day)	CO ₂ E (MT/yr)
Milk Cows	160,000	1,400	101,605,733	9.44	350,092,715	0.24	0.51	42,683,304	28,256.4	154,829	593,383
Dry Cows	28,000	1,120	14,224,803	6.82	35,409,801	0.17	0.02	108,354	71.7	393	1,506
Heifers (1-2 yrs)	76,000	1,003	34,576,794	6.41	80,897,596	0.17	0.02	247,547	163.9	898	3,441
Calves (3 mos-1 yr)	57,000	500	12,927,515	6.41	30,245,861	0.17	0.02	92,552	61.3	336	12,867
Calves (<3 mos)	19,000	300	2,585,503	6.41	6,049,172	0.17	0.02	18,510	12.3	67	257
TOTALS***	340,000		165,920,348		502,695,145			43,150,267	28,565.5	156,523	599,875

*Typical Animal Mass from Dairy Technical Report

**Volatile Solids

***In total (#s may be slightly off due to rounding)

Source: EPA Methods for Estimating Greenhouse Gas Emissions from Livestock Manure Management (2005).

Table D-3
1990 San Bernardino County Digestive Methane Emissions

Animal	Head	Digestive Methane Emission Factor (lbs/cow/yr)	Digestive Methane Emissions (lbs/yr)	Digestive Methane Emissions (MT/yr)	Methane (lbs/day)
Milk Cows	160,000	119.10	19,056,000	8,662	52,208
Dry Cows	28,000	119.10	3,334,800	1,516	9,136
Heifers (1-2 yrs)	76,000	61.00	4,636,000	2,107	12,701
Calves (3 mos-1 yr)	57,000	20.60	1,174,200	534	3,217
Calves (<3 mos)	19,000	20.60	391,400	178	1,072
TOTALS	340,000		28,592,400	12,997	78,335
				Total Methane Emissions (MT/yr) (Manure + Digestive)	41,562
				Total CO ₂ E (MT/yr)	872,802

Source: EPA 1998. AP-42, Fifth Edition, Volume I, Chapter 44: Greenhouse Gas Biogenic Sources 14.4 Enteric Fermentation – Greenhouse Gases, Supplement D., February 1998.

**Table D-4
1990 San Bernardino County N₂O Emissions from Manure Management**

Liquid System

Animal	Head	Factor	Typical Animal Mass (lbs)	Liquid Waste Factor	Liquid Waste Nitrogen (lbs/yr)	Liquid Waste Nitrogen (kg/yr)	Emission Factor (kg N ₂ O-N/kg N)	N ₂ O Emissions (N ₂ O-N/kg N)	N ₂ O (MT/yr)	N ₂ O (lbs/day)
Milk Cows	160,000	1.40	224,000	40.88	9,157,120	4,153,642	0.00	4,153.6	4.6	25
Dry Cows	28,000	1.12	31,360	24.64	772,632	350,464	0.00	350.5	0.4	2
Heifers (1-2 yrs)	76,000	1.03	78,280	24.64	1,928,623.5	874,818	0.00	874.8	1.0	5
Calves (3 mos-1 yr)	57,000	0.50	28,500	24.64	702,168.75	318,502	0.00	318.5	0.4	2
Calves (<3 mos)	19,000	0.30	5,700	24.64	140,433.75	63,700	0.00	63.7	0.1	0.4
Subtotal Liquid*	340,000				12,700,978	5,761,126		5,761.1	6.5	34.4

Dry System

Animal	Head	Factor	Typical Animal Mass (lbs)	Solid Waste Factor	Solid Waste Nitrogen (lbs/yr)	Solid Waste Nitrogen (kg/yr)	Emission Factor (kg N ₂ O-N/kg N)	N ₂ O Emissions (N ₂ O-N/kg N)	N ₂ O (MT/yr)	N ₂ O (lbs/day)
Milk Cows	160,000	1.40	224,000	10	9,157,120	4,153,642	0.02	20,768	22.9	125
Dry Cows	28,000	1.12	31,360	16	772,632	350,464	0.02	4,673	5.2	28
Heifers (1-2 yrs)	76,000	1.03	78,280	16	1,928,623.5	874,818	0.02	11,664	12.9	70
Calves (3 mos-1 yr)	57,000	0.50	28,500	16	702,168.75	318,502	0.02	4,247	4.7	26
Calves (<3 mos)	19,000	0.30	5,700	16	140,433.75	63,700	0.02	849	1.0	5
Subtotal Dry*	340,000				12,700,978	5,761,126		42,201	46.5	254
Total Dry & Liquid System*								47,963	53	288

*Numbers in totals may be off slightly due to rounding

Sources:

Liquid & solid waste factors and resulting liquid & solid waste nitrogen from SJVAPCD Dairy Technical Report

Emission factor (kg N₂O-N/kg N): EPA, Methods for Estimating Greenhouse Gas Emissions from Livestock Manure Management (March 2005) DRA

APPENDIX E

POPULATION AND EMPLOYMENT DATA

Table E-1 summarizes population and employment data used to project energy use in this analysis. All the socioeconomic data were provided by SCAG and used in the 2007 AQMP.

Table E-1

San Bernardino County Population and Employment Data

	1990	2002	2007	2020
Population	1,418,380	1,785,347	2,056,450	2,533,956
Employment	444,128	614,505	729,470	1,002,376

Table E-2 Summarizes Population Data for Areas under County's Jurisdiction

Table E-2

Population Data for Areas under County's Jurisdiction

	1990	2002	2007	2020
Population	207,083	260,661	300,242	369,958

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APPENDIX E

A LOOK FORWARD TO 2030

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APPENDIX E

REDUCING SAN BERNARDINO COUNTY'S EMISSIONS FURTHER:

A LOOK FORWARD TO 2030

PREPARED BY ICF INTERNATIONAL

In order to assess whether implementing this plan achieves the State's long-term climate goals, one must look beyond 2020 to see whether the emissions reduction measures set the County on a trajectory needed to do its part. Governor Schwarzenegger's Executive Order S-3-05 calls for an 80 percent reduction below 1990 greenhouse gas emission levels by 2050. This results in a 2050 statewide target of about 85 million metric tons of carbon dioxide equivalent (MMT CO_2E) (total emissions), as compared to the 1990 level (also the 2020 target) of 427 MMT CO_2E . Assuming that San Bernardino County's 2020 goal of 15% below 2007 levels (equal to 5.2 MMT CO_2E) is roughly equivalent to 1990 levels, the 2050 County goal to match the S-3-05 goals would be 1.1 MMT CO_2E in 2050.

Full implementation of CARB's Scoping Plan and the County's GHG Reduction Plan will put the County on a path toward these required long-term reductions. Figure E-1 depicts what an emissions trajectory might look like, assuming San Bernardino County follows a linear path from the 2020 reduction target to a 2050 goal matching that in S-03-05. While the measures needed to meet the 2050 goal are too far in the future to define in detail, one can examine the measures needed to keep the County on track through at least 2030.

To stay on course toward the 2050 target, the County's greenhouse gas emissions need to be reduced to approximately 3.9 MMT CO_2E by 2030. This translates to an average reduction of 2.7 percent per year between 2020 and 2030. An additional challenge comes from the fact that the population in unincorporated San Bernardino County will grow further between 2020 and 2030. To counteract this trend, per-capita emissions must decrease at an average rate of slightly less than 3.1 percent per year during the 2020 to 2030 period.

These reductions are possible. The measures needed are logical expansions of the programs recommended in the CARB Scoping Plan at the state level and the measures included in the San Bernardino GHG Reduction Plan at the local level that get the County to the 2020 goal.

The State can help San Bernardino County keep on track through 2030 by extending state action in the following ways that it described in the Scoping Plan (CARB 2008):

- Expand vehicle efficiency regulations to achieve a 40 percent fleet-wide passenger vehicle reduction by 2030 (approximately double the almost 20 percent expected in 2020);

-
- Increasing California's use of renewable energy in electricity generation (beyond the 33% planned for 2020);
 - Reducing the carbon intensity of transportation fuels by 25 percent (a further decrease from the 10 percent level set for 2020);
 - Increasing energy efficiency and green building efforts (so that the savings achieved in the 2020 to 2030 timeframe are approximately double those accomplished in 2020); and
 - Using a regional or national cap-and-trade system to further limit emissions from the 85 percent of greenhouse gas emissions in capped sectors (Transportation Fuels and other fuel use, Electricity, Residential/Commercial Natural Gas, and Industry). By 2030 a comprehensive cap-and-trade program could lower emissions in the capped sectors from 365 MMTCO₂E in 2020 to around 250 MMTCO₂E in 2030. The County's GHG Reduction Plan has not assumed any benefit from a cap and trade system 2020, but if and when implemented, such a system would result in reductions beyond that currently anticipated in the Plan for 2020 and additional reductions for 2030;

San Bernardino can do its part to be on track through 2030 to meet the 2050 goal by implementing the following:

- Increasing energy efficiency and green building efforts (for County municipal buildings as well as private buildings in the County) so that the savings achieved in the 2020 to 2030 timeframe are approximately double those accomplished in 2020;
- Continuing to implement land use and transportation measures to lower VMT and shift travel modes (assumed improvement of 10% compared to unmitigated condition which is a mid-point between the SB375 SCAG goal of 8% for 2020 and 12% for 2035);
- Capture more methane from County landfills, move beyond the 75% local waste diversion goal for 2020, and utilize landfill gas further as an energy source.
- Continue to improve local water efficiency and conservation.

The effects of these strategies are presented in Table E-1 and would represent an approximate doubling of effort from that planned at the state and County level for 2020.

In total, the measures described above would produce reductions to bring the County's GHG emissions to an estimated 3.9 MMTCO₂E. While the potential mix of future GHG reduction measures articulated in this section is only an example, it serves to demonstrate that the measures in the CARB Scoping Plan and the County's GHG Reduction Plan can not only move the County to its 2020 goal, but can also provide an expandable framework for much greater long-term greenhouse gas emissions reductions.

This appendix was prepared by Rich Walter, Principal, ICF International and Brian Schuster, Technical Analyst, ICF international.

