

## II. San Carlos' Community Greenhouse Gas Emissions

With the help of Local Governments for Sustainability (ICLEI), San Carlos quantified our community greenhouse gas emissions in August 2008. The inventory acts as a baseline against which we can track our progress in lowering greenhouse gas emissions. It also gives us an understanding of where the highest percentages of emissions are originating, and consequently, where the greatest opportunities for emissions reductions exist.


The inventory measures greenhouse gas emissions released as a result of activity within the geographic borders of San Carlos in the year 2005. Although there is more recent data available, using a baseline of 2005 allows us to compare and track San Carlos' emissions against those of other Bay Area cities, most of which also use a 2005 baseline. It is hoped that higher emission reductions can take place through regional cooperation and a more standardized approach to addressing greenhouse gas emissions between local governments.

### Municipal Operations Emissions

The 2005 Community Greenhouse Gas Emissions Baseline Inventory includes emissions from Government owned and operated facilities, however these emissions have not been analyzed independently of the greater data set. A municipal inventory is being developed to delineate between community and City operations. The municipal emissions inventory will add value to the Climate Action Plan by outlining specific cost and emissions savings the City can obtain by improving energy efficiency, reducing waste, and minimizing vehicular emissions within City operations. Once analyzed, the program to address municipal emissions will be incorporated into this Plan. It is estimated that City operations are responsible for only 1-5% of total community-wide emissions, which is consistent with other cities' inventory findings.

### Inventory Methodology

With the exception of transportation emissions, the Inventory was calculated using the Clean Air and Climate Protection (CACCP) software developed by ICLEI. Transportation emissions were calculated using methodology contained within the General Plan update.<sup>10</sup> This software takes data on electricity and natural gas consumption, vehicle miles traveled, and solid waste tonnage and converts it into carbon dioxide equivalent, or CO<sub>2</sub>e, using specific coefficients according to fuel or waste type. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane (CH<sub>4</sub>) is twenty-one times more powerful than carbon dioxide on a per weight basis in its capacity to trap heat; so the CACCP



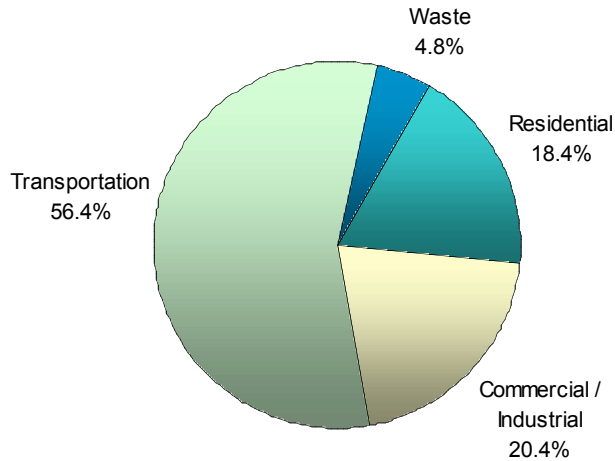
**How much is a Metric Ton of Carbon Dioxide (CO<sub>2</sub>)?**

1 metric ton = 2,205 pounds  
One pound of CO<sub>2</sub> can fill 120 party balloons. That means that one metric ton of CO<sub>2</sub> could fill more than 250,000 party balloons.

<sup>10</sup> Transportation analysis utilizes VMT numbers from the "City of San Carlos General Plan Traffic Study" prepared for the City of San Carlos by Hexagon Transportation Consultants, Inc., dated May 13, 2009.

software converts one metric ton of methane emissions to 21 metric tons of carbon dioxide equivalents.<sup>11</sup>

**Figure 6**  
**Community GHG Emissions by Sector**



San Carlos does not have any commercial scale power plants or natural gas generators within our city limits, therefore most energy consumed in San Carlos is produced outside of the community and imported into San Carlos. Given this fact, it is still the responsibility of San Carlos to include these greenhouse gas emissions released in another community in this report. Although these emissions are not directly emitted within San Carlos, we still must take ownership over these emissions in order to lower our impact on the region as a whole.

Creating this emissions inventory required the collection of information from a variety of sources, including the Pacific Gas and Electric Company (PG&E), the Metropolitan Transportation Commission (MTC), the California Integrated Waste Management Board, Caltrans, Caltrain, and internal City records. Data from the year 2005 was used for the community inventory, with the exception of a subset of the waste data, which utilizes a California statewide waste characterization study conducted in 2003-04.

