City and Borough of Sitka

Climate Action Plan

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TABLE OF CONTENTS

1.0 Summary

The City and Borough of Sitka Assembly committed to taking action on climate change by endorsing the U.S. Mayor's Climate Protection Agreement in December of 2007. A key component of the Agreement was the climate action planning process of which this Climate Action Plan (CAP or Plan) is a major part (sections 2.0 & 3.0). This Plan specifically targets municipal operations and actions.

In this report, carbon dioxide is measured in terms of equivalent carbon dioxide (eCO_2) which is a combination of the carbon dioxide formed by using/burning gas and diesel (in vehicles and for heating), plus the carbon dioxide formed when the City uses diesel to generate electricity.

Municipal operations for the City and Borough of Sitka (City) generated 3,732 tons of eCO_2 in 2003 (City of Sitka 2008). In 2009, the City set a goal for a municipal greenhouse gas reduction of 25% from 2003 levels by 2020. To meet this goal, the Sitka Climate Action Plan Task Force (Task Force) was formed and asked to find actions that would reduce the City's emissions by 934 tons per year by 2020. Due to the addition of the Performing Arts Center, an estimated additional 71 tons of eCO_2 not accounted for in the City's 2008 emissions inventory are emitted by School operations. The Task Force compensated for this addition and sought 1,005 tons per year of eCO_2 reductions to meet the overall goal. The initiatives (and some baseline adjustments) are summarized in Table 1.

The Task Force came up with greenhouse gas emission-reducing initiatives through four processes:

1) reviewing and taking items directly from energy audits of City and School buildings,
2) taking direct recommendations from City and School staff, Assembly, and some City commission members,
3) through our research into other City's climate action plans, and
4) through individual proposals from the community or Task Force members.

The Task Force reviewed all planned and proposed initiatives that could reduce greenhouse gas emissions. Several projects listed are planned and budgeted for, or planned but not yet budgeted. The Task Force supports those proposals and displays these initiatives as information for the Assembly & staff.

Many situations made meeting the City's carbon emissions goal more difficult and more expensive than originally expected. The need for ventilation at Blatchley Middle School negated using the school's energy audit proposals to reduce the City's greenhouse gas emissions because the proposals were all needed to match the energy increase from proper ventilation. The energy audits at the City buildings were helpful in finding useful, cost-effective energy/CO_2 savings. However, the other schools (some of the largest CO_2 emitters) and some of the other City buildings do not have energy audits; thus, the Task Force did not have enough information to recommend appropriate "low hanging fruit" energy conservation proposals at many facilities. Additionally, while electricity-saving initiatives are absolutely necessary to bring down the City's overall electric load (and reduce the potential for using diesel), electricity-saving actions have a miniscule effect on eCO_2 emissions (0.00007 tons of eCO_2/kWh). Past energy efficiency activities have helped to reduce the City's current "carbon footprint." At the same time, those activities cannot be used to provide additional reductions at this time; added activities may require additional ventilation. The addition of the Performing Arts Center required additional measures to be found. The City has done an excellent job of reducing energy use at its facilities; the Task Force realizes that to meet the City's goal, more drastic energy reduction measures will be necessary.

The proposals are expected to be implemented over an extended time frame (from 2010 through 2020) and the City is not expected to bear all the costs of the proposals. Lists of funding and implementation opportunities are located in Appendices B & C of this Plan. In some cases, grant funds are already available or being requested. To best implement this plan, the Task Force suggests the following be completed first:

1) Review funding and implementation opportunities and options (Appendix B and C),
2) Implement planned and budgeted items and energy conservation items related to behavior modification (e.g., turning off computers, reducing vehicle idling, etc.-Appendix A, Table A-1); these modifications cost little, but save a lot,
3) Replace current diesel generators (see section 2.6) to have the greatest impact,
4) Install Sitka High School electric boiler (since parts are purchased and labor is budgeted-see section 3.3.2).

