

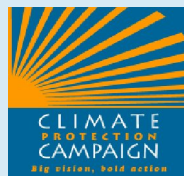
GHG Emissions 2000 Inventory

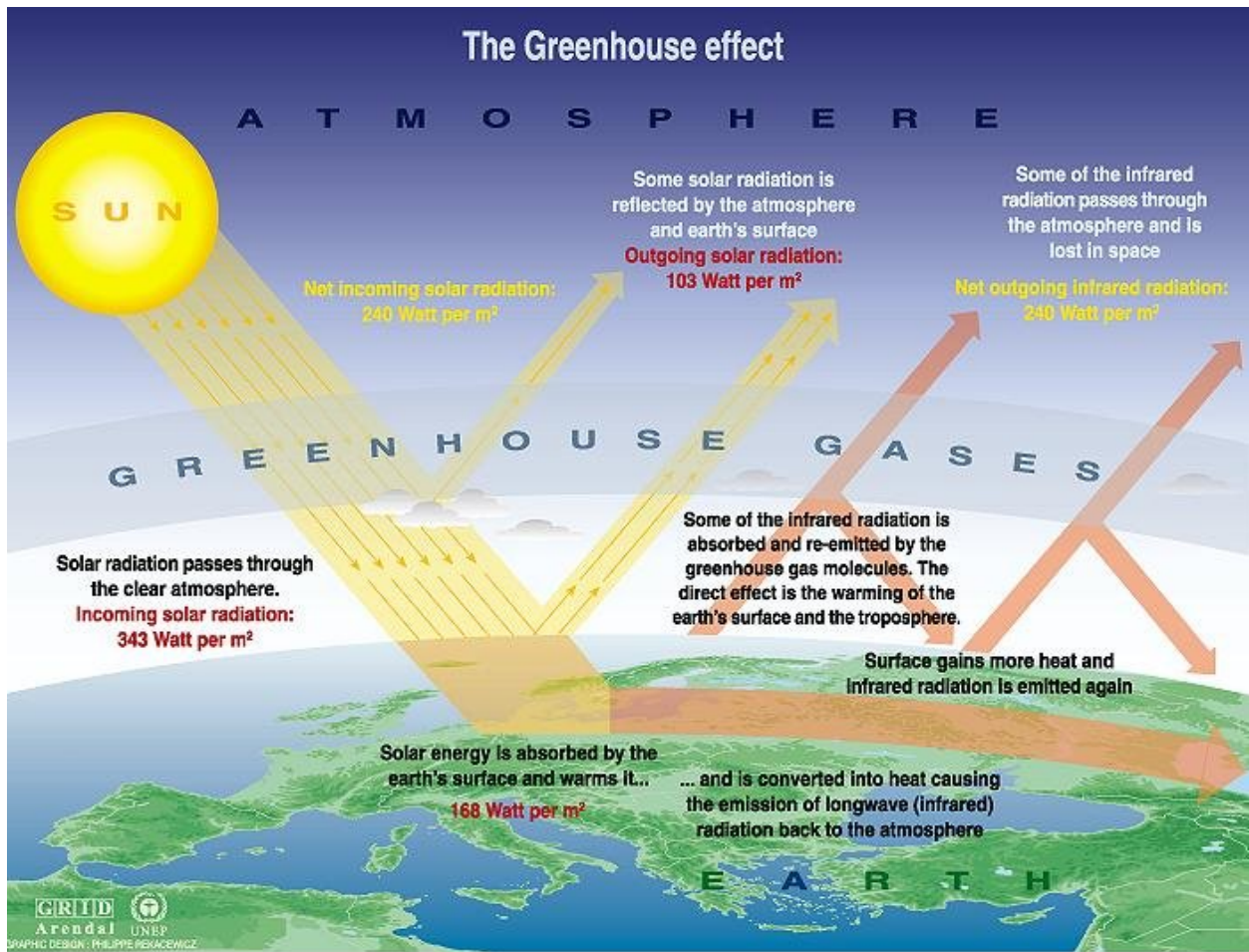
City of St Helena

August 3, 2007



Sam Pierce, PE
Senior Engineer
Climate Protection Campaign





Sources: Okanagan university college in Canada, Department of geography, University of Oxford, school of geography; United States Environmental Protection Agency (EPA), Washington; Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996.

Acknowledgements: This report relied on the work of City Staff to assemble the necessary base information. The support of this effort by the City Manager, Bert Johansson has been critical to its success. Delia Guijosa and Elizabeth Bates played a key and effective role in assembling the material for analysis with important support from Sandra Ericson. This work was completed under the guidance of Ann Hancock, Executive Director of the Climate Protection Campaign (CPC), and utilized the critical expertise of Dave Erickson, Technical Director, CPC. Finally, ultimate appreciation goes to Mayor Del Britton and the St. Helena City Council for their vision for a stronger, more secure future for our community, expressed in many ways, including their support for this important work.

Disclaimer: The Climate Protection Campaign and its subcontractors do not imply any guarantees. The information contained in this report is intended to support the City in its efforts to understand the greenhouse gas emissions trend for city operations and employee commutes. All results are approximations using standard engineering methodologies, based on historical energy usage.

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1.0 Executive Summary

The City is implementing the ICLEI program to reduce the greenhouse gas (GHG) emissions from city controlled sources. This program has five steps, referred to as “Milestones.” This report addresses the requirements of Milestone 1, the establishment of the baseline GHG emissions inventory. Milestone 2 will be addressed when the City Council adopts a GHG reduction target. Milestone 3 requires the creation of a plan to meet this target. The plan should provide a roadmap to meet the requirements of Milestone 2 with a measure-specific plan to reduce emissions by the specified percentage by the date provided by Council direction. Furthermore, the framework associated with the plan should support the City in meeting the requirements of Milestones 4 (implementation) and Measure 5 (monitoring and adjusting). A successful analytical framework will facilitate the integration of new and revised information over the life of the Action Plan.

This analysis provides the energy demand and associated GHG emissions for each of the contributing sectors (Building Efficiency, Fleet, Commute, Water/Sewer, Streetlights, and Photovoltaic), utilizing the best available information provided by the City Staff at the time of research. The results provide clear understanding of the GHG emissions by the city operations presented as CO₂e tons¹, and the energy cost associated these emissions. These results provide the current trend and the relationship of this trend to the Kyoto Protocol target². The intent is to provide a complete foundation upon which a Greenhouse Gas Action Plan can be developed.

Figure 1 below provides the GHG emissions from City Operations from 2000 to 2006 and projects out to 2015 using the trend from data associated with this period.

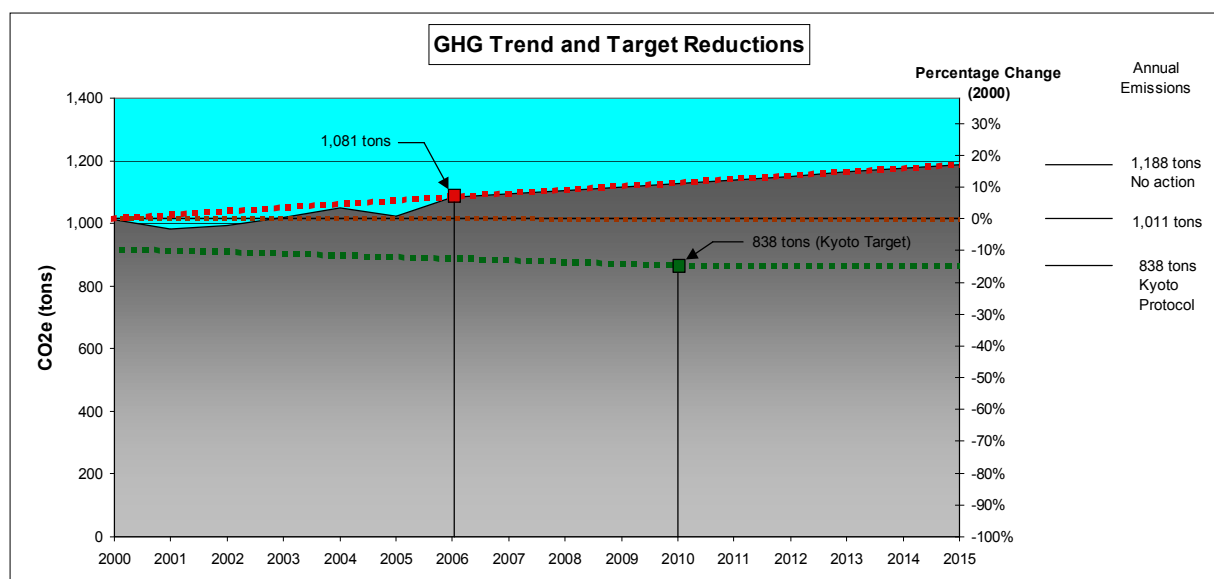
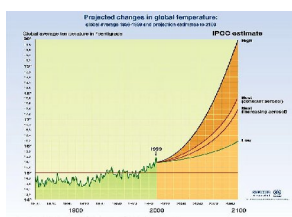


Figure 1: GHG Trend from 2000 to 2015

¹ CO₂e: Equivalent CO₂ in lbs or tons. The additional greenhouse gases such as methane are converted into the equivalent amount of CO₂ for clearer presentation.

