CITY OF RIVERSIDE

Baseline Community Greenhouse Gas Emissions Inventory

July 2010

EXECUTIVE SUMMARY

Overview

The City of Riverside (City) is committed to becoming a clean, green and sustainable Community. The City has commissioned this Community Greenhouse Gas (GHG) Emissions Inventory Report as part of an ongoing effort to measure and diminish the impact that their community has on the environment. The community-scale inventory estimates the quantity of GHG emissions for which the Community as a whole is responsible.

Current Inventory

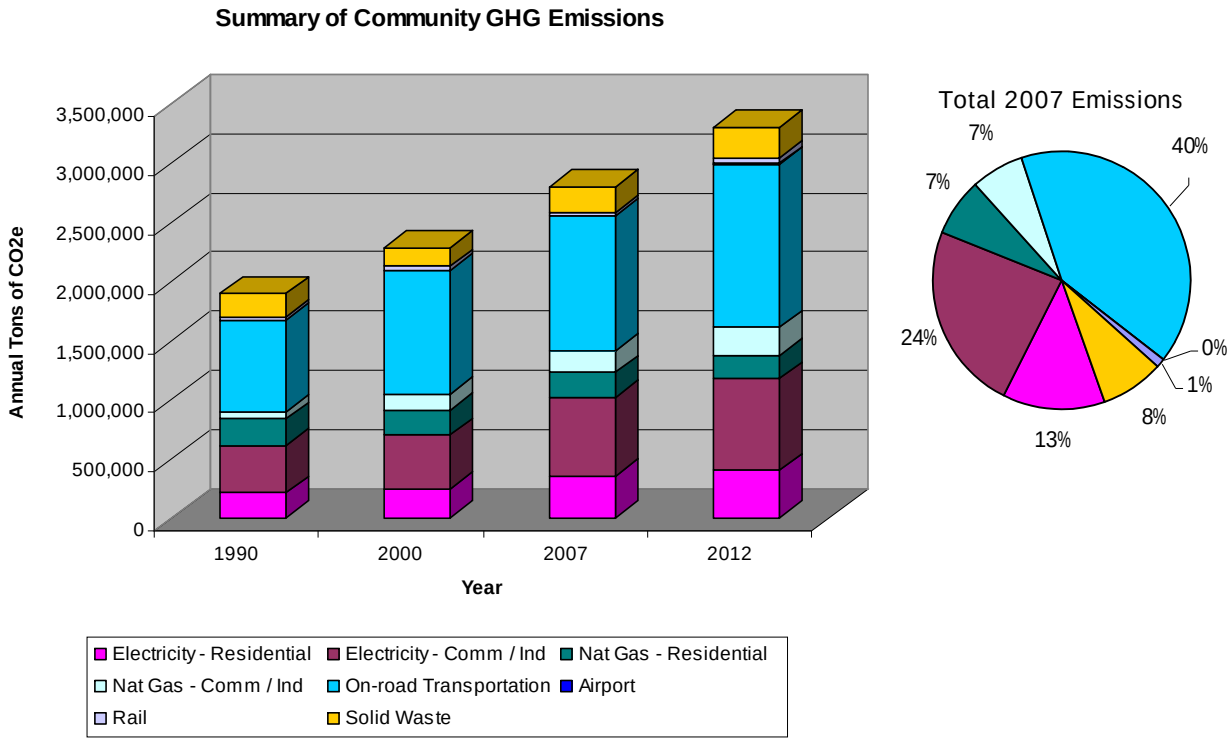
This preliminary study evaluates the current level of GHG emissions from the Community within City of Riverside's geographic boundary (Community) and utilizes ICLEI's Clean Air and Climate Protection (CACP) Software and emission accounting protocols for assessing emissions from the following sectors:

- Built Environment
  - Residential
  - Commercial
  - Industrial
- Mobile Emissions
  - On-road Transportation
  - Airport
  - Rail
- Solid Waste

The Community's estimated GHG emissions (as represented by carbon dioxide equivalents, CO_2e in metric tons) for the years 1990, 2000, 2007 (baseline) and 2012 a 5-year business-as-usual (BAU) projection are as follows:

Table ES1, Summary of Community GHG Emissions

	1990		2000		2007		Projected 2012 BAU	
Sector	CO_2e (tons)	% of Total	CO_2e (tons)	% of Total	CO_2e (tons)	% of Total	CO_2e (tons)	% of Total
Built Environment Energy Use - Electricity								
Residential	216,658	11.4%	251,253	11.0%	357,306	12.7%	405,185	12.3%
Commercial / Industrial	402,519	21.2%	452,472	19.8%	669,297	23.9%	773,772	23.4%
Built Environment Energy Use – Natural Gas								
Residential	221,472	11.6%	211,732	9.2%	204,976	7.3%	200,261	6.1%
Commercial / Industrial	63,643	3.3%	136,281	6.0%	187,152	6.7%	237,028	7.2%
Mobile Emissions								
On-road Transportation	768,731	40.4%	1,041,975	45.5%	1,139,674	40.6%	1,379,744	41.8%
Airport	3,155	0.2%	2,575	0.1%	1,540	0.1%	2,828	0.1%
Rail	23,501	1.2%	33,580	1.5%	27,524	1.0%	51,245	1.6%
Solid Waste	201,779	10.6%	159,667	7.0%	218,432	7.8%	254,610	7.7%
Total	1,901,458	100.0%	2,289,535	100.0%	2,805,901	100.0%	3,304,673	100.0%



Energy consumption from on-road transportation was the single largest source of emissions in 2007, contributing 40.6% of total emissions.

Table ES2, Community GHG Emissions, Percentage Change

Sector	1990 to 2000	2000 to 2007	Projected 2007 to 2012 BAU
Built Environment Energy Use - Electricity			
Residential	15.97%	42.21%	13.40%
Commercial / Industrial	12.43%	47.89%	15.61%
Built Environment Energy Use – Natural Gas			
Residential	-4.40%	-3.19%	-2.30%
Commercial / Industrial	114.13%	37.33%	26.65%
Mobile Emissions			
On-road Transportation	35.54%	9.38%	21.06%
Airport	-18.38%	-40.19%	83.64%
Rail	42.89%	-18.03%	86.18%
Solid Waste	-20.87%	36.80%	16.56%
Weighted Total	20.41%	22.55%	17.78%

The Riverside Community produced an estimated 1,901,458 tons of CO_2e in the year 1990, 2,289,624 tons in 2000, 2,805,901 tons in 2007 and are projected to produce 3,304,673 tons of CO_2e in the year 2012 under a business-as-usual scenario. This is a 20.4% increase in the years between 1990 and 2000. A critical factor in this increase is the continued growth and development within the Community. For comparison, GHG emissions nationwide increased by about 15% between 1990 and 2000, according to the EPA. Similar population growth and development occurred in the City between 2000 and 2007, and is anticipated going forward to 2012. Under a business-as-usual scenario, if the City does not implement any further reduction measures as of 2007, it is projected that the City's emissions will increase in 2012 by 17.8% compared to 2007.

Current GHG Emissions Trend

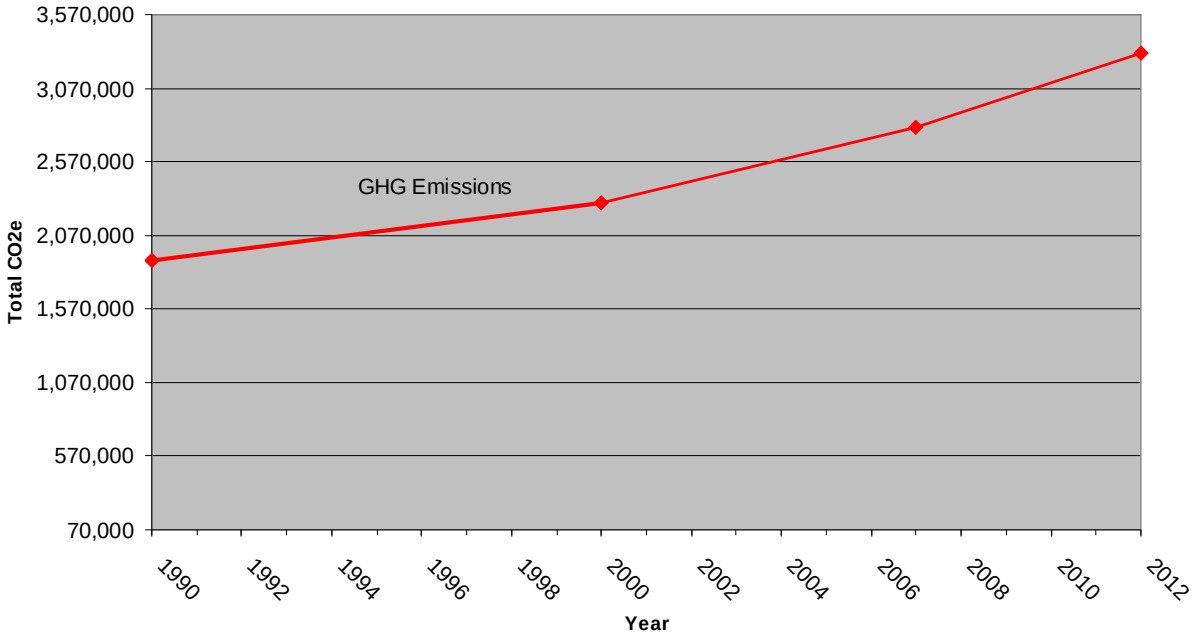


TABLE OF CONTENTS

LIST OF ACRONYMS

AB32	California Global Warming Solutions Act of 2006
ARRA	American Recovery and Reinvestment Act
BNSF	Burlington Northern Santa Fe
CACP	Clean Air Climate Protection
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCAR	California Climate Action Registry
City	City of Riverside
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CH_4	methane
CNG	compressed natural gas
CURE	Clean Up Riverside's Environment
E85	ethanol – 85%
EPA	Environmental Protection Agency
GHG	greenhouse gas
HFC	hydrofluorocarbon
ICLEI	Local Governments for Sustainability
km	kilometers
KRCB	Keep Riverside Clean and Beautiful
kWh	kilowatt hour
LED	light emitting diode
LGO	Local Government Operations
LMOP	Landfill Methane Outreach Program
LPG	liquefied petroleum gas
MARB	March Air Reserve Base
mWh	megawatt hour
N_2O	nitrous oxide
NO_X	oxides of nitrogen
PFC	perflourocarbon
PUP	Power Utility Protocol
RCP	Regional Comprehensive Plan
RGB	Riverside Green Builder
RHNA	Regional Housing Needs Assessment
RIDI	Residential Infill Development Incentive
RPU	Riverside Public Utilities
RTA	Riverside Transit Authority
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Community Strategy
SF_6	sulfur hexafluoride
SO_X	oxides of sulfur

SRPS	Sustainable Riverside Policy Statement
SUV	sport utility vehicle
ULSD	ultra low sulfur diesel
UP	Union Pacific
VMT	vehicle miles traveled
W	watts

1.0 INTRODUCTION

1.1 OBJECTIVE

The City of Riverside (City) is committed to becoming a clean, green and sustainable community. The City has commissioned this Community Greenhouse Gas (GHG) Emissions Inventory Report as part of an ongoing effort to measure and diminish the impact that their community has on the environment. The community-scale inventory estimates the quantity of GHG emissions for which the community as a whole is responsible. The inventory will include the quantities of electricity and fuels used in the residential, commercial, industrial, and transportation/mobile emissions sectors, along with the amount of waste produced and landfilled, as well as the quantity of GHG emissions produced by each of these sectors. In 2008, the City completed a baseline inventory of emissions generated by current municipal operations and prepared recommended best practices for reducing GHG emissions. The Riverside Green Action Plan was developed to ensure sustainable growth in the City while preserving the health of the local environment for generations. The goals of the Green Riverside Action Plan will also assist in addressing the City's and California's GHG emission reduction goals.

1.2 OVERVIEW OF CLIMATE CHANGE

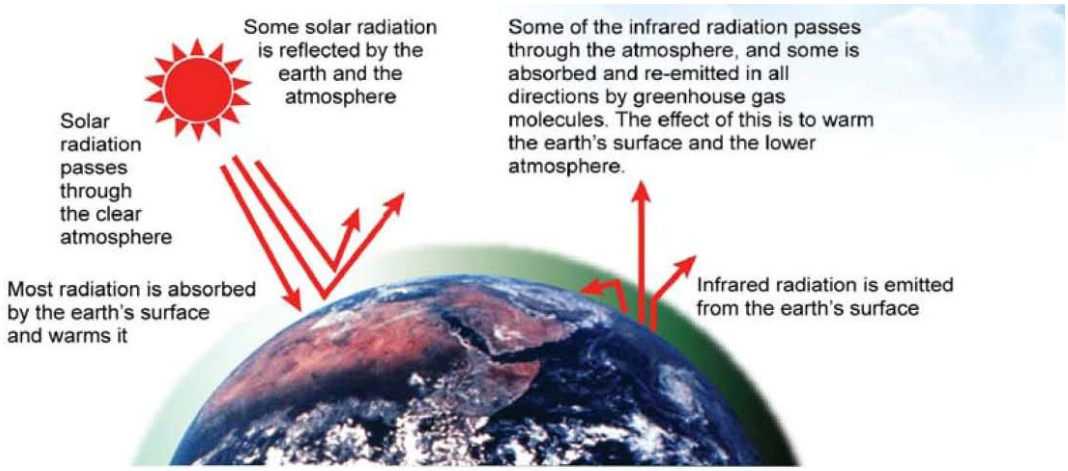
Gases in the earth's atmosphere insulate the planet from radiation originating beyond our atmosphere. The gases in the atmosphere that trap heat inside it are termed greenhouse gases because they cause a natural "greenhouse effect" (Figure 1.1). The sun radiates heat to the earth's surface, where some is absorbed by the earth, and some is reflected out to space. The GHGs in the earth's atmosphere both absorb some of this heat and reflect some of it back to the earth, causing a warming effect.

