

Appendix B: Greenhouse Gas Emissions Reductions Analysis Calculations

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This appendix outlines the sources of the greenhouse gas emissions reductions calculations. Most estimations were facilitated through 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, current research, and the results of pilot programs or case studies in other jurisdictions. All CAPPA sources were evaluated for reliability and applicability before the calculation was made. Where a CAPPA reduction analysis wasn't available or appropriate, other research and City data was compiled to create an estimate or to display that an estimate is not currently possible.

1. Expand energy saving opportunities to businesses

1.1. Consider developing a tax rebate program for efficiency improvements in businesses.

Source No calculation possible.

1.2. Expand energy saving opportunities for large and small commercial and industrial properties.

Sources PMC, ICLEI

Input San Carlos Chamber of Commerce data on number of businesses (2,100). 10% energy savings per business assumed per ICLEI recommendation and calculating using a case study in Boulder, CO and a 2003 Commercial Building Energy Consumption Survey by the Energy Information Administration (EIA).

2. Improve residential energy efficiency

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

Source PMC

Input GHG reductions unknown at this time

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

Source PMC, ICLEI and LBNL Home Energy Saver (hes.lbl.gov)

Input Difference between an efficient and non-efficient home in San Carlos from the Home Energy Saver calculator developed by the Lawrence Berkeley National Laboratory - <http://hes.lbl.gov/>

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

Source PMC, ICLEI

Input Assumption that at least 10,000 CFLs, 500 showerheads, and 500 faucets will be distributed and used before 2020. kWh savings of various devices obtained from the U.S. Department of Energy – Energy Efficiency and Renewable Energy.

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

Source PMC, ICLEI

Input Assumption of the number of homes served by a weatherization program based on levels of service of similar weatherization programs in the Bay Area, including that of Berkeley and Oakland.

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

3.1A. Enforce State Green Building requirements and provide information and support to developers on LEED and GreenPoint standards.

Source PMC, Current voluntary State Green Building checklist, USGBC
Input It is estimated that State standards and promotion of LEED and GreenPoint certification would lower energy consumption in new development and remodels by an estimated 20%.

3.1B. Create a green building ordinance requiring a GreenPoint, LEED, or equivalent green building certification per development category.

Source PMC, USGBC
Input LEED, GreenPoint, or equivalent standards are estimated to lower energy consumption in new development and remodels by an estimated 30%. This is a low estimate of an estimate given by the US Green Building Council (USGBC) which estimated a 50% reduction.¹

4. Create water and waste efficient landscapes

4.1. Formalize the City's efficient landscaping practice by writing it into the Parks Master Plan.

Source PMC, ICLEI
Input 143 Acres of park land in San Carlos. Assumption that 50% is landscaped. Energy savings from water calculated using the CEC's "Redefining Estimates of Water Related Energy Use In California" in 2006.

4.2. Expand the current landscaping ordinance to require efficient landscaping in conjunction with all residential and commercial property improvements.

Source PMC, ICLEI
Input Fifty percent of household growth between 2010 and 2030 was assumed to be detached family houses requiring efficient landscaping. The national average yard size (.5 acres) was used as well as national averages for lawn mower gasoline consumption, average water consumption per acre of lawn, and average energy use per gallon of water. San Carlos specific data was not available.

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

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

Source PMC, ICLEI
Input Assumption that a minimum of 400 kW would be installed on city property. Hours of sunlight per day obtained from www.rockygrove.com

5.2. Identify opportunities for Wind energy generation.

Source PMC, ICLEI
Input Assumption that ten small-scale wind turbines will be installed before 2020. Each turbine of 10-kW will produce approximately 22,000 kWh per year based on information from the American Wind Energy

¹ US Green Building Council, CEO of U.S. Green Building Council discusses benefits of green building, <http://www.usgbc.org/News/USGBCInTheNewsDetails.aspx?ID=2882>, accessed December 2, 2008.

Association (AWEA). Total of 328,500 kWh of clean energy produced per year in San Carlos.

5.3. Identify opportunities for Biomass energy opportunities.

Source	No Calculation
Input	No Calculation

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

Source	City Staff
Input	Unknown until the municipal facilities audit is completed.

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

Source	City Staff, ICLEI and PMC
Input	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 15% of all hardscape controlled by the City is repaved with high albedo content material by 2020, we estimate that this measure will result in at least 1,160 metric tons of CO2 equivalent savings per year.

8. Encourage tree planting.

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

Source	ICLEI, PMC, and City Staff
Input	Assumption that at least 200 new trees would be planted as a result of this program. Tree benefit from Tree Benefit Estimator http://www.appanet.org/treeben/calculate.asp .

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

Source	ICLEI and PMC
Input	Assumption that at least 900 new trees would be planted as a result of this program. Tree benefit from Tree Benefit Estimator http://www.appanet.org/treeben/calculate.asp .