**Figure E-1: San Bernardino County
GHG Emission and Projections, 1990 to 2050**

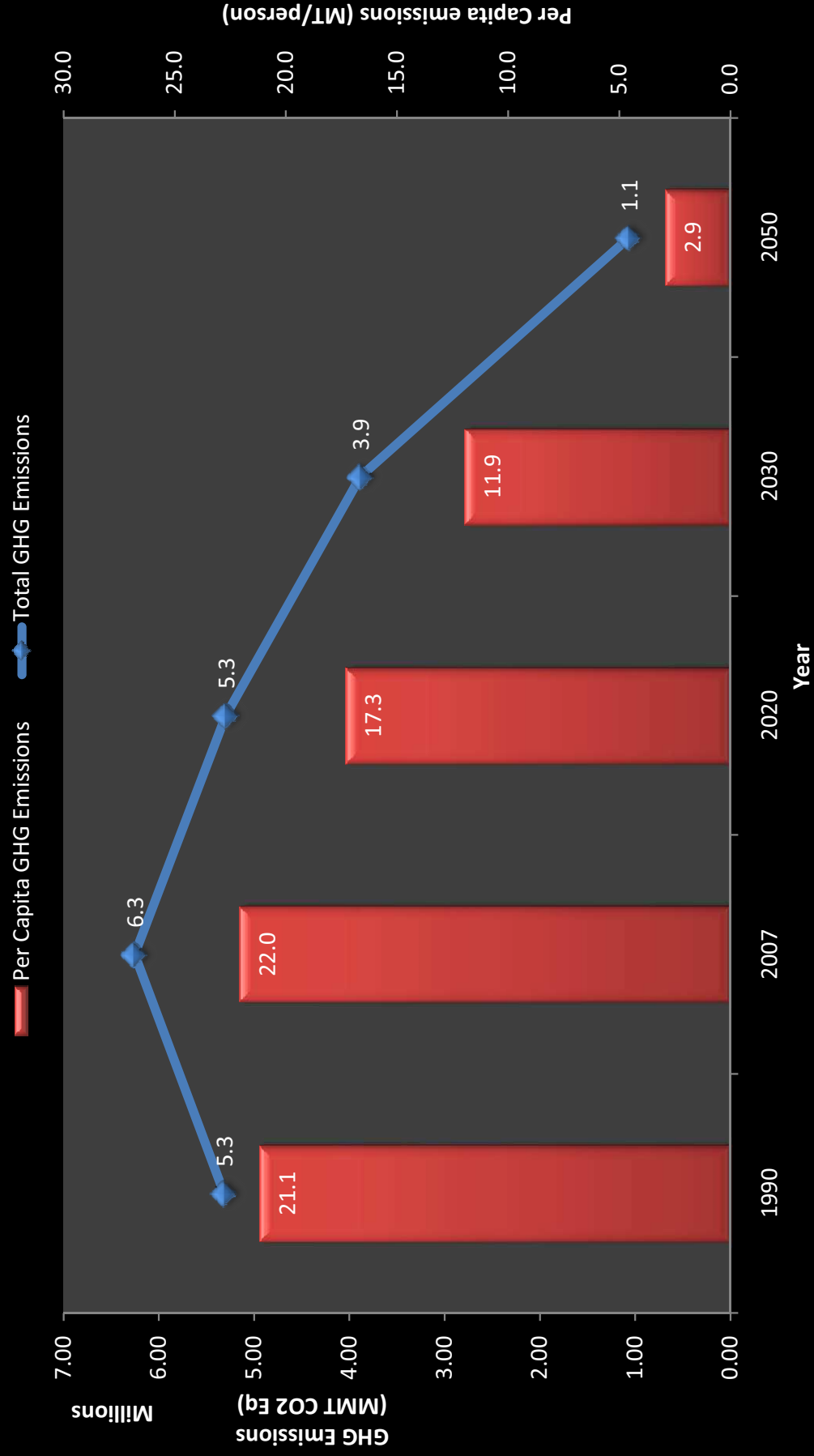


Table E-1: San Bernardino County, 2030 Reduction Scenario

Scenario	2020 Plan			2030 Scenario					Notes
	Reductions State	Reductions Local	Unmitigated Emissions	Reductions State	Reductions Local	Reductions State	Reductions Local	Total Reductions	
Stationary Sources	33%	0%	3,649,630	46%	0%	1,678,830	0	1,678,830	Assumed state continues efforts to reduce carbon intensity of cement and other industrial processes (assumed 13% improvement 2020 to 2030 which is a 50% slower rate of improvement than assumed in County GHG reduction plan from 2007 to 2020).
Residential and Commercial	22%	11%	860,284	45%	20%	387,128	172,057	559,185	CARB Scoping Plan calls for doubling of energy efficiency reductions between 2020 and 2030. Local measure improvements in energy efficiency and use of renewable energy estimates to double reductions in this sector by 2030.
Industrial	22%	11%	905,392	45%	20%	407,427	181,078	588,505	CARB Scoping Plan calls for achieving twice as much reductions from vehicle fleet by 2020 compared to 2030 and more than doubling reduction of carbon intensity of transportation fuels. Local reduction assumed be between 2020 SCAG goal of 8% and 12% of goal for 2035 for VMT reduction.
Transportation: On-Road	20%	2%	2,654,879	40%	10%	1,061,951	265,488	1,327,439	CARB Scoping Plan calls for more than double the reduction of carbon intensity of transportation fuels.
Transportation: Off-Road	7%	0%	307,919	14%	0%	44,340	0	44,340	
Landfill Waste	0%	58%	397,944	0%	65%	0	258,663	258,663	Assumed County continues further efforts at methane control, waste diversion, and potential waste to energy projects to result in 7% further reduction in sector.
Agriculture	3%	0%	41,813	3%	0%	1,254	0	1,254	No assumed change.
Wastewater	0%	7%	41,920	0%	10%	0	4,192	4,192	Assumed additional 3% in reduction in sector due to fugitive emission capture and additional water conservation.
Water Conveyance	15%	20%	15,325	20%	25%	3,065	3,831	6,896	Assumed state continued effort to reduce carbon intensity of cement and other industrial processes (assumed 17% improvement 2020 to 2030).
Miscellaneous	0%	0%	509	0%	0%	0	0	0	No assumed change.
Additional Reductions Assumed from Cap and Trade								514,786	CARB Scoping Plan assumed approximately 5.8% of reductions by 2020 in capped sectors not otherwise accounted for through specific sectoral measures. Used same methodology for 2030 scenario.
TOTAL Mitigated Emissions	25%	5%	8,875,614	46%	10%	4,098,781	885,310	4,984,091 3,897,523	Overall, approximate doubling of effort from 2020 at both state and local level would keep County on track to 2050 reductions.

Notes:

1. CARB Scoping Plan, 2008, p. 117 to 120 presents a 2030 reduction scenario. Assumptions for state action derived from Scoping Plan as noted in table.
2. State and local measure percent reductions for 2020 are from County GHG Reduction Plan, Appendix A, and are approximations for aggregated sectors.
3. 2030 unmitigated emissions were forecast from 2020 unmitigated emissions using annual average growth factors from County GHG Reduction Plan, Appendix A for aggregated sectors and carrying them out to 2030.

GREENHOUSE GAS EMISSIONS

Development Review Processes County of San Bernardino, California

August 2011

Prepared for:

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Introduction

The San Bernardino County GHG Emissions Reduction Plan (GHG Plan) includes reducing 159,423 Metric Tons of Carbon Dioxide Equivalents (MTCO₂e) per year from new development by 2020 as compared to the 2020 unmitigated conditions.

Mitigation of GHG emissions impacts through the GHG Development Review Process (DRP) provides one of the most substantial reduction strategies for reducing external emissions. The DRP procedures for evaluating GHG impacts and determining significance for CEQA purposes will be streamlined by (1) applying a uniform set of performance standards to all development projects, and (2) utilizing Screening Tables to mitigate project GHG emissions. Projects will have the option of preparing a project-specific technical analysis to quantify and mitigate GHG emissions. A review standard of 3,000 MTCO₂e per year will be used to identify projects that require the use of Screening Tables or a project-specific technical analysis to quantify and mitigate project emissions. The review standard of 3,000 MTCO₂e per year and the performance standard are described in Attachment 1, and the Screening Tables & methodology are described in Attachment 2, the methodology for determining unmitigated and mitigated emission is described in Attachment 3.

As part of the implementation of the County GHG Plan, a uniform set of performance standards will be applied to development projects. These performance standards will be added to the County Development Code to ensure consistent application during development review. The complete Development Review Process, including the use of performance standards, for assessing and mitigating GHG emissions is outlined below.

- a) County Performance Standards. All development projects, including those otherwise determined to be exempt from CEQA will be subject to applicable Development Code provisions, including the GHG performance standards, and state requirements, such as the California Building Code requirements for energy efficiency. With the application of the GHG performance standards, projects that are exempt from CEQA and small projects that do not exceed 3,000 MTCO₂e PER YEAR will be considered to be consistent with the Plan and determined to have a less than significant individual and cumulative impact for GHG emissions. (See Attachment 1 hereto, for description of the performance standards and the methodology relating to the 3,000 MTCO₂e per year level)
- b) Regulatory Agency Performance Standards. When, and if, South Coast Air Quality Management District or Mojave Basin Air Quality Management District adopts standards, the County will consider such guidance and incorporate all applicable standards.

- c) Projects Using Screening Table. For projects exceeding 3,000 MTCO₂e per year of GHG emissions, the County will use Screening Tables as a tool to assist with calculating GHG reduction measures and the determination of a significance finding. Projects that garner a 100 or greater points would not require quantification of project specific GHG emissions. The point system was devised to ensure to Project compliance with the reduction measures in the GHG Plan such that the GHG emissions from new development, when considered together with those existing development, will allow the County to meet its 2020 target and support reductions in GHG emissions beyond 2020. Consistent with the CEQA Guidelines, such projects are consistent with the Plan and therefore will be determined to have a less than significant individual and cumulative impact for GHG emissions. (See Attachment 2 hereto, for a full description of the Screening Tables and methodology.)
- d) Projects Not Using Screening Tables. Projects exceeding 3,000 MTY of GHG emissions that do not use the Screening Tables, will be required to quantify project-specific GHG emissions and achieve the equivalent level of GHG emissions efficiency as a 100-point project. Consistent with the CEQA Guidelines, such projects are consistent with the Plan and therefore will be determined to have a less than significant individual and cumulative impact for GHG emissions. (See Attachment 3 hereto for a description of this alternative GHG mitigation analysis and methodology.)
- e) Residential Projects Located Outside City Sphere of Influence. Residential Projects (or mixed use projects with a residential component) in excess of 250 residential dwelling units that are located in unincorporated area not within a City Sphere of Influence (SOI) will not be eligible to use the Screening Tables or rely on the Plan for a determination of less than significant on individual or cumulative impact for GHG emissions. These projects must perform an independent project-specific evaluation of GHG emissions as described in Attachments 1 and 3 hereto, and present project-specific conclusions regarding significance of GHG emissions impacts. (See Attachments 1 and 3 hereto for a full description of the mitigation analysis and methodology for these projects.)

Summary

In total, Projects that emit 3,000 MTCO₂e or more per year are anticipated to reduce a total of approximately 150,600 MTCO₂e per year as compared to the 2020 unmitigated scenario. To summarize the GHG Reductions:

Performance Standards are expected to reduce	5,282.3 MTCO ₂ e per year
Small accessory renewable energy projects are expected to reduce	8,628.0 MTCO ₂ e per year
Projects demonstrating consistency with the GHG Plan will reduce	<u>150,600.0 MTCO₂e per year</u>
Total:	164,510.3 MTCO₂e per year

Note the anticipated reductions, including those attributable to small accessory renewable energy projects described in Attachment 4 hereto, exceed the GHG Plan reductions required for new development by approximately 5,088 MTCO₂e per year.

ATTACHMENT 1:

- a. Performance Standards**
- b. Projects Emitting 3,000 MTCO₂e Per Year or Less**
- c. Residential Projects Outside of City Spheres of Influence**

PERFORMANCE STANDARDS

The GHG reducing performance standards were developed by the County to improve the energy efficiency, water conservation, vehicle trip reduction potential, and other GHG reducing impacts from all new development approved within the unincorporated portions of San Bernardino County. As such, the following Performance Standards establish the minimum level of compliance that development must meet to assist in meeting the 2020 GHG reduction target identified in the in the County GHG Emissions Reduction Plan. These Performance Standards apply to all Projects, including those that are exempt under CEQA, and will be included as Conditions of Approval for development projects.

The following are the Performance Standards (Conditions of Approval) used for Industrial, Commercial and Residential projects in the County:

COMMERCIAL AND INDUSTRIAL PROJECTS

1. GHG – Operational Standards. *The developer shall implement the following as greenhouse gas (GHG) mitigation during the operation of the approved project:*
 - a) Waste Stream Reduction. *The “developer” shall provide to all tenants and project employees County-approved informational materials about methods and need to reduce the solid waste stream and listing available recycling services.*
 - b) Vehicle Trip Reduction. *The “developer” shall provide to all tenants and project employees County-approved informational materials about the need to reduce vehicle trips and the program elements this project is implementing. Such elements may include: participation in established ride-sharing programs, creating a new ride-share employee vanpool, designating preferred parking spaces for ride sharing vehicles, designating adequate passenger loading and unloading for ride sharing vehicles with benches in waiting areas, and/or providing a web site or message board for coordinating rides.*
 - c) Provide Educational Materials. *The developer shall provide to all tenants and staff education materials and other publicity about reducing waste and available recycling services. The education and publicity materials/program shall be submitted to County Planning for review and approval. The developer shall also provide to all tenants and require that the tenants shall display in their stores current transit route information for the project area in a visible and convenient*

location for employees and customers. The specific transit routes displayed shall include Omni Trans Route 8, San Bernardino-Mentone-Yucaipa.

- d) Landscape Equipment. The developer shall require in the landscape maintenance contract and/or in onsite procedures that a minimum of 20% of the landscape maintenance equipment shall be electric-powered.

2. GHG – Construction Standards. *The “developer” shall submit for review and obtain approval from County Planning of a signed letter agreeing to include as a condition of all construction contracts/subcontracts requirements to reduce GHG emissions and submitting documentation of compliance. The developer/construction contractors shall do the following:*

- a) *Implement the approved Coating Restriction Plans.*
- b) *Select construction equipment based on low GHG emissions factors and high-energy efficiency. All diesel/gasoline-powered construction equipment shall be replaced, where possible, with equivalent electric or CNG equipment.*
- c) *Grading contractor shall provide the implement the following when possible:*
 - 1) *training operators to use equipment more efficiently.*
 - 2) *identifying the proper size equipment for a task can also provide fuel savings and associated reductions in GHG emissions*
 - 3) *replacing older, less fuel-efficient equipment with newer models*
 - 4) *use GPS for grading to maximize efficiency*
- d) *Grading plans shall include the following statements:*
 - *“All construction equipment engines shall be properly tuned and maintained in accordance with the manufacturers specifications prior to arriving on site and throughout construction duration.”*
 - *“All construction equipment (including electric generators) shall be shut off by work crews when not in use and shall not idle for more than 5 minutes.”*
- e) *Schedule construction traffic ingress/egress to not interfere with peak-hour traffic and to minimize traffic obstructions. Queuing of trucks on and off site shall be firmly discouraged and not scheduled. A flagperson shall be retained to maintain efficient traffic flow and safety adjacent to existing roadways.*
- f) *Recycle and reuse construction and demolition waste (e.g. soil, vegetation, concrete, lumber, metal, and cardboard) per County Solid Waste procedures.*
- g) *The construction contractor shall support and encourage ridesharing and transit incentives for the construction crew and educate all construction workers about the required waste reduction and the availability of recycling services.*

3. GHG – Design Standards. *The developer shall submit for review and obtain approval from County Planning that the following measures have been incorporated into the design of the project. These are intended to reduce potential project greenhouse gas (GHGs) emissions. Proper installation of the approved design features and equipment shall be confirmed by County Building and Safety prior to final inspection of each structure.*

a) Title 24 + 5%. *The Developer shall document that the design of the proposed structures exceeds the current Title 24 energy-efficiency requirements by a minimum of five percent. County Planning shall coordinate this review with the County Building and Safety. Any combination of the following design features may be used to fulfill this mitigation, provided that the total increase in efficiency meets or exceeds the cumulative goal (105%+ of Title 24) for the entire project (Title 24, Part 6 of the California Code of Regulations; Energy Efficiency Standards for Residential and Non Residential Buildings, as amended October 1, 2005; Cool Roof Coatings performance standards as amended September 11, 2006):*