Some GHGs, such as carbon dioxide (CO_2) and methane (CH_4), occur naturally through processes such as transpiration from plants and vegetation decomposition. CO_2 can also form from anthropogenic or man-made sources such as the combustion of fossil fuels. Other GHGs, such as fluorinated gases are emitted solely from human activities. The significant GHGs emitted due to human activity and the specific focus of international attention via the Kyoto Protocol are carbon dioxide CO_2, methane CH_4, nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perflourocarbons (PFCs), and sulfur hexafluoride (SF_6).

While a natural balance of GHGs contributes to the maintenance of our atmosphere and climate, an excess of anthropogenic GHGs is considered to be one of the main factors contributing to the enhanced greenhouse effect known as global climate change.

There are a variety of scenarios for potential impacts from climate change. Potential impacts could include more extreme temperatures, drought, sea level rise, and habitat disturbance. One major impact in California is reduced snowpack in the Sierra Nevada, which will affect California's water supplies.

Figure 1.1, The Greenhouse Effect



Source: U.S. Environmental Protection Agency Climate Change website

1.3 Key Climate Change Legislation And Initiatives

1.3.1 AB32

The California Global Warming Solutions Act of 2006 (AB32) adopts a statewide goal to reduce GHG emissions to 1990 levels by 2020. Under this Act, the California Air Resources Board (CARB) is given the authority and a timeline to undertake a number of steps in order to meet this goal. CARB's GHG inventory work provided the basis for developing the 1990 statewide emissions level and 2020 emissions limit 1990 statewide emissions level and 2020 emissions limit required by AB32. The difference between the 2020 emissions limit and the 2020 business-as-usual forecast estimate is the amount of emission reductions that must be achieved by the State. After that, California's goal is a reduction of 80 percent from 1990 levels by 2050. The emission reductions will be reduced largely through a Scoping Plan.

The Scoping Plan has a range of GHG emission reduction actions which include direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade system, and an AB32 cost of implementation fee regulation to fund the program. The proposed Scoping Plan was released on October 15, 2008 and approved at the CARB hearing on December 12, 2008.

Key programs to be developed by CARB in order to meet the state's GHG emissions reduction goal under AB32 include:

- The creation of market mechanisms including an enforceable statewide cap on GHG emissions that will be phased in starting in 2012;
- Regulations for the mandatory reporting of GHG emissions by elected emission sources and source categories have already been developed by CARB; and
- Regulations to achieve emission reductions for selected emission sources and source categories in the subsequent years.

A preliminary draft regulation for a California cap-and-trade program was released for public review and comment on November 24, 2009. The California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms is scheduled for public review of final draft regulation in Summer 2010, and final draft approval in October 2010.

CARB has already adopted a number of "early action" measures required by the Scoping Plan, and is now working on the Plan's other measures. The majority of this work must be completed by December 31, 2010, with most regulations and other initiatives adopted by the start of 2011. This means more than 20 additional Scoping Plan measures will be adopted by CARB in 2009 and 2010.

http://www.arb.ca.gov/cc/ab32/ab32.htm

Table 1.1, AB32 CARB Action Timeline

By July 1, 2007	CARB forms Environmental Justice and Economic & Technology Advancement advisory committees.
By July 1, 2007	CARB adopts list of discrete early action measures that can be adopted and implemented before January 1, 2010.
By July 1, 2008	CARB adopts regulations for mandatory GHG emissions reporting. CARB defines 1990 emissions baseline for California (including emissions from imported power) and adopts that as the 2020 statewide cap.
By July 1, 2009	CARB adopts plan indicating how emission reductions will be achieved from significant sources of GHGs via regulations, market mechanisms, and other actions.
By July 1, 2009	CARB staff drafts rule language to implement its plan and holds a series of public workshops on each measure (including market mechanisms).
By July 1, 2010	Early Action Measures take effect.
By July 1, 2010	CARB conducts a series of rulemakings, after workshops and public hearings, to adopt GHG regulations, including rules governing market mechanisms.
By July 1, 2011	CARB completes major rulemakings for reducing GHGs, including market mechanisms. CARB may revise the rules and adopt new ones after January 1, 2011 in furtherance of the 2020 cap.
By July 1, 2012	GHG rules and market mechanisms adopted by CARB take effect and are legally enforceable.
By July 1, 2020	Deadline for achieving 2020 GHG emissions cap.

1.3.2 SB375

SB375 requires the CARB to set regional targets for the purpose of reducing GHG emissions from automobiles and light trucks for 2020 and 2035. CARB must propose draft targets by June 30, 2010, and adopt final targets by September 30, 2010. The 18 Metropolitan Planning Organizations in California will prepare a "sustainable communities strategy" to reduce the amount of vehicle miles traveled (VMT) in their respective regions and demonstrate the ability for the region to attain ARB's targets.

- ARB would later determine if each region is on track to meet their targets.
- Builders also would get relief from certain environmental reviews under California Environmental Quality Act if they build projects consistent with the new sustainable community strategies.
- In addition, cities would get extra time – eight years as opposed to five – to update housing plans required by the state.

RIVERSIDE SUSTAINABILITY PROGRAMS AND GHG REDUCTION INITIATIVES

1.4.1 Green Riverside Action Plan

The City of Riverside is committed to becoming a clean, green and sustainable community. Following the Mayor's State of the City Address in January 2007, the City Council approved the Sustainable Riverside Policy Statement (SRPS). The Clean and Green Task Force framed the SRPS with a practical emphasis on how the City could implement cleaner, greener and more sustainable programs to benefit both City Operations and the local community.

To further Riverside's commitment to a clean, green and sustainable future, the Green Riverside Action Plan was developed. Successful implementation of the Action Plan will ensure sustainable growth while preserving the health of the local environment for generations. The Action Plan is a working document to be continually reviewed with progress reports to be presented to the City Council at least annually.

In January 2009, the California Department of Conservation announced that Riverside was designated an "Emerald City" in its Emerald Cities Pilot Project. This recognition is for sustainable green initiatives and commitment to help the state achieve multiple environmental priorities. Riverside will be one of two cities in the pilot project.

The Green Riverside Action Plan is part of an implementation 'road map' to help the city move toward a more sustainable future. Reinforcing the blueprint set forth in the SRPS, the Green Riverside Action Plan highlights the following vital areas of city life:

Energy - Riverside is committed to providing safe, reliable and affordable power that achieves a balance between high quality, low cost energy and the environmental impacts of providing those energy resources.

Greenhouse Gas Emissions - While the City continues to make efforts to reduce pollution through emission reduction measures, additional steps are being created and implemented to improve air quality.

Waste Reduction - Riverside is committed, through programs like CURE (Clean Up Riverside's Environment) and Keep Riverside Clean and Beautiful (KRCB) to promote the basic principles of recycle, reduce, reuse. Also, the City developed and is implementing a Green Purchasing Policy to promote City purchasing of environmentally preferable products.

Urban Design - In order for Riverside to meet the demands of its existing and anticipated residential and business community, the City will adhere to the smart growth goals established in the General Plan 2025. Also, Riverside is dedicated to attracting more green industry into the region to operate sustainable businesses through the assistance of the Economic Development Division and the Greater Riverside Chambers of Commerce.

Urban Nature - To guarantee Riverside remains a green city, the City will continue to plant trees and preserve park and natural habitat for future generations.

Transportation - Transportation is crucial to the economy and our personal lives, but the environmental impacts of transportation are equally significant and wide ranging. The City will adopt strategies that improve regional mobility and vehicle emissions.

Water - While great strides in water conservation and efficiency programs have been made, additional conservation measures will be taken in order to continue to provide safe and reliable water to Riverside's customers.

Healthy Communities - Riverside is committed to actively promote sustainable and healthy living for all residents.

1.4.2 General Plan 2025

On a community-scale, the City is implementing the General Plan 2025 policies to ensure new growth meets pedestrian-friendly, high-density, mixed-use and transit-oriented development goals that utilize fewer natural resources. Well-planned communities with a balance of housing, jobs, shopping, schools, and recreation give people the option of walking, biking or using transit rather than driving. This results in lower GHG emissions and also promotes physical activity and more vibrant, healthy and sustainable communities.

The Riverside bicycle master plan in tandem with other land use planning provides residents the opportunity to use non-polluting forms of transportation, thus reducing vehicle miles traveled., The bicycle master plan envisions over 140 miles of new bike paths, lanes and routes to connect commuters with jobs, students with schools, and the general population with parks, shopping and regional bicycle trails.

1.4.3 Riverside Public Utilities

Riverside Public Utilities is committed to helping make Riverside a greener place to live by committing to support renewable, environmentally friendly electric power sources, and sustainable living practices. The City is striving to receive 50% of its total power from renewable resources by 2013.

Riverside Public Utilities has established the programs within the following general categories that are designed to not only help conserve water and energy, but to save its customers money. Many programs are funded by the state-mandated Public Benefits Surcharge on the electric bill.

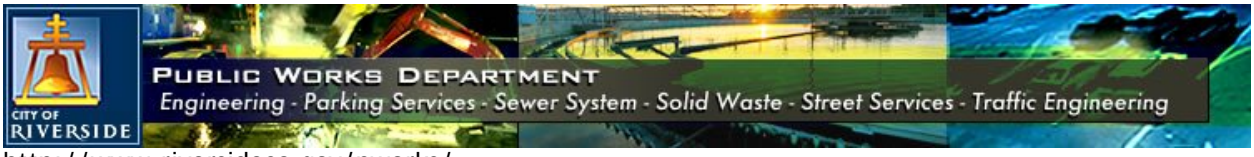
- Conservation and Energy Efficiency Programs
- Green Power Rebates & Programs
- Water Rebate Programs

Riverside Recycled Water Project

In 2008, the City approved the Riverside Recycle Water Project which will use highly treated wastewater rather than high quality potable (drinkable) water to serve the agricultural and irrigation needs throughout the City. The project is designed to pump the treated "recycled water" north, parallel to the Santa Ana River, and then throughout the City to irrigate parks, golf courses, and other public use facilities. This plan will provide nearly 5 billion gallons of recycled water each year by 2015, and more than 13 billion gallons per year by 2030.

http://www.riversideca.gov/utilities/water-recycled-water.asp

1.4.4 Riverside Public Works



http://www.riversideca.gov/pworks/

Clean Up Riverside's Environment (CURE)

Clean Up Riverside's Environment (C.U.R.E.) is a comprehensive waste management program developed as an expansion of existing AB939 programs with the goal to more effectively handle and dispose of divertible and hazardous waste and, ultimately, to address the related problem of illegal dumping by offering convenient, flexible and frequent disposal and recycling options. CURE contributes significantly to Riverside's goal of reducing waste, based on the 2007 per capita baseline, by 75% by 2020.

Traffic Management Center (TMC)

Staff at the Traffic Management Center monitors live video of major intersections and roadways. Information gained from monitoring traffic is used to optimize traffic flow by adjusting signal timing. Traffic tools allow us to improve roadway conditions and maximize intersection operations. Monitoring traffic also allows us to rapidly respond to incidents as they occur. Intersections are monitored to observe traffic flow and allow real-time signal timing alterations. Railroad crossings are monitored for stopped trains and proper train movement Interactive traffic signal diagrams allow engineers to verify proper signal timing operation.

Urban Forest

The City of Riverside is known as a "City of Trees." The 100,700 street trees and 40,000 park and open space trees throughout Riverside are a community asset. The urban forest provides environmental benefits, adds to property value and provides an enhanced quality of life for all residents. The City has established guidelines for the planting, pruning, preservation and removal of all trees in city right-of-ways and recreational facilities.

1.4.5 Riverside Planning Division

Sustainable Community Strategy (SCS)

The Planning Division is working alongside the Southern California Association of Governments (SCAG) to develop a Sustainable Community Strategy (SCS) for compliance with Senate Bill 375. The SCS is intended to link land use and transportation planning policies with the aim of reducing GHG emissions related to vehicle miles traveled. The SCS will tie SCAG's Regional Transportation Plan, The Regional

Comprehensive Plan (RCP), Regional Housing Needs Assessment (RHNA), and all of their jurisdicitions' General Plans into a cohesive plan for GHG reduction. As part of that ongoing effort, the Planning Division recently completed a review of socioeconomic projections (housing, population, and employment statistics) for the City through the year 2035.

Residential Infill Development Incentive (RIDI) Program

The City's Residential Infill Development Incentive (RIDI) Program provides incentives for single-family residential infill developments of five parcels or fewer in designated low-income areas. One key program objective is to provide housing in close proximity to existing business and employment areas, reducing the need for extensive vehicle trips.

Specific Plan Updates

The City is utilizing American Recovery and Reinvestment Act (ARRA) grants to update the Marketplace and University Avenue Specific Plans beyond the land use strategies proposed in the General Plan 2025 for even greater intensities tied to the idea of reducing VMT. The updates would require all future development in these areas to significantly reduce energy consumption by promoting a denser mix of uses. The strategy would serve to promote greater pedestrian activity, promote the use of public transportation, and lessen a person's reliance on the automobile.