**Community Greenhouse Gas Emissions**

In the base year 2005, the community of San Carlos emitted approximately 267,237 metric tons of CO<sub>2</sub>e with the following distribution:

**Table 1**  
**City of San Carlos Community Greenhouse Gas Emissions by Sector, 2005**

Sector	Metric tons CO <sub>2</sub> e	Percent
Residential	49,178	18.4%
Commercial / Industrial /Municipal	54,619	20.4%
Transportation	150,663	56.4%
Waste	12,777	4.8%
<b>Total</b>	<b>267,237</b>	<b>100%</b>

<sup>11</sup> The potency of a given gas in heating the atmosphere is defined as its Global Warming Potential, or GWP. For more information on GWP see: IPCC Fourth Assessment Report, Working Group I, Chapter 2, Section 2.10.

As illustrated in Figure 6 below, the transportation sector was the largest emitter of greenhouse gas emissions, producing 56.4% of the 267,237 metric ton total. The residential sector was the second largest source of emissions with 18.4% of the total. Emissions from the commercial/industrial/municipal sector and waste contributed 20.4% and 4.8% respectively.

It is important to note that San Carlos' greenhouse gas emissions are likely greater than 267,237 metric tons. The data used to calculate this estimate is limited by privacy laws, data availability, and the lack of a reasonable methodology to collect this data.

In some cases the data may not be available. For instance, privacy laws restrict us from collecting data on the San Carlos Airport (SQL). Additionally, lack of data availability limits us from calculating emissions from sewage created in San Carlos and treated in the South Bayside System Authority's facilities. Due to a number of differences between the municipalities that operate the System, including water efficiency requirements, impervious surface allowances, landscape irrigation efficiency standards, and type of building stock, it is unclear what portion of the sewage treated at these facilities originates from San Carlos. The City is working with other participants in the SBSA to develop a protocol for measures and tracking emissions related to each individual municipality, however a system was not in place at the time of this document's release. For these reasons, emissions estimates associated with our share of sewage cannot be made at this time.

Lastly, there is a lack of reasonable methodology for estimating lifecycle emissions for the community of San Carlos. Lifecycle emissions are emissions associated with the production and disposal of items consumed by residents of San Carlos. For instance, a lifecycle analysis would not only calculate the emissions from vehicular travel within the City, but also emissions associated with the manufacture, fueling, and eventual disposal of vehicles.

The good news is that as awareness of climate change improves and local governments improve data collection protocols, it can be expected that a greater percentage of our actual emissions will be captured through improved data management.

Under these limitations, it is likely that San Carlos' emissions are greater than 267,237 metric tons of CO<sub>2</sub>e per year. However, it is important to note that these 267,237 metric tons are primarily greenhouse gases that the community has directly caused and has

#### **What's the difference between an emissions inventory and a carbon footprint?**

An emissions inventory incorporates emissions directly caused by actions taken within the City that we know how to calculate. A carbon footprint, on the other hand, encompasses greenhouse gas emissions from the entire life cycle of a product or service utilized within San Carlos. This could include the emissions from raising beef for sale at the supermarket or the fuel consumption associated with residents' flights out of SFO for vacation. At this time, it is difficult to accurately estimate the community's carbon footprint. However, individuals may reduce their carbon footprint by buying local, reducing packaging, and other behavioral changes.

the ability to reduce through implementation of this Climate Action Plan and corresponding efforts.

**Discussion: 1990 Greenhouse Gas Emissions**

State, Federal, and international targets for greenhouse gas emissions frequently use the year 1990 as a reference point. For instance, AB 32, The California Global Warming Solutions Act of 2006, sets the goal of reducing emissions to 1990 levels by 2020 and to 80% below 1990 levels by 2050. The baseline year of 1990 is thought to be used in AB 32 in order to make it comparable to the Kyoto Protocol of 1992, which commits member nations to reducing emissions by 5.2% below their 1990 baseline by 2012.

Although 1990 is a common reference point for greenhouse gas reductions, it is difficult to calculate a level of CO<sub>2</sub> equivalent from that time when no previous analysis has been made. The current methodology for estimating 1990 levels, called “back-casting,” calculates 1990 emissions levels based on current levels of CO<sub>2</sub>e and adjusted for 1990 population and job statistics. Back-casting is a very indefinite science; not only does it not take into account changes in consumption and efficiency, but it relies heavily upon finding reliable data from almost two decades ago.