² The Kyoto Protocol, an international and legally binding agreement to reduce greenhouse gases emissions world wide, entered into force on 16 February 2005, http://unfccc.int/essential_background/items/2877.php, June 2007, (not adopted by the United States).

2.0 Background



The City of St. Helena is located in the center of the world famous wine growing Napa Valley, 65 miles north of San Francisco. The area was settled in 1834 as part of General Vallejo's land grant. The City of St. Helena was incorporated as a City on March 24, 1876 and reincorporated on May 14, 1889.

The City from its inception has served as a rural agricultural center. Over the years, with the growth and development of the wine industry, the City has become an important business and banking center for the wine industry. The City also receives many visitors as a result of the wine industry and the area's scenic qualities. The main goal of the City is to maintain a small-town atmosphere and to provide quality services to its citizens. The official population of the City of St. Helena as of January 1, 2005 is 6,006. St. Helena is a full service City and encompasses an area of 4 square miles.³

The city operates numerous buildings including the City Hall, Library, Teen Center and Fire Station; a fleet of vehicles used for city operations; a water supply and waste water system as well as street and area lighting. Each of these requires energy to operate. The fuel used to generate the energy results in greenhouse gas emissions, either at the vehicle tailpipe, or the utility power plant. In addition, the city employees must get to work, and the city trash must be disposed of properly, activities that also generate greenhouse gas.

3.0 Results

Figure 2 below provides the percentage of GHG emissions by sector. The water / wastewater sector is the largest at 37% of the total city emissions followed by the employee commute to work at 23%.

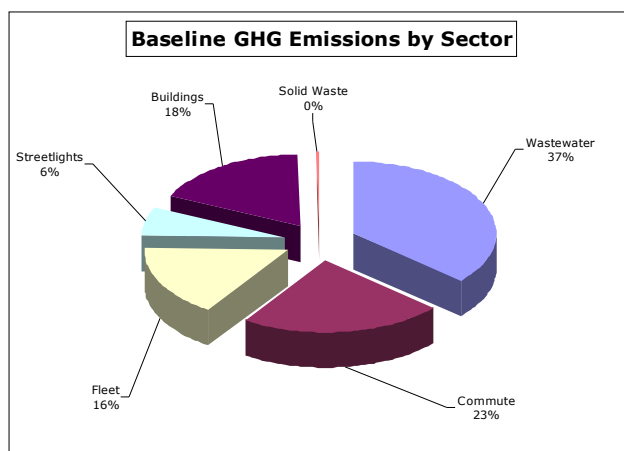


Figure 2: City GHG inventory as a percentage of the 2000 total

³ <http://city.ci.st-helena.ca.us/section.cfm?id=9>, June 2007

The annual GHG emissions are calculated by identifying the amount of energy used in a year for each of these sectors, and applying the appropriate conversion factors which provides the amount of CO₂e. The total emissions for 2000 are 1,011 tons of CO₂e. There were no significant new sources of GHG emissions identified since the baseline year of 2000. The variation from 2000 to 2006 reflects variation in the utility billing data over that period.

The amount of emissions for each sector is presented in the figure below.

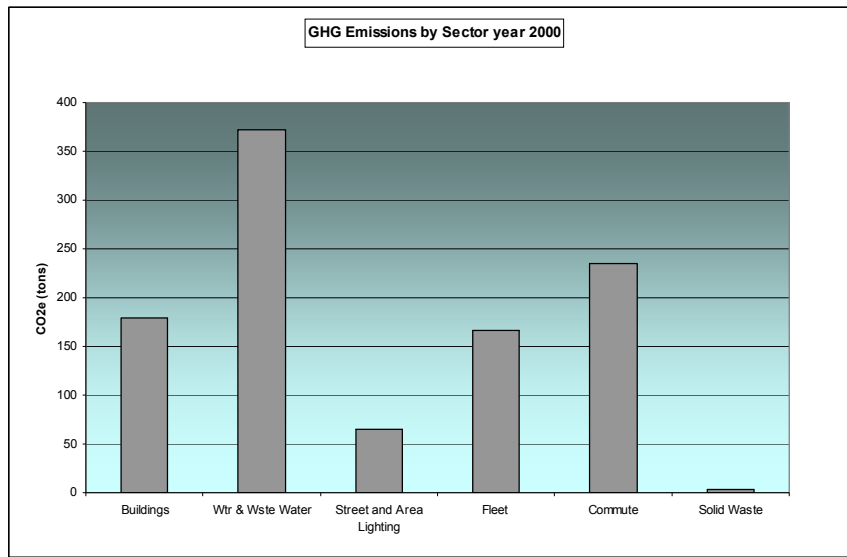


Figure 3: GHG Emissions by Sector

Table 1 provides the GHG emissions by sector and year from 2000 to 2006. These results are based on data provided by the city and utility data (electricity and natural gas) from each of these years.

GHG Emissions (tons CO ₂ e)	2000	2001	2002	2003	2004	2005	2006
Buildings	173	165	200	187	203	197	201
Wtr & Waste Water	369	346	321	342	355	343	400
Street and Area Lighting	66	64	57	66	66	66	65
Fleet	166	166	166	166	166	166	166
Commute	235	239	247	254	254	247	247
Solid Waste	3	3	3	3	3	3	3
Total	1,011	983	994	1,018	1,047	1,021	1,081

Table 1: GHG Emissions by Sector

The figure below indicates a general trend of increasing emissions. The rate of increase averages 1.2% per year. The building and water / wastewater sectors are responsible for most of this increase for the 2000 to 2006 period.

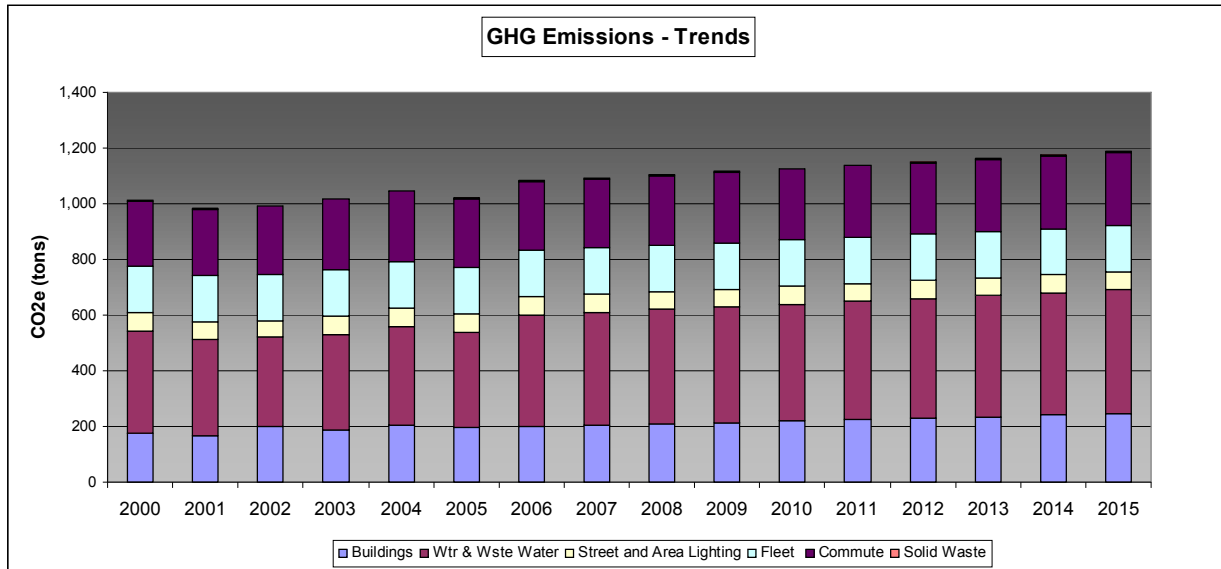


Figure 4: GHG Emissions Trend by Sector

The combined emissions trend of the city operations, including employee commute, are presented in Figure 5 below. The significant dips in the trend for years 2002 and 2005 reflect utility billing data (electricity and natural gas) for those years.

