



City of San Carlos Climate Action Plan - adopted by the City of San Carlos City Council, Resolution 2009-080, October 12, 2009.

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Table of Contents

Executive Summary	i
I. Introduction	1
II. San Carlos' Community Greenhouse Gas Emissions	13
III. Achieving San Carlos' Reduction Target	22
IV. Energy Use Strategies	24
V. Transportation and Land Use Strategies	49
VI. Solid Waste Strategies	73
VII. Reduction Target Analysis	82
VIII. Adaptation to Climate Change.....	87
IX. Public Outreach and Education	92
X. Implementation.....	95
XI. Works Cited	99

Appendices

- Appendix A: Initial Cost Analysis Calculations
- Appendix B: Sources of Greenhouse Gas Emissions Reductions Estimates
- Appendix C: City of San Carlos 2005 Community Greenhouse Gas Inventory
- Appendix D: Reduction Measure Selection Process
- Appendix E: San Carlos Municipal Greenhouse Gas Inventory, 2005

List of Tables

- Table 1, City of San Carlos Community Greenhouse Gas Emissions by Sector, 2005
- Table 2, Municipal Greenhouse Gas Emissions
- Table 3, Emissions forecast for 2020 and 2030 by Sector
- Table 4, Energy Use "Business-as-Usual" Projected Emissions Growth in CO₂e per Year
- Table 5, Summary of Energy Use Reduction Measure 1
- Table 6, Summary of Energy Use Reduction Measure 2
- Table 7, Summary of Energy Use Reduction Measure 3
- Table 8, Summary of Energy Use Reduction Measure 4
- Table 9, Summary of Energy Use Reduction Measure 5
- Table 10, Summary of Energy Use Reduction Measure 6

Table 11, Summary of Energy Use Reduction Measure 7
Table 12, Summary of Energy Use Reduction Measure 8
Table 13, Summary of Emissions Reductions from Energy Use Reduction Measures
Table 14, Transportation “Business-as-Usual” Projected Emissions Growth
Table 15, Summary of Transportation and Land Use Reduction Measure 1
Table 16, Summary of Transportation and Land Use Reduction Measure 2
Table 17, Summary of Transportation and Land Use Reduction Measure 3
Table 18, Summary of Transportation and Land Use Reduction Measure 4
Table 19, Summary of Transportation and Land Use Reduction Measure 5
Table 20, Summary of Transportation and Land Use Reduction Measure 6
Table 21, Summary of Transportation and Land Use Reduction Measure 7
Table 22, Summary of Transportation and Land Use Reduction Measure 8
Table 23, Summary of Transportation and Land Use Reduction Measure 9
Table 24, Summary of Transportation and Land Use Reduction Measure 10
Table 25, Summary of Transportation and Land Use Emissions Reductions
Table 26, Solid Waste “Business-as-Usual” Projected Emissions Growth (CO_{2e} per year)
Table 27, Summary of Solid Waste Reduction Measure 1
Table 28, Summary of Solid Waste Reduction Measure 2
Table 29, Summary of Solid Waste Reduction Measure 3
Table 30, Summary of Solid Waste Emissions Reductions
Table 31, Emission Reduction Analysis from State Initiatives
Table 32, Reduction Target Analysis
Table 33, Phase 1 Reduction Measures to Begin Implementation 2005 - 2010
Table 34, Phase 2 Reduction Measures to Begin Implementation 2010 – 2015
Table 35, Phase 3 Reduction Measures to Begin Implementation 2015 - 2020

List of Figures

Figure 1, Five-Year Climate Action Plan Process and Relation to the General Plan
Figure 2, The Greenhouse Gas Effect
Figure 3, Projected Global Warming Impact on California
Figure 4, California Climate Change Emissions and Targets
Figure 5, ICLEI's Five milestone process
Figure 6, Community GHG Emissions by Sector
Figure 7, Relationship of Community-Wide and Municipal Greenhouse Gas Inventories
Figure 8, Municipal and Community Emissions
Figure 9, Municipal Greenhouse Gas Emissions by Sector
Figure 10, 2030 Emissions Forecast
Figure 11, 2030 Emissions Reductions in San Carlos
Figure 12, The Three-Legged Stool of Transportation
Figure 13, 2030 Emissions Reductions in San Carlos
Figure 14, Estimated Inundation Levels from Sea Level Rise on the South Bay

Table of Constants

The following is a list of common conversions used throughout the San Carlos Climate Action Plan. The 'City of San Carlos – General Greenhouse Gas Conversions' are average estimates of the greenhouse gases (GHGs) produced by a unit of natural gas, electricity, and VMT within the City of San Carlos in calendar year 2005. The purpose of these conversion estimates is to provide an estimate for the reader to visualize the GHG equivalent of activities within the City. The calculations within the Climate Action Plan will not always match the average conversion estimates below due to variable source information; however these estimates are generally appropriate. For more information on greenhouse gas calculations, please see Appendices B, C, and E.

Quantity	Value	Notes
Standard Unit Conversions		
1 pound (lb)	0.0004536 metric tons (tonnes)	Engineering Standard
1 short ton (ton)	0.9072 metric tons (tonnes)	Engineering Standard
1 metric ton (tonne)	1.1023 short tons (tons) 2,204.62 pounds (lbs)	Engineering Standard
1 kilowatt hour (kWh)	3,412 Btu (Btu)	Engineering Standard
1 therm	100,000 Btu (Btu)	Engineering Standard
City of San Carlos – General Greenhouse Gas Conversions for baseline 2005 calculations		
1 kilowatt hour (kWh)	0.492859 lbs Co2e	PG&E 2005 emissions factor certified by the California Climate Action Registry
1 MMBtu	53.05 kilograms (kg) CO2e	PG&E CO2e emissions factor for delivered natural gas, certified by the California Climate Action Registry and CEC
1 Vehicle Mile Traveled (VMT)	1.077 pounds (lbs) CO2e	Average estimate calculated by dividing total CO2e derived from EMFAC and CACP by total VMT. Individual calculations may vary from this average coefficient based on model year and vehicle class.
1 short ton landfilled waste	0.277 metric tons CO2e	Average estimate calculated by dividing total emissions from landfilled waste derived from EPA's WARM model and CACP by total tons landfilled. Individual calculations may vary from this average coefficient based on type of waste landfilled and waste management practices.

Executive Summary

The City of San Carlos Climate Action Plan (hereafter referred to as "Plan") serves as a guiding document to identify ways in which the community and City can reduce greenhouse gas emissions and adapt to the inevitable effects of climate change. Specifically, the Plan does the following:

- ❏ Identifies sources of greenhouse gas emissions caused from actions within the City of San Carlos municipal boundary and estimates how these emissions may change over time;
- ❏ Provides energy use, transportation, land use, and solid waste strategies to bring San Carlos' greenhouse gas emissions levels to 15% below 2005 levels by 2020 and 35% below 2005 levels by 2030;
- ❏ Mitigates the impacts of San Carlos on climate change (by reducing greenhouse gas emissions consistent with the direction of the State of California via AB32 and Governor's Order S-03-05 and Public Resources Code section 21083.3). The CEQA Guidelines encourage the adoption of policies or programs as a means of addressing comprehensively the cumulative impacts of projects. (See CEQA Guidelines, §§ 15064, subd. (h)(3), 15130, subd. (c).)
- ❏ Allows the greenhouse gas emissions inventory and Climate Action Plan to be updated every five years and respond to changes in science, effectiveness of emission reduction measures and federal, state, regional or local policies to further strengthen the City's response to the challenges of climate change.
- ❏ Provides substantial evidence that the emission reductions estimated in the Climate Action Plan are feasible.
- ❏ Serves as the programmatic tiering document for the purposes of CEQA within the City of San Carlos for climate change, by which applicable developments within the City will be reviewed. If a proposed development is consistent with the emission reduction and adaptation measures included in the Climate Action Plan and the programs that are developed as a result of the CAP, the project would be considered to have a less than significant impact on climate change and emissions consistent with the direction of the California Attorney General (Climate Change, CEQA and General Plans, Revised March 6, 2009) and Public Resources Code 21083.3.
- ❏ Outlines ways in which the City can prepare for and adapt to the consequences of climate change; and,
- ❏ Discusses the various outcomes of reduction efforts and how these reduction efforts can be implemented and advertised;

The strategies to reduce greenhouse gas emissions are organized into 21 reduction measures with various components to each reduction measure. Measures are then separated into energy use, transportation and land use, and solid waste categories.

The reduction measures are projected through 2030 with 2020 serving as an interim target. The Climate Action Plan Subcommittee ("Subcommittee"), the community of San Carlos, and City staff chose the reduction measures through a collaborative process. Each reduction measure is analyzed with estimates of initial monetary cost to the City and reduction in greenhouse gas emissions, culminating in an overall recommendation of implementation priority.

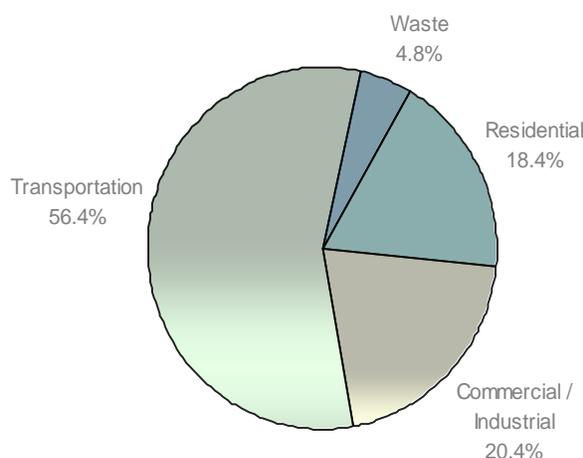
This report is a significant landmark in San Carlos' proactive approach to reducing and adapting to the effects of climate change. It builds upon residents' existing commitment to sustainability by formalizing the process of measuring and addressing greenhouse gas emissions. It also breaks new ground by being developed with the purpose of incorporating the outlined emission reduction strategies as components of the General Plan Update and corresponding Environmental Impact Report. By integrating climate action into the General Plan, San Carlos will ensure that the issue becomes an integral part of the planning process.

"The City of San Carlos will work with residents and businesses as well as in conjunction with neighboring cities, counties and other agencies interested in this matter to progress on reducing greenhouse gas emissions and to reduce global warming pollution levels."

– The San Carlos Climate Protection Letter

For the full picture of San Carlos' efforts to reduce greenhouse gas emissions and reduce the effects of climate change, please visit www.cityofsancarlos.org. As programs are developed to respond to the emission reduction measures outlined in this Plan, they will be explained and tracked on the City's website. Assistance and involvement from the community (including residents, businesses, schools and government agencies) will be crucial to the success of this Plan's implementation. The San Carlos community should be proud to take part in San Carlos' commitment to sustainability, of which this Climate Action Plan is a part.

Community-Wide Greenhouse Gas Emissions



Activities within the jurisdictional boundary of San Carlos within calendar year 2005 caused an estimated 267,237 metric tons of carbon dioxide equivalent (CO₂e) to be released into the atmosphere. The largest source of emissions (56%) was a result of highway and local road vehicular travel.

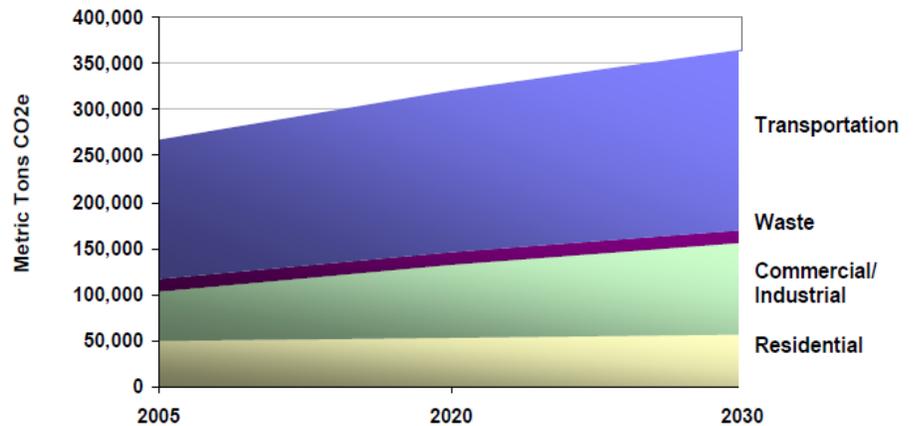
The emissions from municipal operations are currently contained within the Commercial/Industrial category. A separate municipal greenhouse gas inventory has been developed and included as

Appendix E.

If the community of San Carlos continues with the 2005 pattern of energy consumption, travel, and waste production, the level of greenhouse gas emissions is estimated to increase to 321,519 metric tons per year by 2020 and 365,787 metric tons per year by 2030. These “business-as-usual” forecasts of 20.3% and 36.9% higher than 2005

levels, respectively, are due to estimated increases in consumption, population, households, and commercial activity as outlined in the General Plan buildout scenario.

2030 Greenhouse Gas Emissions Forecast by Sector



Achieving San Carlos' Reduction Target

The Climate Action Plan Subcommittee developed a strategic policy focus to direct the development of the Climate Action Plan and associated emission reduction measures. The policies focus on the following:

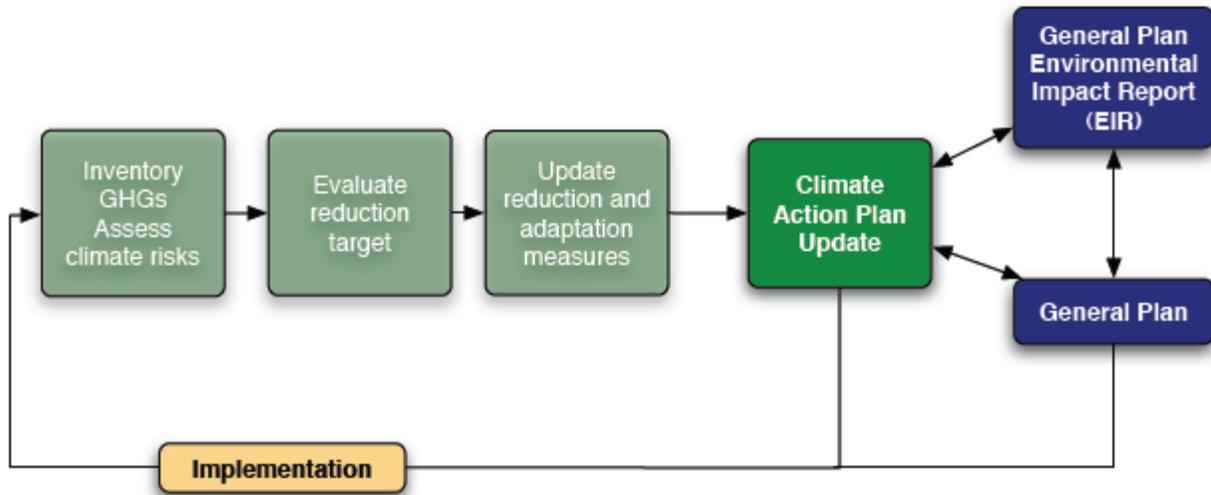
1. Building Efficiency / Site Design
2. Auto Emission Reduction
3. Low Carbon Energy Use
4. Alternative, Non-automotive Travel Modes
5. Waste Reduction Program

The Subcommittee was responsible for reviewing and analyzing strategies aimed at reducing the greenhouse gas emissions from energy consumption, transportation, land use, and solid waste production. Over one hundred possible reduction measures were initially considered. The Subcommittee narrowed this list to 31 measures based on feasibility, cost-effectiveness, and appropriateness to the community. The public then came together at a workshop to form the final 23 reduction measures, which were subsequently condensed into 21. The process of selecting and clarifying San Carlos' reduction measures is explained further in Appendix D.

General Plan Integration

The Climate Action Plan will be updated to analyze new reduction targets and efforts. The General Plan accommodates the Climate Action Plan update process by dynamically referencing sections of the Climate Action Plan instead of concrete text. This will ensure that the City and its planning resources are continuously up to date. The five-year CAP update process and its relation to the General Plan are depicted below.

The Five-year CAP Update Process and its Relation to the General Plan



Energy Use Reduction Measures

The second largest contributor to San Carlos’ greenhouse gas emissions (39%) comes from residential, commercial, and industrial energy use in San Carlos. To address this significant cause of greenhouse gas emissions, the following measures were formed:

- ❏ Adopt a green building standard for new development and major remodels.
- ❏ Expand energy saving opportunities to businesses.
- ❏ Create water and waste efficient landscapes.
- ❏ Improve residential energy efficiency.
- ❏ Identify opportunities for on-site renewable energy generation on City and privately-owned property.
- ❏ Implement reduction strategies included in the energy audit of City facilities. Continue to monitor City facility performance.
- ❏ Provide for increased albedo (reflectivity) of urban surfaces including roads, driveways, sidewalks, and roofs in order to minimize the urban heat island effect.
- ❏ Encourage tree planting.

Green Building Standards for new development and major remodels.
 Energy Use Reduction Measure Highlight
Description: Two green building standard options were analyzed: 1) Provide information on green building certifications and 2) Create a local green building ordinance referencing Leadership in Energy and Environmental Design (LEED), Build It Green (BIG) GreenPoint Rated, or equivalent rating systems.
Emission Reduction: The analysis revealed that San Carlos will save 535.5-11,868 metric tons of carbon dioxide equivalent (CO₂e) per year by 2030 depending on which option was chosen.

These measures were expanded upon and analyzed through various components. The reduction estimates for each measure are structured in a way that if the City discovers a component of the reduction measure is no longer feasible, it can be replaced with another component and still achieve the measure's overall target. All of the measures identified above are expected to save at least 42,369 metric tons of CO₂e per year by 2030.

Transportation and Land Use Reduction Measures

The transportation sector is the largest contributor to greenhouse gas emissions in San Carlos (56%). The majority of these emissions are from vehicles traveling on the length of State Highway 101 running through San Carlos. Transportation and land use are combined into one section because they are highly integrated. In many cases, it requires a change in land use patterns to alter the need for personal automobile use and move towards more fuel efficient vehicles. The transportation and land use measures are as follows:

- ❏ Encourage development that is mixed-use, infill, and higher density.
- ❏ Provide for an education program and stepped up code enforcement to minimize vegetation that degrades access along public rights of way.
- ❏ Convert more City vehicles to hybrid, electric, alternative fuel, or smaller vehicles.
- ❏ Increase bike parking.
- ❏ Actively promote walking and biking as safe modes of local travel, particularly for children attending local schools.
- ❏ Provide for a shuttle service connecting areas not adequately served by public transit.
- ❏ Increase housing density near transit.
- ❏ Promote car sharing programs.
- ❏ Increase accommodation and promotion of alternatively fueled vehicles and hybrids.
- ❏ Create travel routes that ensure that destinations may be reached conveniently by public transportation, bicycling, and walking.

Encourage development that is mixed-use, infill, and higher density.

Transportation and Land Use Reduction Measure Highlight

Description: The principles of infill, high density, and mixed-use development lead to decreased vehicle miles traveled and increased neighborhood vitality. They also have multiple social benefits, including: better health, lower infrastructure costs, and increased accessibility.

Emission Reduction: The analysis revealed that San Carlos can save 5,544 metric tons of CO₂e per year from reduced vehicle trips and shared building materials as a result of higher density, mixed-use development.

These measures are estimated to save 14,109 metric tons of CO₂e per year by 2030. As with the energy sector, each measure's portion of the total reduction target is flexible. If a component of a reduction measure becomes infeasible, it can be adjusted as long as the overall measure's target is accounted for.

Solid Waste Reduction Measures

The waste from San Carlos residents and businesses accounts for 4.78% of San Carlos' yearly greenhouse gas emissions, or 12,777 metric tons of CO₂e. While a small portion of overall emissions, the community has a great deal of control over these emissions. The measures to reduce emissions from solid waste are as follows:

- ✚ For municipal operations, establish a zero waste policy.
- ✚ Make recycling and composting mandatory at public events.
- ✚ Increase overall waste diversion by 1% per year.

These reduction measures are estimated to reduce greenhouse gas emission by 6,560.7 metric tons of CO₂e per year by 2030.

Findings

The quantifiable reduction measures included in this plan are estimated to save at least 63,039 metric tons of CO₂e per year by 2030 when implemented. We are confident that this significant decrease in local emissions, in concert with State initiatives for renewable energy and vehicle efficiency will result in the City meeting, if not exceeding, our emission reduction target of 15% below 2005 levels by 2020 and 35% below 2005 levels by 2030.

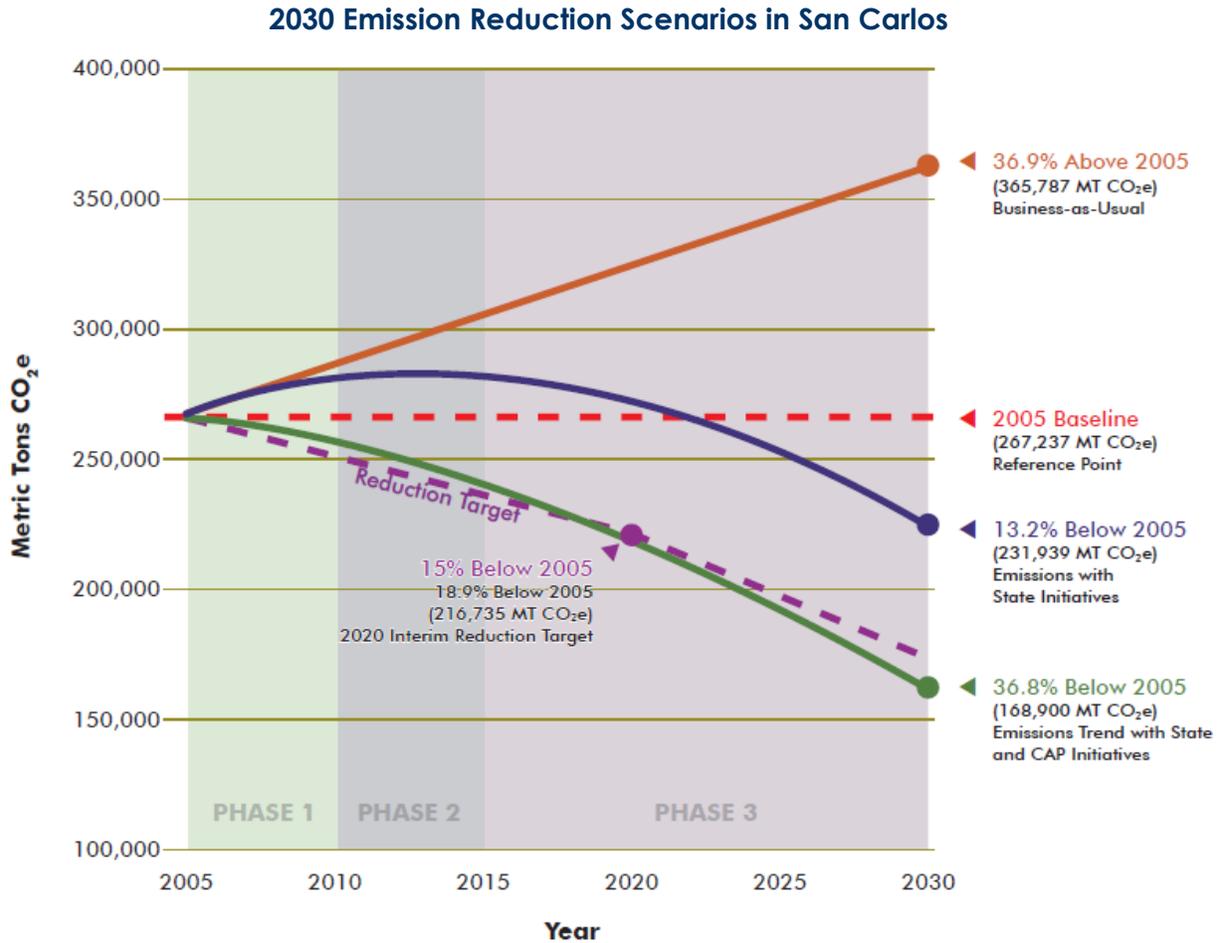
It is important to note that while we begin implementation of the measures of this document, emissions will continue to rise due to population growth and consumption trends. This makes our reduction target challenging but feasible; the decrease in per capita emissions as a result of the measures in this Plan will be working against an increase in overall emissions due to population and job growth. This trend is shown in the graph below. The business-as-usual red line is what we can expect without a decrease in per capita emissions, the horizontal dotted line is a representation of constant 2005 emissions rates as a point of reference, and the bottom dotted line is our reduction target. If we look at the difference between our reduction target and business-as-usual projections, we see that the actual reduction needed from business-as-usual to reach our target is actually over 72%.

Increase overall waste diversion by 1% per year

Solid Waste Reduction Measure Highlight

Description: San Carlos will reduce solid waste generation by a minimum of 1% per year. Steps taken to achieve this goal may include increasing the required construction and demolition diversion rate beyond the 50% currently required by the State and providing expanded recycling outreach and services to multi-family residential buildings, including renter-occupied apartment buildings.

Emission Reduction: San Carlos can save at least 6,222 metric tons of CO₂e per year by 2030.



Possible scenarios for meeting the 2030 targets set forth in this Plan are depicted above and explored in greater detail in the body of this Climate Action Plan. The curved lines in the graph above represent phased implementation of the reduction measures in this Plan as well as State and regional initiatives. 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 such as the renewable energy portfolio standard and implementation of recent State legislation. The overall emission reductions anticipated through these efforts are outlined in the table on the following page.

Reduction Target Analysis

		2020	2030
		Metric Tons CO₂e per year	Metric Tons CO₂e per year
Reference Year Business-As-Usual Emissions Projection		321,519	365,787
1	Energy Use Strategies	-24,496	- 42,369
2	Transportation and Land Use Strategies	-12,886	-14,109
3	Solid Waste	-4,815	-6,561
Subtotal – Emissions with CAP		279,342	302,748
4	Renewable Portfolio Standard	- 13,834	- 31,566
5	Pavley I and II	- 34,649	- 91,978
6	Low Carbon Fuel Standard	- 14,124	-10,304
Total – Emissions with CAP and State Programs		216,738	168,900
Base Year 2005 Community Emissions		267,237	267,237
Percent below 2005 Level		18.9%	36.8%

* The reduction potential of new Title 24 requirements have not been technically analyzed.

Implementation

This report lays the groundwork for a more important task ahead – implementation. The 21 reduction measures are crucial to attaining San Carlos' reduction goal of 35% below 2005 levels by 2030. The San Carlos Climate Action Plan is a foundation for this effort that will be revised and built upon for years to come. Reduction measures will continue to evolve as new climate-related technology, policy, and resources become available. That is why an essential part of implementation of this document is reassessment.

It is suggested that the City update the 2005 Community Greenhouse Gas Emissions Baseline Inventory every five years to see how emissions have changed since the 2005 baseline year. These updated reports will be two-pronged, first reporting emissions using present quantification methodology and protocol in order to create a basis of comparison and secondly reporting emissions using an up-to-date methodology and protocol that will likely capture other sources of emissions that we are currently unable to calculate with today's research methodologies and analysis tools. As a result of these updated inventories, this Climate Action Plan and corresponding reduction measures will be revisited. Attention will be shifted to those sectors displaying faster growth rates than others and to those emission reduction measures which are having greater success at reducing emissions with less cost than other measures.

As part of the adaptation element of this plan, it is recommended that the City prepare itself internally for climate change resiliency. A sustainability coordinator among City Staff and established points of contact to inform and collaborate with resident groups, businesses, schools, City departments, and government agencies to address potential threats of climate change is a way of guaranteeing timely and efficient response to climate challenges.



Timely implementation, along with the initiative of each resident, employee, and business of San Carlos, will put us well on our way to reducing our impact on the earth and the community in which we live while also preparing us for the challenges that lie ahead as a result of the inevitable transformations associated with climate change.

Suggested Implementation Prioritization

This chapter separates reduction measures into three time periods for implementation: 2005 to 2010, 2010 to 2015, and 2015 to 2020. Phases indicate when implementation of the measure begins; the reduction effects and overall maintenance of the program will extend well beyond the allotted phase. All reduction measures will begin implementation by 2020. The period of 2020 to 2030 will be an extension of Phase 3 for evaluation and expansion of all reduction measures. The reduction measures in this Plan are structured in a way that if a component of the measure becomes infeasible, other components can be added or modified, allowing the overall measure's reduction target to still be met.