1.4.6 Riverside Building and Safety Division

http://www.riversideca.gov/building/programs.asp

Riverside Green Builder

Riverside Green Builder (RGB) is a voluntary program primarily for production builders. RGB is based on the California Green Builder Program that is recognized by California Public Utilities Commission, the California Energy Commission and California League of Cities, and is the largest residential green builder program in California. A RGB certified home must meet five criteria: Energy Efficiency, Water Conservation, Waste Reduction, Wood Conservation, and Indoor Air Quality. Home designs are the result of a flexible performance based approach that allows the home builder to utilize the most cost effective means to meet the program standards.

http://www.cagreenbuilder.org/

1.5 Public Sustainability Programs and Energy Efficiency Initiatives

Public programs and incentives to help residents and businesses reduce energy and the impact of GHG emissions on our environment are available from:

- Riverside Public Utilities
- The Gas Company
- Flex Your Power
- Energy Star
- Riverside Transit Agency
- California Integrated Waste Management Board

1.6 APPROACH

Accounting for GHG emissions is a relatively new field, yet it has been developing rapidly in conjunction with growing public awareness and concern relating to global climate change.

The City of Riverside is a member of ICLEI – Local Governments for Sustainability. ICLEI is a current leader in the development of community GHG emissions accounting methodology and its protocol was utilized to develop this community level GHG emissions inventory. The "Local Government Community Protocol for the Quantification and Reporting of Greenhouse Gas Emissions", was not yet finalized when this inventory began to be developed. As such, further work may be required in the future to update this inventory to meet protocol requirements. However, another source of guidance was the International Local Government Greenhouse Gas Emissions Analysis Protocol (IEAP), which includes guidance for the inventorying of emissions from both municipal operations and the Community. The IEAP was drafted in 2007 and Version 1.0 was released in October 2009.

ICLEI and CACP

ICLEI was founded in 1990 as 'The International Council for Local Environmental Initiatives', and is a membership association of local governments that have made a commitment to sustainable development. The organization is now officially known as ICLEI - Local Governments for Sustainability. Through its Cities for Climate Protection campaign, ICLEI is a leader in the development of accounting methodology for local communities' GHG emission inventories. ICLEI coordinates its work with the California Climate Action Registry (CCAR), the U.S. Department of Energy, the U.S. Environmental Protection Agency (EPA), and State and Territorial Air Pollution Program Administrators - Association of Local Air Pollution Control Officials (STAPPA/ALAPCO).

ICLEI, in collaboration with STAPPA/ALAPCO has developed and released the CACP Software. CACP is a valuable tool that has enabled various local governments to inventory their GHG emissions, quantify the benefits of reduction measures, and formulate local climate action plans. The CACP software has been used precisely for these purposes within this inventory.

The Community Inventory utilizes CACP 2009, a new product that replaces the CACP Software originally released in 2003. CACP 2009 has been updated to support emissions inventorying and climate action planning based on the principles and methods of the Local Government Operations Protocol.

Data Collection

This inventory encompasses a Community-wide analysis of the following City's sectors:

- Built Environment
  - Residential
  - Commercial
  - Industrial
- Mobile Emissions
  - On-road Transportation
  - Air
  - Rail
- Solid Waste

The Community Inventory utilizes a data collection approach that is similar to the approach for the City's Municipal Baseline Inventory for government operations. Data from 2007 are the most recent full calendar year with the most complete data available from the aforementioned City sectors. Therefore, 2007 was utilized as the initial reporting (baseline) year for this inventory as it was based on the most reliable data. While 1990 as a base year is stipulated by the Kyoto Protocol, data records from this year

were, for the most part, unavailable. As such, estimates for 1990 and 2000 were based on actual data or backcasted data which were correlated to changes in employee, city population or other data which were considered appropriate to generate the most accurate results.

Since 2007 is considered the baseline year, GHG emissions for the year 2012 were estimated as a short term projection of the City's GHG emission levels in 5 years. The 2012 projection was estimated using a "business-as-usual" (BAU) scenario. Under BAU, any emissions reduction measures or programs that are currently in existence are included in the 2012 scenario; emissions reduction measures that are planned but not currently in place are not represented in the projected 2012 scenario. Forecasted 2012 emissions take into account projected growth within the City, and represent the emissions trend if no new GHG reduction measures were to take place within the next 5 years. Assumptions, as well as data sources, are presented in Section 4, Activity Data Details.

2.0 COMMUNITY PROFILE INFORMATION

The City of Riverside was founded in 1870, and the first orange trees were planted in 1871. The following years led to the establishment and success of the citrus industry and the blooming of the City of Riverside. Even today, the Inland Empire is still experiencing rapid growth, now with increases in the residential and business sectors.

Located in one the fastest growing areas in the state, and with the City Council's dedication to creating a clean and sustainable future, the City has taken key steps toward ensuring sustainable growth to preserving the health of the local environment.

Location and Size

The City is located in the northwest portion of Riverside County. Riverside is situated just southwest of the 91 and 60 Freeways at the juncture of Interstate 215 with established transportation corridors accessible by freeway, air, train or bus.

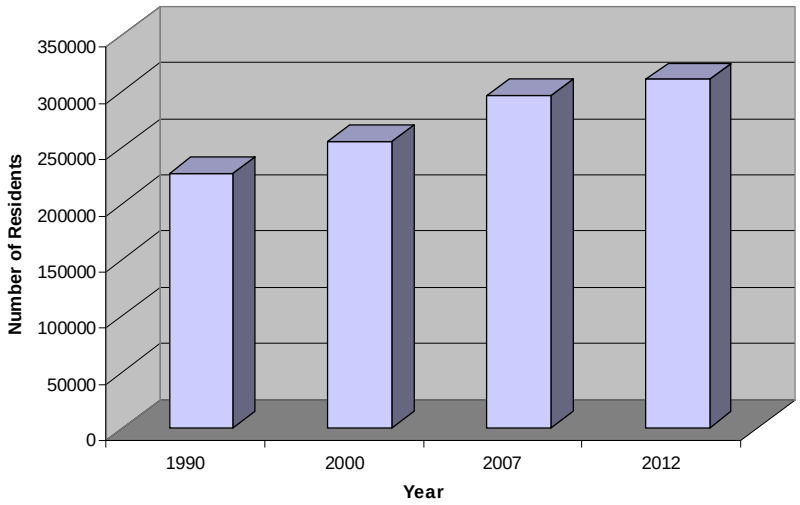
According to the United States Census Bureau, the city has a total area of 78.4 square miles (203.0 km²), of which, 78.1 square miles (202.3 km²) of it is land and 0.3 square miles (0.7 km²) of it is water. The total area is 0.36% water. Riverside is the 61st-largest city in the United States, and the largest city in California's Inland Empire region, the 14th-largest metropolitan area in the nation.

Population

In 2007, growth in the Riverside metropolitan area was the 5th largest in the nation. According to the United States Census Bureau, in 1990, the City had a population of 226,546 residents and in 2000 the City had a population of 255,166 residents. According to California Department of Finance estimates, in 2007 the City's population consisted of 296,842 people. Population in the 17 years from 1990 to 2007 has experienced a 31% growth. According to the City of Riverside General Plan 2025 and Final Program Environmental Impact Report, the projected population in 2025 will be 346,867. Assuming a linear growth rate, a population estimate of 310,738 in 2012 was derived. Much of this projected growth will result from infill and redevelopment within the City. The growth of the City's resident population is shown in Figure 2.1, City Population.

As with any city, an increase in population correlates with the need to expand city services. With increased growth and expansion comes the potential for an increase in GHG emissions unless significant steps are taken to reduce emissions within both municipal and Community operations.

Figure 2.1, City Population



Residential – Commercial / Industrial

The Land Use Policy Map (Figure LU-10 – Land Use Policy Map) in Appendix B illustrates the various types and distribution of land uses planned for Riverside. The land uses classification system (Table LU-3 Land Use Designations) in Appendix B includes twenty-four land use designations. These land use designations identify the types and nature of development allowed in particular locations depicted on the Land Use Map. These designations provide a spectrum of land use types and intensities, including several new categories intended to reduce urban sprawl and conserve public resources by focusing mixed-use and higher density residential development along key corridors and at designated activity centers. The land use designations put into concrete action the objectives and policies presented throughout the Land Use and Urban Design Element as part of the General Plan 2025.

The Residential categories include nine designations that allow for a range of housing types and densities. The non-residential categories include two different intensities of commercial uses, areas for offices, business parks and industrial uses, all to promote a range of revenue- and employment-generating businesses and a more balanced community. There are three specific mixed-use land use designations: Mixed Use–Neighborhood, Mixed Use–Village, and Mixed Use–Urban. Other non-residential designations include Agriculture, Public Facilities, Open Space/Natural Resources and Parks and Private Recreation.

The residential and commercial/industrial sectors represent emissions that result from electricity and natural gas used in both private and public sector buildings and facilities. The transportation sector includes emissions from private, commercial and fleet vehicles driven within the City's geographical boundaries as well as the emissions from transit vehicles and the City owned fleet.

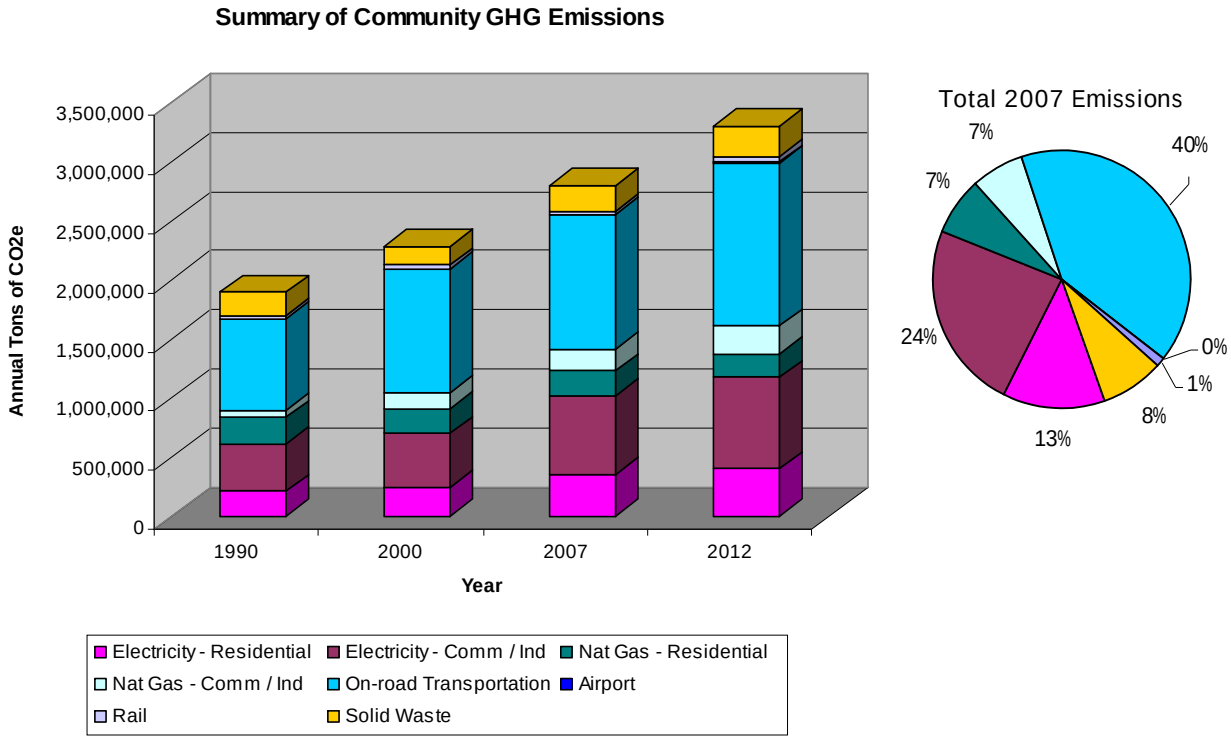
3.0 GREENHOUSE GAS INVENTORY DETAILS

3.1 RIVERSIDE'S SOURCES OF GHGS

From 1990 to 2000, overall GHG emissions produced by the Community within the City of Riverside increased by 20.4%. A critical factor in this rise is the continued growth and development within the City. For comparison, GHG emissions nationwide increased by about 15% between 1990 and 2000, according to the EPA. Similar growth and development occurred in the City between 2000 and 2007, and is projected going forward to 2012 under a business-as-usual scenario. The City's emissions are currently projected increase in 2012 by 17.8% from 2007. Based on a population of 296,842 residents, the per capita CO_2e emissions are 9.45 tons per resident in 2007. The following table and chart summarize the GHG emissions from City operations in 1990, 2000, 2007, and projected emissions in 2012.

Table 3.1, Summary of Community GHG Emissions

	1990		2000		2007		Projected 2012 BAU	
Sector	CO_2e (tons)	% of Total	CO_2e (tons)	% of Total	CO_2e (tons)	% of Total	CO_2e (tons)	% of Total
Built Environment Energy Use - Electricity								
Residential	216,658	11.4%	251,253	11.0%	357,306	12.7%	405,185	12.3%
Commercial / Industrial	402,519	21.2%	452,472	19.8%	669,297	23.9%	773,772	23.4%
Built Environment Energy Use – Natural Gas								
Residential	221,472	11.6%	211,732	9.2%	204,976	7.3%	200,261	6.1%
Commercial / Industrial	63,643	3.3%	136,281	6.0%	187,152	6.7%	237,028	7.2%
Mobile Emissions								
On-road Transportation	768,731	40.4%	1,041,975	45.5%	1,139,674	40.6%	1,379,744	41.8%
Airport	3,155	0.2%	2,575	0.1%	1,540	0.1%	2,828	0.1%
Rail	23,501	1.2%	33,580	1.5%	27,524	1.0%	51,245	1.6%
Solid Waste	201,779	10.6%	159,667	7.0%	218,432	7.8%	254,610	7.7%
Total	1,901,458	100.0%	2,289,535	100.0%	2,805,901	100.0%	3,304,673	100.0%



Energy consumption from on-road transportation was the single largest source of emissions in 2007, contributing 40.6% of total emissions.