Initiatives Proposed to Meet Sitka's Emissions Reduction Goal

Item	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Life Cycle Savings	eCO_2 Reduction (Tons per year)	CAP Section Number
Vehicle fuel adjustment – avg. snow year	N/A			N/A	144	2.5
Actions Already Accomplished (2007-2009)	$1,801,613	41,340	9,990		103	3.1
City Building Energy Audit Initiatives - Planned	$185,165	86,370	4,200	$257,300	48	3.2.1
City Building Energy Audit Initiatives - Unbudgeted	$225,500	92,777	5,270	$215,400	59	3.2.1
Blatchley Middle School Energy Audit - All Initiatives	$1,458,358	740,007[1]	26,178[1]	$1,679,228	Net 0[1]	3.2.2
City Building Electric Heating[2]	$1,233,000	(823,308)	20,065	*	144	3.3.1
School Building Electric Heating (SHS, KGH, BE)[2]	Est. $900,000	(1,343,922)	37,629	*	376	3.3.2
Other City Energy Efficiency Initiatives[2]	$5,500,000	200,000	783,043 (over 11 yr)	*	90[5]	3.4.1
Other School Energy Efficiency Initiatives[2]	$3,000,000	(63,628)	1,379	*	13	3.4.2
Vehicle Fuel Efficiency Projects	$180,000[4]	N/A	10,322	$36,088/yr[5]	100[6]	3.5
City Purchasing and Waste Policies	$197,000 ($145,000 is annual cost)	N/A	N/A	$176,400/yr[5]	37	3.6.1
School Purchasing and Waste Policies	$5,000	N/A	N/A	$10,000/yr[5]	5	3.6.2
Community Wide Measures: Planning, Zoning, Public Outreach	Generally low cost	Low to moderate	Low to moderate	Low to moderate	Low	3.8
TOTAL					**1,119**	

*Electricity use increases because electric heat is substituted for oil heat; savings is minimal; In most cases the Task Force assumed that when adding electric heat to a building, only 30% of the heating would be done with electricity (use expected extra capacity at hydroelectric facilities and help avoid burning diesel to generate power).

[1] All energy audit actions must be completed at BMS to offset the expected energy increase caused by improving ventilation

[2] These capital improvement projects are anticipated to be 70% grant funded

[3] Estimate; SHS parts already purchased and labor budgeted

[4] Estimated total vehicle cost, based on 6 vehicles being phased in over 10 years

[5] Estimated annual savings

[6] Assumes CO2 emissions of 19.4 pounds per gallon of gasoline (source: US EPA http://www.epa.gov/otaq/climate/420f05001.htm)

2.0 Climate Action Planning Background

2.1 Introduction

The City and Borough of Sitka Assembly committed to taking action on climate change by endorsing the U.S. Mayor's Climate Protection Agreement in December of 2007. A key component of the Agreement was the climate action planning process; participating municipalities inventory greenhouse gas emissions from municipal operations and from the surrounding community and use that information to set reduction targets and to develop an action plan to reduce emissions.

Progress toward the development of a local climate action plan for Sitka began early in 2008 following a series of presentations on ocean acidification and climate action planning sponsored by fishing and environmental organizations. In April of 2008, the City of Sitka passed a motion to join Local Governments for Sustainability (also known as ICLEI[1]) joining over 600 local governments as a participant in the Cities for Climate Protection Campaign.

The Cities for Climate Protection Campaign assists local governments in the process of reducing greenhouse gas emissions and planning for community sustainability. The broader goal of the Campaign is to achieve significant reductions in U.S. greenhouse gas emissions through the cumulative reductions achieved by communities. Communities involved range in size from towns smaller than Sitka to cities like Los Angeles and Chicago. The Campaign involves five steps:

(1) conduct a baseline emissions inventory and forecast;
(2) adopt an emissions reduction target;
(3) develop a local climate action plan;
(4) implement policies and measures and
(5) monitor and verify results.

According to a 2005 survey, communities that completed and implemented plans collectively reduced greenhouse gas emissions by 23 million tons and collectively saved $535 million through reduced fuel and electricity usage.