Phase 1: Reduction Measures to Begin Implementation 2005 to 2010

Page	Reduction Measure	2030 Emission Reductions (Metric tons CO2e per year)	First Year Costs per Metric Ton CO2e	Estimated Cost to City
25	Expand energy saving opportunities to businesses	13,300	\$0.18-\$0.38	\$2,500 - \$5,000
27	Improve residential energy efficiency	14,115	\$0.84	\$10,000
50	Encourage development that is mixed-use, infill, and higher density	5,544	\$0.81-\$1.62	\$4,500 - \$9,000
52	Increase housing density near transit	4,957	\$4.54 - \$9.08	*\$22,500 - \$45,000
55	Actively promote walking and biking as safe modes of local travel, particularly for children attending local schools	170	\$923.52	**\$157,000
59	Create travel routes that ensure that destinations may be reached conveniently by public transit, bicycling and walking	122	Negligible	***\$24,000 - \$48,000
66	Convert more City vehicles to hybrid, electric, alternative fuel, or smaller vehicles	59	\$6,537-\$7,027	***\$385,740 - \$414,648
77	Increase overall waste diversion by at least 1% per year	6,222	Negligible	Negligible
65	Enforce affordable housing development standards	192	Negligible	Negligible

*This cost would be included as part of the Zoning Ordinance update following adoption of the General Plan.

**This cost has been partially addressed through the recent installation of bicycle sharrows (Approx. \$45,000), implementation of the 2003 Bicycle and Transportation Plan, as well as Federal stimulus funding for crosswalks and curb ramp improvements (\$550,000).

***This cost would be reflected in the Equipment Replacement fund which would cover future costs as vehicles are replaced over time.

Phase 2: Reduction Measures to Begin Implementation 2010 - 2015

Page	Reduction Measure	2030 Emission Reductions (Metric tons CO2e per year)	First Year Costs per Metric Ton CO2e	Estimated Cost to City
31	Adopt a green building standard for new development and major remodels.	11,868	\$0.93	\$10,000
36	Create water and waste efficient landscapes.	416*	\$4.81-\$9.62	\$2,000 -\$4,000
37	Identify opportunities for on-site renewable energy generation on City and privately- owned property	394	\$1,282-1,320	**\$10,000
41	Implement reduction strategies included in the energy audit of City facilities and continue to monitor City facility performance	16	N/A	Unknown
42	Provide for increased albedo (reflectivity) of urban surfaces including roads, driveways, sidewalks, and roofs in order to minimize the urban heat island effect	2,320	Negligible	Negligible
43	Encourage tree planting	356	\$35.96- \$71.91	\$12,800 -\$25,600
53	Increase bike parking	125	\$6 - \$12	\$900 - \$1,800
74	Support zero waste	83.7	\$59.74	\$5,000
76	Increase recycling and composting at public events	255	Negligible	Negligible

* These emissions are not included in the final reduction target analysis as emissions associated with the filtration and movement of water were not included in the City's baseline Greenhouse Gas Inventory as a disaggregated total.

**This cost would cover a feasibility study of on-site energy generation.

***This cost would partially be covered by the existing Building Division Code Enforcement Program.

Phase 3: Reduction Measures to Begin Implementation 2015 - 2020

Page	Reduction Measure	Emissions Reductions (Metric tons CO2e per year)	First Year Costs per Metric Ton CO2e	Estimated Cost to City
62	Provide for a shuttle service in order to increase transit ridership	1,733	\$1.15 - \$2.30	\$2,000 - \$4,000
63	Promote car sharing programs	1,158	\$1.55 - \$3.11	\$1,800 - \$3,600
67	Increase accommodation and promotion of alternatively fueled vehicles and hybrid vehicles	49	\$200	\$10,000

I. Introduction



The City of San Carlos realizes the challenges that climate change poses to our community and is committed to proactively addressing the issue. In May 2008, the City Council approved the San Carlos Climate Protection Letter, making a formal commitment to calculating the community's greenhouse gas emissions and incorporating climate action into the City's General Plan update. In June 2008, the Climate Action Plan Subcommittee was formed as a subset of the General Plan Advisory Committee

(GPAC) to oversee the formation of a Climate Action Plan.

In order to measure future progress, San Carlos developed the 2005 Community-Wide Baseline Greenhouse Gas Emissions Inventory in August 2008 with the help of Local Governments for Sustainability (ICLEI) for data collection, analysis and management. The baseline report, attached as Appendix C, reveals the major sources of emissions caused from community activities and gives us a basis of comparison.

In response to the findings of the Inventory, the Climate Action Subcommittee chose a reduction target of 15% below the baseline 2005 greenhouse gas emissions levels by 2020. The Subcommittee chose this reduction target for two reasons: 1) To affirm the City's commitment to developing and measuring greenhouse gas reduction measures, and 2) To remain consistent with the AB 32 Scoping Plan recommended reduction target of 15% below present levels by 2020. The reduction target was also projected to reflect the timeline of the General Plan update. Our reduction target of 35% below 2005 levels by 2030 uses the 15% reduction target by 2020 as an interim target.

Although San Carlos has taken significant steps in the past to address climate change, this is the first document to assemble the City's climate action efforts into one centralized plan. The San Carlos Climate Action Plan is the beginning of an ongoing evaluation and reassessment of our response as a community to climate change. This Plan is by no means a strict road map through the year 2020. Future reports will evaluate progress and modify or expand current reduction and adaptation strategies as we learn more about our own community and about climate change.

This report identifies and analyzes ways in which San Carlos can attain its reduction goal through energy use, transportation and land use, and solid waste reduction measures. These strategies, included in Chapters 4-6, are the result of Subcommittee, City staff, and community cooperation during multiple public meetings, a community workshop and Council guidance through the San Carlos Climate Protection Letter.

Also included in this Plan is a section on potential adaptation strategies that may be necessary as the climate changes and sea levels rise. Adaptation measures are important in order to allow our community to proactively prepare for potential effects

of climate change to come. It has become clear that regardless of the efforts to reduce greenhouse gas emissions, not all the effects of climate change can be prevented or reversed. The challenge will be reducing the effects to the lowest level possible and having our community remain healthy and prosperous. We must ensure that we are prepared for the potential resource constraints and climate variability anticipated as a result of climate change.

CAP Purpose and Structure

The City of San Carlos is taking a proactive approach by developing this Climate Action Plan as a component of the 2009 General Plan update. Addressing climate change in this manner defines San Carlos as an innovative member of the local government community by creating a legally defensible approach to ensuring that this Climate Action Plan is implemented.

Specifically, this Plan does the following:

- Identifies sources of greenhouse gas emissions caused from actions within the City of San Carlos municipal boundary and estimates how these emissions may change over time;
- Provides energy use, transportation, land use, and solid waste strategies to bring San Carlos' greenhouse gas emissions levels to 15% below 2005 levels by 2020 and 35% below 2005 levels by 2030;
- Mitigates the impacts of San Carlos on climate change (by reducing greenhouse gas emissions consistent with the direction of the State of California via AB32 and Governor's Order S-03-05 and Public Resources Code section 21083.3). The CEQA Guidelines encourage the adoption of policies or programs as a means of addressing comprehensively the cumulative impacts of projects. (See CEQA Guidelines, §§ 15064, subd. (h)(3), 15130, subd. (c).)
- Allows the greenhouse gas emissions inventory and Climate Action Plan to be updated every five years and respond to changes in science, effectiveness of emission reduction measures and federal, state, regional or local policies to further strengthen the City's response to the challenges of climate change.
- Provides substantial evidence that the emission reductions estimated in the Climate Action Plan are feasible.
- Serves as the programmatic tiering document for the purposes of CEQA within the City of San Carlos for climate change, by which applicable developments within the City will be reviewed. If a proposed development is consistent with the emission reduction and adaptation measures included in the Climate Action Plan and the programs that are developed as a result of the CAP, the project

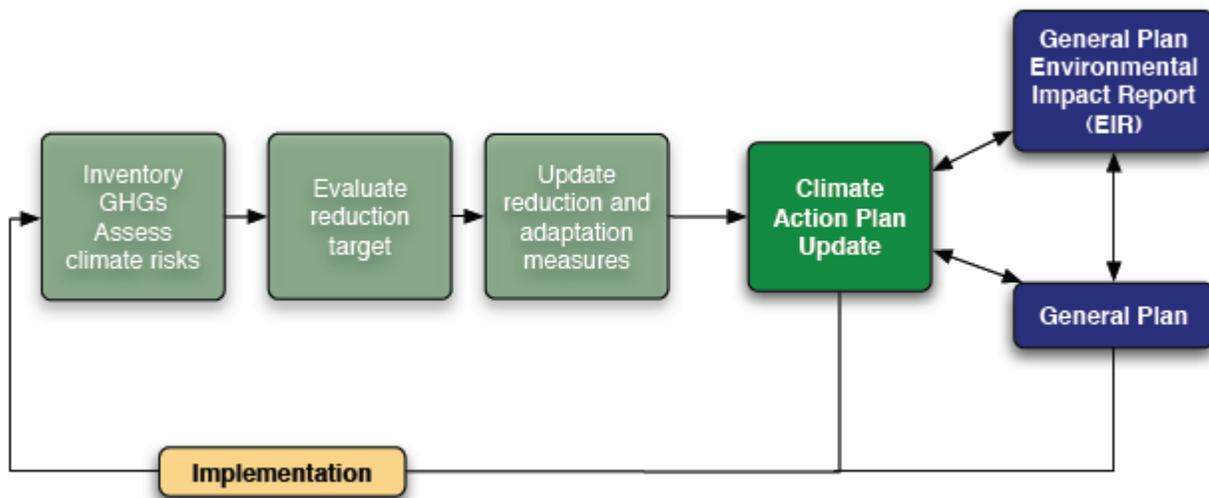


would be considered to have a less than significant impact on climate change and emissions consistent with the direction of the California Attorney General (Climate Change, CEQA and General Plans, Revised March 6, 2009) and Public Resources Code 21083.3.

- ❏ Outlines ways in which the City can prepare for and adapt to the consequences of climate change; and,
- ❏ Discusses the various outcomes of reduction efforts and how these reduction efforts can be implemented and advertised;

Instead of including the text of this Plan in the General Plan, the General Plan will dynamically reference this Plan. Dynamic references will allow the Climate Action Plan to be updated on a more regular basis than the General Plan, ensuring that the General Plan and San Carlos's climate efforts are always up to date. This flexibility is especially important given the constant flux of new research findings, technological improvements, and policy updates dealing with climate change. The CAP update process and its relation to the General Plan are depicted in Figure 1, below.

Figure 1
Five-Year Climate Action Plan Update Process and Relation to the General Plan



This document outlines reduction measures and recommendations for implementation; however it is not a technical implementation plan for San Carlos programs and community actions. City staff, community organizations, and individuals will work together to create the individual programs based on the goals, policies and actions outlined in this report.

It is important to realize that despite their relatively small size in comparison to the global issue of climate change, cities and counties collectively have the ability to reduce greenhouse gas emissions and make an impact on the larger, global climate condition. Making these goals of reduction and adaptation a reality requires a collective effort on the part of the community. No one sector, resident or entity can achieve these

reductions alone. We must all take part in order to achieve our emission reduction goals. Residents, city officials and businesses must all be involved in the ongoing implementation of these measures.

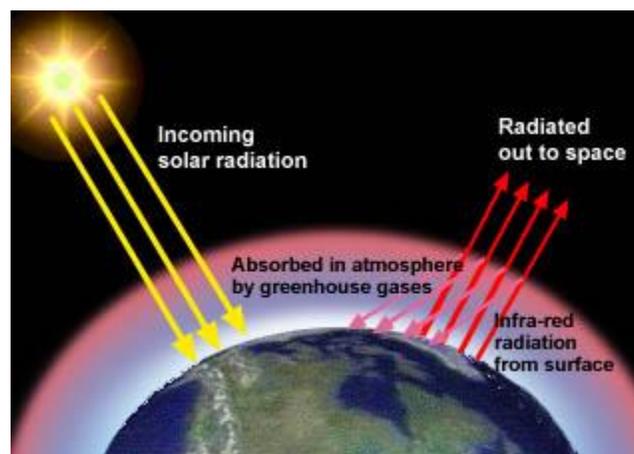
This community's plan to address our contribution to and reaction to climate change is a unique opportunity for the City of San Carlos. Climate action is not only about reducing greenhouse gas emissions, but creating a more sustainable, livable, and equitable community.

Climate Change – Global Issue, Local Problem

The existing and anticipated effects of climate change are now hard to ignore. Twelve of the past 13 years have been the hottest temperatures on record since instrumental records began in 1850. The ocean rose faster in recent years than it ever has before. 'Climate change' and 'global warming' are hot topics in mainstream American culture, resulting in books, public education campaigns, and a myriad of 'eco-friendly' consumer products. American society is growing an awareness linking energy, climate change, and our own personal activities to the environment and economy. As Californians, we choose to lead the nation in addressing this global issue with the hope that through collective action at the local level, global changes in the way we use resources and develop as a society will change and ultimately reduce the impacts of climate change on the human and natural environment.

To fully understand global climate change it is important to recognize the naturally occurring "greenhouse effect" and to define the greenhouse gases (GHG) that contribute to this phenomenon. The temperature on Earth is regulated by this greenhouse effect, which is so named because the Earth's atmosphere acts like a greenhouse, warming the planet in much the same way that an ordinary greenhouse warms the air inside its glass walls. Like glass, the gases in the atmosphere let in light yet prevent heat from escaping.

Figure 2
The Greenhouse Gas Effect



Source: Tufts University

GHG are naturally occurring gases such as water vapor, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) that absorb heat radiated from the Earth's surface. Greenhouse gases – carbon dioxide, methane, nitrous oxide, and others – are transparent to certain wavelengths of the sun's radiant energy, allowing them to penetrate deep into the atmosphere or all the way to the Earth's surface. Clouds, ice caps, and particles in the air reflect about 30 percent of this radiation, but oceans and land masses absorb the rest (70 percent of the radiation received from the sun) before releasing it back toward space as infrared radiation. GHG and clouds effectively prevent some of the infrared radiation from escaping; they trap the heat near Earth's surface where it warms the lower atmosphere. If this natural barrier of atmospheric gases were not present, the heat would escape into space, and Earth's average global temperatures could be as much as 61 degrees Fahrenheit cooler¹.

In addition to natural sources, human activities are exerting a major and growing influence on climate by changing the composition of the atmosphere and by modifying the land surface. Particularly, the increased consumption of fossil fuels (natural gas, coal, gasoline, etc.) has substantially increased atmospheric levels of greenhouse gases. Measured, global GHG emissions resulting from human activities, especially the consumption of fossil fuels, have grown since pre-industrial times, with an increase of 70% between 1970 and 2004.² This increase in atmospheric levels of GHG unnaturally enhances the greenhouse effect by trapping more infrared radiation as it rebounds from the Earth's surface and thus trapping more heat near the Earth's surface. Prominent GHGs contributing to the greenhouse effect and climate change include carbon dioxide (CO₂), methane (CH₄), ozone, nitrous oxide (N₂O), and chlorofluorocarbons (CFCs). Emissions of these gases are attributable to human activities associated with the industrial/manufacturing, utilities, transportation, residential, and agricultural sectors.³

The graph below shows projected climate change impacts to California from the high, medium and low emissions scenarios predicted in 2006. It is important to note that more recent indications show that sea level rise is progressing at a significantly faster pace than what is described in this graphic. It is now likely that sea levels will rise by at least 16 inches by 2050 and 55 inches by 2100.

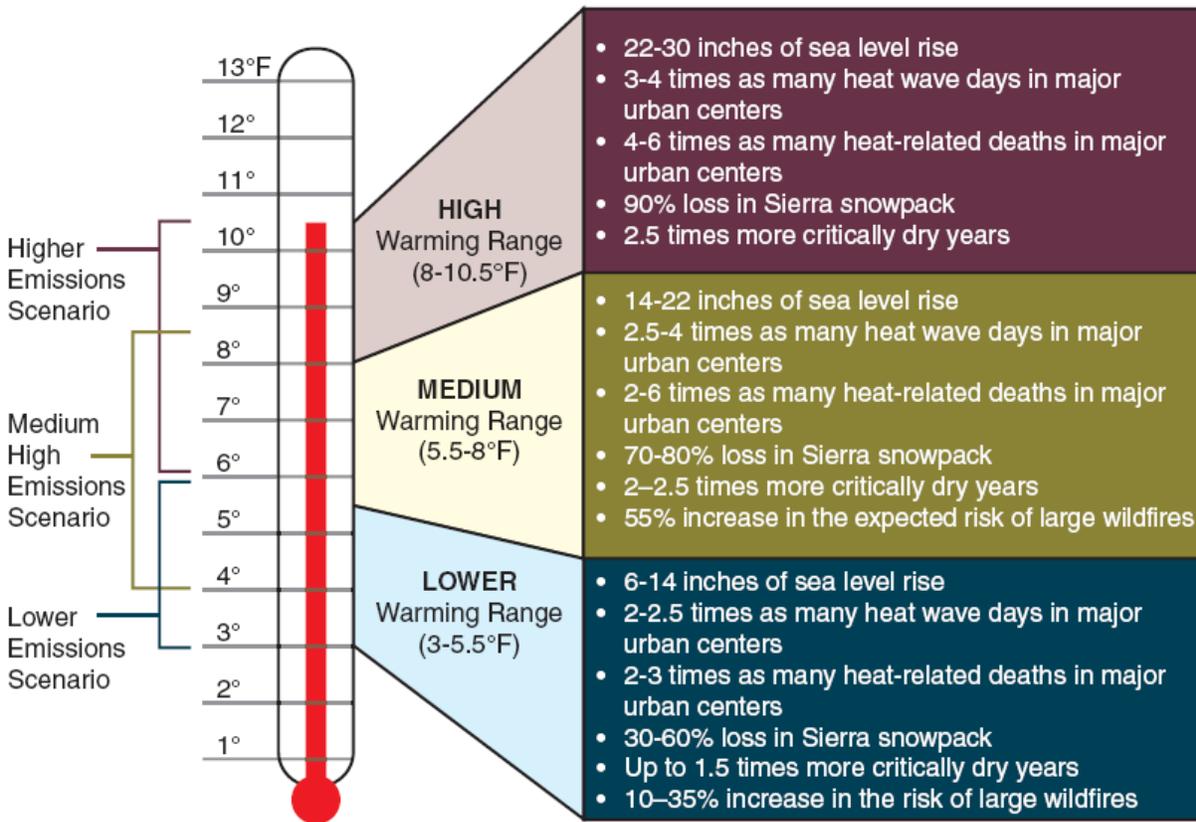
¹ National Aeronautical and Space Administration, "NASA Facts Online," 2007,

http://www.gsfc.nasa.gov/gsfc/service/gallery/fact_sheets/earthsci/green.htm. Accessed June 2007.

² Intergovernmental Panel of Climate Change. National Greenhouse Gas Inventories Programme. <http://www.ipcc-nggip.iges.or.jp/>. Accessed June 2007.

³ California Energy Commission (CEC). "Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004 (CEC-600-2006-013)," December 2006.

Figure 3
Projected Global Warming Impact on California
2070-2099 (as compared with 1961-1990)



Source: *Our Changing Climate: Assessing the Risks to California (2006)*, www.climatechange.ca.gov

Although used interchangeably, there is a difference between the terms “climate change” and “global warming.” According to the National Academy of Sciences, climate change refers to any significant, measurable change of climate lasting for an extended period. It can be caused by natural factors and human activities alike. Global warming, on the other hand, is an average increase in the temperature of the atmosphere caused by increased greenhouse gas emissions from human activities. The use of the term ‘climate change’ is becoming more prevalent because it encompasses all changes to the climate, not just temperature. Additionally, the term ‘climate change’ conveys temporality, implying that climate change can be slowed or reversed with efforts such as this Plan and efforts of other local, state, national, and world leaders.

Climate change is now a widely accepted fact among scientists with the only uncertainty remaining about how climate change will affect earth's systems over time. Although much of the attention to the topic is global in scale, it is important to realize that climate change affects every community at the local level.

Potential consequences of climate change for the City of San Carlos include:

- ✚ **Rising Sea Levels:** Sea level rise is attributed to the increase of average ocean temperatures and the resulting thermal expansion and the melting of snow and ice contributing to the volume of water held in the oceans. The San Francisco Bay Conservation and Development Commission (BCDC) issued a report on sea level rise in April, 2009, which states that sea levels in the Bay Area will rise 16 inches by mid-century and 55 inches by the end of the century as shown in Figure 4.13-1. By mid-century, approximately 180,000 acres of the Bay Area could be flooded and 213,000 acres could be flooded by the end of the century, including 93 percent of both the Oakland and the San Francisco airports. If anticipated flooding occurs, many communities could experience compromised wastewater treatment and infrastructure failure due to inundation from rising sea levels. The estimated economic value of shoreline development that could be impacted by a 55-inch rise in sea level is \$62 billion. Other anticipated economic impacts relate to movement of goods and people in and around the Bay Area that would be disrupted by flooding of ports, airports, highways, and rail lines.⁴ Research estimates that sea level rise could inundate the entire area east of the Bayshore freeway by 2099 if levees are not built or existing flood control structures are compromised⁵. Additional flooding beyond what seasonally occurs in the eastern areas of San Carlos can also be expected as storm surges will be higher and potentially more forceful due to these factors.
- ✚ **Unpredictable weather:** The years of 1995-2005 had the warmest global temperature ever recorded in instrumental history (since 1850)⁶. Higher temperatures will cause more rainfall than snowfall which will impact water supplies for not only San Carlos, but every other user of water in the State. Combined with longer summer seasons, the increased temperature will reduce soil moisture levels which necessitate increased irrigation, increase the need for air conditioning use, increase the rate and spread of wildfires, and stress the electrical infrastructure that serves the City. Increased flooding due to more intense and less predictable storms, along with sea level rise, will require proactive efforts in order to reduce the potential for damaging coastal flooding and erosion.
- ✚ **Increased rate of wildfires:** Wildfire risk is based on a combination of factors including precipitation, winds, temperature, and vegetation, all of which are susceptible to increased warming. Wildfires are likely to grow in number and size throughout the state as a result of increased temperatures induced by climate

⁴ San Francisco Bay Conservation and Development Commission. 2009. (April) Draft Staff Report. Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline. http://www.bcdc.ca.gov/proposed_bay_plan/bp_1-08_cc_draft.pdf. Accessed June 5, 2009.

⁵ Knowles, Noah. "Protecting Vulnerability to Inundation Due to Sea Level Rise in the San Francisco Bay and Delta." *Fifth Annual California Climate Change Conference*. PowerPoint presentation. 9 Sept. 2008. <http://www.climatechange.ca.gov/events/2008_conference/presentations/2008-09-09/Noah_Knowles.pdf>

⁶ Rosenzweig, C., G. Casassa, D.J. Karoly, A. Imeson, C. Liu, A. Menzel, S. Rawlins, T.L. Root, B. Seguin, P. Tryjanowski, 2007: Assessment of observed changes and responses in natural and managed systems. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 79-131.

change. Even under the 'medium' warming scenario predicted by the Intergovernmental Panel on Climate Change (IPCC), wildfire risk will likely increase by 55% in California.⁷

- ❏ **Negative impacts on wildlife:** Increased global temperatures and resource depletion exacerbated by climate change is causing disruptions in animal migration and plant pollination. As temperatures rise, species are moving north in California or to higher elevations. This change in migration disrupts the food chain and prevents some plant species from being pollinated. Water and food supplies are expected to be more variable and to shift as the seasons change on different timeframes. With vegetation, reduction in soil moisture will result in early die-back of many plants potentially leading to conflicts with animal breeding seasons and other natural processes. Many of the potential affects on wildlife are still being studied, but due to inability to adapt to new climates, the potential for severe species loss is prescient.
- ❏ **Deteriorating public health:** Heat waves are expected to have a major impact on public health as well as decreasing air quality and an increase in mosquito-breeding and mosquito-borne diseases. Vector control districts throughout the state are already evaluating how they will address the expected changes to California's climate. The elderly and young, and those vulnerable populations that do not have the resources to deal with the costs and adapt to the changes that are expected to impact the community will need assistance. Social equity issues related to the unequal distribution of resources and increased costs to address community wide health risks will need to be addressed proactively to reduce the potential for financial strain on the City.
- ❏ **A decreasing supply of fresh water:** Warmer average global temperatures cause more rainfall than snowfall, making the winter snowfall season shorter and accelerating the rate at which the snow packs melt in the spring. With the City of San Carlos' water supply primarily coming from the Hetch Hetchy reservoir in the Sierra Nevada Mountains, the change to a liquid-precipitation-centric system has the potential to reduce storage capacity, water quality, and the accessibility of water for emergency situations. With rain and snow events becoming less predictable and more variable, this could increase the rate of flooding and decrease the City's ability to maintain fresh water for consumption. Additionally, sea level rise is expected to increase salinity levels of the Sacramento Delta region, which could lead communities currently relying on the Delta for their water supplies to search for alternative sources of potable water, further stressing the Hetch-Hetchy system.
- ❏ **Negative impacts on hydropower:** Numerous utilities manage hydropower facilities in the Sierra Nevada Mountains that are fed by streams and precipitation during the spring season. Increased temperatures from climate change are expected to cause an earlier spring snowmelt runoff and cause more precipitation to fall as rain rather than snow. These two effects may

⁷ California Climate Change Center, Our Changing Climate: Assessing the Risks to California, 2006. <http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF>. Accessed Dec. 3, 2008.

negatively affect the operation of high elevation hydropower reservoirs due to greater spillage from higher inflows and a timing mismatch between hydropower energy supply and energy demand.⁸

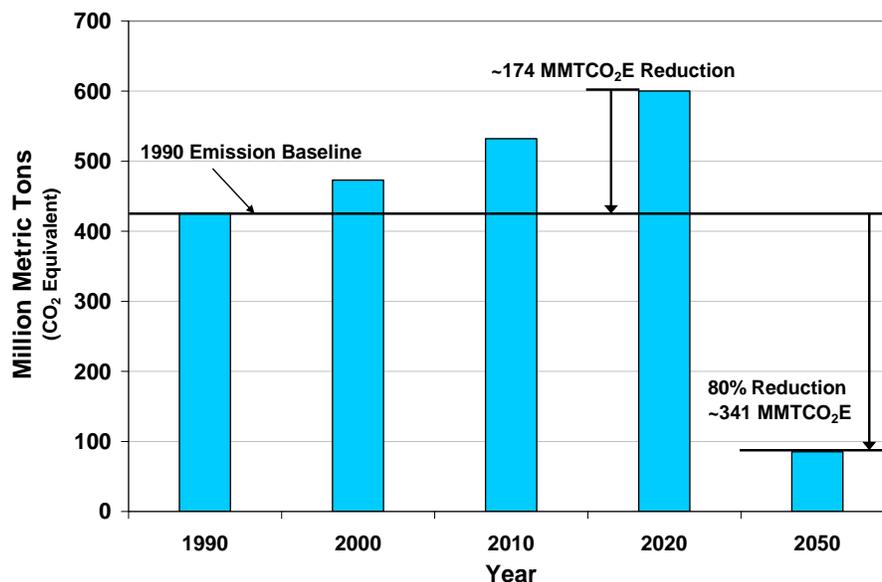
State Initiatives to Combat Climate change

California continues to be a leader in addressing climate change in the United States and in the world. In June of 2005, Governor Schwarzenegger issued a landmark Executive Order establishing progressive greenhouse gas emissions targets for the entire state. Executive Order S-3-05 makes the following goals:

- ☒ By 2010, reduce greenhouse gas emissions to 2000 levels;
- ☒ By 2020 reduce greenhouse gas emissions to 1990 levels;
- ☒ By 2050, reduce greenhouse gas emissions to 80% below 1990 levels.

To support these reduction targets, the California legislature adopted the California Global Warming Solutions Act of 2006, also known as AB 32. The law requires the California Air Resources Board (CARB) to develop regulatory and market mechanisms that will reduce greenhouse gas emissions to 1990 levels by 2020. In December 2008, CARB approved the AB 32 Scoping Plan outlining regulatory and market mechanisms to achieve the goal of AB 32. The plan cites local government action as an integral partner to achieving the State's goals.

Figure 4
California Climate Change Emissions and Targets



Source: California Air Resources Board

⁸ California Climate Change Center, Climate Change Impacts on High Elevation Hydropower Generation in California's Sierra Nevada: A Case Study in the Upper American River, Dec 2005.
<http://calclimate.berkeley.edu/9%20Climate%20change%20impacts%20on%20high%20elevation%20hydropower.pdf>, accessed November 3, 2008.