While it would be beneficial to have parallel reference points for all emissions reductions goals, we believe it is better to use an accurate baseline rather than an estimate of 1990 levels. As a result, this Climate Action Plan for the City of San Carlos will not attempt to back-cast to 1990 levels. This decision is supported by ICLEI, which has stated that back-casting to 1990 is too unreliable to base any sort of reduction target upon. In order to maintain consistency with other Bay Area cities and to provide a reliable emissions estimate, this Plan uses a baseline year of 2005 instead of 1990. Our interim reduction goal of 15% below 2005 levels by 2020 is confirmed by the California Attorney General and California Air Resources Board to be equivalent to reducing emissions to 1990 levels by 2020 as outlined in AB 32.

Although 1990 back-casts from 2005 emissions levels are not accurate, a rough approximation of San Carlos' 1990 emission levels were calculated as solely an information item for decision makers and the community. This estimate is based on population and household growth rates in the City of San Carlos and in the County of San Mateo. An estimate of decreased waste recycling was also factored in. This estimate does not take into account changes in energy generation efficiency, consumer behavior, or vehicle efficiency. Under these conditions, it is estimated that the community of San Carlos emitted 213,605 metric tons of CO<sub>2</sub>e in 1990. This results in an estimate of increased emissions of 8.5% between 1990 and 2005.

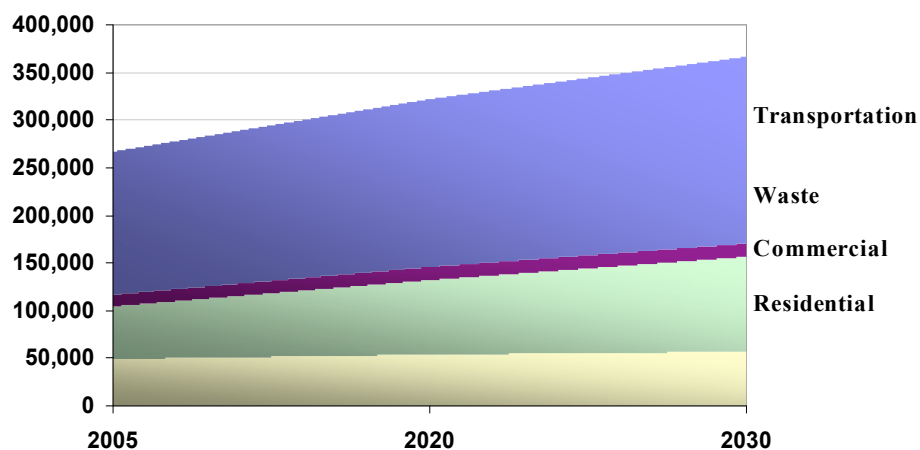
**San Carlos' Greenhouse Gas Emissions Forecast**

If the community of San Carlos continues with the 2005 pattern of energy consumption, travel, and waste production, the rate of greenhouse gas emissions is estimated to increase to 321,519 metric tons of CO<sub>2</sub>e per year by 2020 and 365, 787 metric tons of CO<sub>2</sub>e per year by 2030. These “business as usual” forecasts are 20.3% and 36.9% higher than 2005 levels, respectively, due to General Plan buildout estimates of population, household, and job growth.

2030 General Plan Buildout Analysis	2005	2030
	<b>Jobs</b>	15,560
<b>Population</b>	28,200	32,303
<b>Households</b>	11,710	13,396

The 2020 and 2030 forecast estimates included in this Plan are based on analysis performed as part of the General Plan update. The job, household, and population growth rates are based on buildout of the preferred growth scenario of the General Plan. It is therefore likely that development and emissions will not increase to this level.