In June of 2008, the City and Borough of Sitka Assembly passed Resolution 2008-19 establishing a Climate Action Plan Task Force. The resolution made the Task Force "responsible for studying and making recommendations to the Sitka Assembly on ways to plan for and mitigate the impacts of climate change on the City and Borough of Sitka's economy, infrastructure and future development, and methods the City and Borough of Sitka can employ to reduce the emission of greenhouse gases."

During the summer of 2008, an intern, Chandler O'Connell, assisted in completing the first step - the inventory. The City of Sitka completed the second step in March of 2009 by passing Resolution 2009-37, which provides for a greenhouse gas emissions reduction target of 25% by 2020 using 2003 levels as a baseline.

This climate action plan is the third step in the program. Using data from the emissions inventory, the task force began researching measures that could be undertaken by the City to reduce greenhouse gas emissions from municipal and school operations and actions. Sections 3.1 through 3.7 of this plan display actions the City and schools can take to move towards the greenhouse gas emission reduction goal. A section on community wide measures (3.8) recommends adjustments to planning and zoning and seeks to utilize public opportunities, funding, and education in order to increase community-wide reductions in greenhouse gas emissions. These reductions are outside of municipal reductions, but are under the management of the City and seek to reduce emissions mainly through small changes in current policy.

[1] International Council for Local Environmental Initiatives.

This section also recommends policy changes at municipal, state, and federal levels to spur action at the highest levels of government as part of a global response to mitigate climate change.

This plan also includes a section (2.2) on potential climate impacts to the Region and City that addresses and suggests local adaptation measures to address local impacts of climate change. Sitka's climate is changing and changes will continue even if global greenhouse reduction goals are met. Adaptation recommendations have the objectives of maintaining a resilient local economy, protecting existing infrastructure, increasing preparation for extreme weather events, and developing policies to guide future development.

Finally, the Climate Action Plan addresses funding and monitoring in the attached appendices. If used as intended, the Climate Action Plan will provide immediate local benefits and make a contribution to the global effort to mitigate climate change that will serve as a model for many other small communities.

2.2 Implications of Climate Change for Sitka – Adaptation & Mitigation

Climate Change Background

The planet receives heat from sunlight that passes largely unfiltered through the atmosphere and warms the earth's surface. As the earth's surface warms, it emits heat energy back into the atmosphere. Atmospheric gases such as carbon dioxide and methane absorb some of this heat energy and another portion reradiates back into space. But as carbon dioxide and methane gas concentrations increase in the atmosphere, more heat is absorbed, causing increased warming of the earth-atmosphere system. This warming affects temperatures, weather patterns, and climate. In turn, these changes affect things like fisheries, forests and wildlife, sea level, and storm intensity. Increased carbon dioxide is also changing ocean chemistry and increasing the acidity of sea water with resultant effects on marine organisms.

Climate Change and Sitka

The citizens of the City and Borough of Sitka have created a community and economy in an environment heavily dependent on the existing climate. Sitka's vulnerabilities are those related to the City and Borough's close relationship to the ocean, both economically and physically. Any significant increase in temperature may cause the climate to change in an unpredictable manner, placing traditional means of subsistence and our natural resource driven economy in jeopardy. These changes will have to be adapted to while mitigation measures are put in place.

Fishery Impacts and Ocean Acidification

The oceans absorb considerable quantities of carbon dioxide, up to 525 billion tons since the start of the Industrial Revolution (AMCC 2008). Carbon dioxide dissolves in sea water, making it more acidic and corrosive to marine organisms that range from plankton to coral to crab and other shellfish. Scientists fear that an increasingly acidic ocean environment could impact the biodiversity and food web in high-latitude marine ecosystems in the near term (AMCC 2008).

When CO_2 reacts with seawater, the reduction in seawater pH also reduces the availability of carbonate ions, which play an important role in shell formation for a number of marine organisms such as corals, marine plankton, and shellfish. This phenomenon, which is commonly called "ocean acidification," could have profound impacts on some of the most basic biological and geochemical processes of the sea in coming decades. Some of the smaller calcifying organisms, such as pteropods, are important food sources for higher marine organisms like salmon (NOAA 2010).