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

Source	ICLEI and PMC
Input	Assumption that at least 50 trees will be planted as a result of this measure. Tree benefit from Tree Benefit Estimator http://www.appanet.org/treeben/calculate.asp .

Transportation and Land Use

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

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

Source	ICLEI, PMC, and City Staff
Input	Assumption that half of the development in San Carlos from 2005 to 2030 will be mixed-use, infill and higher-density. Development growth based on General Plan projections. CO2e reduction based on research by the Victorial Transportation Planning Institute (VPTI) www.vtpi.org .

2. Increase housing density near transit.

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 the personal automobile.

Source	CAPPA, PMC, and City Staff
Input	Assumption that half of the development in San Carlos from 2005 to 2030 will be transit-oriented development growth based on General Plan buildout. CO2e reduction based on research by the Victorial Transportation Planning Institute (VPTI) www.vtpi.org .

3. Provide for an education program and stepped up code enforcement to minimize vegetation that degrades access along public rights of way.

4.1. 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.

Source	No estimate
Input	No estimate

4. Increase bike parking.

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

Source	ICLEI and PMC
Input	Assumption that bike parking would replace 300 average-length weekly car trips based on case studies. Assumption that average bike/car trips are 10 miles.

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

Source	ICLEI and PMC
Input	Assumption that bike parking would replace 200 average-length weekly car trips based on case studies. Assumption that average bike/car trips are 10 miles.

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

6.1. Promote traffic calming methods on City streets such as landscaped median barriers

and traffic circles.

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

6.3. Incorporate bicycle-friendly intersections and boulevards into street design as recommended by the Bicycle Transportation Plan currently under review.

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

Source ICLEI and PMC

Input Estimate that these four measures will result in 750 additional biking and walking trips per week. Assumption that average bike/car trips are 10 miles.

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

7.1. 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 if the plan’s implementation.

Source No estimate

Input No estimate

7.2. Make it a condition for approval that new large-scale developments address transit, biking, and walking access to the location.

Source ICLEI and PMC

Input Estimate that this reduction measure will result in an additional 400 walking and biking trips per week. Assumption that average bike/car trips are 10 miles.

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

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

Source ICLEI and PMC

Input Assumption that a shuttle program would attract 500 new daily rider to public transit that weren't previously using transit. Based on data from the City's pilot shuttle program. Assumption that average car trips are 10 miles.

8. Promote car sharing programs.

9.1. See to the establishment of a car sharing program

9.2. Provide for car share parking spaces in convenient locations

Source CAPP and PMC

Input Assumption that a car share program would attract at least 1,000 members and that those member would reduce vehicle miles traveled by at least 30%, a figure based a study of carshare programs by Robert Cervero (see CAP text).

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

10.1. Replace 18 traditional automobiles in the City’s fleet with more efficient vehicles by 2020.

Source	Staff and PMC
Input	Assumption that the City will replace 18 vehicles with hybrid vehicles. Hybrid fuel economy from www.fueleconomy.gov .

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

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

Source	No estimate
Input	No estimate

11.2. Encourage alternative fueling stations within close proximity to potential customers.

Source	PMC
Input	Assumption that a biodiesel station in San Carlos would cause at least 1,000 gallons of pure biodiesel to be purchased and consumed per month. This estimate is based on the distribution of small refueling stations in San Francisco.

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

Source	PMC and ICLEI
Input	Assumption that 25 electric vehicle recharging stations would be installed before 2020. Assumes recharging stations would be used for daily commutes and replace vehicles with an average of 20 MPG.

11. Price on-street parking in high-traffic areas in order to alleviate congestion, increase motorist convenience, reduce VMT, and create a revenue stream for commercial areas of the City

10.1. Price on-street parking in high-traffic areas

Source	PMC and VTPI
Input	Parking pricing reduces regional VMT by 4-8% - VTPI

Solid Waste

1. Support Zero Waste.

1.1. For municipal operations, establish a zero waste policy.

Source	ICLEI and PMC
Input	Assumption that 4% of the City's waste stream is from municipal activities as supported by similar case studies.

2. Increase recycling and composting at public events.

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

Source	ICLEI and PMC
Input	Assumption that requiring recycling and composting at public events would increase overall waste diversion by 2%. Based on studies of San Francisco's ordinance scaled for the number and size of public events in San Carlos.

3. Establish an environmentally preferable purchasing program (EPP) for government operations.

Source	ICLEI and PMC
Input	An EPP is expected to reduce emissions by 50% from municipal waste production. Assumption that municipal waste accounts for 4% of total community waste.

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

4.1. Increase required Construction and Demolition (C&D) diversion rate beyond the 60% currently required.

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

4.3. Mandate commercial recycling.

Source	PMC
Input	These two measures along with 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. Waste characterization assumed to be constant.