- *Incorporate dual paned or other energy efficient windows,*
- *Incorporate energy efficient space heating and cooling equipment,*
- *Incorporate energy efficient light fixtures, photocells, and motion detectors,*
- *Incorporate energy efficient appliances,*
- *Incorporate energy efficient domestic hot water systems,*
- *Incorporate solar panels into the electrical system,*
- *Incorporate cool roofs/light colored roofing,*
- *Incorporate other measures that will increase energy efficiency.*
- *Increase insulation to reduce heat transfer and thermal bridging.*
- *Limit air leakage throughout the structure and within the heating and cooling distribution system to minimize energy consumption.*

b) Plumbing. *All plumbing shall incorporate the following:*

- *All showerheads, lavatory faucets, and sink faucets shall comply with the California Energy Conservation flow rate standards.*
- *Low flush toilets shall be installed where applicable as specified in California State Health and Safety Code Section 17921.3.*
- *All hot water piping and storage tanks shall be insulated. Energy efficient boilers shall be used.*

c) Lighting. *Lighting design for building interiors shall support the use of:*

- *Compact fluorescent light bulbs or equivalently efficient lighting.*

- *Natural day lighting through site orientation and the use of reflected light.*
 - *Skylight/roof window systems.*
 - *Light colored building materials and finishes shall be used to reflect natural and artificial light with greater efficiency and less glare.*
 - *A multi-zone programmable dimming system shall be used to control lighting to maximize the energy efficiency of lighting requirements at various times of the day.*
 - *Provide a minimum of 2.5 percent of the project's electricity needs by on-site solar panels.*
- d) *Building Design.* *Building design and construction shall incorporate the following elements:*
- *Orient building locations to best utilize natural cooling/heating with respect to the sun and prevailing winds/natural convection to take advantage of shade, day lighting and natural cooling opportunities.*
 - *Utilize natural, low maintenance building materials that do not require finishes and regular maintenance.*
 - *Roofing materials shall have a solar reflectance index of 78 or greater.*
 - *All supply duct work shall be sealed and leak-tested. Oval or round ducts shall be used for at least 75 percent of the supply duct work, excluding risers.*
 - *Energy Star or equivalent appliances shall be installed.*
 - *A building automation system including outdoor temperature/humidity sensors will control public area heating, vent, and air conditioning units*
- e) *Landscaping.* *The developer shall submit for review and obtain approval from County Planning of landscape and irrigation plans that are designed to include drought tolerant and smog tolerant trees, shrubs, and groundcover to ensure the long-term viability and to conserve water and energy. The landscape plans shall include shade trees around main buildings, particularly along southern and western elevations, where practical.*
- f) *Irrigation.* *The developer shall submit irrigation plans that are designed, so that all common area irrigation areas shall be capable of being operated by a computerized irrigation system, which includes either an on-site weather station, ET gauge or ET-based controller capable of reading current weather data and making automatic adjustments to independent run times for each irrigation valve based on changes in temperature, solar radiation, relative humidity, rain and wind. In addition, the computerized irrigation system shall be equipped with flow sensing capabilities, thus*

automatically shutting down the irrigation system in the event of a mainline break or broken head. These features will assist in conserving water, eliminating the potential of slope failure due to mainline breaks and eliminating over-watering and flooding due to pipe and/or head breaks.

- g) Recycling. Exterior storage areas for recyclables and green waste shall be provided. Where recycling pickup is available, adequate recycling containers shall be located in public areas. Construction and operation waste shall be collected for reuse and recycling.*
- h) Transportation Demand Management (TDM) Program. The project shall include adequate bicycle parking near building entrances to promote cyclist safety, security, and convenience. Preferred carpool/vanpool spaces shall be provided and, if available, mass transit facilities shall be provided (e.g. bus stop bench/shelter). The developer shall demonstrate that the TDM program has been instituted for the project or that the buildings will join an existing program located within a quarter mile radius from the project site that provides a cumulative 20% reduction in unmitigated employee commute trips. The TDM Program shall publish ride-sharing information for ride-sharing vehicles and provide a website or message board for coordinating rides. The Program shall ensure that appropriate bus route information is placed in each building.*

- 4. GHG – Installation/Implementation Standards. The developer shall submit for review and obtain approval from County Planning of evidence that all applicable GHG performance standards have been installed, implemented properly and that specified performance objectives are being met to the satisfaction of County Planning and County Building and Safety. These installations/ procedures include the following:*
 - a) Design features and/or equipment that cumulatively increases the overall compliance of the project to exceed Title 24 minimum standards by five percent.*
 - b) All interior building lighting shall support the use of fluorescent light bulbs or equivalent energy-efficient lighting.*
 - c) Installation of both the identified mandatory and optional design features or equipment that have been constructed and incorporated into the facility/structure.*

RESIDENTIAL PROJECTS

1. GHG – Operational Standards. *The developer shall implement the following as greenhouse gas (GHG) mitigation during the operation of the approved project:*
 - a) Waste Stream Reduction. *The “developer” shall provide to all tenants and project employees County-approved informational materials about methods and need to reduce the solid waste stream and listing available recycling services.*
 - b) Vehicle Trip Reduction. *The “developer” shall provide to all tenants and homeowners County-approved informational materials about the need to reduce vehicle trips and the program elements this project is implementing. Such elements may include: participation in established ride-sharing programs, creating a new ride-share employee vanpool, and/or providing a web site or message board for coordinating rides.*
 - c) Provide Educational Materials. *The developer shall provide to all tenants and employees education materials and about reducing waste and available recycling services. The education materials shall be submitted to County Planning for review and approval.*
 - d) Landscape Equipment. *The developer shall require in the landscape maintenance contract and/or in onsite procedures that a minimum of 20% of the landscape maintenance equipment shall be electric-powered.*

2. GHG – Construction Standards. *The developer shall submit for review and obtain approval from County Planning of a signed letter agreeing to include as a condition of all construction contracts/subcontracts requirements to reduce impacts to GHG and submitting documentation of compliance. The developer/construction contractors shall do the following:*
 - a) *Implement both the approved Coating Restriction Plans.*
 - b) *Select construction equipment based on low-emissions factors and high-energy efficiency. All diesel/gasoline-powered construction equipment shall be replaced, where possible, with equivalent electric or CNG equipment.*
 - c) *Grading plans shall include the following statements:*
 - *“All construction equipment engines shall be properly tuned and maintained in accordance with the manufacturers specifications prior to arriving on site and throughout construction duration.”*
 - *“All construction equipment (including electric generators) shall be shut off by work crews when not in use and shall not idle for more than 5 minutes.”*

- d) *Schedule construction traffic ingress/egress to not interfere with peak-hour traffic and to minimize traffic obstructions. Queuing of trucks on and off site shall be firmly discouraged and not scheduled. A flagperson shall be retained to maintain efficient traffic flow and safety adjacent to existing roadways.*
 - e) *Recycle and reuse construction and demolition waste (e.g. soil, vegetation, concrete, lumber, metal, and cardboard) per County Solid Waste procedures.*
 - f) *The construction contractor shall support and encourage ridesharing and transit incentives for the construction crew and educate all construction workers about the required waste reduction and the availability of recycling services.*
3. *GHG – Design Standards.* *The developer shall submit for review and obtain approval from County Planning that the following measures have been incorporated into the design of the project. These are to reduce potential project impacts on green house gases (GHGs): Proper installation of the approved design features and equipment shall be confirmed by County Building and Safety prior to final inspection of each structure.*
- a) *Title 24 + 5%.* *The Developer shall document that the design of the proposed structures exceeds the current Title 24 requirements by a minimum of five percent. County Planning shall coordinate this review with the County Building and Safety. Any combination of the following design features may be used to fulfill this mitigation, provided that the total increase in efficiency meets or exceeds the cumulative goal (105%+ of Title 24) for the entire project (Title 24, Part 6 of the California Code of Regulations; Energy Efficiency Standards for Residential and Non Residential Buildings, as amended October 1, 2005; Cool Roof Coatings performance standards as amended September 11, 2006):*
 - *Incorporate dual paned or other energy efficient windows,*
 - *Incorporate energy efficient space heating and cooling equipment,*
 - *Incorporate energy efficient light fixtures, photocells, and motion detectors,*
 - *Incorporate energy efficient appliances,*
 - *Incorporate energy efficient domestic hot water systems,*
 - *Incorporate solar panels into the electrical system,*
 - *Incorporate cool roofs/light colored roofing,*
 - *Incorporate other measures that will increase energy efficiency.*
 - *Increase insulation to reduce heat transfer and thermal bridging.*
 - *Limit air leakage throughout the structure and within the heating and cooling distribution system to minimize energy consumption.*

- b) Plumbing. All plumbing shall incorporate the following:
- All showerheads, lavatory faucets, and sink faucets shall comply with the California Energy Conservation flow rate standards.
 - Low flush toilets shall be installed where applicable as specified in California State Health and Safety Code Section 17921.3.
 - All hot water piping and storage tanks shall be insulated. Energy efficient boilers shall be used.
 - If possible, utilize grey water systems and dual plumbing for recycled water.
- c) Lighting. Lighting design for building interiors shall support the use of:
- Compact fluorescent light bulbs or equivalently efficient lighting.
 - Natural day lighting through site orientation and the use of reflected light.
 - Skylight/roof window systems.
 - Light colored building materials and finishes shall be used to reflect natural and artificial light with greater efficiency and less glare.
 - A multi-zone programmable dimming system shall be used to control lighting to maximize the energy efficiency of lighting requirements at various times of the day.
 - The developer shall ensure that a minimum of 2.5 percent of the project's electricity needs is provided by on-site solar panels.
- d) Building Design. Building design and construction shall incorporate the following elements:
- Orient building locations to best utilize natural cooling/heating with respect to the sun and prevailing winds/natural convection to take advantage of shade, day lighting and natural cooling opportunities.
 - Utilize natural, low maintenance building materials that do not require finishes and regular maintenance..
 - Roofing materials shall have a solar reflectance index of 78 or greater.
 - All supply duct work shall be sealed and leak-tested. Oval or round ducts shall be used for at least 75 percent of the supply duct work, excluding risers.
 - Energy Star or equivalent equipment shall be installed.
 - A building automation system including outdoor temperature/humidity sensors will control public area heating, vent, and air conditioning units
- e) Landscaping. The developer shall submit for review and obtain approval from County Planning of landscape and irrigation plans that are designed to include drought tolerant and smog tolerant trees, shrubs, and groundcover to ensure the

long-term viability and to conserve water and energy. The landscape plans shall include shade trees around main buildings, particularly along southern and western elevations, where practical.

- f) *Irrigation. The developer shall submit irrigation plans that are designed, so that all common area irrigation areas shall be capable of being operated by a computerized irrigation system, which includes either an on-site weather station, ET gauge or ET-based controller capable of reading current weather data and making automatic adjustments to independent run times for each irrigation valve based on changes in temperature, solar radiation, relative humidity, rain and wind. In addition, the computerized irrigation system shall be equipped with flow sensing capabilities, thus automatically shutting down the irrigation system in the event of a mainline break or broken head. These features will assist in conserving water, eliminating the potential of slope failure due to mainline breaks and eliminating over-watering and flooding due to pipe and/or head breaks.*
 - g) *Recycling. Exterior storage areas for recyclables and green waste shall be provided. Adequate recycling containers shall be located in public areas. Construction and operation waste shall be collected for reuse and recycling.*
 - h) *Transportation Demand Management (TDM) Program. The project shall include adequate bicycle parking near building entrances to promote cyclist safety, security, and convenience. If available, mass transit facilities shall be provided (e.g. bus stop bench/shelter). The developer shall publish ride-sharing information for ride-sharing vehicles and provide a website or message board for coordinating rides. The Program shall ensure that appropriate bus route information is available to tenants and homeowners.*
4. *GHG – Installation/Implementation Standards. The developer shall submit for review and obtain approval from County Planning of evidence that all applicable GHG performance standards have been installed, implemented properly and that specified performance objectives are being met to the satisfaction of County Planning and County Building and Safety. These installations/ procedures include the following:*
- a) *Design features and/or equipment that cumulatively increases the overall compliance of the project to exceed Title 24 minimum standards by five percent.*
 - b) *All interior building lighting shall support the use of fluorescent light bulbs or equivalent energy-efficient lighting.*
 - c) *Installation of both the identified mandatory and optional design features or equipment that have been constructed and incorporated into the facility/structure.*

3,000 MTCO₂e Emission Level

The County determined the size of development that is too small to be able to provide the level of GHG emission reductions expected from the Screening Tables or alternate emission analysis method (described in Attachment D) based upon the 90th percentile capture rate concept. To do this the County determined the GHG emission amount allowed by a project such that 90 percent of the emissions on average from projects would exceed that level and be “captured” by the Screening Table or alternate emission analysis method.

In determining this level of emissions the County used the database of Projects kept by the Governor’s Office of Planning and Research (OPR). That database contained 798 Projects, 60 of which were extremely large General Plan Updates, Master Plans, or Specific Plan Projects. The 60 very large projects were removed from the database in order not to skew the emissions value, leaving a net of 738 Projects. In addition, 27 projects were found to be outliers that would skew the emission value to high, leaving 711 as the sample population to use in determining the 90th percentile capture rate. Note that while the OPR database is a statewide database and may not exactly reflect emissions within the County, this method was considered conservative because development projects within unincorporated San Bernardino County tend to have higher energy consumption rates and have longer commute distances than the statewide average. As such, using the statewide database may produce an emissions value for the 90th percentile capture rate that may capture more than 90 percent of emissions.

The analysis of the 738 Projects within the sample population combined commercial, residential, and mixed use projects. Also note that the sample of projects included warehousing and other industrial land uses but did not include industrial processes (i.e. oil refineries, heavy manufacturing, electric generating stations, mining operations, etc.). Emissions from each of these Projects were calculated by SCAQMD and provide a consistent method of emissions calculations across the sample population further reducing potential errors in the statistical analysis. In calculating the emissions from Projects within the sample population, construction period GHG emissions were amortized over 30-years (the average economic life of a development project). Direct GHG emissions were calculated using URBEMIS and indirect electricity/water use GHG emissions calculated separately and added to the URBEMIS output.

This analysis determined that the 90th percentile ranged from 2,983-3,143 MTCO₂e per year. The **3,000 MTCO₂e per year** value was chosen as the medial value within that range and is used in defining small projects that must include the Performance Standards as described in this Attachment B, but do not need to use the Screening Tables or alternative GHG mitigation analysis described in Attachment D. The database is summarized in the spreadsheet shown on the following pages.