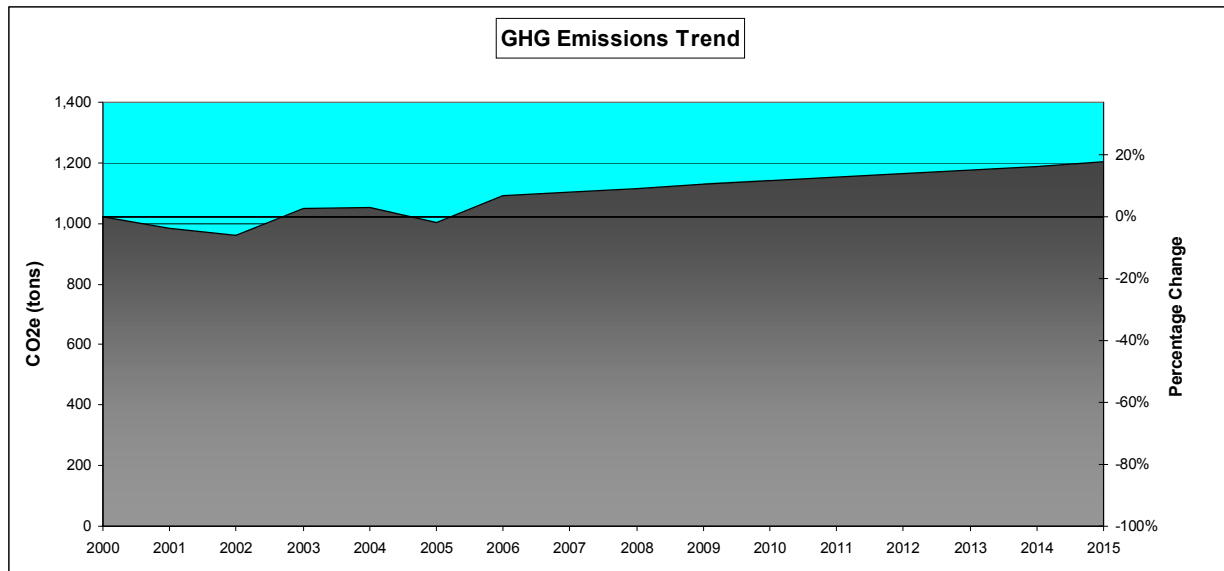


Figure 5: GHG Emissions Trend All Sectors

This trend is compared to the Kyoto Protocol target (7% reduction below 1990, by 2010⁴). The 1990 value was determined by applying the trend from 2000 to 2006 to the period from 1990 to 2000.

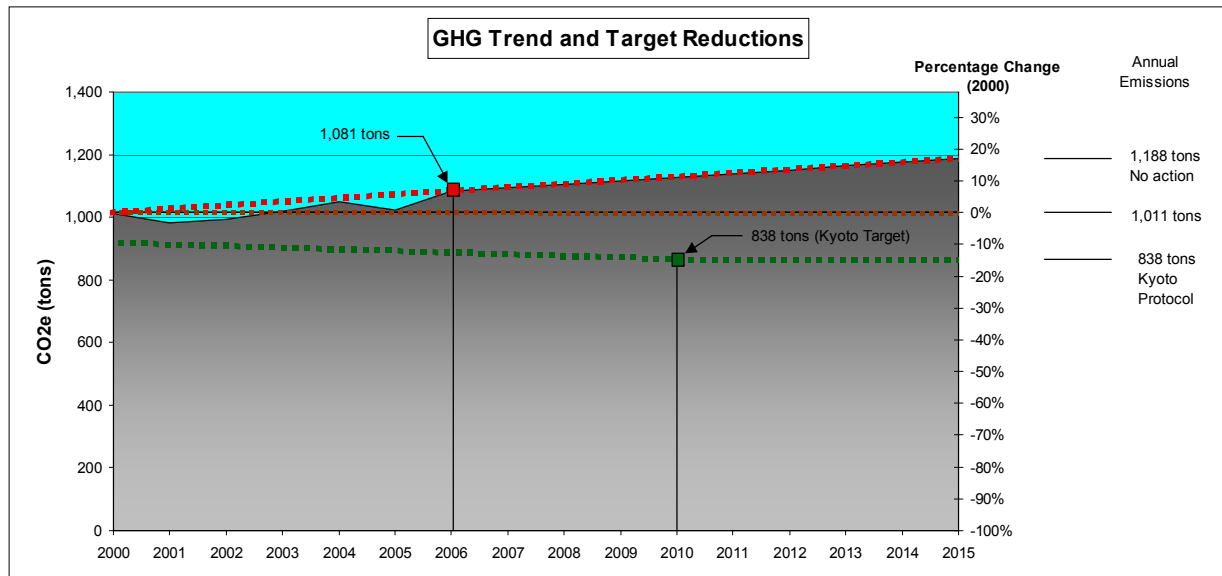


Figure 6: GHG Emissions Trend

The Kyoto Protocol uses 1990 as the base year and sets a target for 2008-2010. This protocol has been prominent in the international response to global climate change. The relationship of this protocol to St. Helena’s emissions is presented in Figure 7 below. The values from 1990 to 2000 and 2006 to 2010 are based on the trend established with the data from 2000 to 2006.

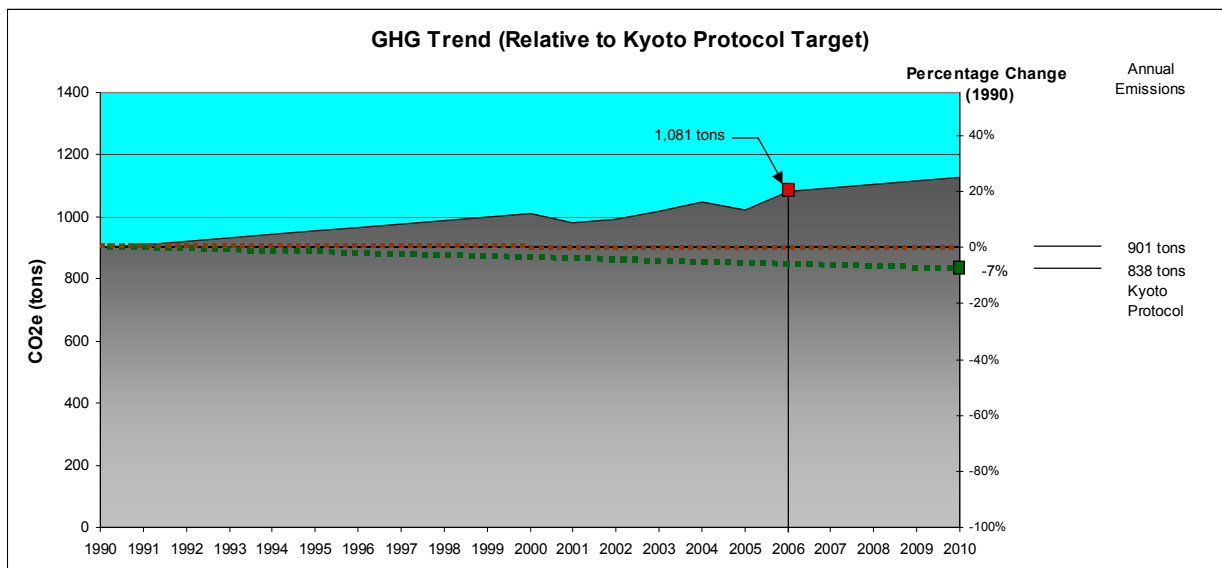


Figure 7: GHG Trend from 1990 to 2010

⁴ This protocol specifies a 7% reduction for the United States from the period of 1990 to 2008-2012. This target was not adopted by the USA. http://unfccc.int/kyoto_protocol/background/items/3145.php, June 2007

The energy use for the City of Helena has been relatively constant for the period studied. However, the cost of energy continues to rise. An approximation of the energy cost trend is provided in Figure 8 below. These values were developed by applying estimated “bundled”⁵ energy unit cost to the energy consumption data with an assumed energy cost escalation rate of 3.5% per year for all fuel types. The base assumptions are documented in Figure 10 within the Methodology section.