3.1.1 Built Environment Energy Use – Electricity and Natural Gas

Description

The built environment sector represents emissions that result from electricity and natural gas used in both private and public sector buildings and facilities. The built environment is comprised of the residential and commercial/industrial sectors. Energy usage from buildings and facilities within the City is expected to increase annually.

Electricity and Natural Gas

The Community receives a majority of its electricity from Riverside Public Utilities. There are two areas, the Woodcrest and North Main areas, that are located within the City boundaries but do not receive service from Riverside Public Utilities. The approximately 186 residential and 15 commercial customers within these two areas were accounted for within this inventory.

The City and community receives 100% of its natural gas service from Southern California Gas Company.

3.1.1.1 Residential

Results

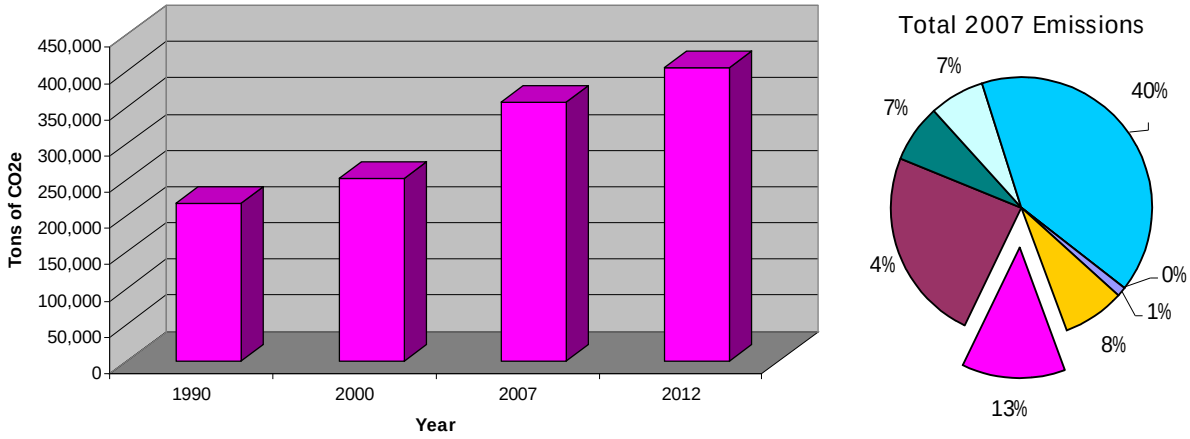
In 2007, the residential buildings within the City utilized an estimated 742,446,894 kilowatt hours (kWh) of electricity and 34,955,762 therms of natural gas. The total GHG emissions from residential electricity usage were 357,306 tons of CO_2e emissions in 2007. California uses less electricity per

person than any other state in the nation. While per capita electricity consumption in the United States increased by nearly 50 percent over the past 30 years, California's per capita electricity use remained almost flat, due in large part to cost-effective building and appliance efficiency standards and other energy efficiency programs.

Table 3.1, GHG Emissions from Residential Electricity Usage

	1990	2000	2007	2012 BAU
Metric Tons CO_2e	216,658	251,253	357,306	405,185

Figure 3.1, GHG Emissions from Residential Electricity Usage



Since 1970, the number of households in California has nearly doubled from 6.5 million to 12.5 million; however, the average annual gas consumption per household has dropped more than 36 percent. This is the result of our appliance and building energy efficiency standards.

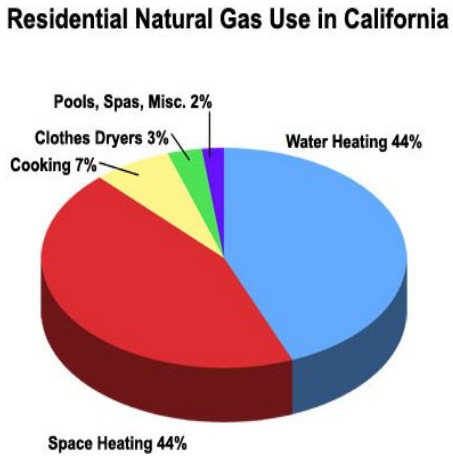
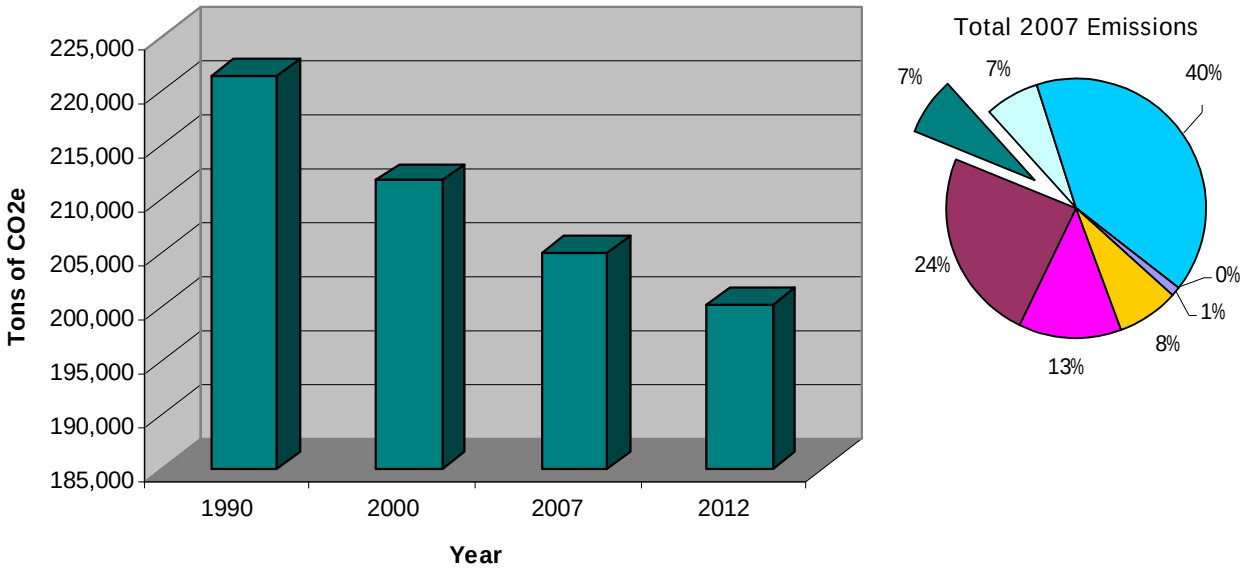


Table 3.2, GHG Emissions from Residential Natural Gas Usage

	1990	2000	2007	2012 BAU
Metric Tons CO_2e	221,472	211,732	204,976	200,261

Figure 3.2, GHG Emissions from Residential Natural Gas Usage



3.1.1.2 Commercial / Industrial

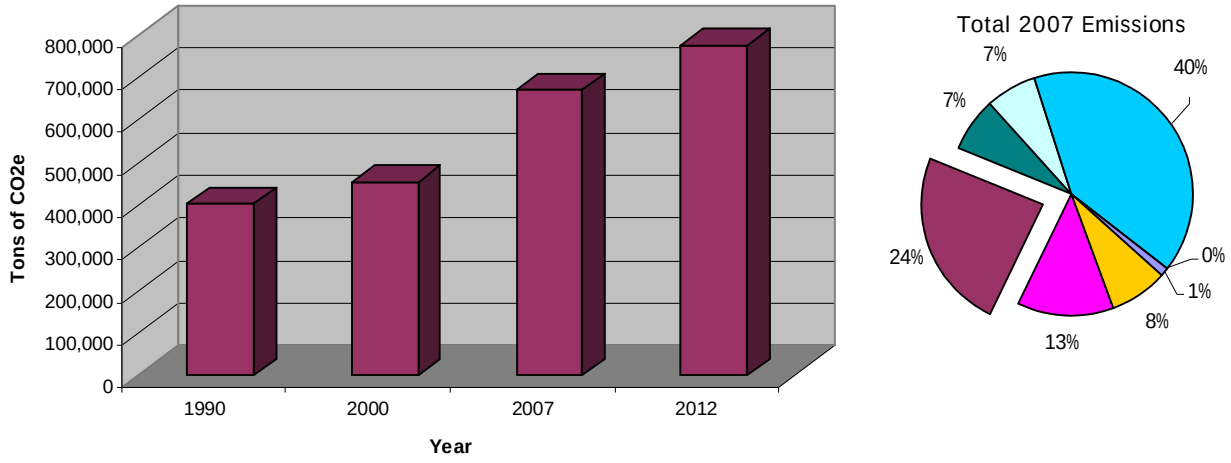
Results

In 2007, commercial facilities operating within the City utilized approximately 448,733,370 kWh of electricity, while industrial facilities utilized approximately 942,000,000 kWh. Commercial and industrial facilities utilized approximately 31,966,656 therms of natural gas. The total GHG emissions from commercial/industrial energy usage were 669,297 tons of CO_2e emissions in 2007.

Table 3.3, GHG Emissions from Commercial/Industrial Electricity Usage

	1990	2000	2007	2012 BAU
Metric Tons CO_2e	402,519	452,561	669,297	773,772

Figure 3.3, GHG Emissions from Commercial/Industrial Usage

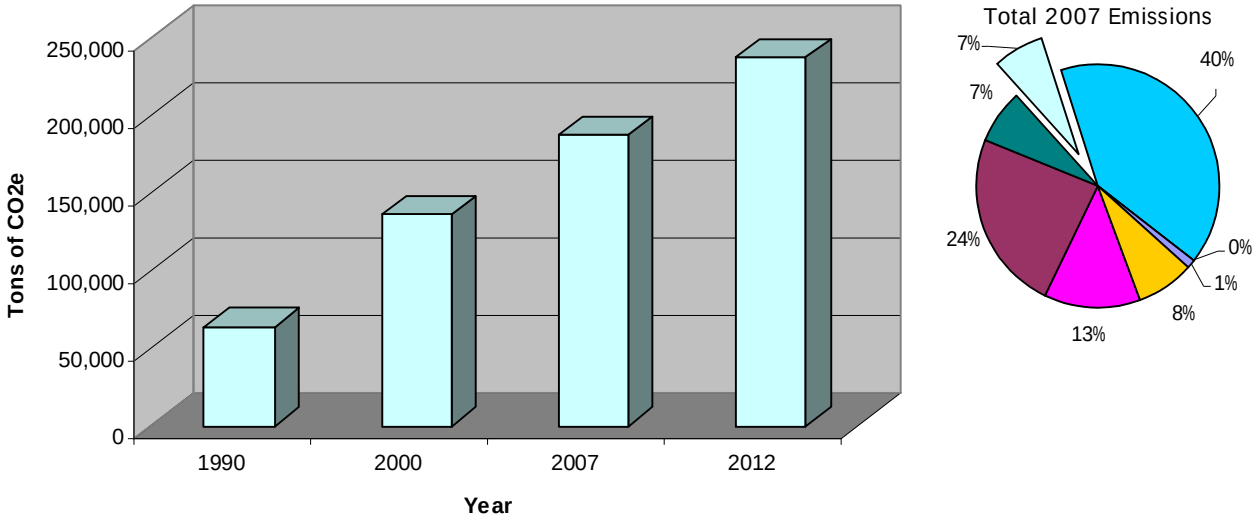


Commercial natural gas use, similar to residential use is largely for space and water heating. This will continue to increase as the primary driver for increased demand is population growth. The only industry in California maintaining a consistent demand for natural gas is petroleum refining, which uses about one-third of the natural gas consumed by industries in the state. Food processors use about 20 percent of the total, but their numbers have declined and their total use appears to be declining also. Other industries whose demand has decreased include glass, chemicals, education, healthcare, paper, and oil and gas extraction.

Table 3.4, GHG Emissions from Commercial/Industrial Natural Gas Usage

	1990	2000	2007	2012 BAU
Metric Tons CO_2e	63,643	136,281	187,152	237,028

Figure 3.4, GHG Emissions from Commercial/Industrial Natural Gas Usage



3.1.2 Mobile Emissions

3.1.2.1 On-road Transportation

The Riverside population uses a variety of transportation modes for travel within and outside of the City. On-road vehicles use Riverside's regional freeways (State Routes 91 and 60 and Interstate 215) and the City's extensive street network. The City is served by several Riverside Transit Authority (RTA) bus routes. Also, the University of California, Riverside operates a number of student bus shuttles.

3.1.2.2 Airport

The Riverside Municipal Airport is one of the largest corporate airports in Southern California and offers service to private aircraft. The Airport does not currently offer scheduled commercial passenger service.

March Air Reserve Base/March Inland Port (MARB/MIP) lies just outside the City's southeastern boundary and is not included within the scope of this inventory.