**Figure 8  
2030 Emissions Forecast**



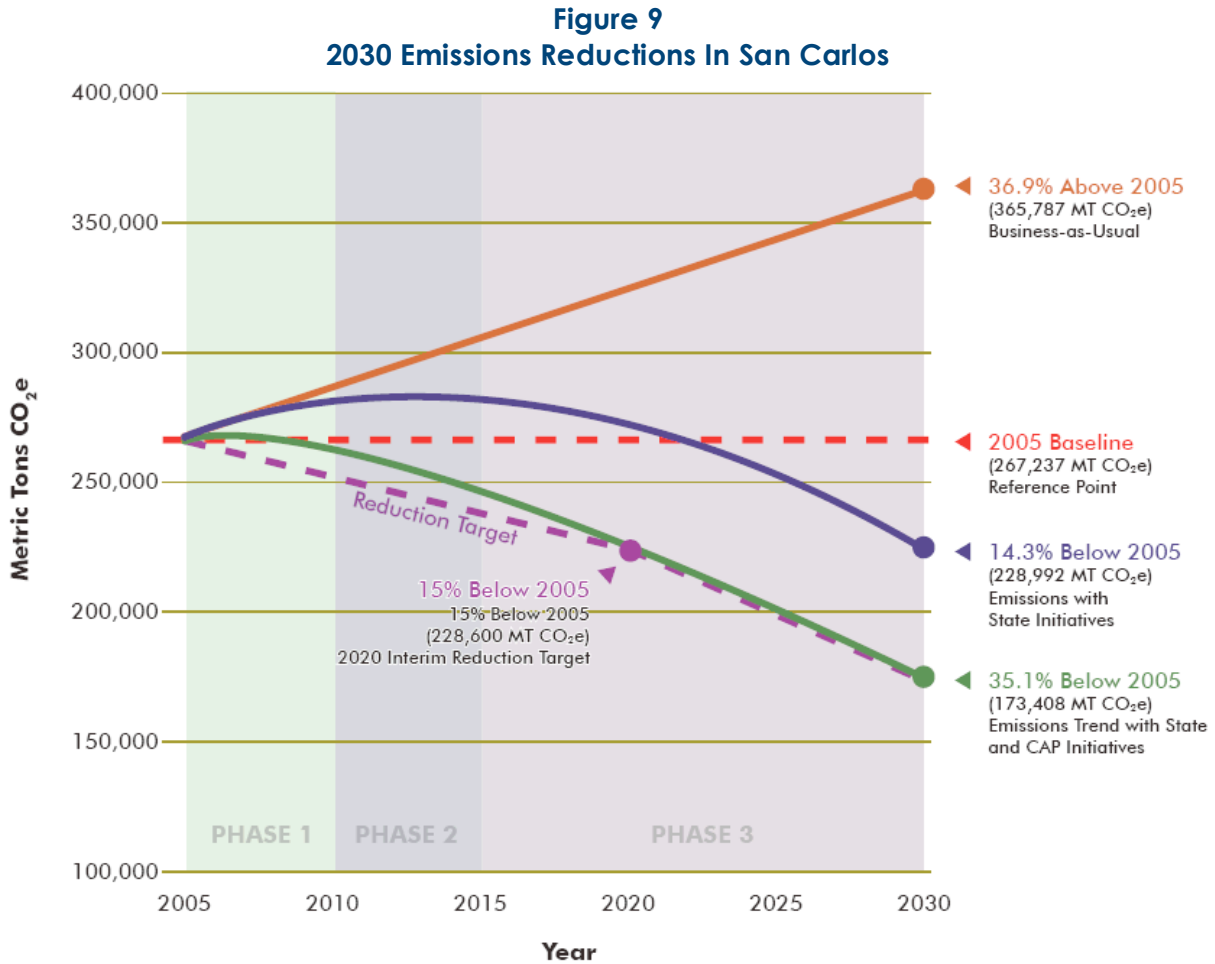
**Table 2  
Emissions Forecast for 2020 and 2030 by Sector**

2005 Community Emissions Growth Forecast by Sector	2005	2020	2030	Annual Growth Rate	Percent Change from 2005 to 2020	Percent Change from 2005 to 2030
Residential	49,178	53,312	56,259	0.540%	8.4%	14.4%
Commercial / Industrial / Municipal	54,619	78,454	99,876	2.444%	43.6%	82.9%
Transportation	150,663	175,891	195,016	1.037%	16.7%	29.4%
Waste	12,777	13,862	14,636	0.545%	8.5%	14.5%
<b>TOTAL</b>	<b>267,237</b>	<b>321,519</b>	<b>365,787</b>	<b>--</b>	<b>20.3%</b>	<b>36.9%</b>

**San Carlos' Greenhouse Gas Reduction Target**

In order to achieve San Carlos' reduction target of 35% by 2030, total emissions within San Carlos would need to lower to 133,679 metric tons per year. That is 63.5% change from the 2030 business-as-usual projection.

It is important to focus on the sectors that will exhibit the greatest projected increase in emissions. As shown in Table 2 and illustrated in Figure 8 above, the greenhouse gas emissions from transportation and commercial / industrial activity are projected to increase at higher rates than the residential and waste sectors. In this Climate Action Plan, the transportation and commercial / industrial sectors will be given greater attention.



This graph and the individual reduction scenarios will be explained thoroughly in the reduction target analysis chapter, however it is important to be aware at the onset that the reduction measures included in this Plan will be implemented throughout time and that there may be different degrees of effectiveness depending upon State and regional programs. As shown through the lower green line above, we expect our 35% reduction target to be achieved through a combination of the reduction measures included in this Plan and State initiatives as explained later in this document.