AB 32 has caused a ripple effect among cities, counties and environment groups throughout the state. In *State of California Attorney General v. San Bernardino County* in 2007, the California Attorney General's office argued that the Environmental Impact Report for San Bernardino's new general plan did not conform to the overall goals of AB 32 because it did not adequately analyze or mitigate the effects of development on global warming. The County settled with the State by agreeing to produce a greenhouse gas emissions reduction plan much like this report and, at the same time, furthering California's commitment to addressing climate change.

The San Bernardino Settlement Agreement led Senators to write SB 97 in August 2007. This law formally acknowledges that climate change is an important environmental issue that requires analysis under the California Environmental Quality Act (CEQA). The Governor's Office of Planning and Research (OPR) is responsible for developing guidelines for addressing climate change in CEQA documents by 2009. The guidelines will be adopted by the State Resources Agency in 2010.

In September 2008, the Attorney General reached another settlement agreement concerning climate change, this time with the City of Stockton. According to the Attorney General's office and the Sierra Club, the City of Stockton did not adequately address climate change in its 2035 General Plan update and corresponding Environmental Impact Report. The City of Stockton settled with the Attorney General by agreeing to adopt a climate action plan designed to reduce sprawl, increase infill development, promote public transit and encourage more energy-efficient buildings.⁹

Although EO S-3-05, AB 32, SB 97, and the Attorney General's actions have made California a global leader in climate change policy, there is much more to come. Numerous bills concerning energy use, land use, transportation, and other climate change topics have been passed in Sacramento. Some of these bills, like SB 375 passed in September 2008, will result in regional approaches to reducing greenhouse gas emissions.

SB 375 aims to reduce greenhouse gas emissions by linking transportation funding to land use planning. It requires Metropolitan Planning Organizations (MPOs) like MTC to create Sustainable Communities Strategies (SCSs) in their regional transportation plans (RTPs) for the purpose of reducing suburban sprawl. It also creates incentives for implementation of the SCS. Additional efforts are underway to affect the overall transportation sector by mandating fewer emissions from vehicles via AB 1493 (Pavley), signed into law in 2002. The Pavley bill requires car manufacturers to reduce tailpipe emissions from new passenger cars and light trucks; however enforcement of this legislation is awaiting approval by the US EPA.

The scale and pace at which the State of California is addressing this issue is even more of a reason San Carlos as a community should accelerate our efforts to combat climate change.

⁹ California Attorney General's Office, "California Environmental Quality Act – Global Warming," <http://www.ag.ca.gov/globalwarming/ceqa.php>. Accessed October 16, 2008.

San Carlos' Commitment to Sustainability

"The City of San Carlos will work with its residents and businesses as well as in conjunction with neighboring cities, counties, and other agencies interested in this matter to progress on reducing greenhouse gas emissions and to reduce global warming pollution levels."

- The San Carlos Climate Protection Letter:

On May 27, 2008, the City Council adopted the City of San Carlos Climate Protection Letter, establishing the City as an active participant in the fight against climate change. The letter urged federal and state governments to work on reducing their dependence on fossil fuels and to accelerate the development of clean, economical energy resources and fuel efficient technologies. Furthermore, it committed the City to addressing its own footprint through inventorying its emissions and developing this Climate Action Plan in conjunction with the General Plan update.

In August of 2008, the greenhouse gas emissions inventory for the community of San Carlos was released. This report was updated and re-released with updated data and projections in October 2008 and is attached as Appendix C. The inventory began the process outlined by ICLEI in Figure 5 below. The Climate Action Plan Subcommittee accomplished the second milestone by setting an emission reduction target. This Climate Action Plan fulfills the third milestone, which is to create a plan, and examine strategies for implementation, further monitoring, and re-assessments.

Figure 5
ICLEI's Five Milestone Process



In addition to beginning this formal process, San Carlos has already made great strides in making itself more sustainable through city- and citizen-led initiatives. The City of San Carlos was a charter member of the Joint Venture: Silicon Valley Climate Protection Initiative, which today includes all 39 cities and counties in Silicon Valley. The City also provided a Community Solar Discount Program promoted by San Carlos Green, which

aims to inspire a more environmentally conscious and sustainable community. As of June 2009, the City boasts at least 20 certified green businesses with many more in the application phase.

When it comes down to making an actual difference, it is this kind of local action that will shape the future of our planet. In developing this Climate Action Plan, the community of San Carlos is creating reduction measures suited specifically to our population and location.

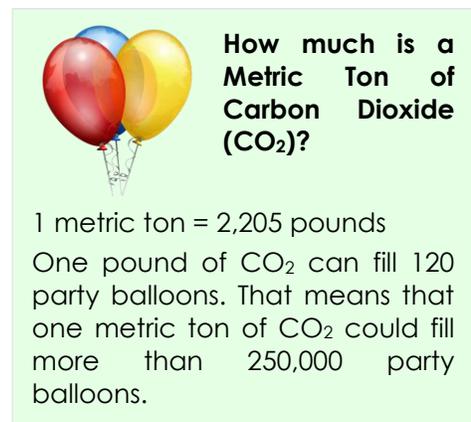
II. San Carlos' Community Greenhouse Gas Emissions

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 community-wide 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.

Community-Wide Inventory Methodology

With the exception of transportation emissions, the Inventory was calculated using the Clean Air and Climate Protection (CACP) software developed by ICLEI.¹⁰ Transportation emissions were calculated using methodology contained within the General Plan update.¹¹ 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 CO₂e, 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 (CH₄) is twenty-one times more powerful than carbon dioxide on a per weight basis in its capacity to trap heat; so the CACP software converts one metric ton of methane emissions to 21 metric tons of carbon dioxide equivalents.¹²



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.

¹⁰ STAPPA/ALAPCO and ICLEI's CACP Version 1.1, June 2005 developed by Torrie Smith Associates.

¹¹ 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.

¹² 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.

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

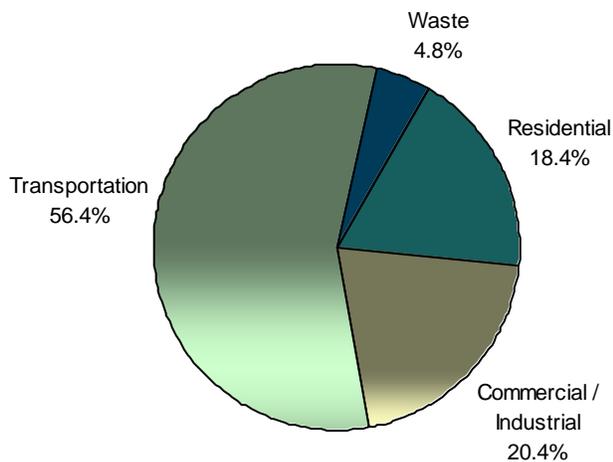
In the base year 2005, the community of San Carlos emitted approximately 267,237 metric tons of CO₂e with the following distribution:

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

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

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.

Figure 6
Community GHG Emissions by Sector



The community-wide and municipal inventories meet and exceed current best practices; however that does not mean that they are entirely comprehensive. Inventories are currently constrained by privacy laws, data availability, and a lack of reasonable methodology to collect or analyze data. The good news is that greenhouse gas inventorying is a constantly evolving science and practice. As greenhouse gas modeling becomes more widespread and methodology improves, emissions not currently included in San Carlos' baseline inventories will

be added and the reduction goals updated.

Specifically, the greenhouse gas emissions sources not included in the municipal and/or community-wide inventories include the following:

- ✚ **Aircraft Emissions:** The airport is operated by the County of San Mateo and emissions from the airports operation will be included in the County's municipal emissions inventory in accordance with accepted inventory protocol. In the future, this number will be included as an information item to provide context with other community emissions. A reasonable methodology for calculating aircraft emissions attributed to a local airport did not exist prior to the completion of the Greenhouse Gas Inventory. Some jurisdictions have chosen to quantify aircraft activity below a certain elevation while others have chosen to quantify aircraft emissions within a certain distance of the airport. It is important to note that while aircraft emissions are not included, emissions from electricity consumption and waste production at the airport are included in the community-wide Inventory since we were unable to disaggregate these numbers at the time the inventory was created.
- ✚ **Sewage Treatment Emissions:** The City is working with other participants in the SBSA to develop a standardized 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. Current inventory protocol allocated emissions related to sewage treatment plants to the jurisdiction in which it is located. Further, lack of consistent methodology limits us from accurately 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. For these reasons, emissions estimates associated with our share of sewage were not made in this report. In the future, this number will be included as an information item to provide context with other community emissions.
- ✚ **Water Emissions:** Emissions from the filtration and movement of water consumed in San Carlos are not entirely included in this inventory per standard practice. The filtration, movement, and treatment of water consumed in San Carlos largely takes place outside of the City's boundary. These emissions, therefore, should be accounted for by the jurisdiction that hosts these facilities. Our Inventory does include energy emissions associated with local consumption of water, including City-owned water pumps and household and commercial hot water heaters. Movement of water to San Carlos results in very little energy use and associated emissions since San Carlos's water supply comes from the Hetch Hetchy reservoir, which is gravity fed to the peninsula. In the future, this disaggregated number will be included as an information item to provide context with other community emissions.

- ❏ **Freight and Off-Road Vehicle/Equipment Emissions:** Emissions from freight trains and off-road vehicles traveling within San Carlos are not included in this Inventory. For rail, and other off-road vehicles and equipment emissions, the California Air Resources Board OFFROAD 2007 software provides emissions from rail and port activities, however these numbers are aggregated for the entire San Mateo County area, including incorporated, unincorporated, and State or federally owned land. Without data specific to incorporated area of San Carlos and without a reasonable methodology for allocating the OFFROAD calculation, freight rail activity emissions were omitted. Passenger rail emissions for CalTrain are included due to data availability as a result of rider surveys. Once disaggregated data becomes available, this number will be included as an information item to provide context with other community emissions in future updates to this document.
- ❏ **Propane Emissions:** Lack of data availability prevents the calculation of emissions from propane (liquefied petroleum gas, or LPG) created in the City's boundaries. Propane is an unregulated fuel in California (except for storage and safety issues which are regulated). Because it is an unregulated commodity, no reliable data is collected by the state on propane sales or usage. Once reliable data becomes available, this number will be included to provide context with other community emissions in future updates to this document.
- ❏ **Lifecycle Emissions:** This Inventory does not include lifecycle emissions for the community of San Carlos. Lifecycle emissions are emissions associated with the production and disposal of items consumed by residents and businesses in San Carlos. These are the types of emissions normally included in a 'carbon footprint' but not in a greenhouse gas inventory (see breakout box). 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. Since these emissions are difficult to accurately estimate and since they are not in the City's control, lifecycle emissions are not included.

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.

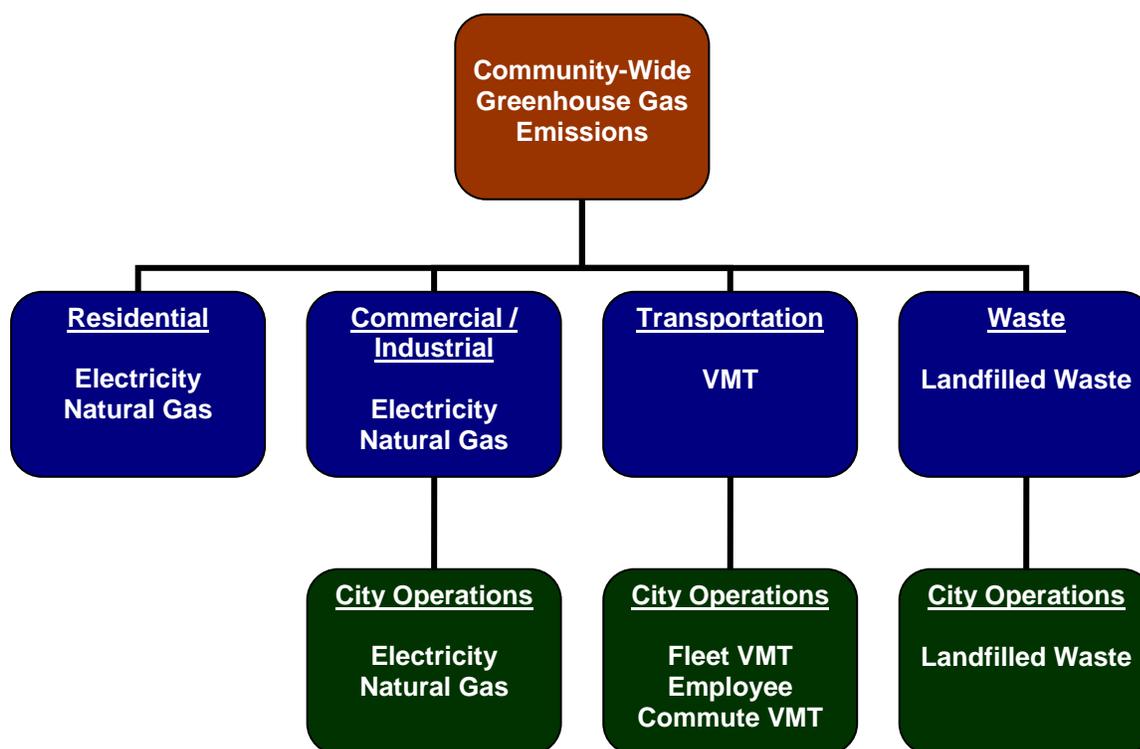
Under these limitations, it is likely that San Carlos' emissions are greater than 267,237 metric tons of CO₂e per year. However, it is important to note that these 267,237 metric tons are primarily greenhouse gases that the community has directly caused and has

the ability to reduce through implementation of this Climate Action Plan and corresponding efforts. Future Greenhouse Gas Inventory data collection efforts will attempt to resolve these data issues and provide additional specificity about emissions. Future inventories will also include emissions using the baseline methodology to allow cross-comparisons of like data.

Municipal Operations Emissions

ICLEI completed the San Carlos Municipal Greenhouse Gas Emissions Inventory ("Municipal Inventory") in August 2009 through a grant from Sustainable Silicon Valley. The Municipal Inventory analyzes greenhouse gas emissions from City operations and facilities, including those from the operation of City offices, fleet vehicles, City-owned water pumps, and more. The Municipal Inventory, like any commercial or household greenhouse gas audit, is a subset of overall community-wide emissions. Since City activities occur within the geopolitical boundary of San Carlos, they are accounted for in the overall community-wide inventory figures. However, the Municipal Inventory is useful in order to delineate which portion of the community-wide Inventory can be attributed to City operations and facilities. The relationship between community and municipal operations is shown below in Figure 7.

Figure 7 – Relationship of Community-Wide and Municipal Greenhouse Gas Inventories



City operations and facilities contributed approximately 1,743 metric tons of greenhouse gas emissions in calendar year 2005. This is approximately 0.6% of total community-wide emissions, which is consistent with other municipalities in California. The majority of City emissions were caused by City employees commuting to and from work.

Figure 8 – Municipal and Community Emissions

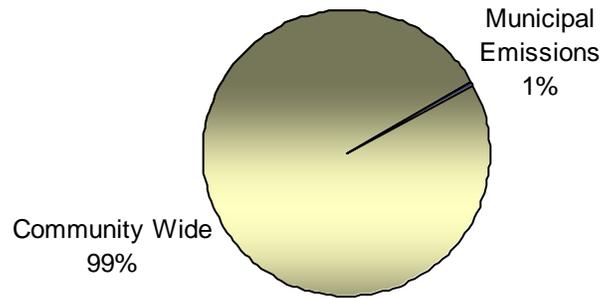


Figure 9 – Municipal Greenhouse Gas Emissions by Sector

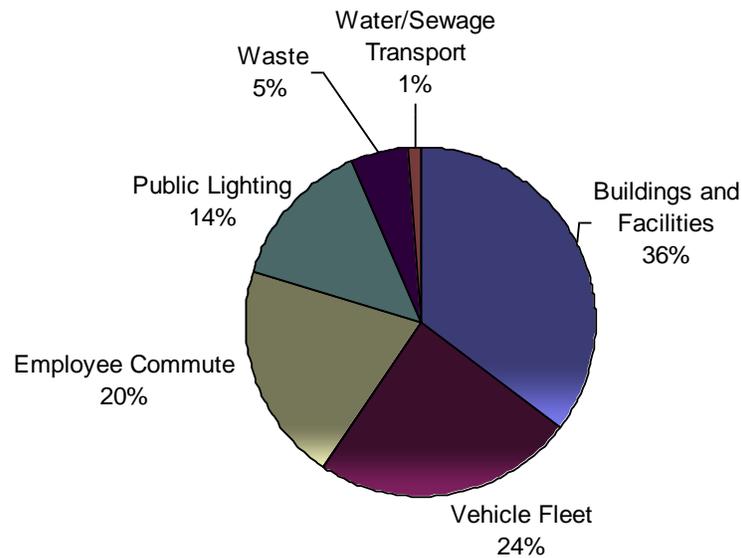


Table 2 – Municipal Greenhouse Gas Emissions

Sector	Metric tons CO ₂ e	Percent
Buildings and Facilities	613	35%
Vehicle Fleet	425	24%
Employee Commute	353	20%
Public Lighting	241	14%
Government-generated Solid Waste	93	5%
Water/Sewage Transport	18	1%
Total	1,743	100%

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 CO₂ 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 CO₂e 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 CO₂e in 1990. This results in an estimate of increased emissions of 8.5% between 1990 and 2005.

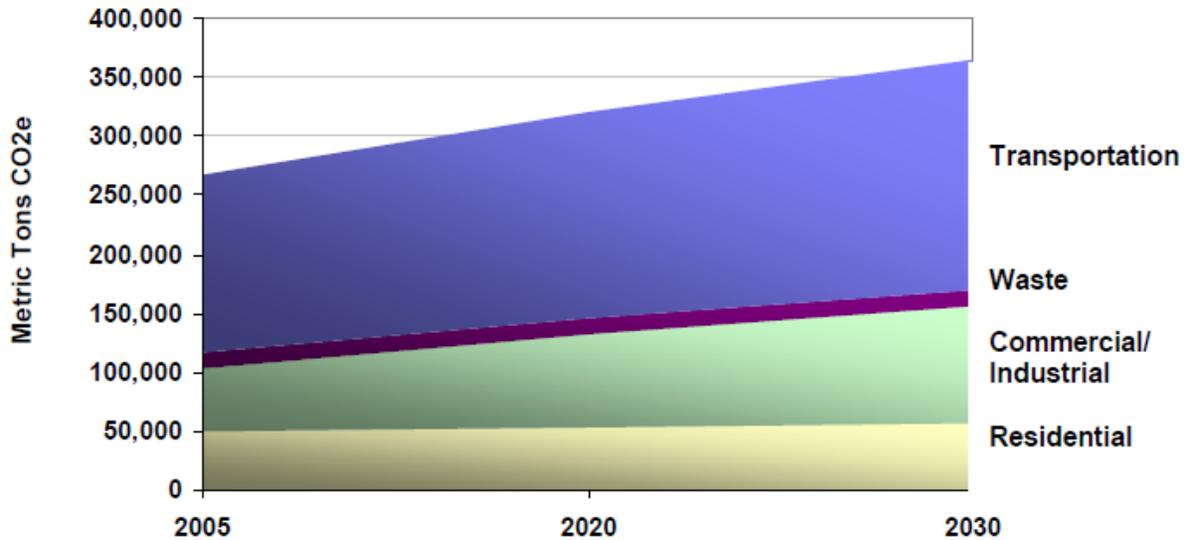
San Carlos’s Greenhouse Gas Emissions Forecast

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 CO₂e per year by 2020 and 365, 787 metric tons of CO₂e 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
	Jobs	15,560
Population	28,200	32,303
Households	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 10
2030 Emissions Forecast**



**Table 3
Emissions Forecast for 2020 and 2030 by Sector**

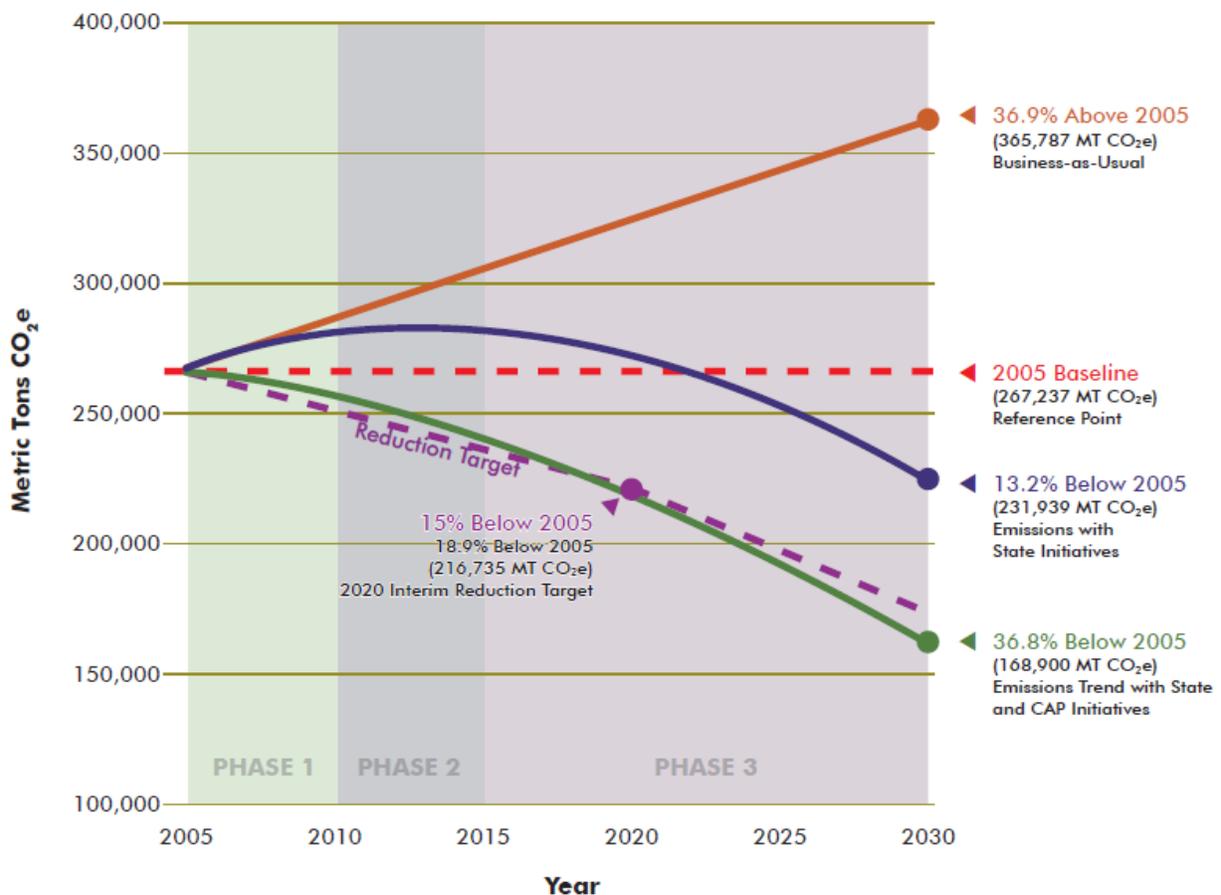
2005 Community Emissions Growth Forecast by Sector	2005	2020	2030	Annual Growth Rate	Percent Change from 2005 to 2020	Percent Change from 2005 to 2030
Residential	49,178	53,312	56,259	0.540%	8.4%	14.4%
Commercial / Industrial	54,619	78,454	99,876	2.444%	43.6%	82.9%
Transportation	150,663	175,891	195,016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

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.

Figure 11
2030 Emissions Reductions In San Carlos



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.

III. Achieving San Carlos' Reduction Target

In June 2008, the San Carlos General Plan Advisory Committee (GPAC) formed the Climate Action Plan (CAP) Subcommittee and charged them with performing the in-depth analysis needed for a Climate Action Plan. In August 2008, using the information from the baseline Greenhouse Gas Inventory as a guide, the Subcommittee developed a Strategic Policy Focus to guide the development of the Climate Action Plan and associated emissions measures. This Policy Focus highlights those emission sources that would have the greatest impact on reducing emissions within the City. Throughout the Climate Action Plan development process, the CAP Subcommittee was responsible for reviewing and analyzing strategies consistent with this policy focus and aimed at reducing greenhouse gas emissions.

San Carlos Climate Action Plan Strategic Policy Focus:

1. Building Efficiency/Site Design
2. Auto Emission Reduction
3. Low Carbon Energy Use
4. Alternative, Non-Automotive Travel Modes
5. Waste Reduction Program

Over 100 strategies were initially considered by the Subcommittee. This list was reduced and modified during several Subcommittee meetings and at a community workshop on September 25, 2008. Workshop participants discussed the proposed reduction measures and provided their thoughts on which were most effective for the unique community of San Carlos. The public workshop comments, along with emails, public comment, and City staff input, culminated in the 21 reduction measures analyzed in this report.

Community participation is essential in the development of a Climate Action Plan because, in the end, it is the people of San Carlos who will drive change and make the sacrifices necessary to reduce emissions. Developing and implementing the measures included in this Plan will require continuous effort and collaboration among businesses, residents, and the City.

Structure

San Carlos' 21 reduction measures are separated into three chapters for analysis: Energy, Transportation and Land Use, and Solid waste. Each reduction measure has its own greenhouse gas reduction goal and is supported by one or more components. The reduction goal of each measure is based on current knowledge and science. If for some reason science, technology, or politics change in the future, the components of each reduction measure can be modified or added to as long as the total greenhouse gas reduction adds up to that measure's goal. This structure of tying the reduction target to the measure rather than the measure's individual components will allow for flexibility and will ensure that San Carlos meets, if not exceeds, our overall reduction target of 35%.

The components of each reduction measure have the following structure:

- ❏ Description: A short description of the overall goal of the reduction measure.
- ❏ Initial cost analysis: An estimate of initial cost to the City of San Carlos for implementing each individual component and the methodology used to calculate this estimate. Costs included in the estimate are mostly for staff time and for materials such as trees or hybrid vehicles. Costs are not adjusted based on planned implementation timeline.
- ❏ Emissions reductions analysis: An estimate of the reduction in greenhouse gas emissions caused by the component. The emission reduction is provided in metric tons of CO₂ equivalent (CO₂e).

Finally, the end of each chapter includes a discussion of San Carlos's activity to date in achieving our reduction target. This includes an estimate of where San Carlos currently stands in reducing emissions to the level outlined in each chapter.

Methodology: Initial Cost analysis

Each reduction measure includes an estimate of initial cost to the City based on current research, case studies, and the experience of City staff. These estimates are non-amortized approximations of first-year costs to the City for Staff time and materials. Although a payback analysis is possible for some measures, only the initial costs were calculated to maintain consistency. For instance, while it is relatively easy to calculate a payback and internal rate of return for hybrid car purchases, it is difficult to calculate a payback for bicycle-friendly intersections.

In the summary table of each measure, the cost per metric ton of CO₂e reduction is calculated. Although this is a good estimate of value to use for comparison, it is important to consider rates of return, social factors, and City preference when comparing reduction measures. The initial costs can be updated as more information is available. Appendix A provides detailed methodology and assumptions for the initial cost analysis of each measure.

Methodology: Greenhouse Gas Emissions Reductions Analysis

The emissions reductions estimate for each measure uses the Climate and Air Pollution Planning Assistant (CAPPA) tool developed by ICLEI. The tool was created to assist local governments in developing customized plans for reducing climate change. CAPPA provides information and quantification tools for over 100 emission reduction strategies in its current form. City-specific data is entered into the CAPPA software and combined with emission coefficients and current research. Where a CAPPA reduction analysis wasn't applicable, current research and City data was compiled to create an estimate or to display that an estimate is not currently possible. Appendix B details the sources and input data for the estimates of greenhouse gas emissions reductions. Appendix B provides detailed methodology and assumptions for the greenhouse gas emissions reductions analysis of each measure.

IV. Energy Use Strategies

The 2005 baseline inventory reveals that the second largest contributor to San Carlos' greenhouse gas emissions (38.8%) comes from residential, commercial, municipal, and industrial energy use in San Carlos. Natural gas accounts for 48.3% of energy-related emissions while electricity accounts for 51.7%. The energy we consume in our homes contributes about half of the greenhouse gas emissions from electricity and natural gas while commercial/industrial/municipal properties contribute the other half. If energy consumption continues as usual, we can expect these emissions from the residential, commercial, industrial, and government sectors to increase 50% by 2030.