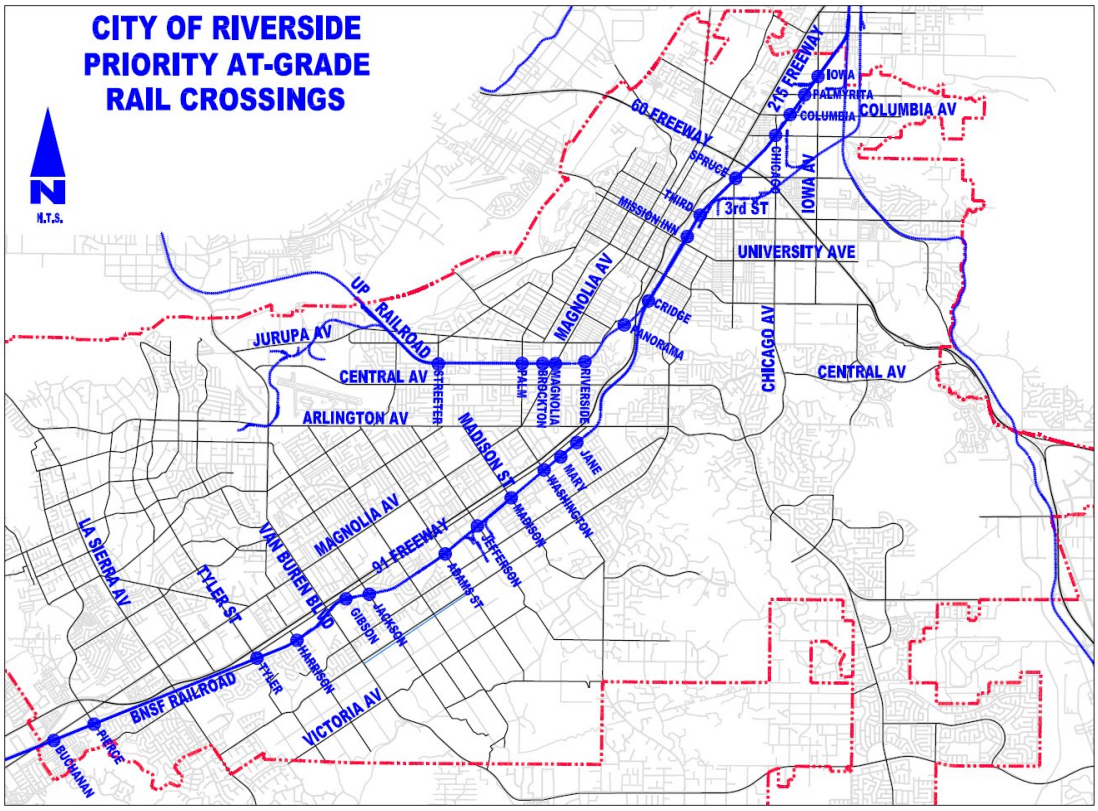
3.1.2.3 Rail

Riverside's rail network provides people with greater regional mobility and also serves an important role in the movement of freight. The City of Riverside is trisected by two transcontinental rail lines, the Burlington Northern and Santa Fe Railroad (BNSF), and the Union Pacific Railroad (UPRR). These two rail lines carry over 75% of the freight handled by the Ports of Long Beach and Los Angeles through the City of Riverside. There are 26 mainline crossings where the railroads intersect with City streets. These rail lines accommodate line haul freight service as well as Metrolink commuter rail service and Amtrak passenger service. Currently approximately 125 trains per day pass through Riverside, and the number is projected to increase to 169 by 2020.

At-grade crossings create traffic delays that generate additional auto emissions from extra idling time. Grade separation projects eliminate these issues by redirecting the vehicle, pedestrian and bicycle traffic above or below the busy railroad tracks. Of the more than 70 railroad crossings in the City of Riverside, 13 are existing grade separations and 26 are primary crossings on a grade separation priority list. Currently the Magnolia Avenue railroad grade separation project is under construction. Three more including Iowa Avenue, Riverside Avenue and Streeter Avenue are in various stages of design.

Figure 3.3 is a map showing the locations of these tracks; this map also shows high priority at-grade rail crossings that may be replaced in the future. The UPRR and BNSF lines merge at Cridge Street. From this point to the northeastern border of the City, UPRR trains that travel north use the BNSF tracks. Also, some trains traveling southwesterly on the BNSF tracks continue on the BNSF tracks, while other trains turn onto the UPRR tracks at the intersection.

Figure 3.3, Map of Rail in Riverside and Priority at-Grade Crossings



Source: Map provided by the City of Riverside Public Works Department

Metrolink also operates passenger trains along the BNSF and UPRR tracks on three lines. The Riverside line uses the UPRR tracks and trains on this line originate and terminate at the downtown Riverside station. The 91 Line and the Inland Empire - Orange County Line use the BNSF tracks. Trains on the 91 Line and some trains on the Inland Empire-Orange County Line originate and terminate at the downtown Riverside station. Other trains on the Inland Empire-Orange County Line originate and terminate in San Bernardino. In the future, Metrolink may operate trains along the east side of the City as the San Jacinto line develops. Amtrak also operates two trains per day on the BNSF tracks.

The increase in train volume is equivalent to an increase in emissions. However, these emissions may be offset by emission reductions from more efficient operations resulting from grade separations that increase train speeds, thereby reducing idling, proposed upgrades to lower-emitting Tier 4 switch diesel locomotives, and CARB's low-sulfur diesel regulations.

Results

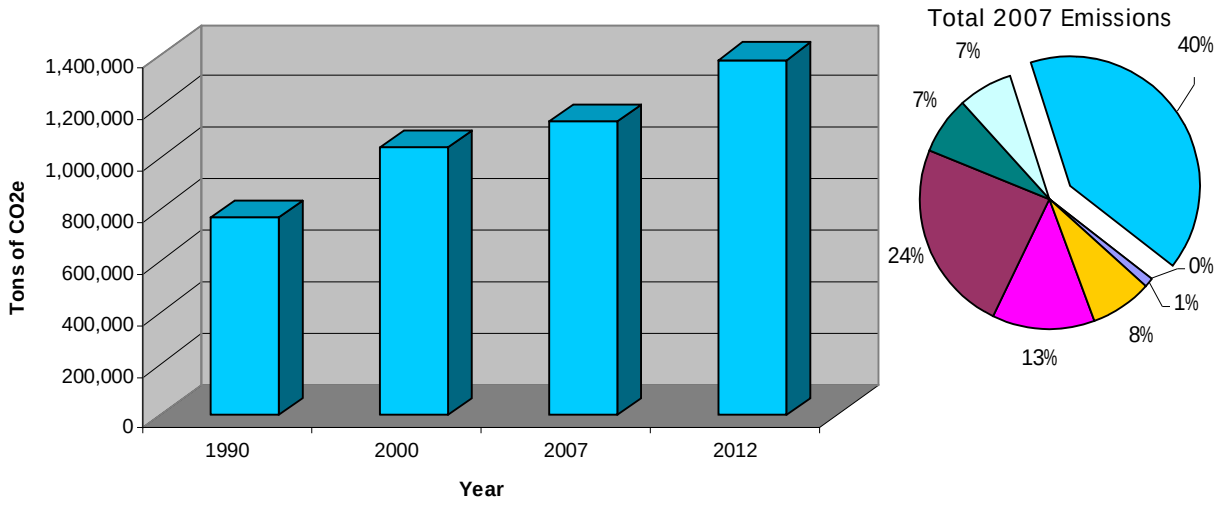
All additional assumptions and methodologies for calculating GHG emissions from transportation are provided in Chapter 4.

The CO_2e emissions attributed to on-road transportation in the Community is as follows:

Table 3.5, GHG Emissions from On-Road Transportation

	1990	2000	2007	2012 BAU
Metric Tons CO_2e	768,731	1,041,975	1,139,674	1,379,744

Figure 3.5, GHG Emissions from On-Road Transportation

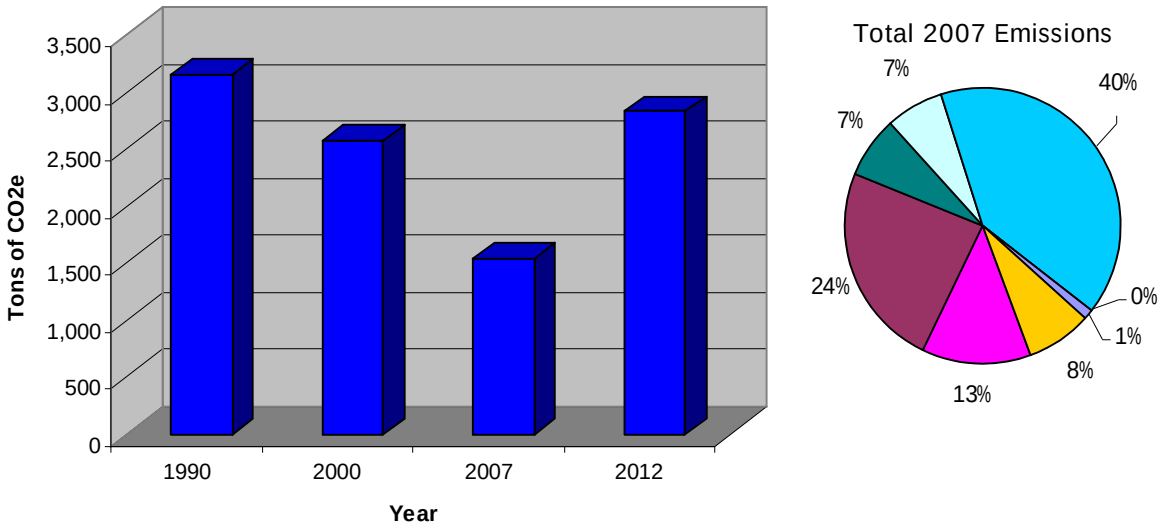


The CO_2e emissions attributed to the Riverside Airport is as follows:

Table 3.6, GHG Emissions from the Airport

	1990	2000	2007	2012 BAU
Metric Tons CO_2e	3,155	2,575	1,540	2,828

Figure 3.6, GHG Emissions from the Airport



Emissions from the airport steadily decreased between 1990 and 2007, but are expected to increase by 2012. The decrease in emissions from 1990 to 2007 is largely related to an economical decrease in flight traffic. The airport previously offered fuel for sale at a relatively high price compared to other corporate airports in the region. However, fuel sales at the airport and related emissions are expected to increase by 2012 for the following reasons:

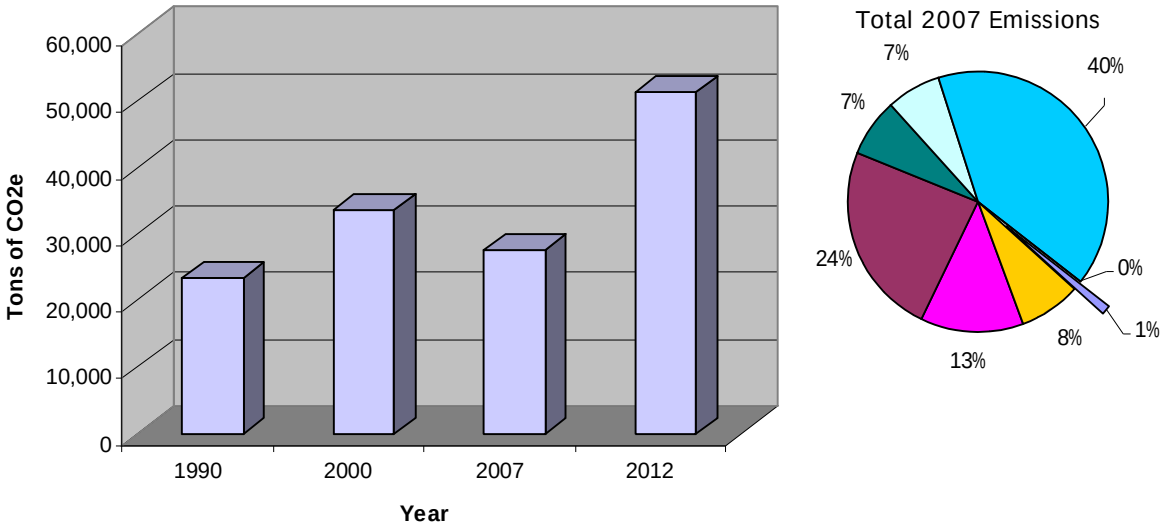
- fuel is now offered at a relatively low price compared to other airports in the region,
- the airport has various development plans, including plans to expand one runway, which is anticipated to attract new additional business,
- flight training school at the airport is expected to have increased enrollment over the next 18 months; and a relative economic recovery is anticipated.

The CO_2e emissions attributed to rail transportation is as follows:

Table 3.7, GHG Emissions from Rail

	1990	2000	2007	2012 BAU
Metric Tons CO_2e	23,501	33,580	27,524	51,245

Figure 3.7, GHG Emissions from Rail



3.1.3 Waste

Description

Household and business waste is generated by the Community. This waste is collected by three commercial waste contractors and transferred to various managed landfills. Landfill waste is primarily sent to either Badlands landfill with a methane gas-to-energy plant or to El Sobrante landfill, which does not have a fully functional gas-to-energy plant and flare. Landfill waste is also sent to Olinda Alpha and Puente Hills landfills and 12 other facilities. According to records from the California Integrated Waste Management Board, in 2007, the Community disposed of 346,823 metric tons of waste to landfills. In 2007, approximately 616,595 metric tons of waste (64%) was estimated to be diverted and recycled. Approximately 14.2 metric tons of waste transferred to the Commerce Refuse to Energy Facility.

Prior to the passage of AB 939 in 1989, the City had no municipally-sponsored recycling program. AB 949, known as the Integrated Waste Management Act, mandated a reduction of waste being disposed: jurisdictions were required to meet diversion goals of 25% by 1995 and 50% by the year 2000. After passage, the City took a very proactive stance that concentrated on program development designed to achieve the diversion goals of AB 939 in the most timely and cost-effective manner. Riverside accomplished its goals in a manner somewhat unique in California by initiating its programs with the major material identified in its waste characterization study, namely green waste. The City worked closely with the County and the waste subcontractors in developing a full range of programs to meet its diversion responsibilities.