Energy Costs	2000	2001	2002	2003	2004	2005	2006
Buildings	\$66,287	\$63,283	\$75,033	\$79,635	\$86,309	\$87,150	\$90,442
Wtr & Wste Water	\$171,838	\$166,832	\$160,145	\$176,738	\$189,813	\$189,656	\$229,170
Street and Area Lighting	\$30,585	\$30,955	\$28,323	\$34,065	\$35,505	\$36,619	\$37,175
Fleet	\$41,346	\$42,793	\$44,291	\$45,841	\$47,445	\$49,106	\$50,825
Commute	\$58,384	\$61,513	\$65,794	\$70,178	\$72,635	\$72,977	\$75,532
Total	\$368,440	\$365,376	\$373,586	\$406,459	\$431,708	\$435,508	\$483,143

Figure 8: Approximate Energy Cost Trends

It is important to note the significant relationship of future cost to the energy cost escalation rate. The difference between the historic rate of 3.5% and a more volatile rate of 6% results in an increase in annual energy cost of over \$200,000 by 2020 (in current dollars). These values include electricity and natural gas, and fleet vehicle fuel. It does not include the costs borne by employee commuters.

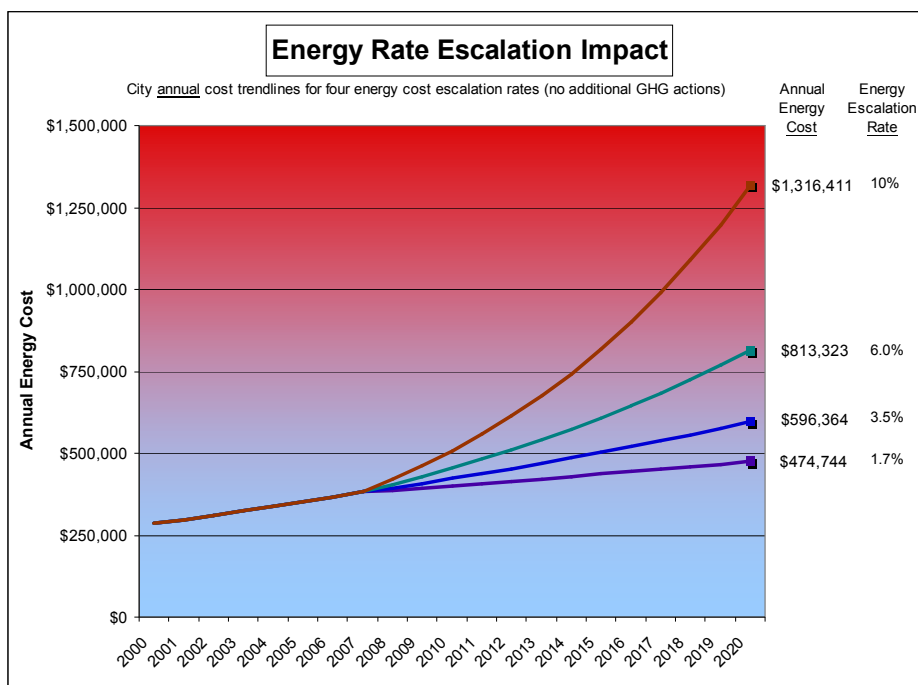


Figure 9: Energy Cost Escalation Scenarios

⁵ The bundled rate used for electricity is \$.145 per kWh. The rate for each account depends on numerous factors and fees such as time of use and rate schedule.

Increasing energy cost can be a burden on the municipal budget. The many of the measures available to reduce GHG emissions also will reduce the City electricity and natural gas, and fleet fuel consumption, and thereby reduce the impact of future energy cost volatility.

4.0 Methodology and Base Data

4.1 Assumptions

The results contained in this study are based on the best available information provided by the City Staff, and billing data downloaded directly from PG&E. The analysis has been completed through spreadsheet analysis of the data provided and is based on numerous assumptions provided in Figure 10. The assumptions are based on ICLEI values⁶, and based on the best information available, such as the local cost of gasoline and diesel. These values have been reviewed by City Staff for adjustment as deemed necessary. The GHG emissions associated with the PG&E supplied electricity is based on their published energy mix.⁷

Metric	Standard Default Values (2007)	Revised Values (for 2000)	Default Values Used in Baseline Analysis	Notes
Year of Baseline			2000	
Term of Analysis (yrs)	25		25	
Term of Financing (yrs)	15	7	7	
Discount Rate	5.00%		5.00%	
Energy Inflation Rate	3.50%		3.50%	
Energy Cost (\$/kWh)	\$0.145	\$0.114	\$0.114	Default based on 2007
Energy Cost (\$/Therm)	\$1.000	\$0.786	\$0.786	Default based on 2007
Interest Rate	3.95%		3.95%	
Inflation Rate	3.00%		3.00%	
Exclude "Completed" from \$\$\$ cost&benefit			yes	
Conversions				
CO2/kWh (lbs.)	0.489		0.489	
CO2/Therm (#/Therm)	12.34		12.34	
CO2e Gasoline	20.7		20.7	lbs/gal
CO2e Diesel	21.0		21.0	lbs/gal
BioDiesel	0		0	lbs/gal
Ethanol	16.69		16.69	lb/gal for 100% ethanol
\$/gal Gasoline	\$3.30	\$2.594	\$2.59	Default based on 2007
\$/gal Diesel	\$3.30	\$2.594	\$2.59	Default based on 2007
\$/gal Biodiesel	\$3.05	\$2.397	\$2.40	Default based on 2007
\$/gal Ethanol	\$4.00	\$3.144	\$3.14	Default based on 2007
CNG equivalent \$/gal	\$1.95	\$1.529	\$1.53	Default based on 2007
CNG conversion cost	\$5,000		\$5,000	
CNG Equipment	\$150,000		\$150,000	
Electric Vehicle Mileage	0.3		0.3	kWh/mile mid size
Electric Vehicle Mileage	0.2		0.2	kWh/mile subcompact
Target (% of 2000)	20.0%		20.0%	
TOU Factor	1		1	Used of PV financial analysis
Hybrid increased eff	30%		30%	Likely to be revised at measure level

Figure 10: Base Assumptions

⁶ STAPPA/ALAPCO and ICLEI Clean Air and Climate Protection Software, State and Territorial Air Pollution Administrators and Association of Local Air Pollution Control Officials, International Council for Local Environmental Initiatives, released May 2003

⁷ PG&E Power Content: Eligible Renewables: 13%, Coal: 2%, Large Hydro: 17%, Natural Gas 44%, Nuclear: 23%, Other; 1%, California Energy Commission, www.energy.ca.gov/consumer, May 2007

4.2 Data by End Use

The GHG emissions results for the sectors, based on PG&E billing data, fleet fuel records, and the commute survey, are presented in Table 2. The building, street and area lighting, and the water / waste water values are calculated from billing data from all PG&E natural gas and electricity accounts from 2000 to 2006. The commute values are based on survey results applied to the employee count from 2000 to 2006. The fleet values are derived from the fuel records applied to the vehicle list provided by Staff (Table 5).

GHG Emissions (tons CO₂e)	2000	2001	2002	2003	2004	2005	2006
Wtr Wste Wtr- Pumping	99.2	117.3	90.9	110.7	128.5	95.8	113.1
Wtr Wste Wtr- Treatment	269.4	228.5	229.8	231.3	226.4	246.8	286.8
Street and Area Lighting- City Owned	7.2	5.8	7.8	27.4	27.8	27.6	26.4
Street and Area Lighting- PGE Owned	58.4	58.3	48.9	38.5	38.5	38.5	38.4
LIBRARY	61.7	51.2	82.7	61.0	66.4	62.2	63.8
FIRE STATION	34.1	35.2	37.2	35.5	35.4	37.9	45.2
CITY HALL 1480 Main St	16.3	17.1	17.9	19.9	17.6	18.0	16.0
CITY HALL OFCS	23.4	25.3	25.2	29.6	32.4	35.7	35.6
CARNEGIE BLDG	8.9	8.4	9.7	10.0	9.0	9.0	9.2
SPRINKLER CONTROL	4.5	4.5	4.5	4.5	4.5	4.5	4.5
CITY GARAGE	5.0	4.3	4.7	4.5	4.4	4.8	3.5
TEEN CTR MAIN	2.7	4.2	3.8	3.4	3.2	2.8	2.2
CITY/CORP YARD	3.0	3.9	4.2	4.8	4.3	3.1	4.6
REC BLDG E/PARK	4.2	4.0	3.8	4.6	4.2	5.0	4.2
City Offices 1490 Library Ln	1.9	1.7	1.7	1.8	1.3	1.3	1.2
HISTORICAL PARK	1.8	1.2	1.0	0.9	0.9	2.0	2.1
RESTRM	1.2	0.5	0.6	0.3	0.4	0.4	0.3
Misc Building Accounts	4.5	3.1	3.4	5.8	18.7	9.8	8.3
Fleet Fuel	166.1	166.1	166.1	166.1	166.1	166.1	166.1
Commute Fuel	234.5	238.7	246.7	254.3	254.3	246.8	246.8
Solid Waste	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Total	1,011	983	994	1,018	1,047	1,021	1,081

Table 2: GHG Emissions by End Use

The estimated energy costs associated with the energy use is provided in Table 3 below. The values in this table are dependent on the assumed energy escalation rate provided in Figure 10. The cost of energy, both utility supplied and vehicle fuel has escalated more rapidly than the actual energy use.