Large Residential Projects Located Outside a City Sphere of Influence

Residential Projects outside of a City Sphere of Influence that exceed 250 residential units will be required to prepare a project-specific GHG emissions analysis that includes a robust assessment of emissions, appropriate mitigation measures, and the issues associated with land use intensification and VMT generation on a project and regional basis. The analysis must produce an assessment that allows for a determination of whether the specific project causes cumulatively considerable GHG impacts. Residential Projects outside of a City Sphere of Influence that exceed 250 residential units will not qualify for the tiering and streamlining benefits otherwise provided by this Plan as allowed by CEQA Guidelines Section 15183.5 due to the inability to adequately analyze and incorporate programmatic mitigation that comprehensively addresses the issues of GHG emissions for regionally significant residential projects beyond the 2020 analysis horizon. It is anticipated that upon completion of the Sustainable Communities Strategy (SCS) by Southern California Association of Governments (SCAG) and the Regional GHG Reduction Plan currently under preparation by the San Bernardino County Association of Governments (SANBAG), adequate methodology for quantification of regional VMT and more comprehensive mitigation will provide suitable planning tools that can be incorporated into this Plan through a future amendment. Both the SCS and the Regional GHG Reduction Plan are intended to satisfy the requirements of SB 375 and allow better forecasts of GHG emissions in future years, as well as providing a regional strategy for reducing GHG emissions. This provision provides a mechanism to ensure that these types of land use commitments outside of SOIs do not impede the expected emissions trajectory to mid-century and are not likely to conflict with the long term goal of GHG emissions reductions through 2050. This provision is an interim procedure that will be re-examined in a major Plan update and amendment anticipated to occur in 2015 following a new emissions inventory and incorporation of the SCS and Regional GHG reduction measures.

ATTACHMENT 2:

- a. Screening Tables**
- b. Methodology for the Development and Application of the Screening Tables**

Screening Tables

The purpose of the Screening Tables is to provide guidance in measuring the reduction of greenhouse gas emissions attributable to certain design and construction measures incorporated into development projects. The analysis, methodology is based upon the GHG Plan, which includes GHG emission inventories, a year 2020 emission reduction target, the goals and policies to reach the target, together with the Programmatic EIR prepared for the GHG Plan.

Instructions for Residential, Commercial, or Industrial Projects

The Screening Table assigns points for each option incorporated into a project as mitigation or a project design feature (collectively referred to as “feature”). The point values correspond to the minimum emissions reduction expected from each feature. The menu of features allows maximum flexibility and options for how development projects can implement the GHG reduction measures. Projects that garner at least 100 points will be consistent with the reduction quantities anticipated in the County’s GHG Plan. As such, those projects that garner a total of 100 points or greater would not require quantification of project specific GHG emissions reductions. Consistent with CEQA Guidelines, such projects would be determined to have a less than significant individual and cumulative impact for GHG emissions.

Instructions for Mixed Use Projects

Mixed use projects provide additional opportunities to reduce emissions by combining complimentary land uses in a manner that can reduce vehicle trips. Mixed use projects also have the potential to complement energy efficient infrastructure in a way that reduces emissions. For mixed use projects fill out both Screening Table 1 and Table 2, but proportion the points identical to the proportioning of the mix of uses. As an example, a mixed use project that is 50% commercial uses and 50% residential uses will show ½ point for each assigned point value in Table 1 and Table 2. Add the points from both tables. Mixed use projects that garner at least 100 points will be consistent with the reduction quantities in the County’s GHG Plan and are considered less than significant for GHG emissions.

Instructions for All Projects

Those Projects that garner 100 points using the Screening Tables have provided the “fair share” contribution of reductions and are considered consistent with the GHG Plan.

Those Projects that do not garner 100 points using the screening tables will need to provide additional analysis to determine the significance of GHG emissions. The following tables provide a menu of performance standards/options related to GHG mitigation measures and design features that can be used to demonstrate consistency with the reduction measures and GHG reduction quantities in the GHG Plan.

Table 1: Screening Table for Implementation of GHG Reduction Measures for Residential Development

Feature	Description	Assigned Point Values	Project Points
Reduction Measure R2E6: Energy Efficiency for New Residential			
Building Envelope			
Insulation	Title 24 standard (required)	0 points	
	Modestly Enhanced Insulation (5% > Title 24)	3 points	
	Enhanced Insulation (15%> Title 24)	7 points	
	Greatly Enhanced Insulation (20%> Title 24)	9 points	
Windows	Title 24 standard (required)	0 points	
	Modestly Enhanced Window Insulation (5% > Title 24)	3 points	
	Enhanced Window Insulation (15%> Title 24)	7 points	
	Greatly Enhanced Window Insulation (20%> Title 24)	9 points	
Doors	Title 24 standard (required)	0 points	
	Modestly Enhanced Insulation (5% > Title 24)	3 points	
	Enhanced Insulation (15%> Title 24)	7 points	
	Greatly Enhanced Insulation (20%> Title 24)	9 points	
Air Infiltration	Minimizing leaks in the building envelope is as important as the insulation properties of the building. Insulation does not work effectively if there is excess air leakage.		
	Title 24 standard (required)	0 points	
	Modest Building Envelope Leakage (5% > Title 24)	3 points	
	Reduced Building Envelope Leakage (15%> Title 24)	7 points	
Thermal Storage of Building	Minimum Building Envelope Leakage (20% > Title 24)	9 points	
	Thermal storage is a design characteristic that helps keep a constant temperature in the building. Common thermal storage devices include strategically placed water filled columns, water storage tanks, and thick masonry walls.		
	Thermal storage designed to reduce heating/cooling by 5°F within the building	5 points	
	Thermal storage to reduce heating/cooling by 10°F within the building	10 points	
	Note: Engineering details must be provided to substantiate the efficiency of the thermal storage device.		

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Feature	Description	Assigned Point Values	Project Points
Indoor Space Efficiencies			
Heating/ Cooling Distribution System	Title 24 standard (required)	0 points	
	Modest Distribution Losses (5% > Title 24)	3 points	
	Reduced Distribution Losses (15%> Title 24)	7 points	
	Greatly Reduced Distribution Losses (20%> Title 24)	9 points	
Space Heating/ Cooling Equipment	Title 24 standard (required)	0 points	
	Efficiency HVAC (5% > Title 24)	3 points	
	High Efficiency HBAC (15%> Title 24)	7 points	
	Very High Efficiency HBAC (20%> Title 24)	9 points	
Building Envelope			
Water Heaters	Title 24 standard (required)	0 points	
	Efficiency Water Heater (Energy Star conventional that is 5% > Title 24)	3 points	
	High Efficiency Water Heater (Conventional water heater that is 15%> Title 24)	7 points	
	High Efficiency Water Heater (Conventional water heater that is 20%> Title 24)	9 points	
	Solar Water Heating System (this option also implements R2E5)	12 points	
Daylighting	Daylighting is the ability of each room within the building to provide outside light during the day reducing the need for artificial lighting during daylight hours.		
	All peripheral rooms within the living space have at least one window (required)	0 points	
	All rooms within the living space have daylight (through use of windows, solar tubes, skylights, etc.) such that each room has at least 800 lumens of light during a sunny day	3 points	
	All rooms daylighted to at least 1,000 lumens	5 points	
Artificial Lighting	Title 24 standard (required)	0 points	
	Efficient Lights (5% > Title 24)	3 points	
	High Efficiency Lights (LED, etc. 15%> Title 24)	7 points	
	Very High Efficiency Lights (LED, etc. 20%> Title 24)	9 points	
Appliances	Title 24 standard (required)	0 points	
	Efficient Appliances (5% > Title 24)	3 points	
	High Efficiency Energy Star Appliances (15%> Title 24)	7 points	
	Very High Efficiency Appliances (20%> Title 24)	9 points	

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Feature	Description	Assigned Point Values	Project Points
Miscellaneous Residential Building Efficiencies			
Building Placement	North/South alignment of building or other building placement such that the orientation of the buildings optimizes natural heating, cooling, and lighting.	3 point	
Independent Energy Efficiency Calculations	Provide point values based upon energy efficiency modeling of the Project. Note that engineering data will be required documenting the energy efficiency and point values based upon the proven efficiency beyond Title 24 Energy Efficiency Standards.	TBD	
Other	This allows innovation by the applicant to provide design features that increases the energy efficiency of the project not provided in the table. Note that engineering data will be required documenting the energy efficiency of innovative designs and point values given based upon the proven efficiency beyond Title 24 Energy Efficiency Standards.	TBD	
Existing Residential Retrofits	<p>The applicant may wish to provide energy efficiency retrofit projects to existing residential dwelling units to further the point value of their project. Retrofitting existing residential dwelling units within the unincorporated County is a key reduction measure that is needed to reach the reduction goal. The potential for an applicant to take advantage of this program will be decided on a case by case basis and must have the approval of the San Bernardino County Land Use Services Department. The decision to allow applicants to ability to participate in this program will be evaluated based upon, but not limited to the following;</p> <p>Will the energy efficiency retrofit project benefit low income or disadvantaged residents?</p> <p>Does the energy efficiency retrofit project fit within the overall assumptions in Reduction Measure R2E3?</p> <p>Does the energy efficiency retrofit project provide co-benefits important to the County?</p> <p>Point value will be determined based upon engineering and design criteria of the energy efficiency retrofit project.</p>	TBD	
Reduction Measure R2E8: New Home Renewable Energy			
Photovoltaic	<p>Solar Photovoltaic panels installed on individual homes or in collective neighborhood arrangements such that the total power provided augments:</p> <p>Solar Ready Homes (sturdy roof and electric hookups)</p> <p>10 percent of the power needs of the project</p> <p>20 percent of the power needs of the project</p> <p>30 percent of the power needs of the project</p> <p>40 percent of the power needs of the project</p> <p>50 percent of the power needs of the project</p> <p>60 percent of the power needs of the project</p> <p>70 percent of the power needs of the project</p> <p>80 percent of the power needs of the project</p> <p>90 percent of the power needs of the project</p> <p>100 percent of the power needs of the project</p>	<p>2 points</p> <p>7 points</p> <p>12 points</p> <p>17 points</p> <p>23 points</p> <p>28 points</p> <p>34 points</p> <p>40 points</p> <p>46 points</p> <p>52 points</p> <p>58 points</p>	

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Feature	Description	Assigned Point Values	Project Points
Wind turbines	<p>Some areas of the County lend themselves to wind turbine applications. Analysis of the areas capability to support wind turbines should be evaluated prior to choosing this feature.</p> <p>Individual wind turbines at homes or collective neighborhood arrangements of wind turbines such that the total power provided augments:</p> <p>10 percent of the power needs of the project</p> <p>20 percent of the power needs of the project</p> <p>30 percent of the power needs of the project</p> <p>40 percent of the power needs of the project</p> <p>50 percent of the power needs of the project</p> <p>60 percent of the power needs of the project</p> <p>70 percent of the power needs of the project</p> <p>80 percent of the power needs of the project</p> <p>90 percent of the power needs of the project</p> <p>100 percent of the power needs of the project</p>	<p>7 points</p> <p>12 points</p> <p>17 points</p> <p>23 points</p> <p>28 points</p> <p>34 points</p> <p>40 points</p> <p>46 points</p> <p>52 points</p> <p>58 points</p>	
Off-site renewable energy project	<p>The applicant may submit a proposal to supply an off-site renewable energy project such as renewable energy retrofits of existing homes that will help implement R2E6, or the Warehouse Renewable Energy Incentive Program (R2E3).</p> <p>These off-site renewable energy retrofit project proposals will be determined on a case by case basis and must be accompanied by a detailed plan that documents the quantity of renewable energy the proposal will generate. Point values will be determined based upon the energy generated by the proposal.</p>	TBD	
Other Renewable Energy Generation	<p>The applicant may have innovative designs or unique site circumstances (such as geothermal) that allow the project to generate electricity from renewable energy not provided in the table. The ability to supply other renewable energy and the point values allowed will be decided based upon engineering data documenting the ability to generate electricity.</p>	TBD	
Reduction Measure R2WC1: Per Capita Water Use Reduction Goal			
Irrigation and Landscaping			
Water Efficient Landscaping	<p>Limit conventional turf to < 20% of each lot (required)</p> <p>Eliminate conventional turf from landscaping</p> <p>Eliminate turf and only provide drought tolerant plants</p> <p>Xeroscaping that requires no irrigation</p>	<p>0 points</p> <p>3 points</p> <p>4 points</p> <p>6 points</p>	

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Feature	Description	Assigned Point Values	Project Points
Water Efficient irrigation systems	Drip irrigation	1 point	
	Smart irrigation control systems combined with drip irrigation (demonstrate 20 reduced water use)	5 points	
Recycled Water	Graywater (purple pipe) irrigation system on site	5 points	
Storm water Reuse Systems	Innovative on-site stormwater collection, filtration and reuse systems are being developed that provide supplemental irrigation water and provide vector control. These systems can greatly reduce the irrigation needs of a project. Point values for these types of systems will be determined based upon design and engineering data documenting the water savings.	TBD	
Potable Water			
Showers	Title 24 standard (required)	0 points	
	EPA High Efficiency Showerheads (15% > Title 24)	3 points	
Toilets	Title 24 standard (required)	0 points	
	EPA High Efficiency Toilets (15% > Title 24)	3 points	
Faucets	Title 24 standard (required)	0 points	
	EPA High Efficiency faucets (15% > Title 24)	3 points	
Reduction Measure R2T5: Renewable Fuel/Low Emissions Vehicles			
Electric Vehicle Recharging	Provide circuit and capacity in garages of residential units for installation of electric vehicle charging stations	1 point	
	Install electric vehicle charging stations in the garages of residential units	8 points	
Reduction Measure R2T7: Bicycle/Pedestrian Infrastructure			
Sidewalks	Provide sidewalks on one side of the street (required)	0 points	
	Provide sidewalks on both sides of the street	1 point	
	Provide pedestrian linkage between residential and commercial uses within 1 mile	3 points	
Bicycle paths	Provide bicycle paths within project boundaries	TBD	
	Provide bicycle path linkages between residential and other land uses	2 points	
	Provide bicycle path linkages between residential and transit	5 points	