It is estimated that a 10% increase in water temperature leads to a 3% drop in mature salmon body weight (due to physiological effects) while a 10% decrease in pteropod production leads to a 20% drop in mature salmon body weight (due to prey limitation) (Aydin et al. 2005). Pteropods are estimated to be 45% of juvenile pink salmon diet (Aydin et al. 2005). Other salmon are largely unstudied, but substantial effects of ocean acidification are expected.

Declining coral reefs, due to increases in temperature and decreases in carbonate ions, would have negative impacts on fisheries. Abundance of commercially important shellfish species may also decline and negative impacts on finfish may occur. This rapidly emerging scientific issue and possible ecological impacts have raised serious concerns across the scientific and fisheries resource management communities (NOAA 2010, Fabry et al. 2008).

One of the most significant local impacts from temperature increases and changing precipitation patterns pertains to watersheds and hydrological systems. In 2001, the Forest Service reported significant fish kills in several southern Tongass watersheds that "corresponded with low stream-flow and high air temperature events." That summer, the agency reported 318 days of high stream temperature at 18 sites on Prince of Wales Island in between June and September. Seven of the sites had temperatures over 68º F

that significantly exceeded the recommended 59º F threshold. Stream flows declined to roughly 17% of the average flow for a ten day period in August and the low flows corresponded with high stream temperatures. Alaska Department of Fish and Game reported widespread fish kills at some of these sites, Staney Creek and Thorne River, and estimated that there were up to 50,000 dead fish in each watershed.

Two years later, in 2003, there was another extensive kill of unspawned salmon in the same Staney Creek Watershed. During the next year, 2004, there was yet another 20,000 fish kill in Staney Creek. As record temperatures and record low levels of precipitation occurred throughout the Tongass that year, the temperatures of some small streams rose to 82º F. In many cases salmon delayed their migration and in some cases even bypassed their natal streams on the islands in order to spawn in mainland streams cooled by glacial runoff. Two years later, the pink salmon run failed to show up and fish returns were nearly 80% less than predicted. The management director of the Alaska Department of Fish and Game's Commercial Fisheries Division attributed the poor run in large part to the warm temperatures that occurred during the parent year.

Forest and Wildlife Impacts

The Forest Service has documented Spruce Needle Aphid outbreaks on the Tongass beginning in 1998. Aphids defoliated 30,000 acres in 2003 and 9,120 acres in 2006. Together, Black-headed Budworms and Spruce Needle Aphids have defoliated or affected over 300,000 acres on the Tongass since 1991. The panel unequivocally attributed the infestation to warming temperatures. The Forest Service observed the presence of the Spruce Beetle on the Tongass in 2006, an insect it characterizes as "the most destructive forest insect Alaska-wide" that can cause up to 75% mortality rates in Sitka spruce stands.

Southeast Alaska has had a dynamic geologic history, which caused many of its terrestrial species to be isolated on its islands, resulting in a large number of endemic species that are highly susceptible to habitat changes. The United Nations Intergovernmental Panel on Climate Change (IPCC) projects high extinction risks for 20 – 30% of all plants and animals if global air temperatures continue to increase rapidly.

Subsistence and game species may also face increased viability risks from climate change impacts. Severe precipitation events can fundamentally alter prime winter deer habitat. Deer populations plummeted in portions of Baranof and Chichagof Islands because of the 2006/2007 winter severe snow event, causing the closure of the doe harvest by emergency order. The Department of Fish and Game directed the closure after finding various locations where there was substantial winter-related deer mortality.

Mitigation/Adaptation Measures for Fisheries, Forest, and Wildlife Impacts

- Implement this plan and support climate action in other cities, and at the state, national, and international levels.

Rising Sea Levels and Tides

Globally, ocean and sea levels have continued to rise between 1 and 3 millimeters (mm) per year. Due to accelerated climate change effects, sea levels may rise as much as 1.3 meters over the next century (Brahic 2008). However, models of glacial flow in the smaller present-day ice sheets show that a probable maximum value for sea level rise in the next century is 800 mm.