Energy Costs	2000	2001	2002	2003	2004	2005	2006
Wtr Wste Wtr- Pumping	\$46,253	\$56,603	\$45,402	\$57,194	\$68,726	\$53,038	\$64,829
Wtr Wste Wtr- Treatment	\$125,584	\$110,229	\$114,743	\$119,544	\$121,087	\$136,618	\$164,341
Street and Area Lighting- City Owned	\$3,365	\$2,818	\$3,910	\$14,146	\$14,889	\$15,280	\$15,150
Street and Area Lighting- PGE Owned	\$27,220	\$28,137	\$24,413	\$19,920	\$20,617	\$21,339	\$22,025
LIBRARY	\$25,463	\$21,045	\$28,722	\$28,093	\$31,097	\$31,303	\$31,133
FIRE STATION	\$12,516	\$12,812	\$14,453	\$14,739	\$14,875	\$16,055	\$19,191
CITY HALL 1480 Main St	\$7,616	\$8,260	\$8,921	\$10,297	\$9,439	\$9,959	\$9,153
CITY HALL OFCS	\$6,934	\$7,572	\$8,335	\$9,987	\$11,088	\$12,623	\$13,607
CARNEGIE BLDG	\$2,847	\$2,518	\$2,949	\$3,307	\$2,939	\$3,025	\$3,097
SPRINKLER CONTROL	\$2,108	\$2,182	\$2,258	\$2,337	\$2,419	\$2,504	\$2,591
CITY GARAGE	\$1,812	\$1,547	\$1,800	\$1,801	\$1,799	\$1,789	\$836
TEEN CTR MAIN	\$1,241	\$2,017	\$1,880	\$1,751	\$1,697	\$1,574	\$1,257
CITY/CORP YARD	\$1,380	\$1,899	\$2,110	\$2,465	\$2,302	\$1,709	\$2,613
REC BLDG E/PARK	\$1,089	\$1,007	\$1,145	\$1,491	\$1,431	\$1,640	\$1,454
OFC (1574 Railroad)	\$882	\$836	\$835	\$915	\$712	\$745	\$702
HISTORICAL PARK	\$847	\$591	\$494	\$466	\$505	\$1,131	\$1,190
RESTRM	\$568	\$246	\$277	\$161	\$231	\$215	\$185
Misc Building Accounts	\$984	\$752	\$854	\$1,826	\$5,776	\$2,879	\$3,432
Fleet Fuel	\$41,346	\$42,793	\$44,291	\$45,841	\$47,445	\$49,106	\$50,825
Commute Fuel	\$58,384	\$61,513	\$65,794	\$70,178	\$72,635	\$72,977	\$75,532
Total	\$368,440	\$365,376	\$373,586	\$406,459	\$431,708	\$435,508	\$483,143
Total City Expenditure	\$310,056	\$303,864	\$307,792	\$336,280	\$359,073	\$362,531	\$407,612

Table 3: Energy Cost by End Use and Year

4.3 Solid Waste

The contribution of the solid waste from city operations was calculated from trash volumes provided by the City Staff, presented in Table 4, applied to the ICLEI calculator for trash⁶. The historical volumes of solid waste is assumed to be the same as the values below.

Waste Source	volume (gals)	volume (yrds)	frequency (per yr)	frequency (per wk)	total (cu-yrds/year)	Total (gal/yr)	Total tons waste
Corp Yard		20	6		120.0	20,828	20.83
Crane Park		4	2		8.0	1,389	1.39
Corp Yard		2	104	2	208.0	36,103	36.10
WstWtr Fac	32	0.184	52	1	9.6	1,664	1.66
Lyman Park	4	0.023	104	2	2.4	416	0.42
Mixed Recycling	4	0.023	52	1	1.2	208	0.21
Green Waste		20	12		240.0	41,657	41.66
ICLEI results	3	tons CO2e per year, 102 tons, 59.2% Paper Products, 40.8% Plant Debris					
Waste Numbers for the City for the year (2007)							
Conversion: 1gal (US dry)= 0.00576137 cu-yrds (www.onlineconversion.com)							
Conversion: 1gal (US dry)= 2 lbs							

Table 4: City Operations Solid Waste Volumes for 2006

4.4 Vehicle Fleet

The City Fleet analysis is based on the current composition of the fleet which is the best available information. The fuel consumption is based on the fuel records from 2000 through 2003 in Table 6. The mileage per vehicle was determined from experiences with other jurisdictions, modified to conform to the fuel data in Table 6. These assumptions have been evaluated by City Staff for revision as required. The vehicle fuel economy estimates were drawn from the following websites:

- 1) <http://www.mpgbuddy.com>
- 2) <http://www.fueleconomy.gov>

No.	Vehicle type	Dept.	Make	Year	Model	Status	Status Year	Fuel Type	MPG (city)	Default Miles/Yr
1	Dump Truck	Public Works	0	1987	Dump Truck	active	2000	Diesel	8	6000
2	SUV	Public Works	Jacobs	1993	Equipment Trailer	active	2000	gasoline		
3	SUV	Building Inspect	Chev	2002	Tracker	active	2000	gasoline	24	6000
4	pumper	Fire Services	Ford	1985	Beck	active	2000	Diesel	8	3500
5	Rescue	Fire Services	Chev	1988	Rescue Unit	active	2000	Diesel	8	3500
6	Fire Truck	Fire Services	VAN PELT	1941	White	active	2000	Diesel	8	3500
7	antique	Fire Services	Schneer	1917	Fire Truck	active	2000	Diesel	8	10
8	Fire Truck	Fire Services	International	1994	Fire Truck	active	2000	Diesel	8	3500
9	Pumper	Fire Services	PIERCE	1995	Lance Pumper	active	2000	Diesel	8	3500
10	Pickup	Fire Services	Ford	1999	F-350	active	2000	gasoline	15	3500
11	Fire Truck	Fire Services	Peterbilt	1998	Water Tender	active	2000	Diesel	8	3500
12	Fire Truck	Fire Services	Pierce	2001	Aerial	active	2000	Diesel	8	3500
13	SUV	Fire Services	Chev	2004	Suburban	active	2000	gasoline	16	3500
14	Pickup	Garage	Toyota	1988	SR-5	active	2000	gasoline	25	6000
15	Pickup	Buildings	Chev	2000	S-10	active	2000	gasoline	22	6000
16	van	Buildings	GMC	1995	G3500	active	2000	gasoline	15	6000
17	Trailer	Parks	Bilt Rite	1990	trailer	active	2000	gasoline		
18	Pickup	Parks	Ford	1996	F-250	active	2000	gasoline	15	3000
19	Pickup	Parks	Ford	1997	Ranger	active	2000	gasoline	23	3000
20	Pickup	Parks	Ford	1998	F-150	active	2000	gasoline	18	3000
21	Pickup	Parks	Chev	2006	S-10	active	2000	gasoline	22	3000
22	Sedan	Public Safety	Ford	1998	CRN VIC	active	2000	gasoline	18	7500
23	Radar Trailer	Public Safety			Radar Trailer	active	2000	gasoline		
24	Sedan	Public Safety	Ford	1999	Taurus	active	2000	gasoline	23	7500
25	Police Chief	Public Safety	Chev	2000	IMPALA	active	2000	gasoline	21	7500
26	Patrol	Public Safety	Chev	2000	IMPALA	active	2000	gasoline	21	7500
27	Patrol	Public Safety	Chev	2001	IMPALA	active	2000	gasoline	21	7500
28	Patrol	Public Safety	Chev	2001	IMPALA	active	2000	gasoline	21	7500
29	Motorcycle	Public Safety	Harley Davidson	2002	Police MC	active	2000	gasoline	18	7500
30	Patrol	Public Safety	Chev	2003	IMPALA	active	2000	gasoline	21	7500
31	Patrol	Public Safety	Ford	2006	CRN VIC	active	2000	gasoline	18	7500
32	Police Pickup	Public Safety	Chev	2005	Colorado	active	2000	gasoline	18	7500
33	SUV	Public Works	Chev	1994	Suburban	active	2000	gasoline	13	6000
34	Backhoe	Public Works	John Deere	2004	310G	active	2000	Diesel	5	500
35	Trailer	Sewer O&M	Wells Cargo	1996	Trailer	active	2000	gasoline		
36	Utility	Sewer O&M	Chev	2003	Silverado 3500	active	2000	gasoline	14	6000
37	Dump	Streets	GMC	1994	C3500-HD	active	2000	Diesel	8	6000
38	Pipe Cleaning	Streets	International	1975	CS1610B	active	2000	Diesel	8	6000
39	Pickup	Streets	Chev	1996	S-10	active	2000	gasoline	22	6000
40	Street Sweeper	Streets	Five Star	2002	Five Star Air Cub	active	2000	Diesel	8	6000
41	Pickup	Streets	Chev	2006	S-10	active	2000	gasoline	22	6000
42	Utility Truck	Water O&M	Chev	1990	C3500	active	2000	Diesel	15	3500
43	Pickup	Water O&M	Chev	1995	S-10	active	2000	gasoline	18	3500
44	Pickup	Water O&M	Ford	1997	Ranger	active	2000	gasoline	23	3500
45	Dump Truck	Water O&M	Ford	1986	F-6	active	2000	Diesel	8	3500
46	Pickup	Water O&M	Ford	2003	F-150	active	2000	gasoline	16	3500
47	Pickup	WTP	Ford	1997	Ranger	active	2000	gasoline	23	3000
48	Pickup	WTP	Ford	1998	Ranger	active	2000	gasoline	23	3000
49	Pickup	WWTP	Chev	1990	K2500	active	2000	gasoline	14	3000
50	Pickup	WWTP	Chev	1995	S-10	active	2000	gasoline	18	3000
51	Pickup	WWTP	Chev	2001	S-10	active	2000	gasoline	22	3000
52	Pool Car	Pool	Oldsmobile	1995	Cultass Ciera	active	2000	gasoline	20	6000

Table 5: City Fleet List and Assumptions

Napa Valley Petroleum Inc	
Month	Gals total
4/1/2002	1265.4
5/1/2002	1647.3
6/1/2002	1250
7/1/2002	1216.2
8/1/2002	1346.9
9/1/2002	1241.3
10/1/2002	1449.3
11/1/2002	1189.3
12/1/2002	1359.8
1/1/2003	1356
2/1/2003	1126.4
3/1/2003	1443.9
4/1/2003	1396.8
5/1/2003	1339.4
6/1/2003	1608.8
7/1/2003	1559.8
8/1/2003	1628.8
9/1/2003	1544.4
10/1/2003	1522.7
11/1/2003	1180.1
12/1/2003	1631.2
1/1/2004	56.7
2/1/2004	199
3/1/2004	0
4/1/2004	0
5/1/2004	200
6/1/2004	190
7/1/2004	107
8/1/2004	0
9/1/2004	230
10/1/2004	308
11/1/2004	0
12/1/2004	230

Default Mileage	
Department	Mileage
Public Safety	7,500
Public Works	6,000
Pool	6,000
Sewer O&M	6,000
Streets	6,000
Garage	6,000
Buildings	6,000
Water O&M	3,500
Building Inspector	6,000
WTP	3,000
WWTP	3,000
Fire Services	3,500
Parks	3,000
Animal Shelter	3,000
Performing Arts	3,000
Tractors	500
Mules	500
City Trailers	0
Misc. Vehicles	3500

Table 6: Fuel Records and Vehicle Mileage Estimate by Department

4.5 Employee Commute

The emissions associated with the employee commute are based on the number of employees for 2000 through 2007 presented in Table 7, and the results of the commute survey.

FY	Full Time	Part Time	Total
2000	62.86	7.19	70.05
2001	63.41	7.88	71.29
2002	65.44	8.2	73.64
2003	66.44	9.42	75.86
2004	66.44	9.42	75.86
2005	64.25	9.42	73.67
2006	65.25	8.42	73.67
2007	69.75	7.79	77.54

Table 7: Employee Count

67 employees completed the online survey over a three week period. This response rate for the survey is considered to be adequately representative of the entire workforce. Therefore the results for this group were applied to the population of 78 individuals. The survey is provided below.

**Greenhouse Gas Inventory Project
Employee Commute Survey 2007
Telos Project © 2003**

This survey will take you about 5 minutes.

As part of an international effort to protect the climate, Sonoma cities are estimating the greenhouse gas emissions produced by their operations. You were selected at random to provide information about the amount of energy it takes to commute to work. Using your answers we will estimate the total amount of energy needed for employee commutes and convert this to greenhouses gas emissions.

Your answers are totally confidential.

Please answer as accurately as you can. The following questions concern your commute to work for the **last 12 months only**. Please do not include any commuting you do in a city assigned or city fleet vehicle as those emissions are being counted separately.

1. Number of days you traveled to work last year

Please estimate the approximate number of days you traveled to and from work last year.

The following two questions will help you estimate your answer.

a. How many days per week on average did you travel to work?

5 days

4.5 days - 9 days in two weeks

4 days

3 days

2.5 days - 5 days in two weeks

2 days

1 day

b. How many weeks did you work last year?

__ weeks

52 = worked every week. Please subtract vacation and sick time, leave, time you worked at home, and any other time during the year that you didn't travel to work for the city.

Your answers to a. and b. indicate that you traveled to work 245 days during the last year. Please adjust if you think appropriate.

2. How you got to work

Please estimate the percent of travel to and from work last year by the following modes. Hint: Your numbers below should add up to 100%. If you get to work by driving alone in your car, then put 100 in the first box and go to the next question.

Drive Alone %

Carpool %

Bus %

Motorcycle/Other fossil fuel %

Bicycle/Walk/Other non-fossil fuel %

Total %

3. Miles you traveled and type and amount of fuel used

Please answer only for modes of transportation that apply to you, and skip those that don't. If your commute changed during the last year for any reason, for example, if you moved, please do your best to **estimate the average number of miles** you commuted per day last year. If you changed vehicles last year, please do your best to **estimate the average miles per gallon** your commute vehicle used.

Drive Alone

How many miles do you commute per day? In other words what is the total number of miles you travel to and from work each day? _____ miles per day by car

What kind of vehicle do you drive to work in? Brand Year Make

What kind of fuel does your vehicle use? (Please check the one that applies)

Gasoline (this applies to regular and hybrid electric vehicles)

Diesel

Ethanol Blend (E20 or lower)

Biodiesel Blend (B20 or lower)

Other non-fossil

If you checked gasoline, diesel or a blend how many miles per gallon does your vehicle get? _____ miles per gallon

Carpool

How many people on average are in your carpool vehicle?

people in carpool

How many miles do you commute per day? In other words, what is the total number of miles you travel to and from work each day? miles per day carpooling

What kind of vehicle do you carpool to work in? Brand Year Make

What kind of fuel does the commute vehicle use? (Please check the one that applies)

Gasoline (this applies to regular and hybrid electric vehicles)

Diesel

Ethanol Blend (E20 or lower)

Biodiesel Blend (B20 or lower)

Other non-fossil fuel

If you checked gasoline, diesel or a blend how many miles per gallon does your vehicle get?

miles per gallon

Bus

What is the average number of passengers on the bus you ride? (Your best estimate is OK)

average passengers

How many miles do you commute per day? In other words, what is the total number of miles you travel to and from work each day? miles per day by bus

What type of fuel does the bus you take use? (Please check one)

Natural Gas

Diesel

Don't know

Other:

Motorcycle

How many miles do you commute per day? In other words, what is the total number of miles you travel to and from work each day? miles per day by motorcycle

How many miles per gallon does your motorcycle get? miles per gallon

How many people ride the motorcycle when you commute? person/people

Bicycle/ Walk/Other

How many miles do you commute per day? In other words, what is the total number of miles you travel to and from work each day? miles per day by bicycle/walk/other

4. Other

(Optional) What other comments would you like to add about your commute, this survey, your answers, or about climate protection, if any?