DEVELOPMENT REVIEW PROECESS

Feature	Description	Assigned Point Values	Project Points
Reduction Measure R2T6: Vehicle Trip Reduction Measures			
Mixed Use	<p>Mixes of land uses that complement one another in a way that reduces the need for vehicle trips can greatly reduce GHG emissions. The point value of mixed use projects will be determined based upon a TIA demonstrating trip reductions and/or reductions in vehicle miles traveled. Suggested ranges:</p> <p>Diversity of land uses complementing each other (2-28 points)</p> <p>Increased destination accessibility other than transit (1-18 points)</p> <p>Increased transit accessibility (1-25 points)</p> <p>Infill location that reduces vehicle trips or VMT beyond the measures described above (points TBD based on traffic data).</p>	TBD	
Residential Near Local Retail (Residential only Projects)	<p>Having residential developments within walking and biking distance of local retail helps to reduce vehicle trips and/or vehicle miles traveled.</p> <p>The point value of residential projects in close proximity to local retail will be determined based upon traffic studies that demonstrate trip reductions and/or reductions in vehicle miles traveled (VMT)</p>	TBD	
Other Trip Reduction Measures	Other trip or VMT reduction measures not listed above with TIA and/or other traffic data supporting the trip and/or VMT for the project.	TBD	
Reduction Measure R2W5: Construction and Demolition Debris Diversion Program			
Recycling of Construction/ Demolition Debris	<p>Recycle 2% of debris (required)</p> <p>Recycle 5% of debris</p> <p>Recycle 8 % of debris</p> <p>Recycle 10% of debris</p> <p>Recycle 12% of debris</p> <p>Recycle 15% of debris</p> <p>Recycle 20% of debris</p>	<p>0 points</p> <p>1 point</p> <p>2 points</p> <p>3 points</p> <p>4 points</p> <p>5 points</p> <p>6 points</p>	
Reduction Measure R2W6: 75 Percent Solid Waste Diversion Program			
Recycling	<p>County initiated recycling program diverting 75% of waste requires coordination in neighborhoods to realize this goal. The following recycling features will help the County fulfill this goal:</p> <p>Provide greenwaste composting bins at each residential unit</p> <p>Multi-family residential projects that provide dedicated recycling bins separated by types of recyclables combined with instructions/education program explaining how to use the bins and the importance or recycling.</p>	<p>3 points</p> <p>2 points</p>	
Total Points Earned by Residential Project:			

Table 2: Screening Table for Implementation of GHG Reduction Measures for Commercial Development

Feature	Description	Assigned Point Values	Project Points
Reduction Measure R2E7: Energy Efficiency for Commercial Development			
Building Envelope			
Insulation	Title 24 standard (required)	0 points	
	Modestly Enhanced Insulation (5% > Title 24)	4 points	
	Enhanced Insulation (15%> Title 24)	8 points	
	Greatly Enhanced Insulation (20%> Title 24)	12 points	
Windows	Title 24 standard (required)	0 points	
	Modestly Enhanced Window Insulation (5% > Title 24)	4 points	
	Enhanced Window Insulation (15%> Title 24)	8 points	
	Greatly Enhanced Window Insulation (20%> Title 24)	12 points	
Doors	Title 24 standard (required)	0 points	
	Modestly Enhanced Insulation (5% > Title 24)	4 points	
	Enhanced Insulation (15%> Title 24)	8 points	
	Greatly Enhanced Insulation (20%> Title 24)	12 points	
Air Infiltration	Minimizing leaks in the building envelope is as important as the insulation properties of the building. Insulation does not work effectively if there is excess air leakage.		
	Title 24 standard (required)	0 points	
	Modest Building Envelope Leakage (5% > Title 24)	4 points	
	Reduced Building Envelope Leakage (15%> Title 24)	8 points	
Thermal Storage of Building	Minimum Building Envelope Leakage (20% > Title 24)	12 points	
	Thermal storage is a design characteristic that helps keep a constant temperature in the building. Common thermal storage devices include strategically placed water filled columns, water storage tanks, and thick masonry walls.		
	Thermal storage designed to reduce heating/cooling by 5°F within the building	6 points	
	Thermal storage to reduce heating/cooling by 10°F within the building	12 points	
	Note: Engineering details must be provided to substantiate the efficiency of the thermal storage device.		

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Feature	Description	Assigned Point Values	Project Points
Indoor Space Efficiencies			
Heating/ Cooling Distribution System	Title 24 standard (required)	0 points	
	Modest Distribution Losses (5% > Title 24)	4 points	
	Reduced Distribution Losses (15%> Title 24)	8 points	
	Greatly Reduced Distribution Losses (15%> Title 24)	12 points	
Space Heating/ Cooling Equipment	Title 24 standard (required)	0 points	
	Efficiency HVAC (5% > Title 24)	4 points	
	High Efficiency HBAC (15%> Title 24)	8 points	
	Very High Efficiency HBAC (20%> Title 24)	12 points	
Building Envelope			
Commercial Heat Recovery Systems	Heat recovery strategies employed with commercial laundry, cooking equipment, and other commercial heat sources for reuse in HVAC air intake or other appropriate heat recovery technology. Point values for these types of systems will be determined based upon design and engineering data documenting the energy savings.	TBD	
Water Heaters	Title 24 standard (required)	0 points	
	Efficiency Water Heater (Energy Star conventional that is 5% > Title 24)	4 points	
	High Efficiency Water Heater (Conventional water heater that is 15%> Title 24)	8 points	
	High Efficiency Water Heater (Conventional water heater that is 20%> Title 24)	12 points	
	Solar Water Heating System (commercial only-this reduction feature also implements R2E10)	14 points	
Daylighting	Daylighting is the ability of each room within the building to provide outside light during the day reducing the need for artificial lighting during daylight hours.		
	All peripheral rooms within building have at least one window or skylight	1 points	
	All rooms within building have daylight (through use of windows, solar tubes, skylights, etc.) such that each room has at least 800 lumens of light during a sunny day	5 points	
	All rooms daylighted to at least 1,000 lumens	7 points	
Artificial Lighting	Title 24 standard (required)	0 points	
	Efficient Lights (5% > Title 24)	4 points	
	High Efficiency Lights (LED, etc. 15%> Title 24)	6 points	
	Very High Efficiency Lights (LED, etc. 20%> Title 24)	8 points	

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Feature	Description	Assigned Point Values	Project Points
Appliances	Title 24 standard (required) Efficient Appliances (5% > Title 24) High Efficiency Energy Star Appliances (15%> Title 24) Very High Efficiency Appliances (20%> Title 24)	0 points 4 points 8 points 12 points	
Miscellaneous Commercial Building Efficiencies			
Building Placement	North/South alignment of building or other building placement such that the orientation of the buildings optimizes conditions for natural heating, cooling, and lighting.	4 point	
Other	This allows innovation by the applicant to provide design features that increases the energy efficiency of the project not provided in the table. Note that engineering data will be required documenting the energy efficiency of innovative designs and point values given based upon the proven efficiency beyond Title 24 Energy Efficiency Standards.	TBD	
Existing Commercial building Retrofits	<p>The applicant may wish to provide energy efficiency retrofit projects to existing residential dwelling units to further the point value of their project. Retrofitting existing commercial buildings within the unincorporated County is a key reduction measure that is needed to reach the reduction goal. The potential for an applicant to take advantage of this program will be decided on a case by case basis and must have the approval of the San Bernardino County Land Use Services Department. The decision to allow applicants to ability to participate in this program will be evaluated based upon, but not limited to the following:</p> <p>Will the energy efficiency retrofit project benefit low income or disadvantaged communities?</p> <p>Does the energy efficiency retrofit project fit within the overall assumptions in Reduction Measure R2E4?</p> <p>Does the energy efficiency retrofit project provide co-benefits important to the County?</p> <p>Point value will be determined based upon engineering and design criteria of the energy efficiency retrofit project.</p>	TBD	

DEVELOPMENT REVIEW PROECESS

Feature	Description	Assigned Point Values	Project Points
Reduction Measure R2E9 and R2E10: New Commercial/Industrial Renewable Energy			
Photovoltaic	<p>Solar Photovoltaic panels installed on commercial buildings or in collective arrangements within a commercial development such that the total power provided augments:</p> <p>Solar Ready Roofs (sturdy roof and electric hookups)</p> <p>10 percent of the power needs of the project</p> <p>20 percent of the power needs of the project</p> <p>30 percent of the power needs of the project</p> <p>40 percent of the power needs of the project</p> <p>50 percent of the power needs of the project</p> <p>60 percent of the power needs of the project</p> <p>70 percent of the power needs of the project</p> <p>80 percent of the power needs of the project</p> <p>90 percent of the power needs of the project</p> <p>100 percent of the power needs of the project</p>	<p>2 points</p> <p>7 points</p> <p>13 points</p> <p>19 points</p> <p>25 points</p> <p>31 points</p> <p>37 points</p> <p>43 points</p> <p>49 points</p> <p>55 points</p> <p>60 points</p>	
Wind turbines	<p>Some areas of the County lend themselves to wind turbine applications. Analysis of the areas capability to support wind turbines should be evaluated prior to choosing this feature. Wind turbines as part of the commercial development such that the total power provided augments:</p> <p>10 percent of the power needs of the project</p> <p>20 percent of the power needs of the project</p> <p>30 percent of the power needs of the project</p> <p>40 percent of the power needs of the project</p> <p>50 percent of the power needs of the project</p> <p>60 percent of the power needs of the project</p> <p>70 percent of the power needs of the project</p> <p>80 percent of the power needs of the project</p> <p>90 percent of the power needs of the project</p> <p>100 percent of the power needs of the project</p>	<p>7 points</p> <p>13 points</p> <p>19 points</p> <p>25 points</p> <p>31 points</p> <p>37 points</p> <p>43 points</p> <p>49 points</p> <p>55 points</p> <p>60 points</p>	
Off-site renewable energy project	<p>The applicant may submit a proposal to supply an off-site renewable energy project such as renewable energy retrofits of existing residential that will help implement R2E1, existing commercial/industrial that will help implement R2E2, or the Warehouse Renewable Energy Incentive Program (R2E4). These off-site renewable energy retrofit project proposals will be determined on a case by case basis accompanied by a detailed plan documenting the quantity of renewable energy the proposal will generate. Point values will be based upon the energy generated by the proposal.</p>	TBD	

DEVELOPMENT REVIEW PROECESS

Feature	Description	Assigned Point Values	Project Points
Other Renewable Energy Generation	The applicant may have innovative designs or unique site circumstances (such as geothermal) that allow the project to generate electricity from renewable energy not provided in the table. The ability to supply other renewable energy and the point values allowed will be decided based upon engineering data documenting the ability to generate electricity.	TBD	
Reduction Measure R2E7: Warehouse Renewable Energy Incentive Program			
Warehouse Photovoltaic	<p>This measure is for warehouse projects and involves partnership with Sothern California Edison and California Public Utilities Commissions to develop an incentive program for solar installation on new and retrofit existing warehouses. A mandatory minimum solar requirement for new warehouse space. Solar Photovoltaic panels installed on warehouses or in collective arrangements within a logistics/warehouse complex such that the total power provided augments:</p> <p>Solar Ready Roof (sturdy roof and electric hookups)</p> <p>10 percent of the power needs of the project</p> <p>20 percent of the power needs of the project</p> <p>30 percent of the power needs of the project</p> <p>40 percent of the power needs of the project</p> <p>50 percent of the power needs of the project</p> <p>60 percent of the power needs of the project</p> <p>70 percent of the power needs of the project</p> <p>80 percent of the power needs of the project</p> <p>90 percent of the power needs of the project</p> <p>100 percent of the power needs of the project</p>	<p>2 points</p> <p>4 points</p> <p>5 points</p> <p>7 points</p> <p>9 points</p> <p>11 points</p> <p>13 points</p> <p>15 points</p> <p>17 points</p> <p>19 points</p> <p>21 points</p>	
Reduction Measure R2WC-1: Per Capita Water Use Reduction Goal			
Irrigation and Landscaping			
Water Efficient Landscaping	<p>Limit conventional turf to < 20% of each lot (required)</p> <p>Eliminate conventional turf from landscaping</p> <p>Eliminate turf and only provide drought tolerant plants</p> <p>Xeroscaping that requires no irrigation</p>	<p>0 points</p> <p>3 points</p> <p>4 points</p> <p>6 points</p>	
Water Efficient irrigation systems	<p>Drip irrigation</p> <p>Smart irrigation control systems combined with drip irrigation (demonstrate 20 reduced water use)</p>	<p>1 point</p> <p>5 points</p>	
Recycled Water	Graywater (purple pipe) irrigation system on site	5 points	

DEVELOPMENT REVIEW PROECESS

Feature	Description	Assigned Point Values	Project Points
Storm water Reuse Systems	Innovative on-site stormwater collection, filtration and reuse systems are being developed that provide supplemental irrigation water and provide vector control. These systems can greatly reduce the irrigation needs of a project. Point values for these types of systems will be determined based upon design and engineering data documenting the water savings.	TBD	
Potable Water			
Showers	Title 24 standard (required) EPA High Efficiency Showerheads (15% > Title 24)	0 points 3 points	
Toilets	Title 24 standard (required) EPA High Efficiency Toilets/Urinals (15% > Title 24) Waterless Urinals (note that commercial buildings having both waterless urinals and high efficiency toilets will have a combined point value of 6 points)	0 points 3 points 3 points	
Faucets	Title 24 standard (required) EPA High Efficiency faucets (15% > Title 24)	0 points 3 points	
Commercial Dishwashers	Title 24 standard (required) EPA High Efficiency dishwashers (20% water savings)	0 points 4 points	
Commercial Laundry Washers	Title 24 standard (required) EPA High Efficiency laundry (15% water savings) EPA High Efficiency laundry Equipment that captures and reuses rinse water (30% water savings)	0 points 3 points 6 points	
Commercial Water Operations Program	Establish an operational program to reduce water loss from pools, water features, etc., by covering pools, adjusting fountain operational hours, and using water treatment to reduce draw down and replacement of water. Point values for these types of plans will be determined based upon design and engineering data documenting the water savings.	TBD	
Reduction Measure R2T1: Anti-Idling Enforcement			
Commercial Vehicle Idling Restrictions	All commercial vehicles are restricted to 5-minutes or less per trip on site and at loading docks (required of all commercial projects)	1 point	