Table 4
Energy use “business-as-usual” projected emissions growth (CO₂e per year)

Sector	2005	2020	2030	Percent change from 2005 to 2030
Residential	49,178	53,312	56,259	14.4%
Commercial / Industrial / Municipal	54,619	78,454	99,876	82.9%
Total	103,797	131,766	156,135	50.4%

To address this significant cause of greenhouse gas emissions within San Carlos, reduction measures were formed by the Climate Action Plan Subcommittee and City staff. The measures to reduce greenhouse gas emissions from energy use in San Carlos are as follows:

1. Expand energy saving opportunities to businesses.
2. Improve residential energy efficiency.
3. Adopt a green building standard for new development and major remodels.
4. Create water and waste efficient landscapes.
5. Identify opportunities for on-site renewable energy generation on City and privately-owned property.
6. Implement reduction strategies included in the energy audit of City facilities. Continue to monitor City facility performance.
7. Provide for increased albedo (reflectivity) of urban surfaces including roads, driveways, sidewalks, and roofs in order to minimize the urban heat island effect.
8. Encourage tree planting

Even without the implementation of these measures, energy efficiency is expected to increase in the coming years. Recent state legislation will likely require energy efficiency

improvements on new buildings beginning in 2010 through the State's Green Building Code and improvements to Title 24. Additionally, the State has a renewable portfolio standard with a goal of obtaining at least 33% of the State's electricity from renewable power by 2020 and 50% by 2030. These reductions are analyzed more in Chapter 7.

1. Expand energy saving opportunities to businesses

**-13,300
Metric
Tons Co2e**

Commercial and industrial businesses account for 20.4% of the greenhouse gases in San Carlos. Many of these businesses, especially small businesses, lack the resources and time to promote energy efficiency. This measure would facilitate outreach to businesses and offer them assistance or incentives to become more efficient.

1.1. Consider Developing a Tax Rebate Program for Efficiency Improvements in Businesses

Although energy efficiency improvements usually pay for themselves in the long run, they can be costly at the onset. A financial incentive for improving energy efficiency would attract the attention of more businesses in San Carlos. Rebates would also help with initial costs of upgrades, which are often the greatest deterrent to energy efficiency improvements.

Initial Cost

An initial cost estimate for a tax rebate program cannot be made until a more specific scope for the program is developed. Under the City's current financial situation, it is unclear how much the City will be able to invest in such a program. However, long term feasibility is possible and is the reason this implementation strategy is categorized as a long term program rather than something that should be explored immediately. As other similar tax rebate programs are implemented throughout the state, viability of the program in San Carlos will likely become clearer.

Greenhouse Gas Emissions Reductions

An estimate of emissions reductions from this measure cannot be made until there are case studies or research findings upon which to base an estimate. To date, no California cities have offered property tax or business tax rebates for efficiency improvements, therefore an analysis outside of the scope of this Plan would be needed to determine market receptiveness to a tax rebate program in conjunction with rebates already provided by PG&E and the State.¹³

1.2. Expand Energy Saving Opportunities and Assistance for Large and Small Commercial and Industrial Businesses

Businesses are already feeling the burden of increased fuel and electricity costs. PG&E and RecycleWorks have services to help these businesses, but it would be beneficial to have a City staff person to make sure businesses are up-to-date and aware of current services, information, and rebates.

¹³ The State of California Solar Initiative offers property tax exceptions for solar panel installation.

Small businesses in particular are in need of energy efficiency assistance as they often lack time and capital to make such an investment. An example of a program targeted at small businesses is the City of Berkeley and the City of Oakland Smart Lights program, which provides businesses with hands-on assistance in assessing lighting needs and installing high-quality, energy-efficient appliances. Through the program, small businesses have reduced energy costs by 20-50% and improved lighting quality. Most of the participating businesses recover their costs in less than one or two years. Their program has also saved 3.5 million kWh of energy, \$580,000, and 850 tons of CO₂e over five years.¹⁴

Initial Cost

Providing outreach and assistance to businesses in San Carlos would be relatively easy due to the fact that PG&E, RecycleWorks, the City, and the County already have existing resources and programs for businesses to become more energy efficient. For instance, the City of San Carlos and County of San Mateo already participate in the Bay Area Green Business program.

Utility providers, other agencies, and businesses would be bearing the cost of improving energy efficiency in businesses. The cost of facilitation to the City is estimated to be approximately 50 hours of staff time per year or \$2,500-\$5,000 depending on Staff pay rate.



Green Business Program Success Story:

A+ Japanese Auto Repair

A+ Japanese Auto Repair in San Carlos was the first Green Certified Auto Repair facility in San Mateo County. The repair shop saw improvements in just the first 12 months since receiving Green Business certification such as:

- ❏ The facility now uses 15 recycling bins from paper, plastic, aluminum, and other metals and plastics. As a result, the shop has downsized its garbage bin from a 600 gallon bin to a 45 gallon bin.
- ❏ Energy and water cost savings have already paid for the installation of high-efficiency fluorescent ballasts and bulbs and low-flow water appliances.
- ❏ All engine oil, transmission oil, antifreeze, and other harmful substances are picked up by waste recyclers to be used in other products and services.

Based on these changes and others, A+ Japanese Auto Repair has cut its environmental impact by approximately 65%!

¹⁴ City of Berkeley Draft Climate Action Plan, www.berkeleyclimateaction.org, accessed September 5, 2008.

Greenhouse Gas Emissions Reductions

According to the San Carlos Chamber of Commerce, there are 2,100 businesses in San Carlos. Assuming that 1,000 (50%) of existing businesses and new businesses respond to and participate in energy efficiency outreach, it is estimated that emissions will reduce by at least 13,300 metric tons of CO₂e per year by 2030.

Table 5
Summary of Energy Use Reduction Measure 1

	Component	Initial Cost to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Consider developing a tax rebate program for efficiency improvements in businesses.	Unknown	Unknown	N/A
2	Expand energy saving opportunities and assistance for large and small commercial and industrial businesses.	\$2,500-\$5,000	13,300	\$0.18 - \$0.38
TOTAL		\$2,500-\$5,000	13,300	\$0.18-\$0.38

2. Improve residential energy efficiency

**-14,115
Metric
Tons Co2e**

The residential sector accounts for 18.4% of greenhouse gas emissions in San Carlos. This measure calls for multiple programs and requirements to reduce this significant contribution to our baseline.

Residents can take simple measures in their homes to save energy like buying efficient appliances, insulating, sealing leaks, adjusting the thermostat, and installing a hot water blanket. Outreach programs and City requirements would offer this information and, in some cases, create incentives for conservation.

2.1. Establish energy efficiency standards for new construction and remodel projects that exceed the State's 2008 Title 24 energy standards

All new construction and additions in California have been required to meet minimum energy efficiency standards since 1978. These standards, along with those for energy efficient appliances, have saved more than \$56 billion in electricity and natural gas costs.¹⁵

California's Title 24 revised energy standards



¹⁵ California Energy Commission. 2009. <http://www.energy.ca.gov/title24>.

were updated in 2008 and go into effect January 1, 2010. The new standard is intended to increase the energy efficiency of retrofits, renovations, and new construction 15% to 20% over 2005 Title 24 requirements depending on the building type and energy type.

The 2008 California Green Building Standards Code (CALGreen) includes 'reach' standards for new buildings that go beyond mandatory requirements. Tier 1 is approximately 15% above Title 24 and Tier 2 is 30% above Title 24. Tier 1 and 2 will be used in upcoming years as eligibility criteria for California's Go Solar initiative, future green building standards, and more.

Under this reduction measure, the City would mandate that new construction be built to Tier 1 Title 24 standard before it is required by the State. This approach to regulation allows the applicants to choose where their energy savings will come from, and as a result accommodates multiple building types and construction methods without restricting the applicants' choices about materials. This will ease implementation of California's goal to make new residential development zero net energy by 2020, which would require a 45% increase in efficiency over 2008 Title 24 mandates. This reduction measure also requires that San Carlos enforce a Tier 2 Title 24 standard to new construction by 2020, a level which will most likely be required by the State regardless of local action.

Initial Cost

It is estimated that writing energy efficiency standards for new construction and remodel projects would cost approximately 100 hours of Staff time, which equates to approximately \$10,000. There will be additional costs associated with staff time needed for plan checks; however this cost will be absorbed by the applicant.

Greenhouse Gas Emissions Reductions

More stringent Title 24 standards are expected to save approximately 4,184 metric tons CO₂e by 2020 and 10,732 metric tons CO₂e by 2030. This reduction is based on an impact study by the California Energy Commission and San Carlos's project emissions growth in these time periods.

2.2. Perform energy-efficient lighting retrofits and/or home energy audits

Home energy audits are an effective way to educate residents on energy efficiency in a hands-on manner. The Cities of Menlo Park, Redwood City, Palo Alto, and Sunnyvale participate in the Green@Home project, a service run by the nonprofit organization Acterra. The organization offers free home energy audits performed by trained volunteers from the community.¹⁶

San Carlos could consider partnering with Acterra or a similar organization to coordinate home energy audits. Conversely, it could work with community groups to coordinate efforts independent of a third party. Either way, home energy audits are especially effective in lowering consumption in homes built before the Title 24 standards came into effect in 1978.

¹⁶ Acterra, Green@Home. <http://www.acterra.org/greenathome/index.html>. Accessed October 13, 2008.

Initial Cost

The cost of this measure depends on whether the home energy audits are coordinated by a non-profit organization like Acterra or by community groups. The cost of enlisting the services of Acterra would be approximately \$35,000 for 250 two-hour home energy audits. On the other hand, costs to the City for a home energy audit program run by community groups would be negligible. We therefore assume that this reduction measure will have costs anywhere from \$0 - \$35,000.

Greenhouse Gas Emissions Reductions

According to the Home Energy Saver calculator developed by the Lawrence Berkeley National Laboratory, the difference between an efficient and inefficient home in San Carlos is approximately 2,400 kilowatt-hours (kWh) of electricity and 445 therms of natural gas per year.¹⁷ Assuming that an energy auditing program serves at least 500 existing homes before 2030, we can estimate that energy consumption in San Carlos would decrease by 600,000 kWh and 111,250 therms per year by 2020 and 1,200,000 kWh and 222,500 therms per year by 2030.¹⁸ Converting this figure into CO₂e, it is estimated that home energy audits will reduce emissions by 1,452 metric tons per year.

2.3. Expand the distribution of free or subsidized energy and water saving devices and services to the mass market

Subsidized devices are already readily available, but more education and outreach is needed about these opportunities. This reduction measure would call for 10,000 CFLs, 500 low-flow showerheads, and 500 faucet aerators to be distributed to the community before 2020 and again between 2020 and 2030. These distributions are in addition to the home energy audit reduction measure. The devices would be distributed through weatherization programs, community events, and targeted outreach.

Initial Cost

The cost of distributing free or subsidized energy and water saving devices and services is minimal assuming that supplies are provided as they have been historically by utility providers and through promotions.

Greenhouse Gas Emissions Reductions

This reduction measure would reduce energy consumption associated with lighting and with water filtration, movement, and heating. Specifically, this reduction measure would reduce greenhouse gas emissions from the following sources in the following ways:

- Compact Fluorescent Lightbulbs (CFLs): Each CFL saves an average of 44 kWh per year when replacing traditional incandescent bulbs.¹⁹ We estimate that 10,000 incandescent lightbulbs will be replaced with CFLs by 2020 and 10,000

¹⁷ Lawrence Berkeley Laboratory Home Energy Saver. <http://hes.lbl.gov/>, Session ID# 1260074, accessed January 2009.

¹⁸ Assumes 250 energy audits before 2020 and 250 additional audits before 2030.

¹⁹ ICLC CAPP software estimates 44 kWh a year in savings based on replacing half 100watt and half 60w incandescent bulbs with 25w and 15w cfls respectively (i.e. avg 80w replaced with avg 20w, for 60w per bulb savings). Assumes each bulb is on 2 hours per day, which is average for residential lights according to National Lighting Inventory and Energy Consumption Estimate 2002. http://www.eere.energy.gov/buildings/info/documents/pdfs/lmc_vol1_final.pdf.
 $60w \times 2\text{hours/day} \times 365 \text{ days/year} = 44 \text{ kWh/year}$

more incandescent lightbulbs will be replaced with CFLs by 2030. Assuming that CFLs continue to be used after initial replacement, we can estimate that energy consumption will reduce by 440,000 kWh per year. This is equivalent to 93 metric tons of CO₂e per year.

- ❏ **Low-flow showerheads:** Low-flow showerheads save energy associated with water filtration, movement, and heating. Assuming that 1,000 low-flow showerheads are distributed and used, this reduction measure could save 66 metric tons of CO₂e per year from the filtration, movement, and treatment of water. However, since energy for these purposes is not included in the baseline 2005 inventory, this reduction is provided as an information item only. Low-flow showerheads also save energy because they require less water to be heated. Assuming that 42 percent of San Carlos residents use electric water heaters and the rest use gas, this reduction measure would result in an additional reduction of 66 metric tons CO₂e per year. Since energy for heating water within homes is included in the 2005 baseline, this figure will be included in the analysis of San Carlos' total reductions.
- ❏ **Low-flow faucets:** Low-flow faucets, much like showerheads, save energy associated with water filtration, movement, and heating. As an information item, 1,000 low-flow faucets would save 6 metric tons of CO₂e per year from water filtration, movement, and treatment. In addition, this measure would save 12 metric tons of CO₂e from less water having to be heated. As described above, only the emissions reductions associated with in-home heating of the water will be included in the total of San Carlos' reductions.

CFLs, low-flow showerheads, and low-flow faucets together save an estimated 243 metric tons of CO₂e per year, 171 metric tons of which will be included in the final analysis of San Carlos' reductions.

2.4. Expand and better integrate programs that increase energy efficiency in low-income households

This measure will help to ensure that residents have the ability to respond to climate change equally. Low-income weatherization programs are often win-win situations; the City lowers its greenhouse gas emissions and the low-income resident saves money on their energy bill.

Initial Cost

The Federal Low-Income Household Energy Assistance Program (LI-HEAP) distributes funding for low-income weatherization services as does the U.S. Department of Energy and PG&E. It is likely that some coordination time from City staff would be necessary to determine applicant eligibility however this time is negligible and would most likely be covered by grants.

Greenhouse Gas Emissions Reductions

Based on studies of similar low-income weatherization programs, it is estimated that this reduction measure will save approximately 1,760 metric tons of CO₂e per year, assuming that 1,000 homes are served before 2030.

Table 6
Summary of Energy Use Reduction Measure 2

	Component	Initial Cost to the City	GHG Reduction (metric tons CO₂e / year)	Cost per metric ton CO₂e
1	Consider establishing energy efficiency standards for new construction and remodel projects that exceed the State's Title 24 energy standards.	\$10,000	10,732	\$0.93
2	Perform energy-efficient lighting retrofits and/or home energy audits.	Negligible - \$35,000.	1,452	\$0 - \$24.10
3	Expand the distribution of free or subsidized energy and water saving devices and services to the mass market.	Negligible	171	Negligible
4	Expand and better integrate programs that increase energy efficiency in low-income households.	Negligible	1,760	Negligible
TOTAL		\$10,000 - \$45,000	14,115	\$0.93 - \$25.03

3. Adopt a green building standard for new development and major remodels

**-11.868
Metric
Tons Co2e**

"Green Building" is defined as a whole-systems approach to the design, construction, and operation of buildings that helps mitigate the environmental, economic, and health impacts of buildings. Green building practices recognize the relationship

between natural and built environments and seek to minimize the use of energy, water, and other natural resources and provide a healthy productive indoor environment. There are multiple organizations that offer green building certification including Build It Green's GreenPoint Rated system (GreenPoint) and Leadership in Energy and Environmental Design (LEED). In addition, the

California Building Standards Commission has adopted a green building code for new development. In October 2003, the State of California released an in-depth analysis called *The Costs and Financial Benefits of Green Buildings*, which presented a



comprehensive study on the cost benefits of green buildings and concluded that the financial upside exceeds the cost by a factor of ten-to-one.²⁰

This measure would enforce a green building standard for new construction or major remodels in the City of San Carlos. There are many standards to choose from, including the GreenPoint rating system, LEED, the State, or a customized green building checklist created by City staff. Municipalities often choose a combination of standards. For instance, for buildings in unincorporated areas, the County of San Mateo requires GreenPoint or LEED certification for new residential construction and 50% remodels and requires LEED certification for new commercial construction and remodels over 3,000 square feet²¹. On the other hand, the City of San Mateo has implemented a voluntary Green Building ordinance in order to consider making the program mandatory after one year.

The Climate Action Plan explored two alternative methods of achieving this reduction measure: 1) Enforce the mandatory California Green Building Standard Code (CALGreen) and provide information and support to developers on LEED and GreenPoint standards, analyzed in Appendices A and B as Energy Use measure 3.1A OR 2) Create a green building ordinance requiring a GreenPoint, LEED, or equivalent green building certification per development category, analyzed in Appendices A and B as Energy Use measure 3.1B. Based on the City Council adoption of the Climate Action Plan on October 12, 2009 by Resolution 2009-080, Energy Use measure 3.1B is the selected alternative.

Implementation of a green building standard would include providing additional training for zoning and building staff to enable them to assist developers with their green building requirements. Adequate training for staff will save developers time and maintain the City of San Carlos as a convenient place to do business.

Green Building Success Story: Santa Rosa BIG

The City of Santa Rosa launched its Santa Rosa Build It Green (SR BIG) program in 2003. A voluntary program, SR BIG promotes building and remodeling homes in a way that reduces energy demands, releases far fewer pollutants into the atmosphere, conserves water and reduces construction waste. The program follows a set of simple but comprehensive Green Building Guidelines that provide a roadmap for building design and construction. SR BIG-certified homes look like any other home, and include large custom homes, production subdivision homes, affordable homes (built by Habitat for Humanity) and municipal remodeled dwellings, such as the Santa Rosa Samuel Jones Hall Homeless Shelter. An SR BIG home is at least 11 percent more energy efficient than a conventional new home and is commensurately less expensive to heat, cool and operate.



Source: <http://www.cacities.org/index.jsp?zone=wcm&previewStory=26804>

²⁰ Kats, Greg. The Costs and Financial Benefits of Green Buildings, October 2003. <http://www.usgbc.org/Docs/News/News477.pdf>

²¹ San Mateo County Ordinance No. 04411, February 26, 2008.

3.1A. Enforce mandatory and encourage voluntary actions under the California Green Building Standards Code (as amended) in addition to continuing support to developers on LEED and GreenPoint standards

This reduction measure is currently the standard in San Carlos. It calls for the promotion of LEED and GreenPoint standards in addition to enforcing and supporting the California Green Building Standard Code (CALGreen). CALGreen is the first state-wide green building standard in the country and contains both mandatory and voluntary green-building measures that address areas such as energy efficiency, water consumption, dual-plumbing systems for potable and recyclable water, diversion of construction waste from landfills, and use of environmentally sensitive materials in construction and design (including eco-friendly flooring, carpeting, low VOC paint, adhesives, thermal insulation and acoustical wall and ceiling panels).²² Code requirements are currently voluntary and become mandatory on January 1, 2011.

The majority of the benefits from this measure are included or superseded by Energy Use Measure 2.1 and Waste Measure 3.1. With implementation of measure 3.1B, measure 3.1A would no longer apply. This reduction measure calls for increased outreach by planners and City staff, which has already started. This increased outreach would leverage training and communication already required by the mandatory code enforcement to support voluntary Code measures, LEED certification, GreenPoint certification, and other certification programs as appropriate.

Initial Cost

The initial costs for implementation of this measure include City staff training and additional staff time. The cost of training five City staff members in green building would be approximately \$1,000 for materials and 40 hours of Staff time. However, since this training is mandatory under State law, it will not be considered a cost under this reduction measure. Additional time for promoting LEED, GreenPoint, and other certifications would be equivalent to the level of promotion already taken at City Hall. Therefore, additional costs from this reduction measure are negligible.

Greenhouse Gas Emissions Reduction

Much of the energy and greenhouse gas savings from this measure are captured in Energy Use Measure 2.1, which calls for establishing energy efficiency standards above the CALGreen requirements. Additional greenhouse gas reductions are included in Solid Waste Measure 3.1, which calls for increased construction and demolition diversion requirements. It is estimated that promotion of voluntary Code requirements and promotion of LEED/GreenPoint certification would lower energy consumption in new development and remodels by an estimated 5%. These savings would lower greenhouse gas emissions from the built environment by roughly 466 metric tons of CO₂e per year by 2020 and 535.5 metric tons per year by 2030.



²² California Building Standards Commission, *California Green Building Standards Code*, Effective August 1, 2009. http://www.documents.dgs.ca.gov/bsc/2009/part11_2008_calgreen_code.pdf

3.1B. Develop a green building ordinance that is consistent with that of neighboring jurisdictions or that is custom to the City of San Carlos that requires a GreenPoint, LEED, or equivalent green building certification per development category.

This measure, selected by the City Council as the preferred green building option, requires the City to adopt a customized green building ordinance similar to other approaches to green building currently moving forward in the Bay Area. This option could be developed as a stand alone green building ordinance specific to the City of San Carlos, or could be completed in coordination with neighboring jurisdictions, the County of San Mateo, or other appropriate entity as preferred by the City Council. This green building option would require a more rigorous set of green building standards than those that may be required by the State. Although there are a number of options for development of a green building code, the requirements would generally be created in cooperation with neighboring cities and counties in order to create regional consistency and therefore ease obstacles to development at the regional level.

Initial Cost

Depending on the type of green building ordinance adopted (regional or custom), the cost of development of the code could vary substantially.

For a regional approach, as preferred by the City Council, the primary costs would be related to development of the green building ordinance since there would be no public workshops or local coordination at the City level. According to City staff, if the ordinance is coordinated with neighboring jurisdictions or coordinated regionally, the cost of the ordinance would be minimal, with only staff time to coordinate the process. Training on LEED and GreenPoint certification would require a day-long training session with approximate costs of \$10,000 for staff time, ordinance and materials.

For a custom approach, the up front cost of developing a green building ordinance just for the City of San Carlos could be higher. According to staff cost estimates and informal queries of neighboring jurisdictions, costs could range from less than \$10,000 to over \$100,000. Most formal cost estimates do not account for staff time associated with project development and are not consistent with our conservative approach to estimating fully loaded cost. For this reason, comparable studies were not available to inform this cost/benefit analysis. Staff estimated the amount of time it would take for City staff to develop a green building code in coordination with consultants and other regional resources.

With San Carlos' history of public involvement, the City could host public workshops to ensure the stakeholders in the community can be involved in what is included in a custom green building code for the City. With the cost of the workshops, writing a custom ordinance, and managing the ordinance development process, the fully loaded costs for the City of San Carlos are estimated to be in the range of \$50,000 to \$75,000. Fully loaded costs include staff time, consultant time, workshop facilitators, and materials for distribution and training for building department employees. If this

option is selected, staff will apply for grant funding to cover the costs but there is no guarantee that these funds would be granted.

For either approach above, an estimated \$100-\$200 in staff time per plan check would also be necessary with the implementation of LEED, GreenPoint, or equivalent building standard, however this cost would be absorbed by the developer through application fees.

Greenhouse Gas Emissions Reductions

LEED, GreenPoint, or equivalent standards are estimated to lower energy consumption in new development and remodels by an estimated 30%. These savings would lower greenhouse gas emissions from the built environment by roughly 11,868 metric tons of CO₂e per year.

**Table 7
Summary of Energy Use Reduction Measure 3**

	Component	Initial Cost to the City	GHG Reduction (metric tons CO₂e / year)	Cost per metric ton CO₂e
1A	Provide information and support to developers on LEED and GreenPoint standards and enforce State green building standards.	Negligible	535.5 (not included in total)	Negligible
OR				
1B	Develop a green building ordinance either consistent with that of neighboring jurisdictions or custom to the City of San Carlos that requires a GreenPoint, LEED, or equivalent green building certification per development category.	\$10,000	11,868	\$0.84
	Total	\$10,000	11,868	\$0.84

4. Create water and waste efficient landscapes.

**-416
Metric
Tons Co2e**

Expand the current landscaping ordinance to require efficient landscaping in conjunction with residential and commercial property developments and major remodels

The City of San Carlos already has a water-efficient landscaping requirement (Municipal Code Section 15.64) for new residential improvements going before the Residential Design Review Committee. This measure would expand upon the current ordinance to require efficient landscaping practices in new developments and major remodels.

An example of a more encompassing water-efficient landscaping ordinance is that of the City of Menlo Park. Their ordinance requires new development and landscape renovations to submit a landscape plan with sprinkler flow rates, a soils test, irrigation schedule, plant selection, and more.²³

Initial Cost

To update and enforce a more restrictive landscaping ordinance, approximately 40 hours of staff time or \$2,000-\$4,000 would be required. As an information item, additional review by plan-checkers is estimated to be an added half hour per application or \$3,750-\$7,500 assuming 150 qualifying plan checks per year; however these additional costs will be absorbed by the applicants.

Greenhouse Gas Emissions Reductions

This measure saves water and thus the energy used for water filtration and movement. It also lowers the amount of yard waste sent to landfills and reduces demand on our limited supply of fresh water, which largely comes from the potentially-overburdened Hetch Hetchy reservoir system.

The average acre of lawn in the U.S. uses 652,000 gallons of water each year. In northern California, 10,000 gallons of water takes 54 kWh for indoor use and 35 kWh for outdoor use for transport, treatment, distribution, and wastewater treatment.

Using these figures, it can be estimated that a more efficient landscaping requirement would reduce emissions by 416 metric tons of CO_{2e} per year solely from new development.²⁴ However, since emissions from water consumption within the City were not included in the 2005 Greenhouse Gas Inventory, this reduction cannot be deducted from the baseline as part of our reduction analysis. Therefore, this reduction is an information item only.



²³ City of Menlo Park, "Water-efficient Landscaping Ordinance."

<http://www.menlopark.org/departments/pln/waterlandord.pdf>, accessed Sept. 30, 2008.

²⁴ General Plan Buildout estimates show an increase of 1,686 households before 2030. For the analysis, 50% (843) were assumed to be detached family houses requiring efficient landscaping. Since recent California-specific data is unavailable, the national average yard size (.5 acres) was used as well as national averages for lawn mower gasoline consumption, average waster consumption per acre of lawn, and average energy use per gallon of water.

Table 8
Summary of Energy Use Reduction Measure 4

	Component	Initial Cost to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Expand the current landscaping ordinance to require efficient landscaping in conjunction with residential and commercial property improvements.	\$2,000 - \$4,000	416*	\$4.81 - \$9.62
TOTAL		\$2,000 - \$4,000	416*	\$4.81 - \$9.62

* Information Item Only. Greenhouse gas emissions from water filtration, movement, and treatment were not included in the baseline inventory of emissions referenced in this report as a disaggregated total; therefore these reductions cannot be added to the total reductions from the baseline year.

5. Identify opportunities for on-site renewable energy generation on City and privately-owned property

**-394
Metric
Tons Co2e**

The City does not currently have a formalized program to support on-site energy generation in its facilities or in its municipal code. The City does have solar panels installed on its public work's corporation yard building which generates much of the power used onsite. This reduction measure calls for the City to complete additional research and identify opportunities for incorporating on-site renewable energy generation devices into municipal code language, installing them in additional City-owned facilities, and educating businesses about their benefits. There are multiple State programs that can be used to encourage alternative energy and net-metering. This measure would ensure that City officials and businesses are aware of these programs offering financial assistance and environmental benefits.

****A Note on overall initial cost and emissions reductions for the following supporting measures:** Implementing this measure and its three components (solar, wind, and biomass power) would initiate a \$10,000 one-time cost for a feasibility study of on-site energy generation. The study would focus on incorporating more renewable energy sources into City facilities and services. Until this initial feasibility study and the municipal greenhouse gas audit are completed, it is difficult to make accurate estimations of initial cost and greenhouse gas emissions reductions. For instance, we know that using solar as the power source of sewer pump stations would cost an average \$9 per watt for systems above 2kW, but until the municipal greenhouse gas inventory is complete we do not know how many watts would be replaced.²⁵ However, in order to give some idea of what the energy savings and costs would be to the City for implementing these measures, we are attaching minimum figures to these measures solely for the purpose of weighing the priority of these measures against others in this report.

²⁵ Find Solar. www.findsolar.com. Accessed October 16, 2008.



San Carlos REI Installs Solar Panels

In the fall of 2008, the REI store in San Carlos installed what is believed to be the largest photovoltaic array in San Carlos. This 99 kW system is expected to provide 40% of the store's annual energy needs and save the co-op \$24,000 annually. Avoiding creation of 152,000 pounds of carbon dioxide emissions also fits with the company's environmental commitment. "This investment in solar technology will deliver both financial and environmental benefits, helping to contribute to the long-term strength of the co-op and support our goal to reduce our carbon footprint," said REI's Brian Unmacht.