These programs include:

- Green and wood waste/composting
- Residential curbside
- Residential drop-off
- MRF recovery of commercial waste
- Concrete and asphalt
- White goods, tires, and telephone books
- Office paper collection
- Economic incentives
- Ordinances

Table 3.8 shows the approximate breakdown of the materials the Community sent to the landfill based percentages of residential and business waste and the CIWMB profile in 2008. Organic materials such as food and yard waste disposed of in landfills decompose and emit methane, a GHG 21 times more potent than CO_2. Materials that do not breakdown and release GHGs are aggregated into the "All Other Waste" category.

Table 3.8, Waste Disposal by Materials

Waste Type	Waste
Paper Products	30.8%
Food Waste	17.6%
Plant Debris	12.8%
Wood/Textiles	4.8%
All Other Waste	34.0%
Total	100.0%

Results

The primary GHG emissions are from decomposition of landfilled organic waste.

Due to lack of data availability on diverted waste types relative to total landfilled waste, the emissions impact of recycling practices is not included in this analysis. Waste sector emissions calculations are based on a number of factors, including: the methane recovery factor at the landfills to which the city's solid waste are sent; the total amount of solid waste sent to the landfills; the composition of the waste sent to the landfills; and emissions coefficients derived from the U.S. EPA's Waste Reduction Model (WARM). A weighted average of the methane recovery factors for the landfills to which Riverside sends its waste equals approximately 75%. This estimate is based on data supplied by the U.S. EPA's Landfill Methane Outreach Program (LMOP).

Based on emissions coefficients for the waste sector, and because more than 75% of the methane produced from Riverside's solid waste is estimated to be recovered (either captured perpetually under the liner of the landfill or captured and then flared), waste emissions for several waste types result in slightly negative tons of CO_2e. Since the model does not capture the emissions credit achieved through the city's recycling efforts, we are choosing to "zero out" the emissions credit attributed to landfilling of these waste types for the purposes of this inventory. Zeroing out the emissions credit for landfilling is consistent with the action taken by a number of ICLEI members in California.

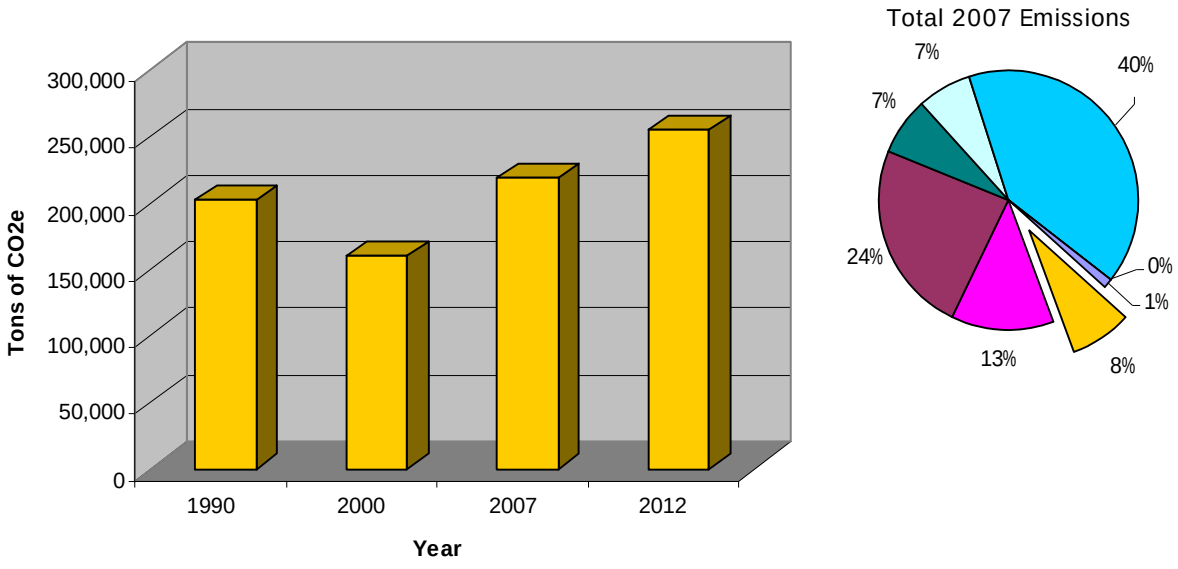
The benefits gained from recycling and the associated reduction in "upstream" energy use far outweigh sending waste to the landfill. For example, if Riverside recycled an additional 20,000 tons of waste, then the City would reduce its annual CO_2e emissions by an additional amount of 12,600 tons.

In 2007, total GHG emissions were 218,432 metric tons of CO_2e. Under a business-as-usual scenario, if the City maintained the percentage of solid waste to be recycled, total GHG emissions are projected to be 254,610 metric tons of CO_2e. The CO_2e attributed to waste each year is as follows:

Table 3.9, GHG Emissions from Waste

	1990	2000	2007	2012 BAU
Metric Tons CO_2e	201,779	159,667	218,432	254,610

Figure 3.9, GHG Emissions from Waste



4.0 ACTIVITY DATA DETAILS

4.1 SOURCES OF ALL ACTIVITY DATA REPORTED

4.1.1 Population

1990 and 2000 City population data were obtained from the U.S. Census Bureau, and population data for 2007 were obtained from California Department of Finance estimates. These data were forecast to 2012 using a projected 1% annual rate of growth over this period. 2025 City population data were obtained from the Riverside General Plan 2025, adopted November 2007.

4.1.2 Buildings and Other Facilities

Data are reported at an aggregate level for each sector – Residential, Commercial and Industrial. Commercial and Industrial are often bundled together since industrial customers are subject to State PUC confidentiality laws (15/15 rule) if they consume a certain proportion of the electricity within the local government. At least a portion of the industrial consumption is reported in the commercial sector and reported emissions from the industrial sector would constitute only a subset of the actual industrial emissions.

Electricity Usage

Electricity is provided to the Community of Riverside by the City via Riverside Public Utilities. Electricity usage in kilowatt hours (kWh) from residential, commercial and industrial buildings and facilities under the Riverside Public Utilities service area for the years 2000 and 2007 was obtained from annual Riverside Public Utilities financial statements. The financial statements are available for each fiscal year from 1997/1998 through 2007/2008. Fiscal year data (i.e. July 2006 through June 2007) were modified to represent a full calendar year (i.e. January 2007 through December 2007) by taking the sum of half a fiscal year (i.e. January 2007 to June 2007 from fiscal year 2006/2007) with the sum of half the next fiscal year (i.e. July 2007 to December 2007 from fiscal year 2007/2008).

It is estimated that approximately 200 residential and commercial electricity users are outside of the Riverside Public Utilities service area within the Woodcrest and North Main communities of the City. Therefore, no electricity usage data was available for these areas. In order to represent the electricity usage within the area not serviced by Riverside Pubic Utilities, the average annual kWh of electricity usage for a typical resident or commercial customer in the City was used to derive approximate electricity usage for each respective year of data.

Since 1990 data were unavailable, the average rate of change per year between usage in 1998 and 2000 was used to backcast 1990 data. The average rate of change per year between usage in 2000 and 2007 was used to forecast 2012 data.

The 2007 emissions for electricity by fuel source were provided by Riverside Public Utilities. The types of power sources that make up a utility's electricity generation mix have a significant impact on a city's GHG emissions. A coal fired power plant, for example, releases an average of approximately 1.3 tons of CO_2e per megawatt-hour (mWh) of electricity generated versus 0.7 tons for gas turbines and 0 tons for renewable electric power.

Natural Gas Usage

Natural gas usage from residential, commercial and industrial buildings and facilities for the years 2000 and 2007 was supplied by the City's representative for Southern California Gas Company. Since 1990 data were unavailable, the average rate of change per year between usage in 2000 and 2007 was used to backcast 1990 data and forecast 2012 data.

4.1.3 Transportation

Transportation data covered three categories: on-road transportation, which includes all passenger vehicles, buses, and trucks traveling in or through the City of Riverside; air transportation originating from the Riverside Airport; and rail transportation, which includes both freight trains and passenger trains traveling through the City of Riverside.

On-Road Transportation

Emission calculations for on-road transportation are based on the total vehicle miles traveled (VMT) in Riverside. The necessary VMT data for the Community were taken from the California Department of Transportation (Caltrans) Highway Performance Monitoring System Data Library Archives, and from the Caltrans Public Road Data Reports. Data were available for 1996-2007, and these data were used to backcast the 1990 data and to forecast the 2012 data based on the average annual increase of VMT in the City of Riverside from 1996-2007.

To input data into the CACP software, a breakdown of the types of vehicles on the road was needed for each year included in this inventory. These data were obtained from the 2007 Emission Factors (EMFAC) model developed by CARB.

Air Transportation

As per the guidance in the ICLEI International Local Government GHG Emissions Analysis Protocol, emissions from the Riverside Airport are calculated based on the amount of fuel dispensed at the airport. The Airport dispenses two types of fuel: kerosene-type jet fuel (Jet A) and aviation gasoline (100 low lead). Fuel amounts were provided by Airport staff; fuel dispensed in 2000 and 2007 were based on actual records. Data for 1990 were backcasted and data for 2012 were forecasted using fuel sale trends and the number of operations at the airport in the past and planned for the future.

Rail Transportation

Data were gathered on the number of freight and passenger trains traveling through the City of Riverside each day from numerous data sources. Some data were provided from gate down time observations provided by staff at the City of Riverside. Additional data were found in the *Inland Empire Railroad Main Line Study Final Report*, 2005, from the Southern California Association of Governments (SCAG). This report uses peak day train counts at a 90th percentile-day, meaning that 90% of the year did not exceed the train counts on these days. 1990 data were backcasted based on data trends. 2010 and 2025 data were forecasted in the *Inland Empire Railroad Main Line Study Final Report*; to find 2012 forecasted data, the project team determined the projected annual change in the number of trains from the 2010 and 2025 forecasted levels and interpolated the 2012 data.

Passenger train information was also gathered from train schedules from Metrolink and Amtrak.

Also, the distance of each rail line that travels through the City of Riverside was determined by analyzing GIS maps. All of these data sources were then used to calculate the total miles traveled through the City of Riverside by freight and passenger trains.

The final inputs into the CACP software were the total fuel usage for freight and passenger trains. For freight trains, ton-miles were calculated using the data described above and an assumption that the

average weight per train is 3,100 tons. Finally, the project team used an average fuel efficiency of 436 ton-miles per gallon of diesel fuel to determine the fuel usage by the trains. For passenger trains, it was assumed that each train has an average fuel efficiency of 42 miles per gallon of diesel fuel. Annual fuel usage was derived using total VMT for passenger trains and this fuel efficiency assumption.

4.1.4 Waste

Landfilled and diverted waste data were supplied by the City of Riverside's Public Works Department and the California Integrated Waste Management Board.

A typical waste composition for public administration organizations was obtained from the California Integrated Waste Management Board's *Business Waste Composition Study* (1999) as shown below:

Table 4.1, Waste Disposal by Material Category

Waste Type	Residential	Business
Paper	27.5%	32.1%
Other Organic	45.0%	31.3%
Plastic	8.8%	9.0%
Metal	4.6%	6.3%
Construction and Demolition	4.5%	12.2%
Glass	4.0%	2.7%
Mixed Residue	4.0%	0.5%
Household Hazardous Waste	0.3%	0.2%
Special Waste	0.0%	0.5%

Organic materials such as food and yard waste disposed of in landfills decompose and emit methane, a GHG 21 times more potent than CO_2. Materials that do not breakdown and release GHGs are aggregated into the "All Other Waste" category.

In 2007, 346,823 metric tons of waste was sent to managed landfills from the City of Riverside. In 2007, 616,595 metric tons of waste was recycled from the Community.

Annual population growth of 1% and annual business growth of 4.4% from 2007 were extrapolated to estimate residential and business waste disposal in 2012. It is assumed that the statewide per capita disposal rates of 5.8 pounds/person/day would remain the same. To represent a business-as-usual scenario, it was also assumed that the City would maintain its solid waste recycling at 64% from 2007 to 2012.

The landfills to which waste is sent either collect the landfill gas to use with gas flares to control methane emissions and/or reduce the methane in waste-to-energy facilities.

4.2 METHODOLOGY/EMISSION FACTOR DETAILS

4.2.1 Fuel Emission Factors

Default fuel combustion emission factors were based on ICLEI's CACP software default emission factors.

4.2.2 Purchased Electricity Emission Factors

Electricity CO_2 emission factors from 1990 and 2000 were based on Riverside Public Utilities' verified 2007 Power Utility Protocol (PUP) report electricity deliveries emission factor as included in CCAR public reporting. Because the actual resource mix was not able to be obtained for 1990 and 2000, Riverside Public Utilities' PUP report CO_2 emission factor was taken to be the most accurate emission factor available. The default emission factor included in the CACP software was not considered to be representative, as the typical California state power mix has a higher proportion of renewable energy than Riverside Public Utilities, for which coal fired power stations form a large proportion of the power mix. The actual power mix for 1990 and 2000 was not known; however, so it was not possible to develop an accurate emission factor for these years and instead the verified 2006 emission factor was used based on the assumption that the power resource mix has not changed significantly since this time.

Electricity CO_2 emission factors for 2007 were based on Riverside Public Utilities' 2007 PUP report emission factor for electricity deliveries as supplied by City staff.

The 2007 PUP report data were used to derive an estimated 2012 electricity CO_2 emission factor, based on Riverside Public Utilities stated RPS goals of 20% eligible renewables by 2010 and 25% by 2015.