DEVELOPMENT REVIEW PROECESS

Feature	Description	Assigned Point Values	Project Points
Reduction Measure R2T2: Employment Based Trip and VMT Reduction Policy			
Compressed Work Week	Reduce the number of days per week that employees need to be on site will reduce the number of vehicle trips associated with commercial/industrial development. Compressed work week such that full time employees are on site:		
	5 days per week	0 points	
	4 days per week on site	4 points	
	3 days per week on site	8 points	
Car/Vanpools	Car/vanpool program	1 point	
	Car/vanpool program with preferred parking	2 points	
	Car/vanpool with guaranteed ride home program	3 points	
	Subsidized employee incentive car/vanpool program	5 points	
	Combination of all the above	6 points	
Employee Bicycle/ Pedestrian Programs	Complete sidewalk to residential within ½ mile	1 point	
	Complete bike path to residential within 3 miles	1 point	
	Bike lockers and secure racks	1 point	
	Showers and changing facilities	2 points	
	Subsidized employee walk/bike program	3 points	
	Note combine all applicable points for total value		
Shuttle/Transit Programs	Local transit within ¼ mile	1 point	
	Light rail transit within ½ mile	3 points	
	Shuttle service to light rail transit station	5 points	
	Guaranteed ride home program	1 points	
	Subsidized Transit passes	2 points	
	Note combine all applicable points for total value		
CRT	Employer based Commute Trip Reduction (CRT). CRTs apply to commercial, offices, or industrial projects that include a reduction of vehicle trip or VMT goal using a variety of employee commutes trip reduction methods. The point value will be determined based upon a TIA that demonstrates the trip/VMT reductions. Suggested point ranges: Incentive based CRT Programs (1-8 points) Mandatory CRT programs (5-20 points)	TBD	
Other Trip Reductions	Other trip or VMT reduction measures not listed above with TIA and/or other traffic data supporting the trip and/or VMT for the project.	TBD	

DEVELOPMENT REVIEW PROECESS

Feature	Description	Assigned Point Values	Project Points
Reduction Measure R2T4: Signal Synchronization and Intelligent Traffic Systems			
Signal improvements	Signal synchronization-1 point per signal	1 point/signal	
	Traffic signals connected to ITS	3 points/ signal	
Reduction Measure R2T5: Renewable Fuel/Low Emissions Vehicles			
Electric Vehicle Recharging	Provide circuit and capacity in garages/parking areas for installation of electric vehicle charging stations.	2 points/area	
	Install electric vehicle charging stations in garages/parking areas	8 points/station	
Reduction Measure R2T6: Vehicle Trip Reduction Measures			
Mixed Use	Mixes of land uses that complement one another in a way that reduces the need for vehicle trips can greatly reduce GHG emissions. The point value of mixed use projects will be determined based upon traffic studies that demonstrate trip reductions and/or reductions in vehicle miles traveled	TBD	
Local Retail Near Residential (Commercial only Projects)	Having residential developments within walking and biking distance of local retail helps to reduce vehicle trips and/or vehicle miles traveled. The point value of residential projects in close proximity to local retail will be determined based upon traffic studies that demonstrate trip reductions and/or reductions in vehicle miles traveled	TBD	
Reduction Measure R2W5: Construction and Demolition Debris Diversion Program			
Recycling of Construction/ Demolition Debris	Recycle 2% of debris (required)	0 points	
	Recycle 5% of debris	1 point	
	Recycle 8 % of debris	2 points	
	Recycle 10% of debris	3 points	
	Recycle 12% of debris	4 points	
	Recycle 15% of debris	5 points	
	Recycle 20% of debris	6 points	
Reduction Measure R2W6: 75 Percent Solid Waste Diversion Program			
Recycling	County initiated recycling program diverting 75% of waste requires coordination with commercial development to realize this goal. The following recycling features will help the County fulfill this goal:		
	Provide separated recycling bins within each commercial building/floor and provide large external recycling collection bins at central location for collection truck pick-up	2 points	
	Provide commercial/industrial recycling programs that fulfills an on-site goal of 75% diversion of solid waste	5 points	
Total Points Earned by Commercial/Industrial Project:			

References

- Association of Environmental Professionals (AEP) White Paper: Alternative Approaches to Analyzing Greenhouse Gases and Global Climate Change Impacts in CEQA Documents, June 2007.
- Association of Environmental Professionals (AEP) White Paper: Community-wide Greenhouse Gas Emission Inventory Protocols, Mach 2011.
- Bass, Ronald E., Herson, Albert I. and Bogdan, Kenneth M., CEQA Deskbook, April 1999
- California Air Pollution Control Officers Association (CAPCOA), White Paper: CEQA and Climate Change, January 2008
- California Air Pollution Control Officers Association (CAPCOA), Quantifying Greenhouse Gas Mitigation Measures, August 2010
- California Air Resources Board, AB 32 Scoping Plan, December 2009
- California Climate Action Team's Final Report to the Governor and Legislature, March 2007
- California Climate Action Registry, General Reporting Protocol, Version 2.2, March 2007
- San Bernardino County, Draft Greenhouse Reduction Plan, March 2011
- South Coast Air Quality Management District, Rules and Regulations, 2010
- U.S. Environmental Protection Agency, AP-42, Compilation of Air Pollutant Emission Factors, Fifth Edition, September 1995
- U.S. Environmental Protection Agency, AP-42, Final Rule on Update to the Compilation of Air Pollutant Emission Factors, October 2009

METHODS SUMMARY FOR SCREENING TABLES

The point values in the Screening Tables were derived from the projected emissions reductions that each of the R2 reduction measures within the San Bernardino County GHG Reduction Plan (GHG Plan) would achieve. The GHG Plan shows the reduced emissions for each of the reduction measures in aggregate terms, meaning that the total emission reductions afforded each measure is based on both changes in existing land use activities as well as how new development is designed and built. In order to correctly allocate the emission reductions within the Screening Table, the amount of emission reductions afforded new development had to be segregated out of the aggregate total in a manner that is described below. Once the process of segregating new development out of the aggregate reduction totals was completed, the points were then proportion by residential unit or square feet of commercial/industrial uses. This was accomplished by taking the predicted growth in households and commercial/industrial uses by the year 2020 and assigned the appropriate proportion of the total R2 reduction quantities for new development to the residential, commercial, and industrial land use sectors within the Screening Table. The result is point values that are allocated by residential unit or commercial/industrial square footage (measured in 1000 sq.ft.). Because of this, the size of the project is not relevant to the Screening Table. Regardless of size, each project needs to achieve 100 points to demonstrate consistency with the GHG Plan. Efficiency, not size of the Project is critical. The following emission factor can be used in determining the amount of emissions reduced per point in the Screening Table:

The respective calculated emission values are in metric tons of carbon dioxide equivalents (MTCO_{2e})

For Residential Projects:

0.092 MTCO_{2e} per Point per Residential Unit

For Commercial and Industrial Projects:

0.691 MTCO_{2e} per Point per 1,000 Square Feet of gross Commercial/Industrial building area

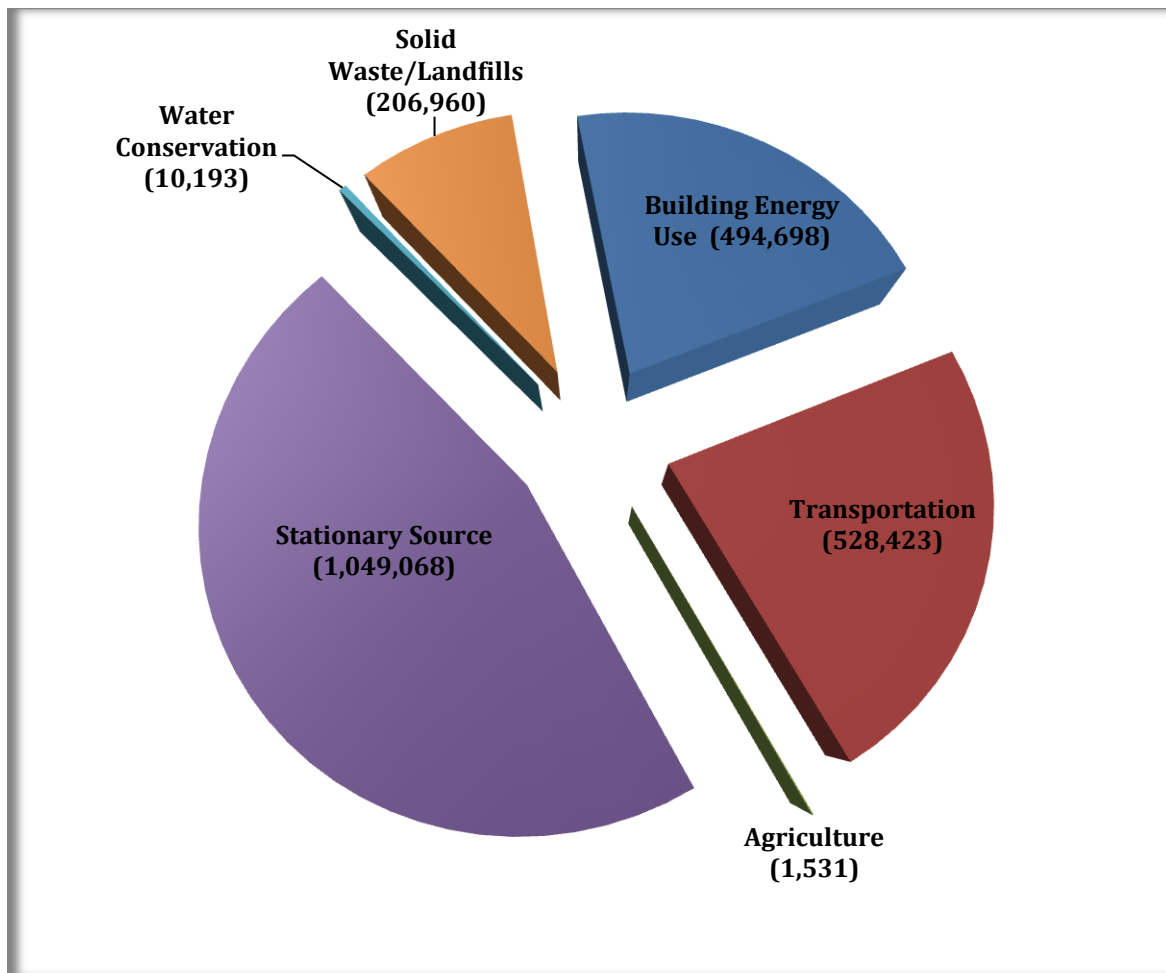
Note that the Screening Table and point values are best used for typical development projects processed by the County. Examples of typical development projects include residential subdivisions, multi-family residential apartments, condominiums and townhouses, retail commercial, big box retail, office buildings, business parks, and typical warehousing. Mixed use projects can use the Screening Tables following the instructions. Transit oriented development (TOD), and infill projects are able to use the Screening Tables, but the Screening Table points are likely to underestimate total emission reductions afforded these types of projects. Note that the Screening Tables include the opportunity to custom develop points (using the factors above) in order to account for the predicted reductions in vehicle trips and vehicle miles traveled within a project specific traffic study and GHG analysis. TOD and infill projects can be more accurately assessed and allocated points using this method.

However, more unusual types of industrial projects such as cement manufacturing, metal foundries, refrigerant manufacturing, electric generating stations, and oil refineries cannot use the Screening Tables because the emission sources for those types of uses were not contemplated in the table.

DEVELOPMENT OF THE POINT VALUES

The first step in developing the point system was the need to determine the total reductions afforded the GHG Plan. Figure 1 below shows the total emission reductions achieved by the GHG Plan. In total 2,290,874MMTCO₂e will be reduced as a result of the GHG Plan.

Figure 1



The next step in developing the point system is to segregate out the State efforts in reducing GHG emissions within the County. Table 1 shows the reductions allocated to State measures and County strategies.

Table 1

Sector	2020 Reduction (MTCO ₂ e)		Total
	State Strategies	County Strategies	
Building Energy -Energy Efficiency and Alternative Energy	335,246	159,452	494,699
Transportation and Land Use	486,157	42,266	528,423
Solid Waste/Landfills	0	206,960	206,960
Stationary Source	1,049,068	0	1,049,068
Agriculture & Resource Conservation	1,531	0	1,531
Water Conservation	10,193	0	10,193
Total	1,882,195	408,678	2,290,874

As shown in Table 1, 408,678 MMTCO₂e are reduced by the County's R2 measures. This amount includes reductions afforded existing building retrofits, other changes to activities associated with existing land uses, as well as reductions associated with new development.

The next step is to segregate out of the County strategies total the amount of emissions that will be reduced within new development.

Table 2 on the next page summarizes the reduction in emissions afforded new development from the R2 measures. Table 2 shows 159,423 MTCO₂e being reduced from new development as a result of the County strategies (R2 measures in the GHG Plan). Within the 138,377 MTCO₂e of new development reductions afforded County strategies, 117,385 MTCO₂e of emissions reduced is accomplished through new Commercial and Industrial Projects, and 42,038 MTCO₂e of emissions reduced is accomplished through new residential projects.