5.1. Identify opportunities for increasing solar system installations in the community and on City facilities

Under this reduction measure, opportunities for solar panel installation on City facilities would be identified and the permitting process for community installations aided. Maximizing solar panel usage on City facilities is a good way to increase visibility and awareness of solar power. Local governments can borrow money at low interest rates for solar system installation.

Another integral part of this measure is to allow for easy and affordable approval processes for the installation of solar panels within the community. The City could explore options like eliminating the Electrical Permit Fees for Solar Photovoltaic (PV) panels.

For our estimates of initial cost and minimum greenhouse gas emissions savings, it is assumed that the City will install a minimum of an additional 100 kW system on City property and help facilitate at least 300 kW of PV system installations on businesses and houses.

Initial Cost

The average cost of PV installation per kW is \$9,000 without subsidies or financial assistance.²⁶ Keeping with our assumptions above, the gross cost to the City for installing an additional 100 kw of solar panels would be \$900,000 with a 50-year simple payback. Half of this cost is estimated to be paid back by the California Solar Initiative (CSI) with remaining costs being recovered through decreases in energy spending.²⁷

²⁶ Solar Buzz, "Fast solar energy facts," <http://www.solarbuzz.com/FastFactsIndustry.htm>, accessed November 1, 2008. Middle of \$8-10 per watt price range

²⁷ California Solar Initiative pays \$0.50 per kWh for solar power generation in the first five years. With an average of 4.5 hours of sunlight each day over the course of a year (Rocky Grove Sun Company, "How many PV modules?" <http://www.rockygrove.com/design/howmany.html>, accessed November 3, 2008) we can estimate that a 100 kW

The remaining \$450,000 can be paid incrementally through loans, but for the purpose of this analysis we are assuming the initial cost will be paid up front.

Greenhouse Gas Emissions Reductions

Solar power uses sunlight to create energy, thus eliminating the need for fossil fuels which produce greenhouse gas emissions. As described earlier, San Carlos has already installed a 60 kW PV system atop of the corporation yard and helped facilitate the installation of 83 kW of residential solar system installation.

The addition of 400 kW of solar energy in place of traditional energy would reduce emissions in San Carlos by 263 metric tons of CO₂e per year. This estimate is based on the average hours of sunlight throughout the year (4.5 hours).

5.2. Identify opportunities for Wind energy generation

Under this reduction measure, the City would identify opportunities for increasing wind energy generation in appropriate locations for both the community and City facilities. Wind energy can be very cost-effective in windy areas. Even a small wind turbine can produce enough energy to power a home, small business, or school. For instance, the City of Berkeley installed a 35 foot high turbine at a nature center and it produces 60-80% of the building's electricity use.

As part of the initial feasibility study for on-site energy production, it is recommended that the City identify barriers to the installation of small wind turbines such as permitting complications, zoning barriers, and utility grid hookups.

Initial Cost

Small wind energy systems cost from \$3,000 - \$5,000 for every kilowatt of generating capacity, or about \$40,000 for a 10 kW installed system without taking into account rebates or incentives.²⁸ For the purpose of analyzing the cost benefit of this measure, we will assume that the City installs ten small-scale wind turbines, which would equal \$30,000 - \$50,000 without assistance.

The California Solar Initiative provides rebates for wind turbines less than 50 kW. The American Wind Energy Association estimates that this program, along with other federal programs, will cover the cost of a wind turbine within 10 years, resulting in 20 years of relatively no-cost energy.²⁹

For the purposes of this study, we will assume that half of the cost of the wind turbines will be borne up-front in order to create consistency with other measures that also have a payback. Therefore, the initial cost of ten wind turbines is



system would produce 164,250 kWh per year (100 kW of PV installed * 4.5 sun hours per day * 365 days = 164,250 kWh-hours (kWh). This equates to \$410,625 over five years, or roughly half of the cost of installation.

²⁸ American Wind Energy Association (AWEA), "Finding Incentives,"

<http://www.awea.org/smallwind/toolbox2/financing.html>, accessed November 3, 2008.

²⁹ AWEA, "Finding Incentives"

estimated to be \$15,000 - \$30,000 assuming most planning and coordination by Staff is completed as part of the initial feasibility study.

Greenhouse Gas Emissions Reductions

For the purpose of this cost/benefit analysis, we assumed the City will install at least ten small-scale wind turbines and the community will install at least five. Each turbine of 10 kW will produce approximately 22,000 kWh per year.³⁰ That's a total of 328,500 kWh of clean energy produced per year in San Carlos and 131 metric tons of CO₂e prevented from release into the atmosphere.

5.3. Identify opportunities for Biomass energy opportunities

This measure would lead to the identification of opportunities for biomass energy production and consumption. Biomass energy is energy from plants and plant-derived materials like agricultural waste, yard waste, and even methane from waste decomposition. It can be used for power production, products, and fuels.³¹

It is difficult to make an estimate of initial cost and greenhouse gas emissions reductions from biomass energy, even for the sake of analysis. The only method of biomass energy production that is quantifiable is methane capture. However, since the landfills serving the City of San Carlos are all outside of City limits, it is unlikely that this biomass energy could be routed back into City limits.

**Table 9
Summary of Energy Use Reduction Measure 5**

	Component	Initial Cost to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
Overall Cost for a feasibility study of on-site renewable energy generation		\$10,000	0	N/A
1	Identify opportunities for increasing solar system installations in the community and on City facilities.	\$480,000*	263*	\$1,825
2	Wind energy generation	\$15,000 - \$30,000*	131*	\$114.50 - \$229
3	Biomass energy	Unknown	Unknown	N/A
TOTAL		\$505,000 – \$520,000	394	\$1,282 - \$1,320

* These are minimum estimates of what the City could produce under these measures for the purpose of the cost/benefit analysis. These cost estimates do not factor in the energy use reductions that would result, and the associated utility bill savings. Estimated return on investment is 15-20 years.

³⁰ 10 kWh system * .25 capacity factor * 24 hours/day * 365 days per year = 21,900 kWh. Capacity factor provided by AWEA at <http://www.awea.org/faq/basicen.html> accessed November 4, 2008.

³¹ National Renewable Energy Laboratory, Biomass Energy Basics. http://www.nrel.gov/learning/re_biomass.html. Accessed October 13, 2008.

6. Implement reduction strategies included in the energy audit of City facilities and continue to monitor City facility performance

**-16
Metric
Tons Co2e**

The City is currently working on auditing the energy performance of City owned and operated facilities. This measure is to implement the recommendations included in the audit to increase efficiency in City-owned and -operated buildings. The City may also consider seeking energy audits of organizations to which it makes financial contributions.

A lighting audit of the Adult Community Center (ACC) has already been completed. The preliminary audit shows that the City will save approximately \$91,000 in the long run from a lighting retrofit in the ACC alone!

Lighting retrofits and other measures will continue to save the City money on electricity while lowering its greenhouse gas emissions. It will also establish the City as an example for privately-owned facilities to follow.



Initial Cost

Until the audit is completed, the cost of modifying City facilities and their operations to increase efficiency is unknown.

Greenhouse Gas Emissions Reductions

The total greenhouse gas emissions reductions cannot be calculated until the audit of City facilities is completed. However, from the completed audit of the Adult Community Center we can calculate that at least 16 metric tons of CO_{2e} will be saved annually.

**Table 10
Summary of Energy Use Reduction Measure 6**

	Component	Initial Cost to the City	GHG Reduction (metric tons CO _{2e} / year)	Cost per metric ton CO _{2e}
1	Implement the audit of municipal facilities when completed	Unknown	16	N/A
TOTAL		Unknown	16	N/A

7. Provide for increased albedo (reflectivity) of urban surfaces including roads, driveways, sidewalks, and roofs in order to minimize the urban heat island effect

**-2,230
Metric
Tons Co2e**

'Cool roofs' and 'cool pavements' are made of materials with higher solar reflectivity, which counters the urban heat island affect and reduces air conditioning use. Dark pavement and roofs absorb heat from the sun, creating higher urban temperatures and increasing the need for air conditioning. According to a recent study by Akbari, Menon, and Rosenfeld, using white materials for a 1,000 square foot roof can reduce carbon dioxide emissions by approximately 10 metric tons and urban surface temperatures up to three degrees.

California has required white colored material for flat roofs since 2005. Under this reduction measure, the City would pave surfaces with high-albedo concrete or aggregate when in need of repair with the overall goal of paving 15% of hardscape under the City's control with high albedo materials. Surfaces can include parking lots, sidewalks, driveways, and roads.

Initial Cost

The US Environmental Protection Agency identifies multiple cool pavement technologies, many of which are similar if not lower in cost to traditional asphalt. There would be some staff time for coordinating with public works and including the high albedo content requirements in the design of projects included in the Capital Improvement Plan (CIP). CalTrans would also need to be contacted regarding El Camino Real and the State's efforts to increase albedo on State highways.

Greenhouse Gas Emissions Reduction

The Lawrence Berkeley National Laboratory Urban Heat Island Group estimates that pavement reflectivity can be raised on average only 15% in an urban area. This 15% causes four metric tons of carbon dioxide to be offset per 1,000 square feet replaced when compared to traditional asphalt. Assuming that 12% of San Carlos is covered in pavement, or approximately 2 million square feet, and assuming that 30% of hardscape controlled by the City is repaved with high albedo content material by 2030, we estimate that this measure will result in at least 2,320 metric tons of CO₂ equivalent savings per year.

Table 11
Summary of Energy Use Reduction Measure 7

	Component	Initial Cost to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Provide for increased albedo (reflectivity) of urban surfaces including roads, driveways, sidewalks, and roofs in order to minimize the urban heat island effect.	Negligible	2,320	Negligible
TOTAL		Negligible	2,320	Negligible

8. Encourage tree planting

**-356
Metric
Tons Co2e**

This reduction measure calls for increased support for community tree planting programs and more rigorous tree planting requirements for new development. Trees reduce greenhouse gas emissions by naturally sequestering carbon dioxide and creating more oxygen. Additionally, the shade from trees helps minimize or prevent the urban heat island effect, a condition where urban surface and air temperatures are higher than rural surrounding areas due to development patterns.³² The urban heat island effect can have a large impact on local air temperatures and long-term climate patterns. Air temperature differences of approximately 3.6°F to 7.2°F have been observed for urban neighborhoods of contrasting tree cover, averaging approximately 1.8°F per 10% canopy cover.³³

8.1. Provide for City assistance to community tree planting programs and efforts

Many individuals and community groups would be able to coordinate tree planning programs with help from the City. Namely, community efforts need help coordinating with utility providers over the safe and adequate placement of trees to ensure that they do not conflict with underground utility pipes and overhead wiring. The City could also provide design examples and standards to the public for the selection and placement of trees. By reaching out to community groups and



³² US Environmental Protection Agency, "Heat Island Effect." <http://www.epa.gov/hiri/about/index.html>. Accessed Oct 12, 2008.

³³ Scott, Simpson, and McPherson. "Effects of Tree Cover on Parking Lot Microclimate and Vehicle Emissions." *Journal of Arboriculture* 24(3): May 1999, 129.

offering support, it will become easier to plant trees on private property and parking lots.

Initial Cost

The cost of this measure would be twenty hours of staff time required for kickoff of the program and the preparation of a Council resolution (\$1,000-\$2,000 depending on staff wage). There would be an additional staff time cost of one hour per tree for coordination. Assuming that 200 trees are planted by community tree planting programs, this could be up to \$20,000 in staff cost, however this does not take into consideration community participation. Depending on the level of staff involvement, this measure could cost anywhere from \$1,000 with community group and resident participation to \$22,000 with entirely municipal coordination.

Greenhouse Gas Emissions Reductions

It is estimated from previous tree-planting programs that the community would plant approximately 400 new trees as a result of a City assistance program. This measure would be implemented in two phases: 1) 200 trees planted before 2020 and 2) 200 trees planted before 2030. Based on known carbon sequestration rates and studied decreases in cooling costs as a result of increased tree canopy, it is estimated that planting 400 trees within the City of San Carlos will save 102 metric tons of CO_{2e} per year.

8.2. Require a specific tree coverage and tree replacement requirement for new development

San Carlos currently requires 10% landscaping for new development, but this landscaping can be placed anywhere on the property. Providing for even shading throughout parking lots and properties will shade houses and pavement, thus reducing the cooling costs, energy use, and the urban heat island effect. This requirement would also allow for solar panels to be installed in lieu of trees being planted when these panels provide shade on parking lots.

Initial Cost

This reduction measure can be implemented as part of the next Zoning Code update. Staff estimates that updating the zoning code with shading requirements (including the shading requirement in the next measure) will take 36 hours of Staff time, which is equivalent to \$1,800 - \$3,600.

Greenhouse Gas Emissions Reductions

Based on San Carlos' projected commercial and residential growth rates, we estimate that this reduction measure will result in 900 additional trees within the City by 2030. It is estimated that planting these 900 trees will save 228 metric tons of CO_{2e} per year due to known carbon sequestration rates and studied decreases in cooling costs as a result of



increased tree canopy.

8.3. Develop and implement a shading requirement for City-owned parking lots

While the City is unable to require existing parking lots and developments to adhere to a shading requirement, it is able to renovate its own parking lots and streets to include more trees. This reduction measure should allow for solar panels to be installed in lieu of trees when they provide equivalent shading.

Initial Cost

This reduction measure is more cost intensive than the previous two. According to the Department of Public Works, the cost per tree would be \$1200 per year for watering for the first five years and eight hours a year of maintenance (trimming, debris cleanup, etc.). Averaging these yearly costs, a tree costs approximately \$10,000 over its lifespan. Assuming 50 trees are planted as a result of this measure, an estimated cost of \$500,000 would be borne over time. However, since maintenance and upkeep costs are not included in the initial cost analysis, this figure is for information only.

Installing trees in existing parking lots is also expensive because half of a parking spot is lost for every tree. This loss of parking invalidates the \$15,000 spent for construction of the parking spot; however this figure will not be included in our total as it is a sunk cost.

Actual costs for developing a shading requirement for City parking lots is combined with the previous measure for a total of 36 hours staff time.

Greenhouse Gas Emissions Reductions

It is estimated that a shading requirement for City-owned parking lots would result in 100 new trees within the City of San Carlos. Based on known carbon sequestration rates and studied decreases in cooling costs as a result of increased tree canopy, it is estimated that these 50 trees will save 26 metric tons of CO_{2e} per year.

Table 12
Summary of Energy Use Reduction Measure 8

	Component	Initial Costs to the City	GHG Reduction (metric tons CO _{2e} / year)	Cost per metric ton CO _{2e}
1	Support community tree planting programs	\$1,000 - \$22,000	102	\$9.80 - \$215.69
2	Create a shading requirement for new development	\$1,800-\$3,600	228	\$7.09 - \$14.17
3	Develop a shading requirement for City parking lots		26	
TOTAL		\$12,800-\$25,600	356	\$35.96 - \$71.91

Energy Use Reduction Measures – Progress to Date

We are well on our way to achieving the emissions reductions outlined in this chapter. Between our baseline year of 2005 and the development of this Plan in 2009, the City and community have embarked on multiple projects and programs to reduce emissions in the energy sector. These efforts are summarized below and measured in comparison to the overall 2030 energy emission reduction target.

San Carlos Green Business Program

At the invitation of San Mateo County Supervisor Mark Church and the County's Recycle Works.Org Division, San Carlos became one of 6 cities in San Mateo County to pilot this County's participation in the Bay Area Green Business Program last summer. The program, which started 10 years ago in Alameda County is sponsored by the Association of Bay Area Governments (ABAG) and encourages local businesses of all sizes to adopt Green Business Practices and then to participate in a certification process. Certification involves completing an 11 page checklist, working with your City, local utilities and regulators and the County. Certified Green Businesses receive a Green Business Program window sticker for their firm, Green Business artwork for their web site and a listing in a Bay Area Green Business Guide that now tops 1,000 firms.

To date, 20 San Carlos businesses have earned the Bay Area Certified Green Business designation. Several more are in the process of gaining their Certified Green Business award.

We estimate that this effort to date has reduced **133 metric tons of CO₂e**, which contributes directly to Reduction Measure 1 – Expand Energy Saving Opportunities to businesses.

“Greenest City Challenge”

San Carlos won third place nation-wide in the Yahoo! “Greenest City Challenge” in 2007 and received 5,000 compact fluorescent light bulbs (CFLs), which were distributed to residents. Additionally, between 2007 and 2008, San Carlos Green distributed 450 additional CFLs donated by PG&E, along with 200 garden hose nozzles, 100 low-flow shower heads, 200 low-flow sink aerators, and several hundred toilet leak detection tablets donated by California Water Service Company. All devices were accompanied by literature on energy and water conservation.

The LED lightbulbs are estimated to have saved **26 metric tons of CO₂e**, which contributes directly to Reduction Measure 2 –Improve Residential Energy Efficiency

The San Carlos Community Solar Program

In 2007, residents were invited to participate in the Community Solar Discount Program in partnership with Solar City and San Carlos Green. The 18 participating residents

exceeded the Program's goals, installing 83kW of solar power generation in just three months.

The Community Solar Program is estimated to save approximately **54 metric tons of CO2e per year**, which contributes directly to Reduction Measure 5 - Identify opportunities for on-site renewable energy generation on City and privately-owned property.

Analysis of Reduction Target – Energy Use

The emissions reductions estimates from energy use are summarized below. As the chart concludes, the eight energy use measures analyzed in this chapter are estimated to reduce energy emissions by approximately 18%.

Table 13
Summary of Emissions Reductions from Energy Use Reduction Measures

		2030 Metric Tons CO ₂ e per year
Reference year 2030 Energy Use "Business-as-Usual" Emissions		156,135
1	Expand energy saving opportunities to businesses	- 13,300
	1.1. Consider developing a tax rebate program for efficiency improvements in businesses.	
	1.2. Expand energy saving opportunities and assistance for large and small commercial and industrial businesses.	
2	Improve residential energy efficiency	- 14,115
	2.1. Establish energy efficiency standards for new construction and remodel projects that exceed the State's Title 24 energy standards.	
	2.2. Perform energy-efficient lighting retrofits and/or home energy audits.	
	2.3. Expand the distribution of free or subsidized energy and water saving devices and services to the mass market.	
	2.4. Expand and better integrate programs that increase energy efficiency in low-income households.	
3	Adopt a green building standard for new development and major remodels.	- 11,868
	3.1a. Enforce State green building requirements and provide information and support to developers on LEED and GreenPoint standards. Option 3.1b, if chosen, would replace option 3.1a.	
4	Create water and waste efficient landscapes.	*- 416
	4.1. Formalize the City's efficient landscaping practice by writing it into the Parks Master Plan.	
	4.2. Expand the current landscaping ordinance to require efficient landscaping in conjunction with residential and commercial property improvements.	

		2030 Metric Tons CO ₂ e per year
Reference year 2030 Energy Use "Business-as-Usual" Emissions		156,135
5	Identify opportunities for on-site renewable energy generation on City and privately-owned property.	- 394
	5.1. Identify opportunities for increasing solar system installations in the community and on City facilities.	
	5.2. Identify opportunities for Wind energy generation.	
	5.3. Identify opportunities for Biomass energy opportunities.	
6	Implement reduction strategies included in the energy audit of City facilities. Continue to monitor City facility performance.	- 16
	6.1. Implement reduction strategies included in the energy audit of City facilities. Continue to monitor City facility performance.	
7	Provide for increased albedo (reflectivity) of urban surfaces including roads, driveways, sidewalks, and roofs in order to minimize the urban heat island effect.	- 2,320
	7.1. Provide for increased albedo (reflectivity) of urban surfaces including roads, driveways, sidewalks, and roofs in order to minimize the urban heat island effect.	
8	Encourage tree planting	- 356
	Support community tree planting programs	
	Create a shading requirement for new development	
	Develop a shading requirement for City parking lots	
Total Community Energy Use Emissions Reduction		- 42,369
California Renewable Portfolio Standard (RPS)		- 31,566
Net 2030 Community Energy Use Emissions		**81,665
Base Year 2005 Energy Use Emissions		103,797
Percent below 2005 level		9.89%

* Information Item Only. Greenhouse gas emissions from water filtration, movement, and treatment were not included in the baseline inventory of emissions referenced in this report as a disaggregated total.

**Does not include emissions reductions from water (Measure 4)

V. Transportation and Land Use Strategies

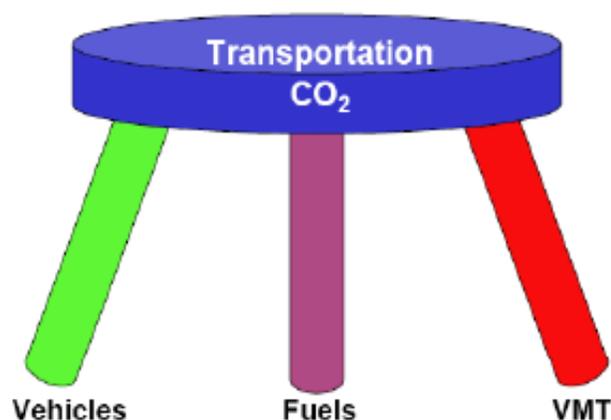
The transportation sector is the largest contributor to greenhouse gas emissions in San Carlos (56.4%). These emissions are from vehicles traveling on the length of State Highway 101 running through San Carlos, on-road vehicle miles traveled, and an estimate of Caltrain diesel consumed by San Carlos weekday commuters. If traffic patterns within San Carlos continue as business-as-usual, it is estimated that emissions from the transportation sector will increase by over 14.5% due to population growth and historic growth rates.

**Table 14: Transportation “Business-as-Usual”
Projected Emissions Growth (CO₂e per year)**

Sector	2005	2020	2030	Percent Change from 2005 to 2030
Transportation (highway and community)	150,663	175,891	195,016	29.4%

Achieving our reduction target will require significant changes to our transportation system. These changes depend on three sectors – vehicles, fuels, and vehicle miles traveled – that are also referred to as the “three legged stool” of transportation.

**Figure 12
The Three-Legged Stool of**



Source: 5th Annual CA Climate Change Conference presentation by Daniel Sperling, UC Berkeley and CARB

The measures below cover all three legs of the stool by addressing improvements in vehicle efficiency and public transportation, promotion of alternative fuels, and methods of decreasing the amount of vehicle miles traveled by residents of San Carlos.

This section, while mainly focused on transportation, includes another key element highly integrated and almost inseparable from transportation: Land Use. At the basic level, it is land use and thus the distance between and orientation of destinations that requires us to travel. Only by changing our land use patterns and environment in which we live will we

significantly change our travel patterns.

Reducing greenhouse gas emissions from transportation will not only give San Carlos environmental benefits, but also an improved quality of life. Communities that are less dependent on personal vehicles exhibit a higher level of safety in streets, better health from increased exercise, improved accessibility, and more financial savings from decreased car maintenance.

The reduction measures of this section to decrease vehicular emissions are:

1. Encourage development that is mixed-use, infill, and higher density.
2. Increase housing density near transit.
3. Increase bike parking.
4. Create travel routes that ensure that destinations may be reached conveniently by public transportation, bicycling, and walking.
5. Actively promote walking and biking as safe modes of local travel, particularly for children attending local schools.
6. Provide for a shuttle service connecting areas not adequately served by public transit to public transit.
7. Promote car sharing programs.
8. Enforce affordable housing development standards
9. Convert more City vehicles to hybrid, electric, alternative fuel, or smaller vehicles.
10. Increase accommodation and promotion of alternatively fueled vehicles and hybrids.



Given the high level of emissions from the transportation sector, these measures should be acted on quickly and efficiently. Not changing our behavior could result in the projected 'business as usual' 2030 scenario.

1. Encourage development that is mixed-use, infill, and higher density

**-5,544
Metric
Tons Co₂e**

The principles of infill, higher density, and mixed-use, also known as 'smart growth,' lead to decreased vehicle miles traveled and increased neighborhood vitality. These methods of development also have multiple social benefits, including: better health, lower infrastructure costs, and increased accessibility. Infill, higher density development is especially important to create more urban housing within San Carlos and thus the Bay Area. Increasing our housing stock will prevent more suburban sprawl from being developed on the outskirts of our region. Sprawl is a huge barrier to climate action because it creates a strain on infrastructure and is highly automobile-dependant. By changing our land use patterns, we can allow more people to live in areas where they can walk to complete their errands rather than drive.

1.1. Revise municipal codes to encourage and allow for mixed-use, infill, and higher-density development

Under this measure, areas of San Carlos would be identified as viable for higher densities and mixed use. These could be areas that have little neighborhood-serving retail like laundromats, corner markets, and coffee shops or they could be areas in need of revitalization. The City might also consider the balance of jobs to housing by increasing densities near commercial centers.



It is important to differentiate the goals of this reduction measure from Transit Oriented Development, or TOD, which is discussed in the next measure of this chapter. While the principles of TOD and smart growth overlap considerably, smart growth can be applied City-wide while TOD is more appropriate on a smaller-scale for areas in need of connectivity. A TOD is typically defined as a residential and commercial center designed around a rail or bus station in order to encourage transit ridership.³⁴

Although municipal code densities may be constricted by the preferred land use alternative included in the 2009 General Plan update currently underway, this reduction measure will encourage planners to approve or give incentives for building at the maximum allowed density for the area.

Initial Cost

City Staff estimates that writing mixed-use, infill, and higher-density code revisions will consume approximately 90 hours of staff time which equals \$4,500-\$9,000 a year depending on pay rate. It is important to note that these hours can be spent in conjunction with other code revision efforts following the General Plan update.

Greenhouse Gas Emissions Reductions

Mixed-use, infill, and higher density development is known to have many environmental benefits. A 2005 Seattle study found that residents of neighborhoods where land uses were mixed and streets were better connected, making non-auto travel easier and more convenient, traveled 26% fewer vehicle miles than residents of neighborhoods that were more dispersed and less connected.³⁵

Assuming that this reduction measure results in 50% of new development being mixed-use, infill, and higher density, we can estimate that half of the new population will be driving 25% less in 2020. Assuming that growth in the transportation sector is due to new residential development and job growth, we can estimate that greenhouse gas emissions will reduce by at least 5,544 metric tons of CO₂e per year by 2030.

³⁴ Victoria Transportation Planning Institute, *Transit Oriented Development*, www.vtpi.org/tdm/tdm45.htm, accessed October 30, 2008.

³⁵ US Environmental Protection Agency (EPA). "Environmental Benefits of Smart Growth." <http://www.epa.gov/dced/topics/eb.htm>, accessed Oct. 1, 2008.

Table 15
Summary of Transportation and Land Use Reduction Measure 1

	Component	Initial Costs to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Revise municipal codes to encourage and allow for mixed-use, infill, and higher-density development.	\$4,500-\$9,000	5,544	\$0.81 - \$1.62
TOTAL		\$4,500-\$9,000	5,544	\$0.81-\$1.62

2. Increase housing density near transit

**-4,957
Metric
Tons CO₂e**

Housing density near transit, known as Transit Oriented Development or TOD, can make a city more equitable, accessible and lower greenhouse gas emissions from personal vehicles. The current General Plan update process encourages greater housing density near transit as well.

The benefits of TOD have been researched and proven. A study of the Portland area found that 30% or more of the Transit Oriented Development residents commuted by the regional light rail system at least once a week and 23-33% used transit as their primary commute mode.³⁶

Overall, commuting by transit has increased when people moved to Transit Oriented Developments. A 2003 California TOD travel characteristics study found TOD office workers within a half mile of rail transit stations have transit commute shares averaging 19% as compared to 5% region wide. For residents, the statewide average transit share for TODs within a half mile of the station was 27% compared to 7% for residences between a half mile and three miles of the station.³⁷



2.1. Revise municipal codes to encourage and allow for higher-density commercial and residential centers near transit corridors with the express intent of encouraging transit ridership and reducing the use of personal automobiles

Many residents and businesses are attracted to higher-density, accessible development, however it is often difficult to change land use regulations to allow for

³⁶ Victoria Transportation Planning Institute, *Transit Oriented Development*, www.vtppi.org/tdm/tdm45.htm, accessed October 30, 2008.

³⁷ Victoria Transport Policy Institute. "Transit Oriented Development." Online TDM Encyclopedia, <http://www.vtppi.org/tdm>, accessed Sept. 30, 2008.

and encourage higher-density developments around transit stations. Parking requirements, density and height limitations, and single-use zoning in many locations make TOD difficult to get approved.

Initial Cost

City staff has indicated an estimate of roughly \$22,500-\$45,000 in initial staff time for a planner to write TOD code revisions (equivalent to 450 hours).