Electricity CH_4 and N_2O electricity emission factors for all years were based on default ICLEI CACP software emission factors for Region 13. ICLEI default emission factors were used for these gases are more accurate figures are not included in CCAR public reporting for Riverside Public Utilities.

Emissions sources that met the following criteria were excluded from the inventory:

Small and unimportant – Emissions sources are considered "de minimis" if, when combined, the excluded emissions total less than 5% of the total of the emissions from the Community Inventory.

Prohibitively difficult to track with accuracy or lack necessary data to calculate –The science is still evolving in many sectors, and data may not be available - e.g., non-combustion industrial emissions sources, emissions from composting activities.

Largely located outside the jurisdiction's boundaries – such as intercity transportation fuel (i.e. air, rail, marine and intercity highway traffic).

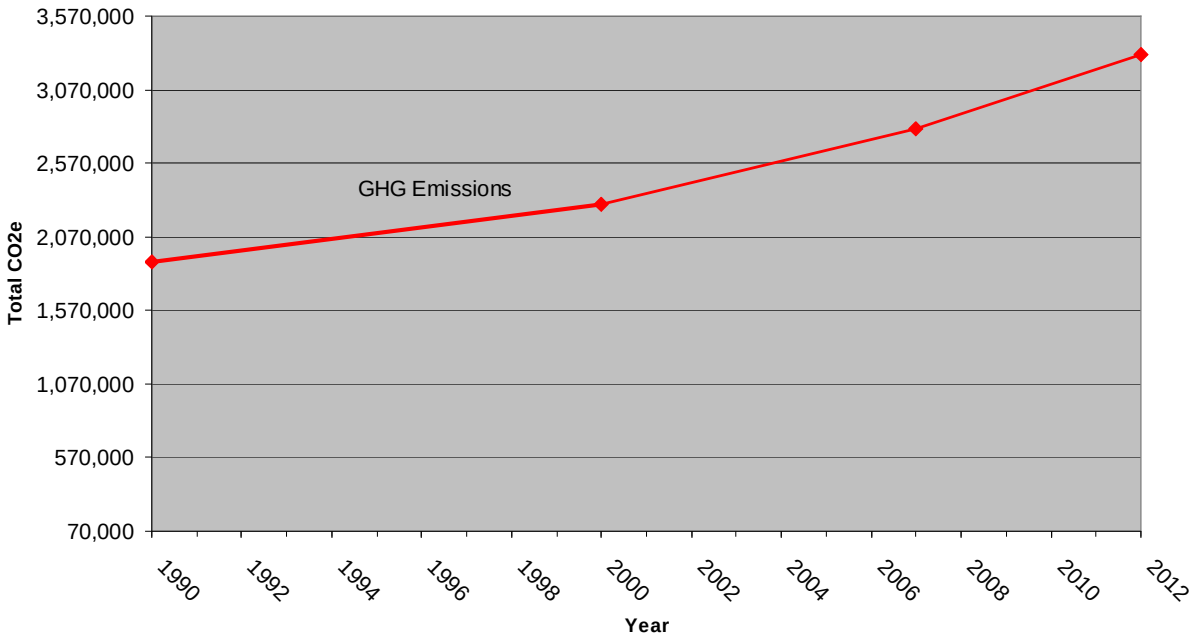
4.2.3 Scopes

The scopes framework is designed to categorize emissions according to source location and the ability of the local governments to affect their emissions. Scopes must be reported separately, as adding scopes may result in double counting. In this inventory, the only source of possible double counting is in the waste sector, where Community-generated waste may be disposed of in a landfill within the City jurisdiction. Depending upon the source of waste in a landfill, it may be very difficult to separate out emissions resulting from waste generated within the Community versus emissions from waste generated outside of the Community. For this reason, ICLEI has strongly recommended reporting emissions by Scope for the Riverside inventories.

5.0 SUMMARY

The Riverside Community produced an estimated 1,901,458 tons of CO_2e in the year 1990, 2,289,624 tons in 2000, 2,805,901 tons in 2007 and are projected to produce 3,304,673 tons of CO_2e in the year 2012 under a business-as-usual scenario. This is a 20.4% increase in the years between 1990 and 2000. A critical factor in this rise is the continued growth and development within the Community. For comparison, GHG emissions nationwide increased by about 15% between 1990 and 2000, according to the EPA. Similar population growth and development occurred in the City between 2000 and 2007, and is anticipated going forward to 2012. Under a business-as-usual scenario, if the City does not implement any further reduction measures as of 2007, it is projected that the City's emissions will increase in 2012 by 17.8% compared to 2007.

Current GHG Emissions Trend



Acknowledgment

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REFERENCES

California Energy Commission (CEC), California Energy Almanac, California Residential Natural Gas Consumption http://www.energyalmanac.ca.gov/naturalgas/residential_natural_gas_consumption.html

California Energy Commission (CEC) 2007 Integrated Energy Policy Report, Commission Final Report, December 5, 2007. Publication # CEC-100-2007-008-CMF.

California Integrated Waste Management Board (CIWMB) Business Waste Composition Study for Public Administration. (1999). Webpage: http://www.ciwmb.ca.gov/WASTECHAR/BizGrpCp.asp

California Integrated Waste Management Board (CIWMB) Statewide Waste Composition Study: Results and Final Report. (1999). Webpage: http://www.ciwmb.ca.gov/Publications/default.asp?pubid=824, Source: http://www.ciwmb.ca.gov/WASTECHAR/DispRate.htm

Carollo Engineers, City of Riverside Wastewater Collection and Treatment Facilities Integrated Master Plan, Volume 4: Wastewater Treatment System (February 2008). Webpage: http://www.riversideca.gov/PDF2/masterplan/Vol%204%20-%20Ch%2002%20-%20Summary%20of%20Planning%20Studies.pdf

City of Riverside Public Utilities, Green Riverside (2008). Webpage: http://www.riversideca.gov/utilities/comm-gp.asp,

ICLEI, About ICLEI (2008). Webpage: http://www.iclei.org/index.php?id=global-about-iclei http://www.iqled.com/

ICLEI, International Local Government GHG Emissions Analysis Protocol. Release Version 1.0 (October 2009).

Kats, Greg. The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force, (October 2003).

Metropolitan Transportation Commission, Census Transportation Planning Package Part 3-Journey to Work Data (CTPP2000). (2004) Webpage: http://www.mtc.ca.gov/maps_and_data/datamart/census/ctpp2000/

Riverside Public Utilities, Electric Financial Report 2007/2008 http://www.riversideca.gov/utilities/pdf/annual/Financial-Report_07-08%20-%20Electric.pdf

Riverside Public Utilities, Electric Financial Report 2001/2002 http://www.riversideca.gov/utilities/pdf/ElecStats2001-02.pdf

Riverside Public Utilities, Water Financial Report 2007/2008 http://www.riversideca.gov/utilities/pdf/annual/Financial-Report_07-08%20-%20Water.pdf

Riverside Public Utilities, Water Financial Report 2001/2002 http://www.riversideca.gov/utilities/pdf/WaterStats2001-02.pdf

Southern California Association of Governments. Inland Empire Railroad Main Line Study Final Report. (June 30, 2005).

Southern California Association of Governments. Business Case: Rail Expansion, Emissions Reduction, and Grade Separation Project, Appendix F. (2008)

Santa Barbara County, Environmental Thresholds and Guidelines Manual (which cites Matrix Management Group, et al. Best Management Practices Analysis for Solid Waste (1988), (1990). Webpage: http://www.ciwmb.ca.gov/WASTECHAR/WasteGenRates/Institution.htm

State of California, Department of Finance, E-1 Population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2007 and 2008. Webpage: http://www.dof.ca.gov/research/demographic/reports/estimates/e-1_2006-07/

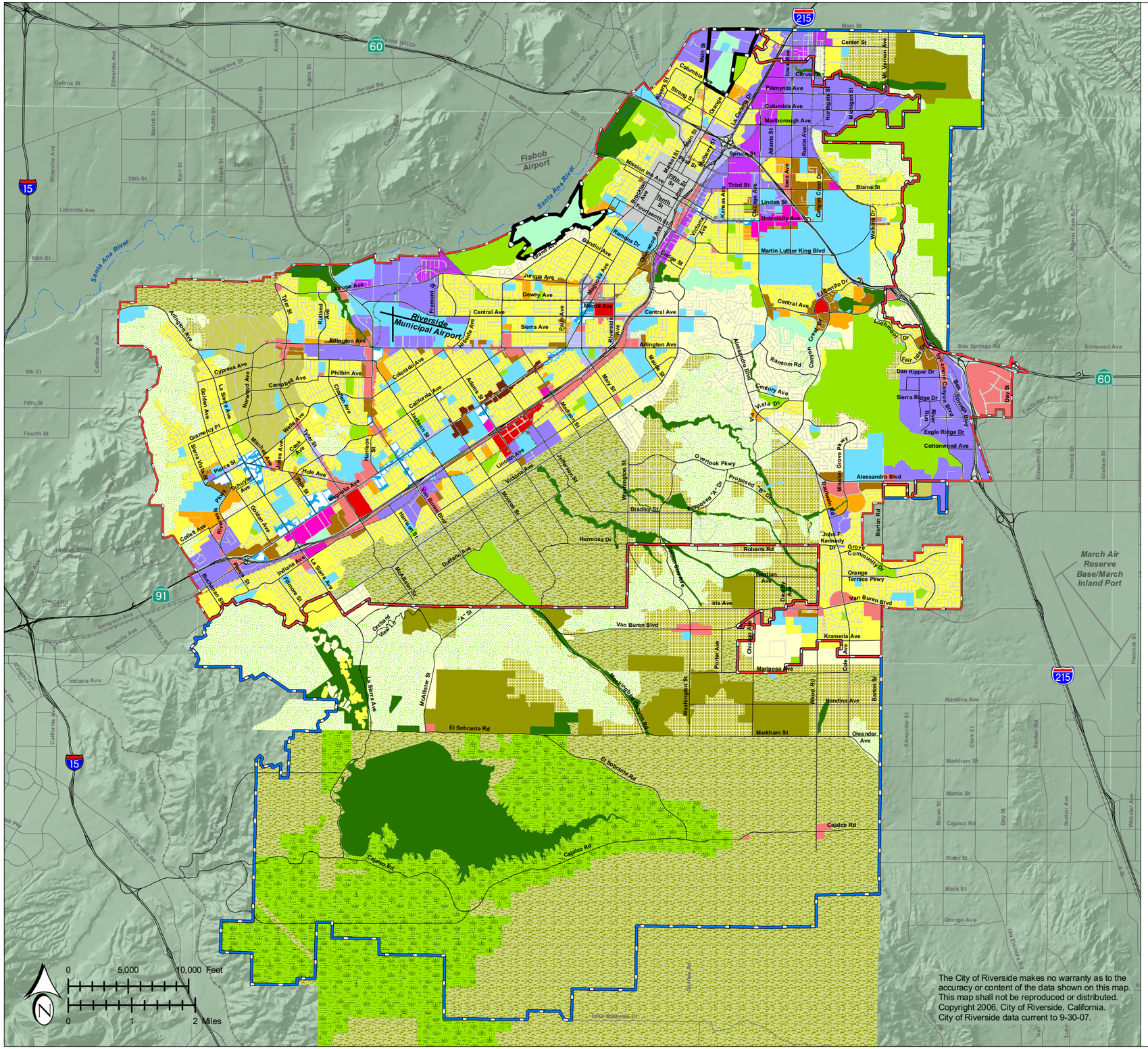
U.S. Census Bureau, American Fact Finder – Riverside City, 1990, 2000. Webpage: http://factfinder.census.gov/

U.S. Environmental Protection Agency, Greenhouse Gas Equivalencies Calculator (2008). Webpage: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

U.S. Environmental Protection Agency, Greenhouse Gas Emissions. Webpage: http://www.epa.gov/climatechange/emissions/index.html

Western Riverside Council of Governments, TUMF Spotlight: The City of Riverside (2007). Webpage: http://www.wrcog.cog.ca.us/ewrcog/etumf0702_main1.html]

APPENDIX A: LAND USE POLICY MAP (FIGURE LU-10: PLANNING AREA BOUNDARIES)



CITY OF RIVERSIDE
GENERAL PLAN 2025

LEGEND

- RIVERSIDE CITY BOUNDARIES
- RIVERSIDE PROPOSED SPHERE OF INFLUENCE
- POTENTIAL SPECIFIC PLAN

GENERAL PLAN 2025
DRAFT LAND USE ELEMENT

- A - AGRICULTURAL
- A/RR - AGRICULTURAL/RURAL RESIDENTIAL
- HR - HILLSIDE RESIDENTIAL
- SRR - SEMI RURAL RESIDENTIAL
- VLDR - VERY LOW DENSITY RESIDENTIAL
- LDR - LOW DENSITY RESIDENTIAL
- MDR - MEDIUM DENSITY RESIDENTIAL
- MHDR - MEDIUM HIGH DENSITY RESIDENTIAL
- HDR - HIGH DENSITY RESIDENTIAL
- VHDR - VERY HIGH DENSITY RESIDENTIAL
- C - COMMERCIAL
- CRC - COMMERCIAL REGIONAL CENTER
- DSP - DOWNTOWN SPECIFIC PLAN
- OSP - ORANGECREST SPECIFIC PLAN
- O - OFFICE
- B/OP - BUSINESS/OFFICE PARK
- I - INDUSTRIAL
- MU-N - MIXED USE-NEIGHBORHOOD
- MU-V - MIXED USE-VILLAGE
- MU-U - MIXED USE-URBAN
- PF - PUBLIC FACILITIES/INSTITUTIONAL
- PR - PRIVATE RECREATION
- P - PUBLIC PARK
- OS - OPEN SPACE/NATURAL RESOURCES
- RAT - KANGAROO RAT HABITAT