The County predicts that 5,083 new residential units will be needed by 2020 to accommodate the population growth by 2020 and 18,873 new jobs will be generated due to growth. A total of approximately 1,887,300 square feet of new commercial and industrial buildings within the unincorporated County area is needed to accommodate anticipated job growth. This estimate is based on the relationship between past growth in employment to the average growth in commercial/industrial building area for San Bernardino County.

Dividing the 42,038 MTCO₂e reductions of emissions afforded the R2 measures for new residential development by the anticipated net of 4,575 new residential units that will be built yields 9.2 MTCO₂e per residential unit that needs to be reduced to fulfill the anticipated reductions of the GHG Plan. That amount equals 100 points, producing the following equation for the point value:

0.083 MTCO₂e per Point per Residential Unit

A similar process was used to derive the point value for new commercial/Industrial development dividing 117,384.9 MTCO₂e reductions of emissions afforded the R2 measures for new commercial/industrial development by the anticipated net of 1,698,570 square feet of new commercial/industrial buildings that will be built yields 6.91 MTCO₂e per 100 square feet of building. That amount equals 100 points, producing the following equation for the point value:

0.0691 MTCO₂e per Point per 100 Square Feet of gross building area. Because commercial/industrial land uses are typically described in thousand square feet of building space, the point value was converted as follows: **0.691 MTCO₂e per 1,000 Sq. Ft. of gross Commercial/Industrial building area.**

The final step was to allocate points to each of the reduction measures in order to provide the menu of point values. The spreadsheet on the next page shows emission reductions afforded each measure. Note that emissions associated with new development are reduced by the State’s R1 measures, as well as the County’s R2 measures. The Screening Tables focus on those measures the County is implementing associated with new development within the unincorporated County area. For this reason, the menu of options pertains to the portions of the R2 measures pertaining to new development.

Table 2

Reduction Number	Reduction Measure Name	Reduced Emissions(MTCO ₂ e)	
		Commercial/Industrial	Residential
R2E4	Warehouse Renewable Energy	6,786.0	
R2E5	Solar Hot Water Systems		11,907.0
R2E6	Residential Energy Efficiency		9,460.0
R2E7	Commercial/Industrial Energy Efficiency	35,342.0	
R2E8	New Home Renewable Energy		2,239.0
R2E9	New Commercial/Industrial Renewable Energy	25,392.0	
R2E10	Comm/Ind. Rehab/Expansion Renewable Energy	21,086	
R2T1	Anti-Idling Enforcement Policy	2,415.2	
R2T2	Employer VMT Reduction	1,651.0	
R2T3	Parking Policies	824.0	
R2T4	Road Improvement/Signal Synchronization/TFM	8,230.0	
R2T5	Low and Zero Emission Vehicle Infrastructure	5,431.7	10,863.3
R2T6	Rideshare/Carpooling Programs	798.0	
R2T7	Bicycle/Pedestrian Infrastructure	532.0	266.0
R2T8	HOV Lanes	1,594.0	
R2W5	Construction Debris Diversion	147.5	147.5
R2W6	75 Percent Waste Diversion	2,059.0	2,059.0
R2WC1	Per Capita Water Reduction	5,096.5	5,096.5
Total R2 Reductions for New Development		117,384.9	42,038.3

ATTACHMENT 3:

Determining Project Unmitigated and Mitigated GHG Emissions

**SAN BERNARDINO COUNTY
GREENHOUSE GAS DEVELOPMENT REVIEW PROCESS
DETERMINING PROJECT UNMITIGATED AND MITIGATED GREENHOUSE GAS EMISSIONS**

San Bernardino County intends to use a Development Review Process to review individual projects for compliance with the San Bernardino County Greenhouse Gas Reduction Plan (Plan). Screening tables have been developed utilizing a 100-point scale that corresponds to approximately 138,227 metric tons of carbon dioxide equivalents per year (MTCO₂e) of emissions reductions attributable to new development within the Plan. That level of emissions reductions is approximately 31 percent reduction of new development greenhouse gas (GHG) emissions (in the aggregate) compared to an unmitigated condition. The scale has been derived from calculations of the 2020 unmitigated emissions at the County level and the mitigative effects of different reduction strategies included in the Plan. Where projects utilize the screening table and qualify for 100 points, the project can be considered less than significant under CEQA and will not be required to quantify their individual project emission reductions. Where a project does not use the screening tables, the project is required to quantify its unmitigated emissions and provide a 31 percent reduction of those emissions in order to be considered less than significant. This memorandum describes a methodology to estimate project-level unmitigated and mitigated emissions.

The Plan includes a set of inventories as follows:

2007 Emissions = 6.25 MTCO₂e

2020 Unmitigated Emissions = 7.59 MTCO₂e (Results by applying predicted growth rates to the 2007 emissions in predicting 2020 unmitigated emissions)

Reduction Target = 5.31 MTCO₂e [requires new development in the County to achieve a 31% reduction (in the aggregate) from the 2020 unmitigated emissions scenario to reduce total emissions in the County down to this level]

The Plan includes a forecast of 2020 unmitigated emissions from a benchmark of 2007 emissions. No emission reductions from future regulations or standards were afforded the 2020 unmitigated emission forecast. This means that the unmitigated emissions shown for 2020 are forecast using the predicted growth in each of the sectors but have an average GHG efficiency equivalent to that of buildings, transportation, and other emission sectors as they were in 2007. As such, 2007 constitutes the benchmark for all projects under evaluation through the development review process. Thus, calculation of unmitigated project GHG emissions is a calculation of what the project's GHG emissions would be under average efficiency assumptions for 2007. Project proponents then must calculate their estimate of current GHG emissions including any applicant-proposed reduction measures to determine whether or not the project will or won't provide 31 percent or more reductions.

Methods are described below for the building energy, transportation, waste, water conveyance emissions. Other source categories will require custom calculations. Due to the complexity of some of

the calculations for unmitigated and mitigated emissions, the need for accuracy, and the challenge of avoiding double-counting, it is recommended that emissions estimates only be prepared by qualified air quality experts. All estimates should provide full documentation of all assumptions and methods utilized. The County will review all provided estimates for adequacy and will only accept sufficiently detailed and supported estimates prepared by qualified individuals.

PROJECT GHG EMISSION SOURCES

Total GHG emissions are the sum of emissions from both direct and indirect sources. Direct sources include mobile sources such as offroad equipment, motor vehicles, landscape equipment; and stationary sources such as cooling and heating equipment. Indirect sources are comprised of electrical generation, and energy use in supplying potable water, as well as the disposal of solid waste, and the treatment of waste water.

Direct GHG emissions from mobile and stationary sources are determined as the sum of the annual GHG emissions from offroad equipment, motor vehicles, landscape equipment, and heating and cooling equipment.

Indirect sources are determined based on source as follows. Electrical usage is reported as annual emissions from electrical usage. Potable water usage is reported as the annual emissions from electricity used for potable water treatment and transportation. Solid waste is reported as the sum of annual emissions from solid waste disposal treatment, transportation, and fugitive emissions of methane at the solid waste facilities. Wastewater usage is reported as the annual emissions from wastewater transport and treatment.

BUILDING ENERGY

Building energy emissions associated with electricity and natural gas assumption are estimated by determining the amount of electricity (in kilowatt-hours) and natural gas consumption (in therms) and then multiplying by the GHG factors corresponding to electricity generation (per kwh) and natural gas combustion (per therm).

Project proponents can utilize the Residential Energy Consumption Survey (RECS) prepared by the U.S. Energy Information Administration (EIA) to determine the approximate average kwh per residential unit for residential projects of similar character as the proposed project. At present, the closest set of data to 2007 is the 2005 version of the RECS.

Project proponents can utilize the Commercial Buildings Energy Consumption Survey (CBECS) prepared by EIA to determine the approximate average therms per residential unit for commercial buildings of similar character as the proposed project. A 2007 version of CBECS should be available in 2011.

Where buildings are not comparable to a RECS or CBECS category, then project proponents must derive a separate rationale for 2007 average building energy consumption by obtaining data on at least three comparable "average" buildings in San Bernardino County by which to derive appropriate factors.

Once the baseline electricity and natural gas consumption have been identified, then they should be multiplied by the GHG intensity factors in Table 1.

RECS is available on the internet here: <http://www.eia.doe.gov/emeu/recs/>

CBCECS is available on the internet here: <http://www.eia.doe.gov/emeu/cbecs/>

TRANSPORTATION

Project proponents can estimate their unmitigated onroad transportation emissions level by utilizing the current land use emissions model recommended by SCAQMD and using the 2007 model year. The current SCAQMD recommended model is the California Emissions Estimator model (CalEEMod) and is available free of charge and a user manual describes how to utilize the model.

CalEEMod can also be used to calculate operational GHG emissions (carbon dioxide, CO₂; methane, CH₄; and nitrous oxide N₂O). CalEEMod uses default trip generation factors, but these factors can be adjusted to reflect site-specific details. Also, CalEEMod uses default trip lengths that may or may not be appropriate in order to capture the full length of project-related trips. Important steps for running CalEEMod are as follows:

1. Without a traffic study prepared for the project,
 - a. Provide the density of the project in CalEEMod (residential units per acre and/or square feet of commercial building per acre), and
 - b. The user should consult with the local air district for direction on which default options should be used in the modeling exercise. Some air districts have recommendations in the CEQA guidelines.
2. If a traffic study was prepared specifically for the project, the following information must be provided:
 - a. Total number of average daily vehicle trips or trip-generation rates by land use type per number of units; and,
 - b. Average VMT per residential and nonresidential trip.
 - c. The user overwrites the "Trip Rate (per day)" fields for each land use in CALEEMOD such that the resultant "Total Trips" and the "Total VMT" match the number of total trips and total VMT contained in the traffic study.
 - d. Overwrite "Trip Length" fields for residential and nonresidential trips in UBEMIS with the project-specific lengths obtained from the traffic study.
3. Calculate results and obtain the GHG emissions from the CalEEMod output file.

Offroad emissions can be estimated by identifying the types of equipment and operational timeframes. CARB's EMFAC model can provide carbon dioxide emission factors for a wide variety of equipment.

Alternatively, if fuel consumption totals can be estimated, then they can be multiplied by the GHG factors in Table 1 below.

CalEEMod is available on the internet here: <http://www.caleemod.com/>

EMFAC is available on the internet here: http://www.arb.ca.gov/msei/onroad/latest_version.htm

WASTE

Project proponents needs to estimate their level of annual waste generation using factors from the CIWMB reporting for San Bernardino County in 2007:

- Per capita disposal rate = 6.2 pounds/day = 1.03 metric tons/year per resident
- Per capita disposal rate = 38 pounds/day = 6.29 metric tons/year per employee

CIWMB reports are available on the internet here:

<http://www.calrecycle.ca.gov/LGCentral/Tools/MARS/DRMCMMain.asp>

Once the unmitigated annual level of waste generation have been identified, then it should be multiplied by the GHG intensity factor utilized in the Plan as follows:

- *2007 average GHG emissions per metric ton of waste (2007) = 0.005526 metric tons*

WATER

Project proponents need to estimate the annual amount of water consumption on an annual basis for the proposed project on a 2007 average basis.

Once the unmitigated level of annual water consumption has been identified, then it should be multiplied by the GHG intensity factors utilized in the Plan as follows:

- *2007 average GHG emissions per acre-feet of water = 0.49 metric tons/*

WASTEWATER

Project proponents need to estimate the annual amount of wastewater generation on an annual basis for the proposed project on a 2007 average basis.

Once the unmitigated level of annual wastewater generation has been identified, then it should be multiplied by the GHG intensity factors utilized in the Plan as follows:

- *2007 average GHG emissions for wastewater = 0.096 metric tons per resident*

POINT SOURCES AND OTHER SOURCES

If the project includes point sources of GHGs, such as industrial consumption of fuels other than natural gas, cement manufacture, or other sources, then custom calculations will have to be made in order to determine the 2007 unmitigated level.

ESTIMATING PROJECT MITIGATED EMISSIONS

Once the unmitigated 2007 emissions for the project have been calculated, then the mitigated project emissions can be calculated. Mitigated project emissions can and should take into account the following:

The current level of GHG efficiency. Since the benchmark year is 2007, the current level of GHG efficiency may be improved since 2007. Where a source sector is not covered by adopted state and local measures (see discussion below), analysis of development projects should use the emission factors found in the latest version of the California Climate Action Registry (CCAR) General Reporting Protocol.

Quantification of emissions from electricity used for potable water treatment and transportation as well as wastewater transport and treatment can be found in the California Energy Commission (CEC) document titled “Refining Estimates of Water-Related Energy Use in California (CEC December 2006).

The effect of adopted state and local measures by 2020. The state has adopted numerous measures to reduce GHG emissions, including vehicle standards, a low carbon fuel standard, a renewable energy standard, and other measures. The state mandates listed in Table 2 can be included in the County-required 31 percent reduction if they specifically relate to the proposed project. Table 3 provides an example of which measures would apply to a standard residential project. All of the calculations in Table 2 are reduction percentages compared to a 2007 benchmark efficiency. Thus, if a project takes credit for an adopted state or local measure, then it should not take additional credit for the difference between current year GHG efficiency and 2007 because the credit in Table 2 already accounts for potential improvements from 2007 to 2020.