Greenhouse Gas Emissions Reductions

It is estimated that transit oriented development will reduce San Carlos' greenhouse gas emissions by 4,957 metric tons of CO₂e per year. This estimate assumes that half of the total housing development in San Carlos between the years 2010 and 2030 will be TOD.

**Table 16
Summary of Transportation and Land Use Reduction Measure 2**

	Component	Initial Costs to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Revise municipal codes to encourage and allow for higher-density commercial and residential centers near transit corridors with the express intent of encouraging transit ridership and reducing the use of personal automobiles.	\$22,500-\$45,000	4,957	\$4.54 - \$9.08
TOTAL		\$22,500-\$45,000	4,957	\$4.54-\$9.08

3. Increase bike parking

**-150
Metric
Tons CO₂e**

Dedicated bike parking (in lieu of locking to trees and utility poles) reduces bike theft and increases convenience for cyclists. As costs of personal vehicle travel rise, it is likely that more residents of San Carlos will come to rely on bicycles as a fast and inexpensive mode of travel. Bicycles are the most efficient mode of transportation and are especially appropriate in reducing the number of short vehicle trips (up to five miles), which constitute more than half of all driving. As a part of this measure, we should encourage, support, and prepare for this modal switch as much as possible.

3.1. Increase the bicycle parking requirement for commercial projects in order to promote cyclist safety, security, and convenience

San Carlos currently requires new developments with fifty or more parking spaces to provide bicycle parking spaces equal to a minimum of 10% of the required vehicles spaces. This portion of the municipal code could be expanded. For example, the City of Portland requires one bike parking space per 3,000 square feet of commercial or office space or 5-10% of the number of automobile spaces. The City of Santa Cruz requires two bike parking spaces plus 15% of the number of automobile spaces, 20-60% of which are required to be Class 1 individual lockers.³⁸



Initial Cost

City Staff estimates approximately 18 hours of effort for planning staff to write bike parking code revisions in conjunction with supporting measure 3.2 (below). When assuming an hourly rate of \$50-\$100 per hour, this translates to \$900-\$1,800 in initial staff time.

Greenhouse Gas Reduction

Assuming that increased bike parking would replace 300 average-length weekly car trips, it is estimated that greenhouse gas emissions will be reduced by 75 metric tons of CO₂e per year.

3.2. Require large employers to provide facilities that encourage bicycle commuting including shower facilities and covered or indoor bicycle parking

A large barrier to cycling as a means of traveling to and from work is lack of facilities for changing into work clothes and protecting a bicycle from the rain. Shower facilities allow workers to rinse off before going to work, which encourages people who live further away to be able to cycle to work. Covered or indoor bicycle parking not only increases security, but prevents bikes from getting wet during the winter. An example of such requirement is the City of Vancouver, which requires any development with four or more required bike parking spaces (based on the number of automobile spaces) to provide shower and wash bin facilities.³⁹

Initial Cost

City Staff estimates approximately 18 hours of effort for planning staff to write bike parking code revisions in conjunction with supporting measure 3.1 (above). When

³⁸ Victoria Transport Policy Institute. "Bicycle Parking." Online TDM Encyclopedia, <http://www.vtpi.org/tdm>, accessed Sept. 30, 2008.

³⁹ Victoria Transport Policy Institute. "Bicycle Parking." Online TDM Encyclopedia, <http://www.vtpi.org/tdm>, accessed Sept. 30, 2008.

assuming an hourly rate of \$50-\$100 per hour, this translates to \$900-\$1,800 in initial staff time.

Greenhouse Gas Reduction

Assuming that increased facilities would replace 200 average-length weekly car trips, it is estimated that greenhouse gas emissions will be reduced by 50 metric tons of CO₂e per year.

**Table 17
Summary of Transportation and Land Use Reduction Measure 3**

	Component	Initial Costs to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Increase the bicycle parking requirement for commercial projects in order to promote cyclist safety, security, and convenience.	\$900 - \$1,800	75	
2	Require large employers to provide facilities that encourage bicycle commuting, including shower facilities, and covered or indoor bicycle parking.		50	
TOTAL		\$900 - \$1,800	125	\$7.20 - \$14.40

4. Actively promote walking and biking as safe modes of local travel, particularly for children attending local schools

**-170
Metric
Tons CO₂e**

There are many design and policy methods to promote pedestrian and bicycle travel, including: increased tree planting, median landscaping, clearly dedicated crosswalks (painted or paved differently), and count-down style cross signals. All of these methods promote enhanced aesthetics, reduced vehicle speeds, and safer pedestrian and bicycle environments.

The City of San Carlos has adopted the *Streets and Sidewalks, People and Cars: The Citizens' Guide to Traffic Calming* by Dan Burden as the City's blueprint for traffic calming. It requires that traffic calming be paid for by the neighborhood requesting them; however this option for the community is not widely publicized.

The supporting measures below will ensure that San Carlos is friendly to pedestrians and bikers as demand increases in the future. Not only will this promote emission reductions, but it will lead to a healthier and more active lifestyle for residents.

4.1. Promote traffic calming methods on City streets such as landscaped median barriers and traffic circles

Traffic calming measures that cause cars to drive at decreased speeds not only increase pedestrian and cyclist safety, but they decrease greenhouse gas emissions by preventing stop-and-go traffic. Studies show that median barriers cause an average 31% decrease in traffic volume, or a decrease of 1,167 vehicles per day (from a sample of 10 sites; average includes various types of volume control measures).⁴⁰



Initial Cost

As previously described, traffic calming measures are the responsibility of the neighborhoods, however this information could be provided in utility bills for greater outreach and public awareness of the opportunity at a negligible cost.

Greenhouse Gas Emissions Reductions

To quantify the greenhouse gas emissions reduction from this measure, it was combined with components 4.2, 4.3 and 4.4 under this measure in order to create a scenario parallel to similar quantified case studies and research. It is therefore estimated that these four reduction measures will cause a total of 750 additional weekly biking and walking trips originating from within the City of San Carlos. Assuming these trips are replacing vehicle trips, these reduction measures will reduce greenhouse gas emissions by at least 170 metric tons of CO₂e.

4.2. Establish clear and convenient pedestrian rights of way with shade and minimal tripping hazards.

The City currently uses \$50,000 a year responding to complaints about public rights of way and pedestrian safety, however creating convenient pedestrian rights of way could be more actively enforced.

Initial Cost

The City already allocates \$50,000 a year to responding to complaints about pedestrian safety. City staff does not estimate that any additional funds will be necessary to implement this reduction measure.

Greenhouse Gas Emissions Reductions

As stated above in measure 4.1, this reduction measure will reduce greenhouse gas emissions by 124 metric tons of CO₂e per year in conjunction with measures 4.1, 4.3, and 4.4.

⁴⁰ Fehr and Peers, TrafficCalming.org, <http://www.trafficcalming.org>, accessed Sept. 30, 2008.

4.3. Incorporate bicycle-friendly intersections and boulevards into street design as recommended by the Bicycle Transportation Plan currently being updated

Communities that improve cycling conditions often experience significant increases in bicycle travel and related reductions in vehicle travel. For U.S. cities with a population of more than 250,000, each additional mile of bike lanes per square mile is associated with a roughly one percentage point increase in bicycle commute mode share.⁴¹ All new intersection sensors within the City of San Carlos are bike friendly; however marking where bikes should be situated in order to optimize sensor activation would be beneficial.

Initial Cost



Preparation of the Bicycle Transportation Plan has already been accounted for in the current budget. The installation of striping for bike intersections would cost approximately \$100 per striped lane, or for a typical intersection with 4 lanes, \$400.

Assuming three additional miles of bike lanes are installed and ten bike intersections are striped, we can estimate that this measure will cost approximately \$157,000.

Greenhouse Gas Emissions Reductions

As stated above in measure 4.1, this reduction measure will reduce greenhouse gas emissions by 124 metric tons of CO₂e per year in conjunction with measures 4.1, 4.2, and 4.4.

4.4. Promote “Walk pools” or “Walking buses” to increase the number of students who walk to school

This measure would expand upon an effort currently in place at some San Carlos schools to establish “walking buses” or “walk pools” to school. Parents would volunteer to meet students at select locations and chaperone them to school on a pre-established route.



Under this reduction measure, the City would coordinate with Safe Routes to School or similar parent groups and school administration to ensure that routes are clear of obstacles and safe for walking.

⁴¹ Fehr and Peers, TrafficCalming.org, <http://www.trafficcalming.org>, accessed Sept. 30, 2008.

Initial Cost

The cost of advertising and coordinating the routes for the program would be borne by parent groups and schools. The cost to the City for coordinating with these programs would be minimal and largely absorbed by the other measures under this measure and existing programs.

Greenhouse Gas Emissions Reductions

As stated above in measure 4.1, this reduction measure will reduce greenhouse gas emissions by 124 metric tons of CO₂e per year in conjunction with measures 4.1, 4.2, and 4.3.

**Table 18
Summary of Transportation and Land Use Reduction Measure 4**

	Component	Initial Costs to the City	GHG Reduction (metric tons CO₂e / year)	Cost per metric ton CO₂e
1	Promote traffic calming methods on city streets such as landscaped median barriers and traffic circles	Cost borne by neighborhood	170	N/A
2	Establish clear and convenient pedestrian rights of way with shade and minimal tripping hazards.	Negligible		
3	Incorporate bicycle-friendly intersections and boulevards into street design as recommended by the Bicycle Transportation Plan currently under review.	\$157,000		
4	Promote “Walk pools” or “Walking buses” to increase the number of students who walk to school.	Negligible		
TOTAL		\$157,000	170	\$923.52

5. Create travel routes that ensure that destinations may be reached conveniently by public transit, bicycling and walking

**-122
Metric
Tons Co₂e**

As costs of personal vehicle travel rise, residents of San Carlos will want to use alternative modes of transportation. The City should be prepared for this increase of walkers, bikers, and transit riders.

This measure also promotes equity in the City, providing low-income residents with convenient modes of travel that are more affordable than personal automobile use.

5.1. Create a plan to identify and address barriers to safe or convenient walking, biking, and transit ridership from major residential areas to public areas of interest and see to the plan's implementation

This reduction measure is largely completed through the Bicycle Transportation Plan, which is currently under revision. This plan identifies multiple barriers and opportunities to pedestrian and cyclist activity to and from points of interest like gyms, employment centers, and schools.

Initial Cost

The initial cost of this measure would be negligible since the plan is already in the process of being updated. Many of the expected recommendations of the Bicycle Transportation Plan are largely encompassed in the initial cost estimations of other reduction measures in this Plan, yet specific total cost cannot be calculated until the Bicycle Transportation Plan is completed.

Greenhouse Gas Emissions Reductions

The emissions reductions cannot be calculated until the Bicycle Transportation Plan is completed.

5.2. Make it a condition for approval that new large-scale developments address transit, biking, and walking access to the location. Require parking lots to be designed in a way that promotes pedestrian, transit, and bicycle travel to and from the site.

As part of project approval, new large-scale developments would be required to analyze transit, biking, and walking accessibility to and from their location.

This measure would also mandate parking lot design that includes clearly marked and shaded pedestrian pathways between transit facilities and building entrances.

Pathways must connect to transit facilities internal or adjacent to project site. The site



plan would demonstrate how the pathways are clearly marked, shaded, and placed between transit facilities and building entrances.

Initial Cost

The only cost associated with this measure is plan review to ensure that new large-scale development applications address transit, biking, and walking access. It is estimated that this requirement will cost an additional four hours per plan check, or \$200-\$400 dollars, however this cost would be absorbed by the applicant.

Greenhouse Gas Emissions Reductions

We estimate that these measures will create 400 additional walking and biking trips per week that were originally taken by car. This reduction in vehicle miles traveled would result in 122 metric tons of CO₂e per year.

5.3. Provide for an education program to residents and businesses as well as increased code enforcement in order to minimize vegetation that degrades access along public rights of way

Trees and shrubs often clutter sidewalks, creating an accessibility and convenience issue that acts as a deterrent to pedestrian travel. The City has an ordinance to minimize vegetation that degrades access along public rights of way, but this ordinance is not enforced. This measure would require increased city staff time for code enforcement to address the issue.

The City has an ordinance to minimize vegetation that degrades public rights of way, but this ordinance is not enforced to its fullest extent. This measure would educate residents on their responsibility to maintain public rights of way adjacent to their properties. It would also provide for increased enforcement and, possibly, an outlet for residents to report violations.

As part of the implementation of this measure, the City could consider a Rights Of Way (ROW) management program to address street tree maintenance and planting along public rights-of-way like sidewalks and paths.

Initial Cost

This reduction measure would cost an approximate \$9,000-\$18,000 for Right of Way (ROW) management in the initial year of implementation. In addition, an expected 300 hours of added enforcement would take place annually at \$15,000-\$30,000 in staff costs.

Greenhouse Gas Reduction

It is unclear how unobstructed pedestrian paths would affect travel behavior and, thus, greenhouse gas emissions. However, this reduction measure largely contributes to reduction measure 6 in this section, which is quantified to save 122 metric tons of CO₂e per year.

**Table 19
Summary of Transportation and Land Use Reduction Measure 5**

	Component	Initial Costs to the City	GHG Reduction (metric tons CO₂e / year)	Cost per metric ton CO₂e
1	Create a plan to identify and address barriers to safe or convenient walking, biking, and transit ridership from major residential areas to public areas of interest and see to the plan's implementation.	Negligible	Unknown	N/A
2	Make it a condition for approval that new large-scale developments address transit, biking, and walking access to the location. Require parking lots to be designed in a way that promotes pedestrian, transit, and bicycle travel to and from the site.	Negligible	122	Negligible
3	Provide for an education program to residents and businesses as well as increased code enforcement in order to minimize vegetation that degrades access along public rights of way.	\$24,000 - \$48,000	Unknown	N/A
TOTAL		\$24,000 - \$48,000	122	Negligible

6. Provide for a shuttle service in order to increase transit ridership

**-1,733
Metric
Tons CO₂e**

This reduction measure would implement a shuttle program that would connect areas not served by public transit to Caltrain. In 2003, The City conducted a pilot program of a limited door-to-door shuttle. The program grew rapidly, reaching a monthly ridership of 8,300, but has since been disbanded due to lack of funding. Survey results indicated out of 250 respondents, 77% noticed a reduction in traffic, 82% would financially support the program (included in that percentage were non-riders who are willing to pay for services), and 94% replied they would use the shuttle service in the future.

6.1. Establish a shuttle service within the City of San Carlos connecting areas not adequately served by public transit to Caltrain

Currently, there are several shuttle services funded through public/private partnerships that serve the San Carlos Caltrain Station and link various employment sites. These shuttle commuter programs include the Electronic Arts Employer Shuttle, Oracle Employer Shuttle, and Redwood Shores (Bridge Park and Clipper) Employer Shuttles. These shuttles are funded jointly by the Bay Area Air Quality Management District Transportation Fund for Clean Air, Peninsula Corridor Joint Powers Board and the respective employers. Passengers pay a fare on the train but ride free on the Shuttle. Several other cities have also participated in public funding of commuter shuttles, including the cities of Menlo Park, East Palo Alto, and Burlingame.

A shuttle service under this reduction measure would coordinate with existing shuttle services in order to serve residents of San Carlos.

Initial Cost

According to CalTrans vehicle specifications, capital costs of a natural gas-fueled, medium-sized shuttle bus (14 passengers) are \$85,000. There would be approximately



14 one-way trips to and from the Caltrain station each weekday (based on current schedule for am/pm commuter trains). The estimated City weekday operating cost would be \$217, with annual operating costs of \$56,637, assuming 261 weekdays per year. Annual amortization of shuttle bus assuming a five year life would be \$17,000 and total annual shuttle cost would be \$73,637. In addition, there would be an estimated \$2,000-\$4,000 in costs generated by 40 hours of staff administration and start up time.

San Mateo County's Measure A provides an estimated \$450 million for transit improvements through 2033, or about 30% of the estimated total local transportation sales tax revenues. Approximately \$60 million, or 4% of the total sales tax revenues, will be used to provide local shuttle services to meet local mobility needs and access to regional transit services. An additional \$60 million in matching monies is anticipated,

bringing the program total to \$120 million over the next 25 years. This program for the operation of local shuttle services is sponsored by SamTrans and priority will be given to shuttle services which include a portion of the funding from businesses, employers and other private sector sources. Priority shall also be given to local services which connect with Caltrain, BART and future Ferry Terminals.

Costs to the City would include the \$2,000 - \$4,000 in coordination, the cost of which would be covered by Measure A monies, Caltrans grants, federal Department of Transportation technical assistance or other sources of funding through regional agencies or the State of California. With Measure A and corporate and business investment, operating costs are expected to be minimal.

Greenhouse Gas Emissions Reductions

Using data from the City pilot program, we estimate that a shuttle system in San Carlos would attract 500 new daily riders to public transit that weren't utilizing public transit before the shuttle service. This increased ridership is expected to decrease greenhouse gas emissions by at least 1,733 metric tons of CO₂e per year.⁴²

Table 20
Summary of Transportation and Land Use Reduction Measure 6

	Component	Initial Costs to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Establish a shuttle service within the City of San Carlos connecting areas not adequately served by public transit to Caltrain.	Negligible	1,733	Negligible
TOTAL		Negligible -	1,733	Negligible -

7. Promote car sharing programs

**-1,158
Metric
Tons CO₂e**

Car sharing programs like City Car Share in San Francisco, Oakland, El Cerrito and Berkeley allow participants to reserve vehicles online for a low hourly rate. Although users are still utilizing personal vehicles, it has been found that car sharing has a major impact on the travel behavior of its members by reducing the number and length of trips. Once members give up their personal cars, the car is no longer the default mode of travel and is therefore used less than a personally owned vehicle. Additionally, car share vehicles are often newer, more efficient models or hybrid vehicles.

7.1. See to the establishment of a car sharing program

It is likely that vehicle miles traveled (VMT) in San Carlos will decline if a car sharing program is established. In San Francisco, car share members' daily VMT (weekday/workday) fell from 2.80 to 1.49 miles while among the control group of non-

⁴² This estimate assumes an average of 9 people per shuttle bus and an average trip of 10 miles per person.

members, it rose from 5.45 to 20.85. These figures refer to second-year impacts; first-year impacts showed a net increase in VMT. In Arlington, VA members reported a reduction in VMT of 43%, or 3,250 miles per year. Forty-five percent of respondents reported reducing driving after joining car-sharing, while 35% said they increased their driving. Nearly half of respondents (49%) said they walk more often because of their involvement in car sharing, and 54% said they use transit more often.⁴³

Initial Cost

It is estimated that initial setup and coordination between City staff and the Car Share organization will cost 36 hours, or \$1,800 to \$3,600 of staff time.

Greenhouse Gas Emissions Reductions

It is estimated that a car share program in San Carlos would reduce greenhouse gas emissions by at least 1,158 metric tons of CO₂e per year. This estimate is assuming that a car share program would attract at least 1,000 members and that those members would reduce vehicles miles traveled by at least 30% as national studies of car share riders show. This estimate is also in conjunction with the next supporting measures as the two components depend on each other for success.

7.2. Provide parking spaces for car share vehicles at convenient locations accessible by public transportation

The success of a car sharing program depends on having easily accessible parking spaces within walking distance of public transit. Under this reduction measure, City staff would encourage developers to dedicate a portion of their parking to car share vehicles.



Initial Cost

The costs for signage and re-striping would be borne by the car sharing company. Costs to the City would be minimal and largely encompassed under the existing permitting process.

Greenhouse Gas Emissions Reductions

As stated above in the initial cost analysis of measure 7.1, this measure would reduce greenhouse gas emissions by 1,158 metric tons of CO₂e per year in conjunction with the first reduction measure.

⁴³ Cervero, Robert and Tsai, Yu-Hsin (2003). San Francisco City CarShare: TravelDemand Trends and Second-Year Impacts. University of California at Berkeley, Institute of Urban and Regional Development. Working Paper 2003-05.

Table 21
Summary of Transportation and Land Use Reduction Measure 7

	Component	Initial Costs to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	See to the establishment of a car sharing program	\$1,800 to \$3,600	1,158	\$1.55 – \$3.11
2	Provide for car share parking spaces in convenient locations	Negligible		
TOTAL		\$1,800 - \$3,600	1,158	\$1.55 – \$3.11

8. Enforce affordable housing development standards

A mix of below market rate (BMR) and market-rate units has been proven to reduce vehicle miles traveled. Low income and senior citizens are much more likely to walk or bike to their destination, which can breed similar behavior in neighbors.

8.1. Continue to enforce the City’s Below Market Rate (BMR) Ordinance (as amended) to support the development of affordable housing in the area

-192 Metric Tons CO₂e

The City of San Carlos Below Market Rate (BMR) Housing Program was adopted by City Council on November 22, 2004. The ordinance requires a percentage of units in larger developments to be below market rate units. The specific levels of affordability are specified in the ordinance. In addition, there is a Partial-Unit Fee for those developments that trigger a partial unit of less than 0.5. A significant amount of evidence points to the fact that lower-income households and senior citizens own fewer vehicles and drive less. Continuation of the BMR ordinance will therefore result in decreased GHG emissions over time.

Initial Cost

The initial cost of this measure would be nominal as the BMR ordinance is already being implemented.

Greenhouse Gas Reduction

This reduction measure will reduce transportation-related greenhouse gas emissions by 95 Metric Tons CO₂e per year by 2020 and 192 metric tons per year by 2030. This estimate is based on San Carlos’s current BMR ordinance, which requires 15% BMR units for every development over 7 units. Total housing growth based on the 2009 San Carlos Housing Element. VMT reduction for affordable units based on a study by

Nelson/Nygard transportation engineers and supported by the Sacramento and San Joaquin Valley Air Districts.

Table 22
Summary of Transportation and Land Use Reduction Measure 8

	Component	Initial Costs to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Continue to enforce the City's Below Market Rate (BMR) Ordinance (as amended) to support the development of affordable housing in the area	Negligible	192	Negligible
TOTAL		Negligible	192	Negligible

9. Convert more City vehicles to hybrid, electric, alternative fuel, or smaller vehicles

**-59
Metric
Tons CO₂e**

This program would expand upon current efforts to replace traditional gas and diesel vehicles with hybrid or electric vehicles when a fleet vehicle is due for replacement.

Studies show that hybrid vehicles recoup their higher cost in 2-3 years.⁴⁴ They also emit 80% less harmful pollutants and greenhouse gases than comparable gasoline cars.⁴⁵ Electric cars have even greater benefits, although they are generally more expensive and require dedicated infrastructure for charging.

9.1. Replace 18 traditional automobiles in the City's fleet with hybrid, electric, alternative fuel, or smaller vehicles by 2020.

The City has approximately 18 vehicles between Public Works, Parks and Recreation, and Building Departments that have the possibility of being replaced in the future with alternative fuel or hybrid technology.

Initial Cost

The initial cost for purchasing a Toyota Prius for City use has a price range of \$21,430 for base model to \$23,036 for standard touring model. This assumes fleet price is \$500 above invoice and includes destination charge with no additional options. Assuming the City purchases 18 additional hybrid vehicles, the total cost to the City would be approximately \$385,740 to \$414,648. As an information item, a calculation provided in the CAPP software shows that the City of San Carlos will recoup the added cost of buying hybrid vehicles within 2 years. Fleet replacement would occur over time as other fleet vehicles are retired. This would

⁴⁴ Hybrid Car Organization, www.hybrid-car.org, accessed Sept. 20, 2008.

⁴⁵ Carte, Sharon Silke. "Hybrids recoup higher cost in less time." USA Today, 5/12/2008, http://www.usatoday.com/money/autos/environment/2008-05-11-hybrids-gas-prices_N.htm.

not be a new cost, but rather an environmentally preferable purchasing standard.

Greenhouse Gas Reduction

The CAPPA software estimates that replacing 18 City fleet vehicles with hybrid vehicles would decrease greenhouse gas emissions by 59 metric tons of CO₂e annually.

**Table 23
Summary of Transportation and Land Use Reduction Measure 9**

	Component	Initial Costs to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Replace 18 traditional automobiles in the City's fleet with hybrid, electric, or alternatively fueled vehicles.	\$385,740 - \$414,648	59	\$6,537 - \$7,027
TOTAL		\$385,740 - \$414,648	59	\$6,537 - \$7,027

10. Increase accommodation and promotion of alternatively fueled vehicles and hybrid vehicles

**-49
Metric
Tons CO₂e**

The City of San Carlos can help promote the use of alternatively fueled and hybrid cars by making it easier for residents and businesses to own and operate such cars. For instance, residents may be willing to convert their diesel engines to biodiesel, however the nearest biodiesel stations to San Carlos are either in Mountain View or San Francisco.

The City does have a Compressed Natural Gas (CNG) station at the PG&E facility, however it has restricted access. In addition, a hydrogen refueling station is currently under construction as a part of the "Hydrogen Highway" program promoted by Governor Schwarzenegger, with anticipated completion in the next few years.

10.1. Offer prioritized parking for hybrid or alternative fuel cars on City streets

Under this reduction measure, select parking spots in convenient and well-trafficked public locations would be designated as "green" spaces only for hybrid, electric, or other alternatively fueled cars. The spaces would be much like handicapped spaces except that a placard would not be required for access. Proper use of the space would be enforced by local enforcement agencies or officers.

Initial Cost

This measure will consist of initial restriping for the selected priority parking spaces, which also is considered an ongoing public works task with a cost of \$100 per parking space. Another \$400 per parking space relating to enforcement of the designated priority spaces by proper cars is estimated. Therefore, assuming that 20 spaces are converted, we can estimate that the cost of this measure is approximately \$10,000.

Greenhouse Gas Emissions Reductions

It is unclear how prioritized parking for hybrid or alternative fuel cars will affect consumer behavior to purchase and drive these vehicles, therefore an estimate of emissions reductions cannot be made at this time.

10.2. Encourage siting of alternative fueling stations within close proximity to potential customers

Allowing for alternative fueling or electrical recharging stations near industrial or commercial areas utilizing large vehicle fleets will encourage these businesses to use alternative fuels. A prime example is biodiesel, which requires no substantial modifications to existing diesel engines yet emits 50% less speciated hydrocarbon emissions than measured for diesel fuel.⁴⁶

Initial Cost

The process of encouraging alternative fueling stations within San Carlos would largely be incorporated in the zoning code update effort following adoption of the General Plan update in 2009.

Greenhouse Gas Emissions Reductions

Based on the present amount of biodiesel Bay Area fueling stations distribute, we estimate that a biodiesel station in San Carlos would cause at least 1,000 gallons of pure biodiesel to be purchased and used per month. This equates to 19 metric tons of CO₂e, based on biodiesel produced from soybeans specifically for the use of biodiesel (not waste oil).⁴⁷

10.3. Encourage developers to dedicate parking lot spaces to electric vehicle recharging stations

Initial Cost

The cost to the City for encouraging electric vehicle recharging stations is negligible. Most likely it would be incorporated into existing incentives and concessions for project approval. As a point of information, the cost to the developer is estimated to be five thousand dollars per lot for recharging stations, including equipment & installation initial cost.

Greenhouse Gas Emissions Reductions

Based on current research, it is estimated that 25 electrical vehicle recharging stations would cause a 30 metric ton decrease in CO₂e levels per year.

⁴⁶ National Biodiesel Board, "Biodiesel emissions factsheet," http://biodiesel.org/pdf_files/fuelfactsheets/emissions.pdf, accessed November 1, 2008.

⁴⁷ Estimate based on the sales of San Mateo Petroleum and adjusted by population and estimated increases in demand.

Table 24
Summary of Transportation and Land Use Reduction Measure 10

	Component	Initial Costs to the City	GHG Reduction (metric tons CO₂e / year)	Cost per metric ton CO₂e
1	Offer prioritized parking for hybrid or alternative fuel cars on City streets.	\$10,000	Unknown	N/A
2	Encourage alternative fueling stations within close proximity to potential customers.	Negligible	19	Negligible
3	Encourage developers to dedicate parking lot spaces to electric vehicle recharging stations.	Negligible	30	Negligible
TOTAL		\$10,000	49	\$200

Transportation and Land Use Reduction Measures – Progress to Date

Efforts to reduce transportation-related emissions are already underway in the City of San Carlos. In addition to hybrid vehicle purchases for the municipal fleet, the City is developing multiple traffic calming measures. The following analyzes San Carlos's progress in achieving the transportation and land use reduction targets outlined in this chapter.

Traffic Calming⁴⁸

Traffic calming measures such as traffic circles, bulbouts, and chokers help to reduce greenhouse gas emissions by lowering traffic speeds and improving the pedestrian and bicycle environment. The City's traffic calming policy was amended in 2004 to require the homeowners pay 100% of construction of traffic calming devices.