* SEE TABLE LU-3 (LAND USE DESIGNATIONS) IN GENERAL PLAN
SOURCE: CITY OF RIVERSIDE

Figure LU-10
LAND USE POLICY MAP

APPENDIX B: CLEAN AIR AND CLIMATE PROTECTION SOFTWARE OUTPUTS

Community Greenhouse Gas Emissions in 1990
Detailed Report

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (kWh)
Residential						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	215,575	5,854	16,725	216,658	10.6	418,129,379
Subtotal Riverside Public Utilitie	215,575	5,854	16,725	216,658	10.6	418,129,379
SoCal Gas Co Residential						
Natural Gas	220,906	833	41,633	221,472	10.8	1,106,631,143
Subtotal SoCal Gas Co Reside	220,906	833	41,633	221,472	10.8	1,106,631,143
Subtotal Residential	436,481	6,686	58,358	438,130	21.4	1,524,760,522
Commercial						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	149,079	4,048	11,566	149,828	7.3	289,153,489
Subtotal Riverside Public Utilitie	149,079	4,048	11,566	149,828	7.3	289,153,489
Subtotal Commercial	149,079	4,048	11,566	149,828	7.3	289,153,489
Industrial						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	251,428	6,827	19,507	252,691	12.3	487,670,400
Subtotal Riverside Public Utilitie	251,428	6,827	19,507	252,691	12.3	487,670,400
SoCal Gas Co Commercial/Industrial						
Natural Gas	63,581	240	2,397	63,643	3.1	318,509,400
Subtotal SoCal Gas Co Comme	63,581	240	2,397	63,643	3.1	318,509,400
Subtotal Industrial	315,009	7,067	21,903	316,334	15.4	806,179,800

Community Greenhouse Gas Emissions in 1990
Detailed Report

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	(%)	Energy (kWh)
Transportation						
Riverside, California						
City of Riverside Airport						
OFF ROAD Aviation Gasoli	1,898	50	3,213	1,940	0.1	7,534,352
OFF ROAD Jet Fuel	1,203	78	68	1,215	0.1	4,149,353
Subtotal City of Riverside Airpo	3,101	128	3,281	3,155	0.2	11,683,705
Freight Trains						
OFF ROAD Diesel	23,278	1,193	3,669	23,501	1.1	84,536,512
Subtotal Freight Trains	23,278	1,193	3,669	23,501	1.1	84,536,512
Passenger Trains						
OFF ROAD Diesel	106	5	17	107	0.0	384,134
Subtotal Passenger Trains	106	5	17	107	0.0	384,134
Vehicle Miles Traveled						
Diesel	28,708	156	149	28,734	1.4	104,317,790
Gasoline	718,158	131,671	136,127	739,997	36.1	2,693,145,929
Subtotal Vehicle Miles Traveled	746,867	131,827	136,276	768,731	37.5	2,797,463,718
Subtotal Transportation	773,352	133,154	143,243	795,495	38.8	2,894,068,070
Waste						
Riverside, California						
Total Waste						*Disposal Method - Managed Landfill*
Paper Products	0	0	22,028,835	231,303	11.3	
Food Waste	0	0	7,229,910	75,914	3.7	
Plant Debris	0	0	3,084,246	32,385	1.6	
Wood or Textiles	0	0	928,164	9,746	0.5	
Subtotal Total Waste	0	0	33,271,155	349,347	17.0	
Subtotal Waste	0	0	33,271,155	349,347	17.0	
Total	1,673,920	150,955	33,506,226	2,049,134	100.0	5,514,161,882

Community Greenhouse Gas Emissions in 2000
Detailed Report

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	(%)	Energy (kWh)
Residential						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	250,228	5,430	17,496	251,253	10.4	603,321,530
Subtotal Riverside Public Utilitie	250,228	5,430	17,496	251,253	10.4	603,321,530
SoCal Gas Co Residential						
Natural Gas	211,191	796	39,802	211,732	8.8	1,057,964,752
Subtotal SoCal Gas Co Reside	211,191	796	39,802	211,732	8.8	1,057,964,752
Subtotal Residential	461,418	6,226	57,299	462,985	19.2	1,661,286,282
Commercial						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	180,090	3,908	12,592	180,828	7.5	434,213,150
Subtotal Riverside Public Utilitie	180,090	3,908	12,592	180,828	7.5	434,213,150
Subtotal Commercial	180,090	3,908	12,592	180,828	7.5	434,213,150
Industrial						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	270,624	5,873	18,923	271,733	11.3	652,500,000
Subtotal Riverside Public Utilitie	270,624	5,873	18,923	271,733	11.3	652,500,000
SoCal Gas Co Commercial/Industrial						
Natural Gas	136,147	513	5,132	136,281	5.7	682,032,977
Subtotal SoCal Gas Co Comme	136,147	513	5,132	136,281	5.7	682,032,977
Subtotal Industrial	406,772	6,386	24,054	408,014	16.9	1,334,532,977

Community Greenhouse Gas Emissions in 2000
Detailed Report

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	(%)	Energy (kWh)
Transportation						
Riverside, California						
City of Riverside Airport						
OFF ROAD Aviation Gasoli	1,302	34	2,203	1,330	0.1	5,165,763
OFF ROAD Jet Fuel	1,231	80	69	1,244	0.1	4,248,683
Subtotal City of Riverside Airpo	2,533	114	2,272	2,575	0.1	9,414,446
Freight Trains						
OFF ROAD Diesel	33,261	1,704	5,243	33,580	1.4	120,788,845
Subtotal Freight Trains	33,261	1,704	5,243	33,580	1.4	120,788,845
Passenger Trains						
OFF ROAD Diesel	875	45	138	883	0.0	3,176,970
Subtotal Passenger Trains	875	45	138	883	0.0	3,176,970
Vehicle Miles Traveled						
Diesel	38,944	225	226	38,981	1.6	141,509,409
Gasoline	971,110	192,389	196,553	1,002,994	41.7	3,641,733,958
Subtotal Vehicle Miles Traveled	1,010,054	192,614	196,779	1,041,975	43.3	3,783,243,368
Subtotal Transportation	1,046,722	194,477	204,432	1,079,013	44.8	3,916,623,629
Waste						
Riverside, California						
Landfilled Waste						*Disposal Method - Managed Landfill*
Paper Products	0	0	17,431,274	183,028	7.6	
Food Waste	0	0	5,720,981	60,070	2.5	
Plant Debris	0	0	2,440,544	25,626	1.1	
Wood or Textiles	0	0	734,450	7,712	0.3	
Subtotal Landfilled Waste	0	0	26,327,248	276,436	11.5	
Subtotal Waste	0	0	26,327,248	276,436	11.5	
Total	2,095,002	210,996	26,625,626	2,407,276	100.0	7,346,656,037

Community Greenhouse Gas Emissions in 2007
Detailed Report

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	(%)	Energy (kWh)
Residential						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	355,814	8,167	21,531	357,306	12.0	742,446,894
Subtotal Riverside Public Utilitie	355,814	8,167	21,531	357,306	12.0	742,446,894
SoCal Gas Co Residential						
Natural Gas	204,451	771	38,532	204,976	6.9	1,024,203,827
Subtotal SoCal Gas Co Reside	204,451	771	38,532	204,976	6.9	1,024,203,827
Subtotal Residential	560,265	8,938	60,063	562,281	18.9	1,766,650,721
Commercial						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	215,053	4,936	13,013	215,955	7.3	448,733,370
Subtotal Riverside Public Utilitie	215,053	4,936	13,013	215,955	7.3	448,733,370
Subtotal Commercial	215,053	4,936	13,013	215,955	7.3	448,733,370
Industrial						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	451,449	10,362	27,318	453,342	15.3	942,000,000
Subtotal Riverside Public Utilitie	451,449	10,362	27,318	453,342	15.3	942,000,000
SoCal Gas Co Commercial/Industrial						
Natural Gas	186,969	705	7,047	187,152	6.3	936,623,021
Subtotal SoCal Gas Co Comme	186,969	705	7,047	187,152	6.3	936,623,021
Subtotal Industrial	638,417	11,067	34,365	640,494	21.6	1,878,623,021

Community Greenhouse Gas Emissions in 2007
Detailed Report

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (kWh)
Transportation						
Riverside, California						
City of Riverside Airport						
OFF ROAD Aviation Gasoli	888	23	1,503	908	0.0	3,525,203
OFF ROAD Jet Fuel	625	41	35	632	0.0	2,157,518
Subtotal City of Riverside Airpo	1,514	64	1,538	1,540	0.1	5,682,721
Freight Trains						
OFF ROAD Diesel	27,263	1,397	4,298	27,524	0.9	99,007,654
Subtotal Freight Trains	27,263	1,397	4,298	27,524	0.9	99,007,654
Passenger Trains						
OFF ROAD Diesel	1,531	78	241	1,545	0.1	5,558,163
Subtotal Passenger Trains	1,531	78	241	1,545	0.1	5,558,163
Vehicle Miles Traveled						
Diesel	49,929	293	302	49,977	1.7	181,425,203
Gasoline	1,067,689	133,332	127,783	1,089,697	36.7	4,003,910,631
Electricity	0	0	0	0	0.0	350,247
Subtotal Vehicle Miles Traveled	1,117,617	133,625	128,084	1,139,674	38.4	4,185,686,081
Subtotal Transportation	1,147,924	135,164	134,162	1,170,283	39.4	4,295,934,619
Waste						
Riverside, California						
Landfilled Waste						*Disposal Method - Managed Landfill*
Paper Products	0	0	23,846,851	250,392	8.4	
Food Waste	0	0	7,826,587	82,179	2.8	
Plant Debris	0	0	3,338,785	35,057	1.2	
Wood or Textiles	0	0	1,004,764	10,550	0.4	
Subtotal Landfilled Waste	0	0	36,016,988	378,178	12.7	
Subtotal Waste	0	0	36,016,988	378,178	12.7	
Total	2,561,660	160,104	36,258,591	2,967,192	100.0	8,389,941,730

Community Greenhouse Gas Emissions in 2012
Detailed Report

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	(%)	Energy (kWh)
Residential						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	403,493	9,261	24,416	405,185	12.3	841,934,778
Subtotal Riverside Public Utilitie	403,493	9,261	24,416	405,185	12.3	841,934,778
SoCal Gas Co Residential						
Natural Gas	199,749	753	37,646	200,261	6.1	1,000,647,125
Subtotal SoCal Gas Co Reside	199,749	753	37,646	200,261	6.1	1,000,647,125
Subtotal Residential	603,242	10,014	62,062	605,446	18.4	1,842,581,903
Commercial						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	219,999	5,050	13,313	220,922	6.7	459,054,238
Subtotal Riverside Public Utilitie	219,999	5,050	13,313	220,922	6.7	459,054,238
Subtotal Commercial	219,999	5,050	13,313	220,922	6.7	459,054,238
Industrial						
Riverside, California						
Riverside Public Utilities Electricity						
Electricity	550,542	12,636	33,314	552,850	16.8	1,148,769,000
Subtotal Riverside Public Utilitie	550,542	12,636	33,314	552,850	16.8	1,148,769,000
SoCal Gas Co Commercial/Industrial						
Natural Gas	236,796	893	8,926	237,028	7.2	1,186,233,061
Subtotal SoCal Gas Co Comme	236,796	893	8,926	237,028	7.2	1,186,233,061
Subtotal Industrial	787,338	13,529	42,240	789,878	24.0	2,335,002,061

Community Greenhouse Gas Emissions in 2012
Detailed Report

	CO_2 (tons)	N_2O (lbs)	CH_4 (lbs)	Equiv CO_2 (tons)	Equiv CO_2 (%)	Energy (kWh)	
Transportation							
Riverside, California							
City of Riverside Airport							
OFF ROAD Aviation Gasoli	890	24	1,505	909	0.0	3,530,590	
OFF ROAD Jet Fuel	1,899	123	107	1,919	0.1	6,551,610	
Subtotal City of Riverside Airpo	2,788	147	1,613	2,828	0.1	10,082,201	
Freight Trains							
OFF ROAD Diesel	50,758	2,600	8,001	51,245	1.6	184,332,872	
Subtotal Freight Trains	50,758	2,600	8,001	51,245	1.6	184,332,872	
Passenger Trains							
OFF ROAD Diesel	1,551	79	245	1,566	0.0	5,633,292	
Subtotal Passenger Trains	1,551	79	245	1,566	0.0	5,633,292	
Vehicle Miles Traveled							
Diesel	56,072	330	342	56,127	1.7	203,748,172	
Gasoline	1,156,784	147,663	141,451	1,181,157	35.9	4,338,025,073	
Electricity	0	0	0	0	0.0	801,256	
Subtotal Vehicle Miles Travelec	1,212,856	147,992	141,792	1,237,284	37.6	4,542,574,501	
Subtotal Transportation	1,267,954	150,819	151,651	1,292,923	39.3	4,742,622,865	
Waste							
Riverside, California							
Landfilled Waste							*Disposal Method - Managed Landfill*
Paper Products	0	0	24,045,265	252,475	7.7		
Food Waste	0	0	7,807,144	81,975	2.5		
Plant Debris	0	0	3,215,894	33,767	1.0		
Wood or Textiles	0	0	1,054,960	11,077	0.3		
Subtotal Landfilled Waste	0	0	36,123,263	379,294	11.5		
Subtotal Waste	0	0	36,123,263	379,294	11.5		
Total	2,878,533	179,412	36,392,528	3,288,463	100.0	9,379,261,067	