(Optional) Please notify me when the results of the employee commute survey are available:

Yes No

(Optional) Please notify me when the results of the GHG Inventory Project are available:

Yes No

(Optional) Contact Information:

First Name

Last Name

Phone

Email

Thank you!

We appreciate your time and attention to this survey. Your participation matters.

5.0 Conclusions

The greenhouse gas inventory is documented in this report for the year 2000, and by extrapolation, 1990. This baseline and the accompanying data provide the information required for the ICLEI Milestone 1, the GHG inventory. The next step in the ICLEI process is for the City Staff and Council to set a GHG emissions reduction target, defining a percentage reduction in emissions and a date to reach this target. The information contained in this report allows the reduction target to use either year 1990 (the Kyoto Protocol base year), or 2000 as the baseline year for St. Helena. Furthermore, the framework for the data collected provides a strong foundation for the development of the GHG emissions reduction action plan, ICLEI Milestone 3.

6.0 Next Steps

The next step, after acceptance of this GHG inventory report, is for the City to set an emissions reduction target. After the target is set, a GHG emissions reduction action plan should be pursued. There are many options for the completion of this plan (Milestone 3 in the ICLEI process). The Outline of Services below is one approach that provides an integrated analysis of the many options, and provides the cost-benefit evaluation required for complex decisions. The outline can be used to understand the task ahead, and to generate the request for proposals for soliciting the expertise to complete the work.

Example Outline of Services

**City of St. Helena
Green House Gas Reduction Analysis**Introduction

This outline of services identifies tasks to provide an analysis of options to reduce the City of St. Helena's Green House Gas (GHG) emissions from city controlled fleet and facilities. Five individual action plans will be created and information will be provided to allow comparison. The analysis will include 30 individual measures for possible inclusion in each action plan. The results of this analysis will be presented in a final report that will detail the economic costs and benefits of implementing each plan and the GHG emissions impact. The total cost to the City of St. Helena will be determined following a project scoping meeting with City Staff. The tasks and cost will be detailed in the resulting Proposal for Services, which will include a detailed budget and timeline.

The methodology for this project will follow the approach employed for the Sonoma County Action Plan, the Rohnert Park Action Plan and the Sebastopol Action Plan which utilize the expertise of a qualified professional, who will be the Project Manager and primary analyst for this effort. While the St. Helena Action Plan will reflect its unique situations and challenges, the opportunities identified in these other efforts may well contribute to the list of options available to the City of St. Helena.

Program Workplan

The objective of this project is to develop five action plans for presentation to the City of St. Helena detailing measures to be employed to meet the Greenhouse Gas emissions reduction target of XX% below 2000 levels by 20XX.

The final report will provide the following information for each of these plans:

- GHG reduction in tons CO₂ avoided
- GHG reduction by sector (buildings, fleet, water/wastewater, streetlights, commute, and generation)
- Annual Cash Flow including debt service and incremental O&M costs
- Outstanding Principal and Debt Service by year if measures are financed
- Simple Payback for each plan
- Internal Rate of Return (IRR) for each plan
- Net Present Value (NPV) for each plan
- Avoided Utility Company Payments (NPV over life of plan)
- Avoided Fuel Purchases (NPV over life of plan)
- Value Invested Locally in GHG Projects

The analysis will rely on information provided by City Staff on past, pending and future measures to reduce greenhouse gas emissions. This information is expected to be in the form of existing energy efficiency reports, studies completed by efficiency service providers such as ABAG EW (building efficiency) and CAL POP (wastewater), fleet lists, and photovoltaic system descriptions. Discussions with City Staff will also identify opportunities to be included in the analysis.

Methodology

The information gathered will be compiled and analyzed using a specialized spreadsheet analysis tool developed for this purpose. A sample of these inputs is provided in the figure below.

Master Inputs		Sheet Update: 5.05.07		
Metric	Standard Default Values	Revised Values	Default Values Used in Analysis	Notes
Term of Analysis (yrs)	25		25	
Term of Financing (yrs)	15		15	
Discount Rate	5.00%		5.00%	
Energy Inflation Rate	2.50%		2.50%	
Energy Cost (\$/kWh)	\$0.145		\$ 0.145	
Energy Cost (\$/Therm)	\$1.000		\$ 1.000	
Interest Rate	4.50%		4.50%	
Inflation Rate	3.00%		3.00%	
Exclude "Completed" from \$\$\$ cost&benefit			no	
CO2/kWh (lbs.)	0.553		0.553	
CO2/Therm (#/Therm)	12.34		12.34	
\$/gal Gasoline	\$3.30		\$ 3.30	
\$/gal Diesel	\$3.30		\$ 3.30	
\$/gal Biodiesel	\$4.00		\$ 4.00	
\$/gal Ethanol	\$4.00		\$ 4.00	
CNG equivalent \$/gal	\$2.48		\$ 2.48	
CNG conversion cost	\$5,000		\$ 5,000	
CNG Equipment	\$10,000		\$ 10,000	
Electric Vehicle Mileage	0.3		0.3	
Electric Vehicle Mileage	0.2		0.2	
Target (% of 2000)	25.0%		25.0%	

Master Input Table

Each measure will have the capacity for unique inputs specific for that strategy, thus overriding the Master Inputs. The measures will also have unique inputs governing the year of implementation, financing, measure category and plan inclusion as described in the table below.

Action Plan					Measure Summary	Description	Category	Status	Financed	Implementation Date
A	B	C	D	E						
y	y	y	y	y	Measure 1	APS Measures	Building	Completed	yes	2006
y	y	y	y	y	Measure 2	Lighting Retrofit (multi-bldg)	Building	Completed	yes	2001
y	y	y	y	y	Measure 3	Building HVAC	Building	Future	yes	2007
y	y	y	y	y	Measure 4	Computer Network Controls	Building	Future	no	2007
y	y	y	y	y	Measure 5	DDC Controls	Building	Future	yes	2008
y	y	y	y	y	Measure 6	Insulation Corp Yrd Blds	Building	Future	yes	2007
y	y	y	y	y	Measure 7	Decommission Fountain	Building	Future	yes	2009
y	y	y	y	y	Measure 8	Boiler Replcmnt Sports Center	Building	Future	yes	2008
y	y	y	y	y	Measure 9	Cogeneration	Building	Future	yes	2008
y	y	y	y	y	Measure 10	Pools Solar Wtr	Building	Future	yes	2008
y	y	y	y	y	Measure 11	Pool Measures	Building	Future	yes	2007

Measure Summary Table (partial)

Each of the measures will have a summary table listing the inputs and results for that specific strategy. The figure below provides an example.

Lighting 2		
Measures Name	Lighting Retrofit (multi-bldg)	Notes
Measure Category	Building	
Measure Status	Completed	2001 Implementation Date
Capital Cost	\$100,000	Provided (Provided or Calculated)
Incremental Capital Cost %	100%	
Incremental Capital Cost	\$100,000	
Rebate	\$16,698	Provided (Provided or Calculated)
Net Capital Cost	\$83,302	Provided (Provided or Calculated)
Annual O&M (incremental cost)	\$0	Provided (Provided or Calculated)
Annual Cost Savings	\$48,425	Provided (Provided or Calculated)
Peak Demand Reduction (kW)	160.6	Provided (Provided or Calculated)
Annual Energy Savings (kWh)	333,966	Provided (Provided or Calculated)
Annual Energy Savings (Therms)	0	Provided (Provided or Calculated)
Annual CO2 Savings (lbs)	250,475	Calculated (Provided or Calculated)
Financed (yes/no)	yes	
Payment Amount	(\$7,757)	
Incremental Replacement Cost	\$0	
Component Life	15	
Inputs Used in Analysis (subject to individual measure override)		Key Assumptions
Term of Analysis	25	
Term of Finance	15	
Discount Rate	5.00%	
Energy Inflation	2.50%	
Energy Cost (\$/kWh)	\$0.145	
Energy Cost (\$/Therm)	\$1.000	
Interest Rate	4.50%	
Inflation Rate	3.00%	
Time of Use (PV)	NA	
Incremental Capital Cost	100.00%	
Exclude "completed" measure C/B	no	
Results		Source:
SPB	1.7	
IRR	62.1%	Draft Plan: Energy Efficiency Report 1/1/2001
NPV	\$776,338	
CO2 reduction (tons)	125.24	

Measure Input Summary

The results of the analysis will be presented in tables and figures designed to enable efficient and effective review and comparison of the various options. The following figures are examples of the presentation strategy to be employed in this project.