Following adoption of the policy and the budget, the following petitions were filed:

- 1) The residents of 2200 and 2300 blocks of Howard avenue for installation of a traffic circle at the intersection of Howard Avenue and Dayton Avenue
- 2) The residents of 700 block of Cordilleras Avenue for installation of two Chokers
- 3) The residents of 900 and 1000 blocks of Elm Street for installation of a Traffic Circle at the intersection of Elm Street and Morse BLVD
- 4) The residents of Magnolia Avenue for installation of a traffic circle and a choker at the intersection of Magnolia Avenue and Chestnut Street

⁴⁸ San Carlos City Council Staff Report, "Report on Traffic and Pedestrian Safety Efforts," dated December 11, 2006.

Following several neighborhood meetings and with recommendation from the Traffic Commission, the above projects were approved by the City Council and were constructed at no cost to homeowners.

It is estimated that this reduction effort will reduce emissions by **approximately 5 metric tons CO₂e**, which contributes directly to Reduction Measure 5 - Actively promote walking and biking as safe modes of local travel, particularly for children attending local schools.

Bike Lanes⁴⁹

Multiple bike lanes were installed during the period of 2005 to 2009, including those on the following streets:

- ❑ Brittan Avenue
- ❑ Alameda de las Pulgas in 2007
- ❑ Sharrows and Share the Road signs were installed on Cedar Street and Arroyo Ave in 2008
- ❑ Arroyo Ave: 3/4 miles of sharrow/share the road signage
- ❑ Cedar Street: 1.9 miles of sharrow/share the road signage

It is estimated that the bike lane installations since 2005 have saved **10 metric tons CO₂e**.

Curb Ramps

Funding has been approved through the American Recovery and Reinvestment Act of 2009 (aka the stimulus package) for the 2009 Pedestrian Improvement Project, which would complete 99 new curb ramps and 110 new crosswalks at the current level of funding. Construction would occur starting in summer 2009. It is estimated that these curb ramps will reduce transportation emissions by approximately **2 metric tons CO₂e**.

Hybrid Vehicles

The City of San Carlos has already begun to convert its vehicle fleet to hybrid and alternatively-fueled vehicles where possible. The police chief and building inspection department recently switched to hybrid vehicles and parking enforcement utilizes an electric utility vehicle. These two hybrids and one electric vehicle are estimated to reduce emissions by approximately **10 metric tons CO₂e** compared to business-as-usual.

⁴⁹ Communication with Robert Weil, City of San Carlos Public Works Director/Engineer, Feb. 23, 2009.

Analysis of Reduction Target – Transportation and Land Use

The 10 measures in this chapter help San Carlos achieve 48% emissions reductions by 2030 in combination with State initiatives such as the Pavley bill and the Low Carbon Fuel Standard discussed later in this document.

Table 25
Summary of Transportation and Land Use Emissions Reductions

		Metric Tons CO ₂ e per year
Reference year 2030 Transportation “Business-as-Usual” Emissions		195,016
1	Encourage development that is mixed-use, infill, and higher density.	- 5,544
	1.1. Revise municipal codes to encourage and allow for mixed-use, infill, and high-density development.	
2	Increase housing density near transit.	- 4,957
	2.1. Revise municipal codes to encourage and allow for higher density commercial and residential centers near transit corridors with the express intent of encouraging transit ridership and reducing the use of personal automobiles.	
3	Increase Bike Parking	- 125
	3.1. Increase the bicycle parking requirement for commercial projects in order to promote cyclist safety, security, and convenience.	
	3.2. Require large employers to provide facilities that encourage bicycle commuting, including shower facilities, and covered or indoor bicycle parking.	
4	Actively promote walking and biking as safe modes of local travel, particularly for children attending local schools.	- 170
	4.1. Promote traffic calming methods on City streets such as landscaped median barriers and traffic circles.	
	4.2. Establish clear and convenient pedestrian rights of way with shade and minimal tripping hazards.	
	4.3. Incorporate bicycle-friendly intersections and boulevards into street design as recommended by the Bicycle Transportation Plan currently being updated.	
	4.4. Promote “Walk pools” or “Walking buses” to increase the number of students who walk to school.	
5	Create travel routes that ensure that destinations may be reached conveniently by public transit, bicycling and walking.	- 122
	5.1. Create a plan to identify and address barriers to safe or convenient walking, biking, and transit ridership from major residential areas to public areas of interest and see to the plan's implementation.	
	5.2. Make it a condition for approval that new large-scale developments address transit, biking, and walking access to the location.	
	5.3. Provide for an education program to residents and businesses as well as increased	

	Metric Tons CO ₂ e per year
Reference year 2030 Transportation “Business-as-Usual” Emissions	195,016
code enforcement in order to minimize vegetation that degrades access along public rights of way.	
6 Provide for a shuttle service in order to increase transit ridership.	- 1,733
6.1. Establish a shuttle service within the City of San Carlos connecting areas not adequately served by public transit to Caltrain.	
7 Promote car sharing programs.	- 1,158
7.1. See to the establishment of a car sharing program.	
7.2. Provide parking spaces for car share vehicles at convenient locations accessible by public transportation.	
8 Enforce affordable housing requirements	- 192
8.1. Continue to enforce the City’s Below Market Rate (BMR) Ordinance (as amended) to support the development of affordable housing in the area	
9 Convert more City vehicles to hybrid, electric, alternative fuel, or smaller vehicles.	- 59
9.1. Replace 18 traditional automobiles in the City’s fleet with hybrid vehicles.	
10 Increase accommodation and promotion of alternatively fueled vehicles and hybrid vehicles.	- 49
10.1. Offer prioritized parking for hybrid or alternative fuel cars on City streets.	
10.2. Encourage siting of alternative fueling stations within close proximity to potential customers.	
10.3. Encourage developers to dedicate parking lot spaces to electric vehicle recharging stations.	
Total Community Reduction	-14,109
Pavley I and II	-91,978
Low Carbon Fuel Standard	-10,304
Net community Transportation Emissions	78,625
Base Year 2005 Transportation Emissions	150,663
Percent below 2005 level	47.8%

It is also important to note that the Caltrain line is slated to become fully powered by electricity through the Caltrain Electrification Project. The Project would convert the Caltrain mainline between San Francisco and Gilroy from diesel-powered to solely electric-powered. Not only would travel time and frequency improve under the new system, but greenhouse gas emission levels would be greatly reduced. The conversion planning process is currently under environmental review. It is possible that San Carlos could achieve greater transportation and land use emissions reductions with greater regional and state cooperation. For now, the aforementioned reduction measures and their corresponding emissions reductions are a best effort under current technology and the limited ability of a municipal government. The effect of State initiatives is explored further in Chapter 7.

VI. Solid Waste Strategies

According to the California Integrated Waste Management Board, residents and businesses of San Carlos sent approximately 45,439 tons of waste to landfills in 2005. That is equivalent to 3,233 pounds of waste for every person in San Carlos.



As this landfill waste decomposes, methane gas is generated and released into the atmosphere, which is 21 times more potent than CO₂. The waste in landfills accounts for 4.8% of San Carlos' greenhouse gas emissions, or 12,777 metric tons of CO₂e.

The reduction measures of this chapter to reduce greenhouse gas emissions associated with solid waste generation are:

1. Support zero waste.
2. Increase recycling and composting at public events.
3. Increase overall waste diversion by 1% per year.

If San Carlos fails to implement the reach the targets included in this chapter, it is likely that emissions could increase by 12.4%, as shown below.

Table 26
Solid waste “Business-as-Usual”
Projected Emissions Growth (CO₂e per year)

Sector	2005	2020	2030	Percent change from 2005 to 2020
Waste	12,777	13,862	14,636	14.5%

Although emissions from solid waste are relatively small in comparison to those from transportation and energy use, the solid waste sector remains a viable option for reducing greenhouse gas emissions. The community has strong, direct power over their solid waste production, especially as recycling and composting services become more widely available under the City's new contract with Recology, which is explained in this chapter.

1. Support zero waste

**-510
Metric
Tons CO₂e**

The Zero Waste International Alliance broadly defines Zero Waste as a philosophy and visionary goal that emulates natural cycles, where outputs are simply an input for another process. Under a zero waste policy, everything would be recycled, minimal disposables would be allowed, and composting would be required. This would necessitate considerable cooperation with the local garbage and recycling collection firm as well as the South Bay Side Waste Management Authority (SBWMA).

A zero waste policy would decrease the amount of waste sent to landfills, thus reducing the greenhouse gas emissions released from landfills. The majority of entities that have implemented zero waste policies at this time are large businesses, some of which may be comparable to the scale of San Carlos' municipal operations. According to the Zero Waste Alliance, Hewlett Packard in Roseville, CA reduced its waste by 95% and saved \$870,564 in 1998 through a zero waste policy. Interface, Inc. in Atlanta, GA has eliminated over \$90M in waste from a zero waste policy.⁵⁰



1.1. For municipal operations, establish a zero waste policy

Establishing a zero waste program for municipal operations would mean designing and managing goods and products to allow for the conservation, reuse, and recycling of resources instead of having them sent to a landfill. Specifically, the City would establish a detailed recycling, composting, and Staff education program that would ensure that at least 90% of materials were reused, recycled, or composted.

Initial Cost

A zero waste policy would require approximately 200 hours of Staff time per year for training, purchasing of receptacles, and coordinating with handlers, or approximately \$10,000 to \$20,000 depending on pay grade. City staff members are already spending this amount of time on coordination of recycling efforts, but this time would be shifted to the new zero waste policy and accompanying trainings. The startup of the program may require additional time the first year.

Greenhouse Gas Emissions Reductions

The San Carlos 2005 Municipal Inventory found that the City's municipal operations produce 93 metric tons of CO₂e per year from solid waste. An EPP policy would reduce this impact to approximately 9.3 metric tons, which is a reduction of 83.7 metric tons per year.

⁵⁰ Zero Waste Alliance, <http://www.zerowaste.org/case.htm#benefits>, accessed Sept. 30, 2008.

1.2. In support of Zero Waste, establish an environmentally preferable purchasing program (EPP) for government operations

Environmentally Preferable Purchasing, or EPP, refers to buying products and services with reduced effects on human health and the environment.⁵¹ An EPP policy would require that environmentally preferable products be purchased when possible and reasonable. For example, under an EPP, cleaning products would have recyclable packaging, contain low or no Volatile Organic Compounds (VOCs), and be free of ozone-depleting substances.

An EPP policy for local government operations would establish the government as an example for citizens to follow in order to decrease their greenhouse gas emissions. The City already purchases recycled paper, but expanding into carpets, building construction and other sectors is possible and often results in cost savings in the long run.

Initial Cost

City staff estimates that the initial cost for preparing an Environmentally Preferable Purchasing ordinance would be approximately \$5,000. There may be additional costs at the onset for quality control of new and unfamiliar products and their providers. There is also potential for higher material costs, although research is showing that the costs of environmentally preferable products are comparable with traditional products.

There are also significant cost-saving opportunities in the future for EPPs. Entering into a regional purchasing cooperative may reduce costs by allowing neighboring cities to buy sustainable products in bulk. Organizations like the State Regional Purchasing Cooperatives and Joint Venture Silicon Valley may be able to facilitate or aid in a program such as this.

Greenhouse Gas Emissions Reductions

An EPP would make zero waste possible; therefore it is included in the previous reduction estimate of 83.7 metric tons per year.

Table 27
Summary of Solid Waste Reduction Measure 1

	Component	Initial Cost to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	For municipal operations, adopt a zero waste policy	Negligible	83.7	\$59.73
2	In support of Zero Waste, establish an environmentally preferable purchasing program (EPP) for government operations	\$5,000		
TOTAL		\$5,000	83.7	\$59.73

⁵¹ Pacific Northwest Pollution Resource Center (PPRC), http://www.pprc.org/pubs/epp/epp_report.cfm

2. Increase recycling and composting at public events

**-225
Metric
Tons CO₂e**

Public events are notorious for excessive packaging and the use of disposable utensils, plates, and cups. California law (AB 2176) already requires large public venues and special events to develop and implement solid waste management plans.⁵² This measure, therefore, would only be for events held in public areas such as street fairs and park events. The City of San Francisco passed a public event waste ordinance requiring recycling at special events. This, along with their ban on polystyrene food service ware, helped the city achieve a 70% waste diversion rate in 2006.



2.1. Require recycling and composting as a condition of approval for public events

This measure would make public event permits conditional upon a waste plan. The City already requires recycling of public event permit holders as practice, but this reduction measure would ensure that it is enforced as law and that composting also be required for approval. The event holder would have to agree to divert a certain amount of waste through recycling and composting in order to be awarded the permit.

Initial Cost

An additional two hours of staff time (\$100-\$200) per public event contract would be necessary under this reduction measure. This includes informing and monitoring recycling and composting opportunities at the applicants' events. The costs of recycling and composting would be incurred by the event holder, not the City. There would likely be a one-time start up cost for staff training, but since a similar practice is already in place, the new training would be minimal.

According to City records, approximately 25 public events occur annually in the City of San Carlos. Therefore, an estimated \$2,500 - \$5,000 is foreseeable to implement this measure; however this cost would be borne by the applicant.

Greenhouse Gas Emissions Reductions

Requiring recycling and composting at public events would increase overall waste diverted from landfills by an estimated 2%. This diversion rate yields a 255 metric ton CO₂e reduction from 2005 levels.

⁵² US EPA, "Recycling on the Go Success Story," <http://epa.gov/osw/conserve/rrr/rogo/documents/sf-ca-ord.pdf>, accessed Sept. 30, 2008.

Table 28
Summary of Solid Waste Reduction Measure 2

	Supporting measure	Initial Cost to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Require recycling and composting as a condition of approval for public events.	Negligible	255	Negligible
TOTAL		Negligible	255	Negligible

3. Increase overall waste diversion by at least 1% per year

**-6,373
Metric
Tons CO₂e**

Increasing the amount of waste that goes into the recycling and compost stream instead of landfills will reduce the amount of methane, a potent greenhouse gas, released into the atmosphere. According to the Natural Resources Defense Council, 60% of household waste produced in the United States is recyclable or compostable.⁵³ Despite this fact, San Carlos residents and businesses only diverted 39% of their waste from landfills in 2006.⁵⁴

3.1. Increase required Construction and Demolition (C&D) diversion rate to 60%

C&D materials can include lumber, paper, cardboard, metals, masonry, carpet, plastic, pipe, drywall, rocks, dirt, and green waste related to land development.⁵⁵ San Carlos adopted a construction and demolition debris diversion ordinance that required 60% diversion (Zoning Ordinance Chp 8.05) in 2000. It requires a construction and demolition permit applicant to address their waste before the permit is approved. There are also minimum amounts of the waste that must be recycled or reused according to type.

Staff recently instituted process changes for the C&D ordinance to increase diversion to the goal of 60%. These changes make it more likely that the City will get 60% diversion through enforcement of the C&D ordinance and by encouraging material salvage.

According to the California Integrated Waste Management Board, Construction and Demolition materials account for 10.4% of business disposal. A stricter ordinance would reduce this number and help San Carlos achieve its 1% per year diversion goal. Additionally, recycling or reusing C&D material is often less expensive than disposing of it. Organizations such as RecycleWorks have instruction manuals on how to recycle or find reuse for almost all materials.

⁵³ Natural Resources Defense Council, "The Past, Present, and Future of Recycling." <http://www.nrdc.org/cities/recycling/fover.asp>, accessed October 13, 2008.

⁵⁴ California Integrated Waste Management Board (CIWMB) Diversion Rate Statistics for Cities in San Mateo County, <http://www.ciwmb.ca.gov/LGTools/MARS/JurDrSta.asp?VW=In>. Accessed October 14, 2008.

⁵⁵ South Bayside Waste Management Authority, www.rethinkwaste.org

Initial Cost

The City of San Carlos is already well on its way to preparing for increased waste diversion. A consultant has been hired to address the C&D waste diversion ordinance and prepare a more stringent program. This extra effort for C&D recycling is currently funded through garbage rates, but it may be funded in the future through C&D permit fee add-ons. The additional counter work would most likely be absorbed by applicants for a construction or demolition permit.

Greenhouse Gas Emissions Reductions

It is estimated that a more restrictive C&D ordinance, along with the next measure and previously planned improvements to waste collection would increase waste diversion by 1% per year. A 1% increase per year as compared to the previous year (compounded) would bring San Carlos' total waste diversion rate to over 70% by 2030. It is estimated that this reduction measure will decrease greenhouse gas emissions by approximately 6,222 metric tons of CO₂ equivalent.

3.2. Provide for expanded recycling outreach and services to multi-family residential buildings, including renter-occupied apartment buildings

Although there are many sources of waste in San Carlos, concentrating on large waste sources like C&D and multi-family residential buildings will be most cost effective in attaining our 1% a year waste diversion goal.



Multi-family houses, especially those that are renter-occupied, often do not offer recycling, green waste, or composting services. There is a need for outreach to property managers and landlords about the cost-savings and environmental benefits of waste diversion. Additionally, residents of multi-family buildings could be urged to ask their landlords for these services.

Expanded outreach to the residents of San Carlos is underway concerning recycling and composting services. In October 2008, City Council directed Staff to begin negotiations with Recology of San Mateo County to become the new Solid Waste, Recycling and Organics Collection firm in San Carlos starting on January 1, 2011. As part the agreement, Recology will be providing a six month recycling publicity program to advertise their new programs. They will also do ongoing outreach and public education as part of their contract with the City.

Initial Cost

As a result of the recent contract with Recology (see page 82 for details), the initial cost to the City for this reduction measure is expected to be negligible.

Greenhouse Gas Emissions Reductions

It is estimated that this measure, along with the previous measure and previously planned improvements to waste collection would increase waste diversion by 1% per

year. A 1% increase per year as compared to the previous year (compounded) would bring San Carlos' total waste diversion rate to over 70% by 2030. It is estimated that this reduction measure will decrease greenhouse gas emissions by approximately 6,222 metric tons of CO₂ equivalent.⁵⁶

3.3. Mandate commercial recycling

The California Integrated Waste Management Board (CIWMB) waste stream profile for San Carlos indicates that 63% of the City's waste comes from commercial properties. Mandatory recycling for daily commercial activities would greatly reduce this percentage, therefore reducing the amount of methane released from landfills.

It is likely that commercial recycling will become mandatory in the near future under the AB 32 Scoping Plan. The preliminary draft recommendations, approved in January 2009, clearly state that the Air Resources Board and CIWMB are considering mandatory programs to increase commercial recycling through local government partnerships.

A mandatory commercial recycling program would require enforcement. Local enforcement agencies or officers would partner with the waste management provider to identify businesses with improperly sorted waste. Enforcement and coordination would be funded by the money generated from fines to commercial properties.

Initial Cost

Costs to mandate commercial recycling would be minimal. The 2011 service contract with Recology is assumed to have capacity for increased commercial recycling.

Greenhouse Gas Emissions Reduction

It is estimated that mandatory commercial recycling within the City of San Carlos would ensure that San Carlos' waste diversion rate reaches over 60% by 2020. This diversion rate would meet, if not exceed, the future State target for overall waste diversion which is now at 50%.

Table 29
Summary of Solid Waste Reduction Measure 3

	Supporting measure	Initial Cost to the City	GHG Reduction (metric tons CO ₂ e / year)	Cost per metric ton CO ₂ e
1	Increase required Construction and Demolition (C&D) diversion rate beyond the 50% currently required by the State.	Negligible	6,222	Negligible
2	Provide for expanded recycling outreach and services to multi-family residential buildings	Negligible		
3	Mandate commercial recycling	Negligible		
TOTAL		Negligible	6,222	Negligible

⁵⁶ Based on a compound interest rate of 1% from 2020 solid waste projections.

Solid Waste Reduction Measures – Progress to Date

San Carlos has taken a proactive approach to reducing waste and increasing waste diversion among residents and businesses. This section describes San Carlos's progress to date in achieving the reduction targets of the measures in this chapter.

Recology Waste Contract

At the October 13, 2008 meeting, the City Council approved a resolution to begin negotiations with Recology (formerly, Recology Systems) of San Mateo County to become the new Solid Waste, Recycling and Organics Collection firm in San Carlos starting on January 1, 2011. Recology was chosen as the City's new provider in part because of its expanded composting, recycling, and outreach services that will help reduce greenhouse gas emissions levels within the City of San Carlos. Specifically, Recology offers the following with respect to waste reduction:



1. The company pioneered Commercial Organics Recycling Collection Service in Northern California and is highly committed to diversion from all service sectors.
2. Recology's proposal includes the high levels of diversion and is specifically strong in the area of Commercial Recycling and Organics Collection Service and in the On-Call (Bulky Items) Collection Service. The company has put forth an aggressive, yet achievable Commercial Recycling diversion goal and innovative approach to attain the desired results.
3. Recology's proposal included environmental enhancements including the use of B-40 fuel (40% bio diesel), regular carbon footprint monitoring and reporting, use of hybrid trucks for route supervisors, and incorporating green building practices and standards at its facilities.
4. Recology will provide a free 6 month Commercial and Multi-Family Dwelling "Recycling Blitz" educational program (estimated to cost \$478,435) and will remit to the SBWMA Member Agencies the revenue derived from the recyclable material that is collected during this program (estimated at \$210,000).

This contract will play an essential role in reducing emissions by the amount set forth in this plan. The "Recycling Blitz" is already in the planning stages.

Construction & Demolition (C&D) Ordinance

As mentioned previously, City staff is instituting process improvements to the C&D ordinance with a 60% diversion goal. The process improvements make it more likely we will get 60% diversion through the C&D ordinance enforcement and the salvage of materials. The C&D ordinance is expected to be crucial to reaching a 1% diversion increase per year for an overall goal of over 70% by 2030.

Analysis of Reduction Target – Solid Waste

With the four reduction measures described in this chapter, San Carlos would reduce its solid waste emissions by 36.8%.

Table 30
Summary of Solid Waste Emissions Reductions

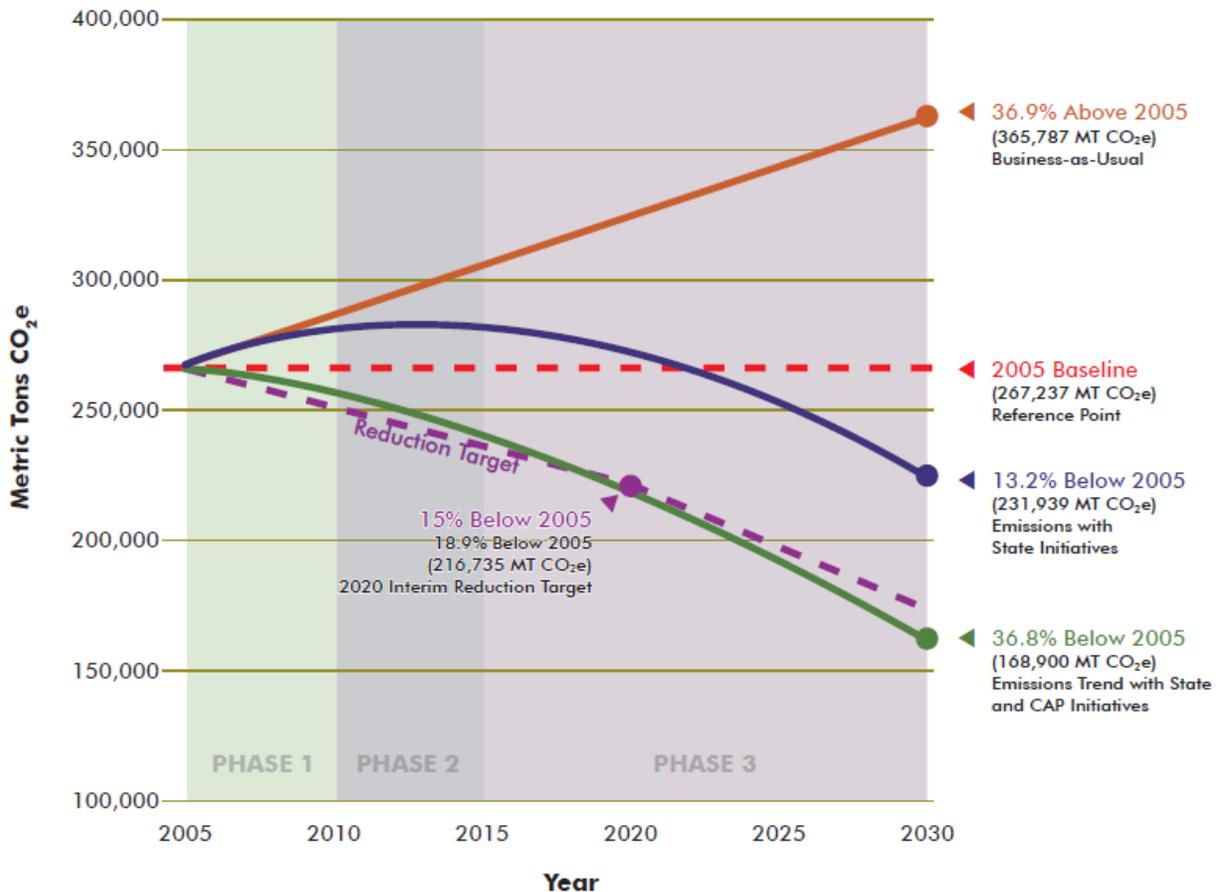
		Metric Tons CO ₂ e per year
Reference year 2030 “Business as Usual” Solid Waste Projection		14,636
1	Promote zero waste.	- 83.7
	1.1. For municipal operations, establish a zero waste policy	
	1.2. Create an Environmentally Preferable Purchasing Policy (EPP) for municipal operations.	
2	Require recycling and composting as a condition of approval for public events.	- 255
	2.1. Require recycling and composting as a condition of approval for public events.	
3	Increase overall waste diversion by at least 1% per year.	- 6,222
	3.1. Increase required Construction and Demolition (C&D) diversion rate beyond the 50% currently required by the State.	
	3.2. Provide for expanded recycling outreach and services to multi-family residential buildings, including renter-occupied apartment buildings.	
	3.3. Mandate commercial recycling	
Total Community Reduction		-6,560.7
Net Community Waste Emissions		8,075.3
Base Year 2005 Solid Waste Emissions (reference)		12,777
Percent below 2005 level		36.8%

VII. Reduction Target Analysis

Job, household, and population growth will weigh against City, State, and regional reduction activities in our effort to see that San Carlos's emissions are 35% below 2005 levels by 2030. This chapter analyzes how these growth factors and reduction efforts affect one another and how they culminate in our estimated 2030 emissions scenario shown in Figure 13 below.

As discussed earlier in this document, if the San Carlos community continues to produce greenhouse gas emissions at the same rate as 2005, our annual emissions will reach 365,787 metric tons of CO₂e by 2030. This 'business-as-usual' linear projection, shown by the red line in Figure 11 below, is a 36.9% increase above 2005 levels due to population, job, and household growth as well as projected increases in consumption.

Figure 13
2030 Emissions Reductions in San Carlos



While we implement the Measures of this document, emissions will continue to rise along this 'business-as-usual' projection. As such, the emissions reductions analyzed in this chapter are subtracted from the business-as-usual projection and not the baseline. Subtracting our reduction efforts from 2005 levels would be assuming that time stops while this Plan and State initiatives are implemented. In reality, our efforts will be implemented while emissions are still increasing in San Carlos. This fact makes our

reduction target of 35% below 2005 levels more challenging, yet still feasible; the percent change from 'business-as-usual' in 2030 to 35% below 2005 levels is over 70%. These trends are shown in Figure 13 above.

The reduction measures in this Plan will be implemented in phases due to financial, technical, or political obstacles and constraints. The curved lines in the graph above were formed by subtracting the greenhouse gas savings of each reduction measure from the projected emissions in the time period in which it is expected to be implemented. The result is a curvilinear trend towards expected emissions levels. These phases of implementation are explained further in this chapter and in the Implementation chapter.

State Initiatives: An Integral Partner in Our Reduction Efforts

Local governments can only do so much as they have minimal control over the transportation and energy sector. The majority of our future emissions depend on State, Federal, and regional efforts to affect the efficiency of vehicles, fuels, electricity, and natural gas. The waste sector remains the one sector in which our local governments have a large influence, which is demonstrated by our estimated 43% reduction from 2005 levels in the waste sector by 2030. The following sections describe and analyze the major State emission reduction efforts including the Renewable Portfolio Standard (RPS), Pavley bill, Title 24, Low-Carbon Fuel Standard, and SB 375.