The effect of proponent-proposed measures. The adopted state and local measures will not be sufficient in and of themselves to reduce project level unmitigated emissions by 31%. Thus, project proponents, who do not use the screening tables, will be required to propose and quantify their individual reduction measures. Measures may include energy efficiency, renewable energy, VMT reductions, water conservation strategies that result in emissions more than the unmitigated levels. Proponents should calculate the effectiveness of proposed strategies such that the total of the adopted state and local measures above and the applicant-proposed measures totals a minimum of 31% of the unmitigated emissions. When determining the GHG reduction effectiveness, one may only count reductions that are in excess of the adopted state and local measures noted above. For example, for energy efficiency, all projects will be required to meet Title 24 efficiency standards that are in effect at the time of the project. Thus, additional credit can only be taken if the project’s energy efficiency exceeds Title 24 requirements. Similarly, waste diversion strategies can only provide additional credit if the project will result in greater than 75 percent diversion by 2020 of site generated waste. Finally, caution must be exercised in avoiding double-counting of emissions between adopted state and local measures, improvements in average GHG efficiency between the current year and 2007, and proponent-proposed measures. For this reason, it is recommended that GHG emission estimates only be prepared by qualified air quality experts.

Table 1: Emission Factors to Use for Estimating Unmitigated Emissions

Fuel	Emission Factor	Source
Compressed Natural Gas (CNG) (Vehicle)	0.054 Kg CO ₂ /Standard Ft ³	USEPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006 (2008)
Motor Gasoline (Vehicle)	8.81 Kg CO ₂ /US gal	Provided in the California Local Government Operations Protocol (CARB et al. 2008)
Propane (Vehicle)	5.74 Kg CO ₂ /US gal	
Diesel (Vehicle)	10.15 Kg CO ₂ /US gal	
Natural Gas	0.0546 Kg CO ₂ /Standard Ft ³	
	0.1 g NO ₂ /MMBTU	
	5 g CH ₄ /MMBTU	
Other Fuels	Variable ¹	SQAQMD
Electricity	290.87 kg CO ₂ /MWh	CCAR (2009a) Public Reports and USEPA eGrid2007 (2005 data)
	2.04 kg NO ₂ /GWh	
	13.88 kg CH ₄ /GWh	

Notes:

¹ Other fuels were included in the SCAQMD inventory. Associated emissions are based on emission factors from CARB's Regulation for the Mandatory Reporting of GHG Emissions and fuel High Heating Values (HHVs) from USEPA's AP-42 document.

Reduction Measure Number	Sector	Description	Sectoral percent reduction
R1E1B	Building Energy	RPS-33% by 2020	7.0%
R1E2	Building Energy	AB 1109 Residential Lighting	1.6%
R1E3	Building Energy	AB 1109 Commercial Lighting	1.0%
R1E4	Building Energy	Electricity Energy Efficiency (Title 24)	7.2%
R1E5	Building Energy	Natural Gas Energy Efficiency (Title 24)	0.6%
Building Energy		Subtotal	17.4%
R1T1	Transportation	Pavely I Standards	8.4%
R1T2	Transportation	Pavely II Standards	1.2%
R1T3	Transportation	Low Carbon Fuel Standard	6.7%
R1T4	Transportation	Tire Pressure Program	0.2%
R1T5	Transportation	Low Rolling Resistance Tires	0.1%
R1T6	Transportation	Low Friction Engine Oils	0.8%
R1T7	Transportation	Cool Paint/Reflective	0.3%
R1T9	Transportation	Heavy-Duty Vehicle Efficiency	0.5%
R1T10	Transportation	Med-& Heavy Duty Hybrid.	0.3%
R1T11	Transportation	Rule 1192-Clean Buses	0.03%
R1T12	Transportation	Rule 1195-Clean School Buses	0.03%
Transportation		Subtotal	18.6%
R2W1	Waste	Increase Methane Recovery at Mid-Valley, Milliken, and Colton Landfills	27.0%
R2W2	Waste	Barstow Methane Recovery	10.6%
R2W3	Waste	Landers Methane Recovery	2.4%
R2W6	Waste	County Diversion Programs — 75 Percent Goal	1.1%
Waste		Subtotal	41.1%
R1WC1	Water Conveyance	RPS-33% by 2020	15.2%
Water Conveyance		Subtotal	15.2%

Reduction Measure Number	Sector	Description	Sectoral percent reduction
<i>R1E1B</i>	<i>Building Energy</i>	<i>RPS-33% by 2020</i>	<i>7.0%</i>
<i>R1E2</i>	<i>Building Energy</i>	<i>AB 1109 Residential Lighting</i>	<i>1.6%</i>
R1E3	Building Energy	AB 1109 Commercial Lighting	1.0%
<i>R1E4</i>	<i>Building Energy</i>	<i>Electricity Energy Efficiency (Title 24)</i>	<i>7.2%</i>
<i>R1E5</i>	<i>Building Energy</i>	<i>Natural Gas Energy Efficiency (Title 24)</i>	<i>0.6%</i>
<i>R1T1</i>	<i>Transportation</i>	<i>Pavely I Standards</i>	<i>8.4%</i>
<i>R1T2</i>	<i>Transportation</i>	<i>Pavely II Standards</i>	<i>1.2%</i>
<i>R1T3</i>	<i>Transportation</i>	<i>Low Carbon Fuel Standard</i>	<i>6.7%</i>
<i>R1T4</i>	<i>Transportation</i>	<i>Tire Pressure Program</i>	<i>0.2%</i>
<i>R1T5</i>	<i>Transportation</i>	<i>Low Rolling Resistance Tires</i>	<i>0.1%</i>
<i>R1T6</i>	<i>Transportation</i>	<i>Low Friction Engine Oils</i>	<i>0.8%</i>
<i>R1T7</i>	<i>Transportation</i>	<i>Cool Paint/Reflective</i>	<i>0.3%</i>
R1T9	Transportation	Heavy-Duty Vehicle Efficiency	0.5%
R1T10	Transportation	Med-& Heavy Duty Hybrid.	0.3%
R1T11	Transportation	Rule 1192-Clean Buses	0.03%
R1T12	Transportation	Rule 1195-Clean School Buses	0.03%
<i>R2W1</i>	<i>Waste</i>	<i>Increase Methane Recovery at Mid-Valley, Milliken, and Colton Landfills</i>	<i>27.0%</i>
<i>R2W2</i>	<i>Waste</i>	<i>Barstow Methane Recovery</i>	<i>10.6%</i>
<i>R2W3</i>	<i>Waste</i>	<i>Landers Methane Recovery</i>	<i>2.4%</i>
<i>R2W6</i>	<i>Waste</i>	<i>County Diversion Programs — 75 Percent Goal</i>	<i>1.1%</i>
<i>R1WC1</i>	<i>Water Conveyance</i>	<i>RPS-33% by 2020</i>	<i>15.2%</i>

RESOURCES

California Climate Action Registry. General Reporting Protocol. Public Reports for Reporting Entities
<http://www.climateregistry.org>

California Energy Commission. Refining Estimates of Water-Related Energy use in California.
http://www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html

EMFAC. Factor model for onroad mobile emissions sources from the California Air Resources Board.
http://www.arb.ca.gov/msei/onroad/latest_version.htm

OFFROAD. Model for factors for offroad equipment from the California Air Resources Board.
<http://www.arb.ca.gov/msei/offroad/offroad.htm>

CalEEMod. Public domain software for calculation criteria pollutant and GHG emissions from land use projects.
<http://www.caleemod.com>

ATTACHMENT 4:

GHG Emission Reduction Calculations for Accessory Renewable Energy Projects

ACCESSORY RENEWABLE ENERGY PROJECTS

The GHG Plan included a GHG Reduction Measure (R3E14) that accounted for small wind energy systems that the County was permitting. These small wind energy systems as well as small photovoltaic energy systems within unincorporated San Bernardino County required a permit by the County. These systems were typically 10 kilowatts (kW) in size and were not regulated by the California Energy Commission (CEC) and did not count toward the utilities renewable portfolio or the State's R1 measures for renewable energy. At the time that the GHG Plan was drafted (2009), the County did not have estimated generation within unincorporated County areas from these systems and could not estimate the GHG reductions from these types of systems. However, the County saw these renewable energy systems as a potential GHG reducing mechanism and wanted to continue permitting such systems and encourage growth in these systems. Therefore the GHP Plan listed the small wind energy systems as well as small photovoltaic energy systems permitting process as an R3 measure that could not include GHG emission reductions calculations.

Since that time, the County has reviewed permitting records and determined the number of these permits issued since 2007. The records indicate the following:

Year 2007: 27 permits issued

Year 2008: 24 permits issued

Year 2009: 25 permits issued

Year 2010: 37 permits issued (permit fees were due to go up July 1, 2010 accounting for the increase in permits being issued in this year)

Systems permitted prior to 2007 were considered within the baseline energy use for the External GHG Inventory and not counted in this analysis. In total, 113 10kW Wind Energy Systems were permitted between 2007 and 2010. Taking out year 2010, on average 25 to 26 permits are issued per year. Year 2010 was taken out of the average because of the spike in permits likely caused by the fee increase. In predicting the number of systems in place by 2020 using these records, approximately 250 permits would be issued between 2010 and 2020 plus the existing 113 units currently operating gives a combined total of 363 wind energy units. Each unit is estimated to account for 22.12 MTCO_{2e} per year in GHG reductions. Total reductions expected from these wind energy systems in year 2020 is **8,030.89 MTCO_{2e} per year**. The calculations of the wind turbine systems generation and GHG emission reductions are shown on the spreadsheet on the following page.

About half this many photovoltaic systems were also permitted by the County (average of 13 per year). A conservative analysis in the emission reductions from these systems estimates at least 127.41 MTCO_{2e} per year assuming 130 systems in place by year 2020 and slightly less than one metric ton CO_{2e} being

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reduced. These estimates are extremely conservative due to the lack of additional data on PV systems and the actual electric generating capacity and emissions reduction from PV is likely much higher.

WindCad Turbine Performance Model

BWC EXCEL-S, Grid - Intertie

Tier/neo-SH3055-23-BWC

Prepared For: **SWCC**
 Site Location: **Reference**
 Data Source: **AWEA Standard**
 Date: **10/13/2011**

10 kW

Inputs:	Results:		
Ave. Wind (m/s) = 8 Weibull K = 2 Site Altitude (m) = 1000 Wind Shear Exp. = 0.200 Anem. Height (m) = 30 Tower Height (m) = 30 Turbulence Factor = 0.0%	Hub Average Wind Speed (m/s) = 8.00 Air Density Factor = -9% Average Output Power (kW) = 7.66 Daily Energy Output (kWh) = 183.9 Annual Energy Output (MWh) = 67 Monthly Energy Output = 6 Percent Operating Time = 96.3%	GHGs Reduced 22.12 MTCO2e Per Unit	Total GHGs Reduced 5,752.15 MTCO2e In 2020

Weibull Performance Calculations

Wind Speed Bin (m/s)	Power (kW)	Wind Probability (f)	Net kW @ V	
1	0.00	1.20%	0.000	Weibull Calculations: Wind speed probability is calculated as a Weibull curve defined by the average wind speed and a shape factor, K. To facilitate piece-wise integration, the wind speed range is broken down into "bins" of 1 m/s in width (Column 1). For each wind speed bin, instantaneous wind turbine power (W, Column 2)) is multiplied by the Weibull wind speed probability (f, Column 3). This cross product (Net W, Column 4) is the contribution to average turbine power output contributed by wind speeds in that bin. The sum of these contributions is the average power output of the turbine on a continuous, 24 hour, basis. Best results are achieved using annual or monthly average wind speeds. Use of daily or hourly average speeds is not recommended.
2	0.00	1.23%	0.000	
3	0.13	1.25%	0.002	
4	0.39	1.89%	0.007	
5	0.80	2.05%	0.016	
6	1.37	2.25%	0.031	
7	2.13	5.45%	0.116	
8	3.12	5.89%	0.183	
9	4.36	6.05%	0.264	
10	5.83	6.78%	0.395	
11	7.46	8.29%	0.618	
12	9.10	10.25%	0.933	
13	10.33	11.43%	1.180	
14	10.68	10.04%	1.072	
15	10.95	9.12%	0.999	
16	11.03	8.40%	0.926	
17	11.03	5.25%	0.579	
18	10.99	1.25%	0.137	
19	10.83	1.02%	0.110	
20	10.39	0.89%	0.092	
Totals:		99.98%	7.663	

Instructions:

Inputs: Use annual or monthly **Average Wind** speeds. If **Weibull K** is not known, use K = 2 for inland sites, use 3 for coastal sites, and use 4 for island sites and trade wind regimes. **Site Altitude** is meters above sea level. **Wind Shear Exponent** is best assumed as 0.18. For rough terrain or high turbulence use 0.22. For very smooth terrain or open water use 0.11. **Anemometer Height** is for the data used for the **Average Wind** speed. If unknown, use 10 meters. **Tower Height** is the nominal height of the tower, eg.: 24 meters. **Turbulence Factor** is a derating for turbulence, site variability, and other performance influencing factors -- typical turbulence has already been incorporated into the model. Use 0.00 (0%) for level sites with limited obstructions. Use -0.10 (negative 10%) for flat, clear sites on open water. Use 0.05 to 0.15 (5% to 15%) for rolling hills or mountainous terrain.

Results: **Hub Average Wind Speed** is corrected for wind shear and used to calculate the Weibull wind speed probability. **Air Density Factor** is the reduction from sea level performance. **Average Power Output** is the average continuous equivalent output of the turbine. **Daily Energy Output** is the average energy produced per day. **Annual and Monthly Energy Outputs** are calculated using the Daily value. **Percent Operating Time** is the time the turbine should be producing some power.

Limitations: This model uses a mathematical idealization of the wind speed probability. The validity of this assumption is reduced as the time period under consideration (ie, the wind speed averaging period) is reduced. This model is best used with annual or monthly average wind speeds. Use of this model with daily or hourly average wind speed data is not recommended because the wind will not follow a Weibull distribution over short periods. The data used in creating the power curve was generated at the BWC test site in Norman, OK. Consult Bergrey Windpower Co. for special needs. *Your performance may vary.*