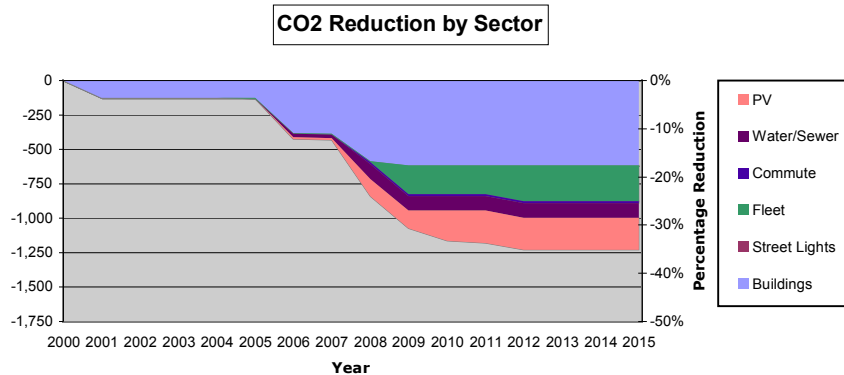
Results and Cash Flow Comparison

The results will be presented in tables allowing easy comparison between plan options. The table below provides an example of the cash flow results of five plans, along with Simple Payback (SPB), Internal Rate of Return (IRR), and Net Present Value (NPV).

GHG Action Plan Summary					
Analysis	Plan A	Plan B	Plan C	Plan D	Plan E
% Reduction	11.1%	12.0%	15.9%	24.0%	35.5%
SPB	NA	NA	0.2	0.9	1.0
IRR	NA	NA	495%	118%	97%
NPV	\$1,862,734	\$1,835,469	\$2,309,139	\$3,841,029	\$3,717,367
Annual Cash Flow					
Year	Plan A	Plan B	Plan C	Plan D	Plan E
2000	\$0	\$0	\$0	\$0	\$0
2001	\$0	\$0	\$0	\$0	\$0
2002	\$49,636	\$49,636	\$49,636	\$49,636	\$49,636
2003	\$50,877	\$50,877	\$50,877	\$50,877	\$50,877
2004	\$52,149	\$52,149	\$52,149	\$52,149	\$52,149
2005	\$53,452	\$53,452	\$53,452	\$53,452	\$53,452
2006	\$54,789	\$54,789	\$54,789	\$56,762	\$56,762
2007	\$50,140	\$50,140	\$72,824	\$64,846	\$85,068
2008	\$57,768	\$57,349	\$76,698	\$78,541	\$89,262
2009	\$61,469	\$40,937	\$73,569	(\$204,208)	(\$224,848)
2010	\$67,270	\$58,430	\$86,908	\$233,717	\$219,835
2011	\$73,322	\$64,774	\$97,965	\$248,007	\$234,608
2012	\$79,634	\$71,386	\$90,968	\$244,315	\$156,416
2013	\$86,220	\$78,279	\$92,849	\$249,574	\$238,098
2014	\$93,092	\$85,465	\$98,079	\$258,255	\$247,344
2015	\$100,262	\$92,959	\$79,964	\$243,669	\$233,342
2016	\$107,746	\$100,773	\$91,937	\$259,247	\$249,528
2017	\$115,557	\$108,922	\$104,339	\$275,333	\$266,244
2018	\$123,710	\$117,423	\$64,279	\$239,039	\$230,604
2019	\$132,222	\$126,291	\$130,500	\$49,059	\$41,303
2020	\$141,109	\$135,543	\$91,389	\$273,929	\$266,875
2021	\$150,389	\$145,197	\$158,597	\$345,156	\$338,830
2022	\$244,152	\$239,344	(\$51,727)	\$138,939	\$133,925
2023	\$255,618	\$251,622	\$236,729	\$431,592	\$427,359
2024	\$268,052	\$284,571	\$344,470	\$543,622	\$542,753
2025	\$279,095	\$296,028	\$361,005	\$564,541	\$564,508

Action Plan Comparison Table

A GHG emissions graph will be included for each plan for years 2000 to 2015. Figure 5 below is an example of the presentation format.



GHG Reduction from 2000 to 2015

The results of this analysis, and the associated tables and graphs will be presented in a draft report for Staff review. All measures, inputs and assumptions will be detailed in the draft report allowing Staff an opportunity to review and modify. The sections expected to be included are the following:

- Executive Summary
- Introduction and Background
- Baseline and Target
- Action Plan Options
- Measure Descriptions
- Implementation Strategy
- Conclusions
- Appendices

This outline is drawn from the previously completed Action Plans, which will be useful resources for general information.

Task List

Project Initiation Meeting

This meeting will include the point of contact for the City of St. Helena and the Consultant and any other personnel identified by the City. The research plan will be discussed, including the project timeline and protocol, key City contacts, discussion of project scope, and documentation needed from the City of St. Helena. This meeting will aid the Consultant team in its goal to minimize demands on City staff while successfully completing this work.

Data Acquisition and Review

The data needed to successfully complete this project will be identified in the Project Initiation Meeting. This typically includes previous energy efficiency reports, fleet lists and associated information, and facility energy billing information.

Measure Development

The measures to be evaluated will include those implemented since year 2000, as well as currently pending actions and future opportunities. Existing energy studies will be a principal source for defining past and future measures. These will include efficiency measures relating to buildings, water and wastewater, streetlights, employee commute, power generation (photo voltaic), fleet measures, and related information. Fleet measures will include compressed natural gas (CNG), fleet purchasing, biodiesel (B20) and (B100), and Ethanol (E85). The concentrations of these fuel alternatives can be adjusted as desired, for example: B50 (50% biodiesel, 50% petroleum diesel) can be substituted for B20. Fleet measures will include a purchasing strategy taking advantage of fuel-efficient opportunities. Limited secondary research will be pursued to clarify applicability of measures to the operations of the City of St. Helena.

Analysis Modeling

The information gathered for the 30 measures will be analyzed for economic and GHG reduction impacts. Measure specific data such as capital cost, year of implementation, financing, energy and cost savings will yield the following analyses for up to five action plans:

- GHG reduction in tons CO₂ avoided
- GHG reduction by sector
- Annual Cash Flow including debt service and incremental O&M costs
- Outstanding Principal and Debt Service by year if measures are financed
- Simple Payback for each plan
- Internal Rate of Return (IRR) for each plan
- Net Present Value (NPV) for each plan
- Avoided Utility Company Payments (NPV over life of plan)
- Avoided Fuel Purchases (NPV over life of plan)
- Value Invested Locally in GHG Projects

The results will be presented by sector to demonstrate the relative balance of each plan.

Draft Report

A draft report will be completed by the consultant. The review of the draft report by City Staff will provide an opportunity to review inputs and assumptions used in the analysis. Comments provided by the City will be incorporated into the final report. The report will include the following sections.

- Executive Summary
- Introduction and Background
- Baseline and Target
- Action Plan Options
- Measure Descriptions
- Implementation Strategy
- Conclusions
- Appendices

Presentation of Draft Results

This task provides for an onsite presentation of the project draft results and report providing an opportunity for feedback and discussion.

Final Report

The final report will incorporate City comments on the draft report.

Presentation of Final Report

This task provides for an onsite presentation of the project final to the group identified by the City contact.

Project Management

This task covers the administrative requirements of implementing this project.

Project Timeline

The draft report documenting the results of this analysis will be provided to the City of St. Helena point of contact. The timeline below is based on availability of City Staff for review meetings. The draft report will be completed five weeks after the receipt of all project data, and associated meetings with Staff. A final report will be provided within two weeks of receiving City comments on the draft report. The project timeline is provided in Figure 9 below.

Project Schedule	Week 1-2	Week 3-4	Week 5-6	Week 7-8	Week 9-10	Week 11-12
Fleet Analysis						
Project Initiation Meetings	■					
Data Acquisition and Review	■					
Identification of Measures	■	■				
Supporting Research	■	■	■	■	■	■
Impact Modeling		■	■	■		
Draft Report				■	■	
Presentation of Draft Results					■	
Final Report					■	■
Presentation of Final Results						■

Figure 8: Project Timeline