Regional Portfolio Standard (RPS)

The State of California Renewable Portfolio Standard (RPS) is one of the most ambitious renewable energy standards in the country. Established in 2002 in Senate Bill 1078, the RPS program requires electricity providers to increase the portion of energy that comes from renewable sources to 20% by 2010 and by 33% by 2020. Per the trend of Executive Order S-14-08, this renewable energy goal is assumed to increase to 50% by 2030.

Assuming a constant distribution of natural gas and electricity use, the California RPS will reduce emissions by approximately 13,834 metric tons CO₂e by 2020 and 31,566 metric tons CO₂e by 2030. According to the California Public Utilities Commission, renewable energy constituted 13.5% of PG&E's electricity mix in 2005.

Assembly Bill 1493 (Pavley) I and II

Assembly Bill 1493 (Pavley), signed into law in 2002, will require carmakers to reduce greenhouse gas emissions from new passenger cars and light trucks beginning in 2011. The California Air Resources Board adopted regulations in September 2004 that create two phases of increasingly stringent standards for car manufacturers between 2009 and 2020. It is expected that new vehicles sold in California will create an average of 16% less greenhouse gas emissions than current models. The bill is being challenged in federal and state courts by automakers and car dealers. It is anticipated that the EPA waiver will be granted in 2009 and the State will be allowed to move forward as outlined in AB 1493.

Pavley I and II are expected to reduce transportation emissions within the City of San Carlos by 34,649 metric tons CO₂e by 2020 and 31,566 metric tons CO₂e by 2030. This estimate is based on the vehicle efficiency rates included in a technical assessment prepared by the California Air Resources Board.⁵⁷ The future vehicle mix in San Carlos was obtained using the EMFAC software. Pavley efficiency rates were then applied to each model year in 2020 and 2030.

Low-Carbon Fuel Standard

The Low Carbon Fuel Standard (LCFS) is a flexible performance standard designed to accelerate the availability and diversity of low-carbon fuels by taking into consideration the full life-cycle of greenhouse gas emissions. The LCFS will reduce emissions and make our economy more resilient to future petroleum price volatility.⁵⁸

As part of the AB 32 Scoping Plan, the LCFS is expected to reduce the intensity of transportation fuels by 10%. This will result in an estimated 14,124 metric tons in reductions by 2020 and 10,304 metric tons in 2030. The amount of CO₂e reduced actually lowers from 2020 to 2030 because the increase in vehicles subject to the Pavley bill.

Senate Bill 375

Senate Bill 375 aims to reduce greenhouse gas emissions by linking transportation funding to land use planning. The bill requires Metropolitan Planning Organizations like MTC to create sustainable communities strategies in their regional transportation plans (RTPs) for the purpose of reducing suburban sprawl. It also creates incentives for implementation of the sustainable communities' strategies and sustainable transportation plans.

The Scoping Plan also estimates a 5 million metric ton reduction as a result of the regional targets set by SB 375. This number represents an estimate of what may be achieved from local land use changes, not the SB 375 regional target. ARB will establish regional targets for each Metropolitan Planning Organization (MPO) region following the input of the Regional Targets Advisory Committee and a public consultation process with MPOs and other stakeholders per SB 375.

Although SB 375 is expected to reduce trips and transportation-related emissions, it is not quantified as a reduction source in this Plan for two reasons: 1) The intent and implementation of SB 375 overlaps greatly with the current mixed use and transit-oriented development measures included in this Plan and 2) A technical, defensible analysis of the bill's projected impact on the State or San Carlos area is not available at this time.

⁵⁷ Percentage reduction in Co₂e per model year derived from California Air Resources Board; An Enhanced Technical Assessment. "Comparison of Greenhouse Gas Reductions for the United States and Canada Under U.S. Café Standards and California Air Resources Board Greenhouse Gas Regulations." Table 11, Page 13; "CO₂-Equivalent Emission Reductions from Adopted Pavley 1 and Anticipated Pavley 2 Regulations in California in 2020."

⁵⁸ AB 32 Scoping Plan, Page 19.

Table 31
Emission Reduction Analysis from State Initiatives

		2020 Metric Tons CO ₂ e per year	2030 Metric Tons CO ₂ e per year
Business-as-Usual Projection		321,519	365,787
1	Renewable Portfolio Standard	- 13,834	- 31,566
2	Pavley I and II	- 34,649	- 91,978
3	Low Carbon Fuel Standard	- 14,124	-10,304
Total Reductions		-62,607	-136,794
Net Emissions		258,912	228,993
Base Year 2005 Community Emissions		267,237	267,237
Percent below 2005 Level		3.1%	14.3%

Climate Action Plan Reductions

Table 32 below shows the quantifiable reduction measures included in this plan in conjunction with the estimated results of State initiatives.

Table 32
Reduction Target Analysis

		2020 Metric Tons CO ₂ e per year	2030 Metric Tons CO ₂ e per year
Reference Year Business-As-Usual Emissions Projection		321,519	365,787
1	Energy Use Strategies	-24,496	- 42,369
2	Transportation and Land Use Strategies	-12,886	-14,109
3	Solid Waste	-4,815	-6,561
Subtotal – Emissions with CAP		279,342	302,748
4	Renewable Portfolio Standard	- 13,834	- 31,566
5	Pavley I and II	- 34,649	- 91,978
6	Low Carbon Fuel Standard	- 14,124	-10,304
Total – Emissions with CAP and State Programs		216,735	168,900
Base Year 2005 Community Emissions		267,237	267,237
Percent below 2005 Level		18.9%%	36.8%

With this Plan, San Carlos is making a proactive effort to reducing climate change locally. By implementing this Plan, San Carlos will ensure that greenhouse gas emissions meet, if not exceed, local and State reduction targets.

Challenges in analyzing San Carlos' future emissions

There are two main challenges in analyzing San Carlos' future emissions. As described in this Plan, not all reduction measures can be quantified in terms of greenhouse gas emissions. This report makes a best effort at estimating possible minimum levels of reduction, but it is more than likely that our analysis did not capture the results of all efforts to be made within the City by 2030. As more research is released and climate action plans become more common, it is likely that a better methodology for calculating emissions reductions will become available therefore reducing our future emissions level even further below what is currently projected.

VIII. Adaptation to Climate Change

Even in a “best case” scenario, the effects of climate change are likely to negatively impact San Carlos. It is therefore prudent that the City and community be prepared for the known and unknown consequences of climate change. Waiting for these impacts to become more severe before responding or having an established method of response will only put the City at an economic and social disadvantage to other Cities in the region that are proactively addressing climate change.



The known consequences of climate change, as discussed in the introduction chapter, include sea level rise, increased risk of wildfires, an increase in unpredictable weather, negative impacts on wildlife, a deterioration of public health, and a decrease in the consistent supply of fresh water. To address these impacts, the following adaptation strategies are recommended:

1. Identify and reassess regional climate change vulnerabilities on a regular basis and work with neighboring cities, counties and regional agencies to establish more uniform approaches to addressing climate change.
2. Evaluate the potential climate change impacts of items being considered by the Planning Commission, City Council, and other discretionary hearing bodies.
3. Prepare for sea level rise by cooperating with the San Francisco Bay Conservation and Development Commission (BCDC) and other regional agencies preparing for sea level rise, coastal erosion, and peak storm events.
4. Address barriers to change and inefficiencies within the existing structure of City government in order to be able to respond quickly to climate change developments. Incorporate climate change threats to the City's existing Emergency Incident Plan and Emergency Operations Center (EOC) training for City staff

It is important that San Carlos prepare for climate change not only within its borders, but within the region as a whole. Creating partnerships with bordering cities, the County of San Mateo, and agencies such as BCDC, ABAG, and MTC will ensure the safety of our region as a whole. It is also important to maintain consistency with State adaptation efforts. Climate change adaptation has recently become a priority at the State level through Executive Order S-13-08 signed by Governor Schwarzenegger in November 2008. The mandate initiates the development of a California Climate Adaptation Strategy (CAS) to be completed in 2009. The Plan will identify climate change vulnerabilities resulting from sea level rise, increased temperatures, shifting precipitation, and extreme weather events and recommend methods and policies to adapt to these

changes. The Order also directs State agencies to analyze existing and planned infrastructure projects that could be at risk to sea level rise.⁵⁹ By coordinating regionally and cooperating with State adaptation efforts, San Carlos will preserve the quality of life residents of the City enjoy now.

1. Identify and reassess regional climate change vulnerabilities on a regular basis

New and more accurate climate change information is being developed and released each day. In order to adequately stay prepared, the City must reassess its regional climate change vulnerabilities on a regular basis and modify its actions accordingly.

This process could be done in combination with the Climate Action Plan update, which is recommended every five years. It has become industry practice to assume re-evaluation of the community's emissions every 5 years. For San Carlos, and most neighboring Cities, that means preparing updated baselines in 2010, 2015 and 2020, with climate action plan updates occurring in 2012, 2017, and 2022.

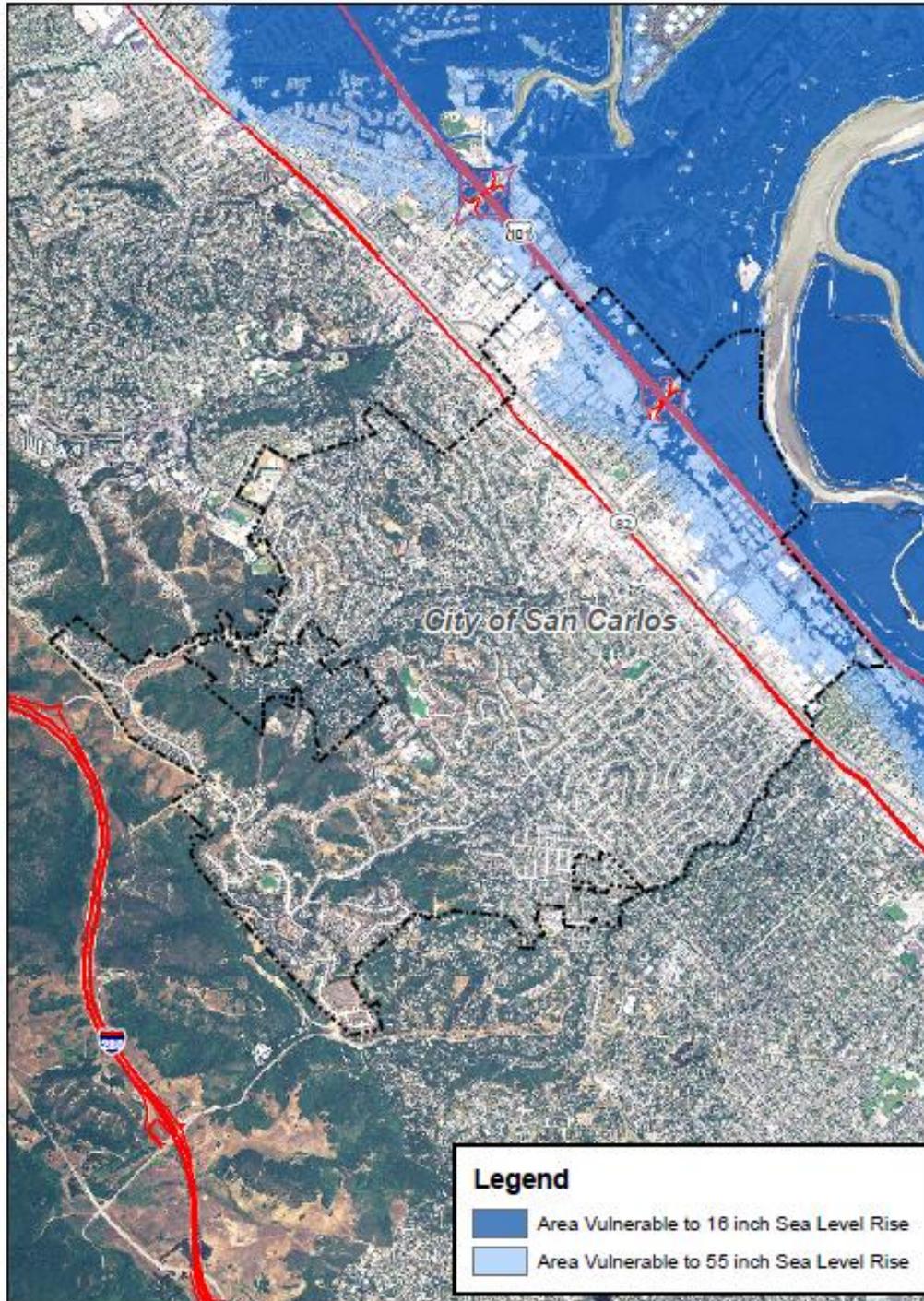
The purpose of re-evaluating the community's emissions is to understand how the reduction measures are working, and to provide an opportunity to develop alternatives to reduction measures that are found to be ineffective or too costly for the emission reductions obtained from the measures. This process will allow adaptive management of the climate action plan and emission reduction measures leading to a more effective resolution to the challenge of climate change.

2. Evaluate the potential climate change impacts of items being considered by the Planning Commission, City Council, and other discretionary hearing bodies

Climate change is a serious threat to the community of San Carlos, with potential economic and social ramifications that could result in fiscal impacts to the City's general fund. Consistency with state goals regarding reduction of greenhouse gas emissions will likely open sources of funding that the City could use to expand or maintain climate programs and other outreach programs. Approving programs and developments that address climate change consistent with this climate action plan and, as a result, State goals regarding climate change will result in more sustainable communities that provide healthier living conditions, fewer pollutants, less waste and a better quality of life. These evaluations would be similar to the 'fiscal impact' analysis already required in Council reports. Climate change evaluations in discretionary decisions will guarantee that the community and City of San Carlos is continuously conscious of our changing environment. It will also keep the goals and recommendations of this report alive and in the forefront of the decision making process.

⁵⁹ Office of the Governor press release, Gov. Schwarzenegger Issues Executive Order Directing State Agencies to Plan for Sea Level Rise and Climate Impacts, November 14, 2008. <http://gov.ca.gov/press-release/11035/>

Figure 14
Estimated Inundation Levels from Sea Level Rise on the South Bay



Source: BCDC, 2009

3. Prepare for sea level rise by cooperating with the San Francisco Bay Conservation and Development Commission (BCDC) and other regional agencies preparing for coastal inundation⁶⁰

Sea level rise is perhaps the most visible and threatening consequence of climate change to the City of San Carlos. BCDC issued a report on sea level rise in April, 2009, which states that sea level along the west coast rises approximately 7.9 inches per century, or approximately 0.08 inches per year. However, the rate of sea level rise is increasing. During the period of 1993-2003, the rate was approximately 0.12 inches per year, which could demonstrate the result of human-induced warming on sea level. The BCDC uses the same sea level rise estimates that are used by California Climate Action Team-funded assessments. These estimates anticipate the sea level in the Bay Area will rise 16 inches by mid-century and 55 inches by the end of the century as shown in Figure 12.

By mid-century, approximately 180,000 acres of the Bay Area could be flooded and 213,000 acres could be flooded by the end of the century. Due to Bay Area topography 100 percent of the development located in 100-year flood plain areas will likely flood by the year 2050. Also, different parts of the Bay Area are more vulnerable to flooding than others. In particular, due to differing tides, the South Bay will likely experience amplified storm surge events. In the vulnerable areas are several large commercial and industrial developments, including 93 percent of both the Oakland and the San Francisco airports that may be inundated by 2100. Half of the vulnerable development is residential and approximately 270,000 people would be at risk of flooding. Approximately 4,300 acres of waterfront parts are expected to flood by 2100.

Given the scale and potential severity of sea level rise impacts, it is important that the coordination and preparation be a region-wide effort. It is recommended that San Carlos participate in and cooperate with efforts like BCDC's in order to protect its own borders, property owners, and neighbors.

4. Address barriers to change and inefficiencies within the existing structure of City government in order to be able to respond quickly to climate change developments. Incorporate climate change threats to the City's existing Emergency Incident Plan and Emergency Operations Center (EOC) training for City staff

Due to the projected increase in peak storm events, along with associated impacts of storm surges exacerbated by sea level rise, adequate preparation will be essential in order to keep the community safe and prepared for these types of situations. In an emergency, there can be inherent difficulties with communication and coordination between a multitude of agencies. By identifying these inefficiencies and preparing a course of action, the City can be better prepared to escalate issues throughout the City government when the need arises. A secondary benefit to improving emergency

⁶⁰ San Francisco Bay Conservation and Development Commission. 2009. (April) Draft Staff Report. *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline*. http://www.bcdc.ca.gov/proposed_bay_plan/bp_1-08_cc_draft.pdf. Accessed June 5, 2009.

response and planning will be the general improvement of emergency preparedness within the City and the community.

One of the primary barriers to implementing climate change reduction measures is a lack of understanding of climate change and its importance in the long term viability of the community. Educating City staff, decision makers, and the public about the risks of climate change and the efforts the City is taking will prepare the City and the community for potential climate related events and the appropriate response to these events. Incorporating climate change education into the existing Emergency Incident training given to City staff should be one major component of this adaptation strategy.

Implementation of Climate Change Adaptation Strategies

Unlike the reduction measures described previously in this document, these four adaptation measures described in this chapter do not include a cost-benefit analysis of greenhouse gas emissions reductions as these are not meant to address our contribution to climate change, but rather our response to the effects of climate change. Many of the processes involved in adaptation efforts can be done in conjunction with existing processes and would not involve substantial cost. Grant funding will likely become available in the next few years to develop climate emergency preparedness plans and response plans in coordination with regional programs to reduce the long term risks of climate change on Bay Area communities. These adaptation measures are an essential part of ensuring the City is proactively prepared for climate change and a way to ensure that the City as a whole maintains its awareness of climate change in its day to day operations.

IX. Public Outreach and Education

A Climate Action Plan can be more effective if the community is aware of its purpose and reduction measures. Resident participation is essential to many of the reduction measures included in this plan if we are to achieve the predicted emissions reductions. The voice of few may have begun the movement to prepare this plan, but it will take the actions of many to see it through implementation.

This chapter outlines three levels of engaging the public in climate action efforts. Descriptions and cost estimates are based on similar scopes of work and budgets prepared by consultants.

Level 1: Minimal Public Outreach and Education

The goal of a level one public outreach and education effort would be to inform the community that the City has developed a Climate Action Plan and will be implementing its measures. It would involve a short four-week campaign consisting of local media outreach, including press releases, a printed FAQ (frequently asked question) sheet and the addition of one page promoting the Plan on the City web site. The cost of this level of outreach is estimated to be \$6,000 through the use of internal staff or outside consultants.

Level 2: Moderate Public Outreach and Education

The goal of a level two public outreach and education effort would be to inform the community of the Climate Action Plan, what its conservation goals are, and how the public can participate in them. It would require a six-month campaign that includes the following outreach components:

- ❏ Development of a campaign motto that represents the goals of the CAP.
- ❏ Local media outreach, including multiple press releases, a media kit and media pitching.
- ❏ Development of a campaign web site that includes information on the CAP, conservation tips, optional online survey and frequently asked questions. The site would be branded to match the City's current site.
- ❏ Staffed participation at two City-sponsored community events, including development of a booth.
- ❏ Development of printed promotional collateral pieces (brochure, FAQ, etc.)
- ❏ Development of a Speaker's Bureau to conduct presentations on the program at important community based organization meetings (Chamber of Commerce, civic and environmental organizations, faith based organizations, etc.).

The cost of this level of campaign would be approximately \$36,000.00 the first year, and less in later years. The first year of implementation would likely use the services of an outside consultant.

Level 3: Comprehensive Public Outreach and Education

A level three public outreach and education campaign would be to educate the community about conservation activities they can participate in that are enforced or recommended by the CAP. It would entail a comprehensive one-year campaign that would target the business community, school system, and residents.

The following outreach components could be included:

- ❏ Development of a unique campaign brand that represents the conservation goals of the CAP.
- ❏ Creation of a series of four community-based events that promote residential conservation (for example composting or water conservation workshops).
- ❏ A membership campaign for businesses who participate in conservation efforts. Those efforts are identified to the public through branded window decals and a membership card that provides a 10 percent discount to customers.
- ❏ School outreach will include a teacher's guide that can be used in elementary schools and high schools.
- ❏ Local media outreach, including multiple press releases, a media kit and media pitching.
- ❏ Development of a campaign web site (up to 6 pages) that includes information on the CAP, conservation tips, optional online survey and frequently asked questions. The site would be branded to match the City's current site.
- ❏ Development of printed promotional collateral pieces (brochure, FAQ, etc.).
- ❏ Development of a Speaker's Bureau to conduct presentations on the program at important community based organization meetings (Chamber of Commerce, civic and environmental organizations, faith based organizations, schools, etc.)
- ❏ Develop utility bill insert touting the campaign with conservation tips to residents.

A comprehensive public outreach and education program would cost an estimated \$60,000 per year for an outside consultant to develop and administer for the first year. Costs to manage the program after the first year would vary depending on whether external assistance is used or whether in house staff manages the program.



Example: City of San Mateo, Climate Action Plan Public Outreach Program

The City of San Mateo developed the San Mateo Acting Responsibly Together (SMART) program to educate residents and businesses on the City's Sustainable Initiatives Plan. It is anticipated that the program will increase awareness and behavioral changes in individual energy consumption, waste production, and travel behavior. This will assist the City in achieving its short- and long-term greenhouse gas emissions reduction targets.

SMART targets businesses, schools and individuals in San Mateo and encourages them to reduce San Mateo's carbon footprint by changing simple, day-to-day behaviors. Businesses can receive a SMART designation by pledging to meet certain guidelines consistent with carbon reduction. A Web site dedicated to SMART uses a pledge form where businesses, individuals and even children can calculate their emissions and make their pledge to live SMART.

As individuals pledge to reduce their carbon footprints, they will receive a SMART card that can be used at participating businesses where they will receive special discounts and/or promotional items. To further promote campaign efforts, some businesses will sell or provide SMART reusable cloth bags that will feature the participating business and SMART logos.

<http://www.cityofsanmateo.org/index.asp?NID=1536>

IX. Implementation

The previous chapters analyze 21 energy use, transportation, and land use reduction measures intended to reduce community emissions in San Carlos by 35% below 2005 levels by 2030. These measures were the result of extensive research, community participation, CAP subcommittee discussion, and City staff input. They represent the hard work and initiative of the City of San Carlos to go above and beyond normal practice by proactively addressing our relationship to global climate change.

This report lays a foundation that will be revised and built upon for years to come. Implementation remains the most difficult component to climate action because the field is always evolving with new technology, policy, and resources. However, having calculated the best known costs and benefits to each reduction measure, we can identify several “low hanging fruits” that bear low initial costs and large reductions in emissions.

It is recommended that one individual within the City would coordinate implementation of these reduction measures and the operation of the programs that result from implementation. Individual department leads may also be warranted to ensure efficient cross-coordination in implementing these measures.

Suggested Prioritization of Reduction Measure Implementation

This chapter separates reduction measures into three time periods for implementation: 2005 to 2010, 2010 to 2015, and 2015 to 2030. Phases indicate when implementation of the measure begins; the reduction effects and overall maintenance of the program will extend well beyond the allotted phase. All reduction measures will begin implementation by 2020. The period of 2020 to 2030 will be for evaluation and expansion of reduction measures.

These implementation lists were generated to help identify which reduction measures are more cost effective, robust, and/or feasible and should therefore be implemented first. All of the reduction strategies are essential to reach the goals set forth in this Climate Action Plan; however some are expected to be implemented on a later timeline due to obstacles of available data, technology, or finances, as described on the following pages.

Phase 1: Reduction Measures to Begin Implementation 2005 to 2010

The majority of Phase 1 reduction measures are those that have already begun to be implemented. The progress of these reduction measures is explained at the end of Chapters 4 through 6.

**Table 33
Phase 1: Reduction Measures to Begin Implementation 2005 to 2010**

Page	Reduction Measure	2030 Emission Reductions (Metric tons CO2e per year)	First Year Costs per Metric Ton CO2e	Estimated Cost to City
25	Expand energy saving opportunities to businesses	13,300	\$0.18-\$0.38	\$2,500 - \$5,000
27	Improve residential energy efficiency	14,115	\$0.84	\$10,000
50	Encourage development that is mixed-use, infill, and higher density	5,544	\$0.81-\$1.62	\$4,500 - \$9,000
52	Increase housing density near transit	4,957	\$4.54 - \$9.08	*\$22,500 - \$45,000
55	Actively promote walking and biking as safe modes of local travel, particularly for children attending local schools	170	\$923.52	**\$157,000
59	Create travel routes that ensure that destinations may be reached conveniently by public transit, bicycling and walking	122	Negligible	***\$24,000 - \$48,000
66	Convert more City vehicles to hybrid, electric, alternative fuel, or smaller vehicles	59	\$6,537-\$7,027	***\$385,740 - \$414,648
77	Increase overall waste diversion by at least 1% per year	6,222	Negligible	Negligible
65	Enforce affordable housing development standards	192	Negligible	Negligible

*This cost would be included as part of the Zoning Ordinance update following adoption of the General Plan.

**This cost has been partially addressed through the recent installation of bicycle sharrows (Approx. \$45,000), implementation of the 2003 Bicycle and Transportation Plan, as well as Federal stimulus funding for crosswalks and curb ramp improvements (\$550,000).

***This cost would be reflected in the Equipment Replacement fund which would cover future costs as vehicles are replaced over time.

Phase 2: Reduction Measures to Begin Implementation 2010 - 2015

These reduction measures are the “low hanging fruit,” or the measures that have the most return for the lowest cost.

Table 34
Phase 2: Reduction Measures to Begin Implementation 2010 - 2015

Page	Reduction Measure	2030 Emission Reductions (Metric tons CO ₂ e per year)	First Year Costs per Metric Ton CO ₂ e	Estimated Cost to City
31	Adopt a green building standard for new development and major remodels.	11,868	\$0.93	\$10,000
36	Create water and waste efficient landscapes.	416*	\$4.81-\$9.62	\$2,000 -\$4,000
37	Identify opportunities for on-site renewable energy generation on City and privately- owned property	394	\$1,282-1,320	**\$10,000
41	Implement reduction strategies included in the energy audit of City facilities and continue to monitor City facility performance	16	N/A	Unknown
42	Provide for increased albedo (reflectivity) of urban surfaces including roads, driveways, sidewalks, and roofs in order to minimize the urban heat island effect	2,320	Negligible	Negligible
43	Encourage tree planting	356	\$35.96- \$71.91	\$12,800 -\$25,600
53	Increase bike parking	125	\$6 - \$12	\$900 - \$1,800
74	Support zero waste	83.7	\$59.74	\$5,000
76	Increase recycling and composting at public events	255	Negligible	Negligible

* These emissions are not included in the final reduction target analysis as emissions associated with the filtration and movement of water were not included in the City's baseline Greenhouse Gas Inventory as a disaggregated total.

**This cost would cover a feasibility study of on-site energy generation.

***This cost would partially be covered by the existing Building Division Code Enforcement Program.

Phase 3: Reduction Measures to Begin Implementation 2015 - 2020

The majority of the Phase 3 reduction measures involve changes that depend on future technology, monetary resources, or political feasibility.

Table 35

Phase 3: Reduction Measures to Begin Implementation 2015 - 2020

Page	Reduction Measure	Emissions Reductions (Metric tons CO2e per year)	First Year Costs per Metric Ton CO2e	Estimated Cost to City
62	Provide for a shuttle service in order to increase transit ridership	1,733	\$1.15 - \$2.30	\$2,000 - \$4,000
63	Promote car sharing programs	1,158	\$1.55 - \$3.11	\$1,800 - \$3,600
67	Increase accommodation and promotion of alternatively fueled vehicles and hybrid vehicles	49	\$200	\$10,000

Implementation Funding

One of the main barriers to seeing through an implementation plan is lack of available funds. There are multiple grant and loan programs through State, Federal, and regional sources to combat climate change. The production of this Climate Action Plan is the result of the Climate Protection Grant program through the Bay Area Air Quality Management District (BAAQMD). With the establishment of this plan for action, San Carlos is in a position to apply for additional funding to implement the supporting measures in a timely fashion. Funding sources may include the Association of Bay Area Governments, the Energy Efficiency and Conservation Block Grant (EECBG) program, the Sustainable Skylines Initiative, and the Bay Area Air Quality Management District.

In addition, funding opportunities will increase with implementation of state legislation approved in 2008. In the energy sector, SB 1754 provides for State financial assistance for installing renewable energy projects. AB 2466, on the other hand, mandates that local governments be paid for the excess renewable energy they generate. With the funding from current State bills and future grant programs like those above, San Carlos is likely to receive assistance in seeing through its climate action goals and measures.

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