Initially in Sitka and Southeast Alaska, rising ocean and sea levels may be mitigated by the "post-glacial isostatic rebound" effect. This occurs when glacial melting relieves the underlying land mass of weight and it is allowed to "spring" back up. Uplift rates from isostatic rebound are about 3 to 4 mm per year for the Sitka area (Larsen et al. 2005). The current rate of sea level rise is estimated at 3.2 mm per year. In their high scenario, the IPCC report projects that the rate of sea level rise will be somewhere between 2.6 to 5.9 mm year during this century (IPCC report, 2007). However, the report does not take into account

losses due to ice dynamics. A recent publication (Pfeffer et al., 2008) takes ice dynamics into account and projects the probable rate of sea level rise during the 21st century to be about 8 mm per year.

What this means for Sitka is that sea level rise is currently keeping pace with isostatic rebound, but in the future sea level rise will outpace the rebound. Sitka should expect some inundation of low-lying coastal areas in the coming decades (Motyka, Pers. Comm. 2010).

Resulting tidal changes are difficult to estimate, but the mean high tide line in Sitka Sound will rise exponentially in relationship to each sea level increase (i.e. a 500 mm rise in sea level does not mean that the mean high tide line only raises 500 mm). Low-lying residential, commercial, and government properties are at the highest risk of being impacted by this climate change effect.

Rising sea levels and tides will most directly impact those properties and infrastructure along the shoreline with damages and loss from flooding. These could include:

- Flooding of Commercial and Residential Properties
- Interruption of Commercial Air Service
- Increase in Property Flood Insurance Premiums
- Loss of Coastal Property Values
- Degradation of Harbor Protection for Marine Vessels/Aircraft

Mitigation/Adaptation Measures for Rising Sea Level and Tides

- Increase zoning setbacks from mean high tide line for further coastal construction
- Conduct engineering study on elevation, composition, and strength of harbor breakwaters and sea walls
- Partner with the FAA to explore impacts to the airport and airport operations in regards to runway elevation and sea level change.

Source: http://www.guardian.co.uk/global/2009/apr/17/alaska-migration-climate-change

Increased Storm Intensity and Frequency

Sitka is the only city in the Southeast that directly faces the Gulf of Alaska; any increase in Gulf generated storm intensity will directly impact the community. Since the late 1970s, the number of days in south-central and southeast Alaska coastal areas with the fastest wind speed in excess of 50 knots has increased dramatically (Weller and Anderson 1998). Increased storm intensities can be experienced as one or a combination of the following: an increase in sustained wind intensities, increase in damaging winter storm precipitation (ice/snow) levels (per storm), and greater breaking wave action. Raised sea

level and tide effects can also be synergistically intensified by an increase in severe storm patterns. Sitka could also experience coastal erosion due to higher sea levels and increased storm intensity (USGS 2006).

Damage will come from high wind damage, flooding, and severe sea action on fixed objects to include:

- Interruption in electric service due to downed power lines
- Wind/sea effects on property and infrastructure (roads, airport, harbor breakwaters, waste water treatment plant, storm drains, etc.)

Mitigation/Adaptation Measures for Increased Storm Intensity and Frequency

- Measures will have to take into consideration the proximity of residential and commercial properties, as well as critical infrastructure to effects from violent sea action.

Increase in Temperature – Change in Precipitation

During the 21st century, Alaska (and the Arctic region as a whole) will warm at least twice as much as the rest of the world. Annual average global temperatures have increased 1º F degree over the past fifty years while annual average temperatures have increased 4º F in Alaska and 7º in the Alaskan Interior. Two of the most accepted model results project additional warming ranges from either 2 to 5º F or 1.5 – 3.6º F between the present and 2030. Temperatures in Juneau increased roughly 3º F between 1940 and 2005 and annual precipitation increased by 2.6 inches over the same period. These statistics are consistent with the projected effect that climate change will have in Southeast Alaska: a shift to a warmer, wetter climate regime. The same study projected that average air temperatures there may increase by approximately 10º F by the end of this century.

Because of these changes, the IPCC cautioned that "[t]he resilience of many ecosystems is *likely* to be exceeded this century by an unprecedented combination of climate change associated disturbances" such as flooding, drought, wildfire, insect infestations, and ocean acidification.

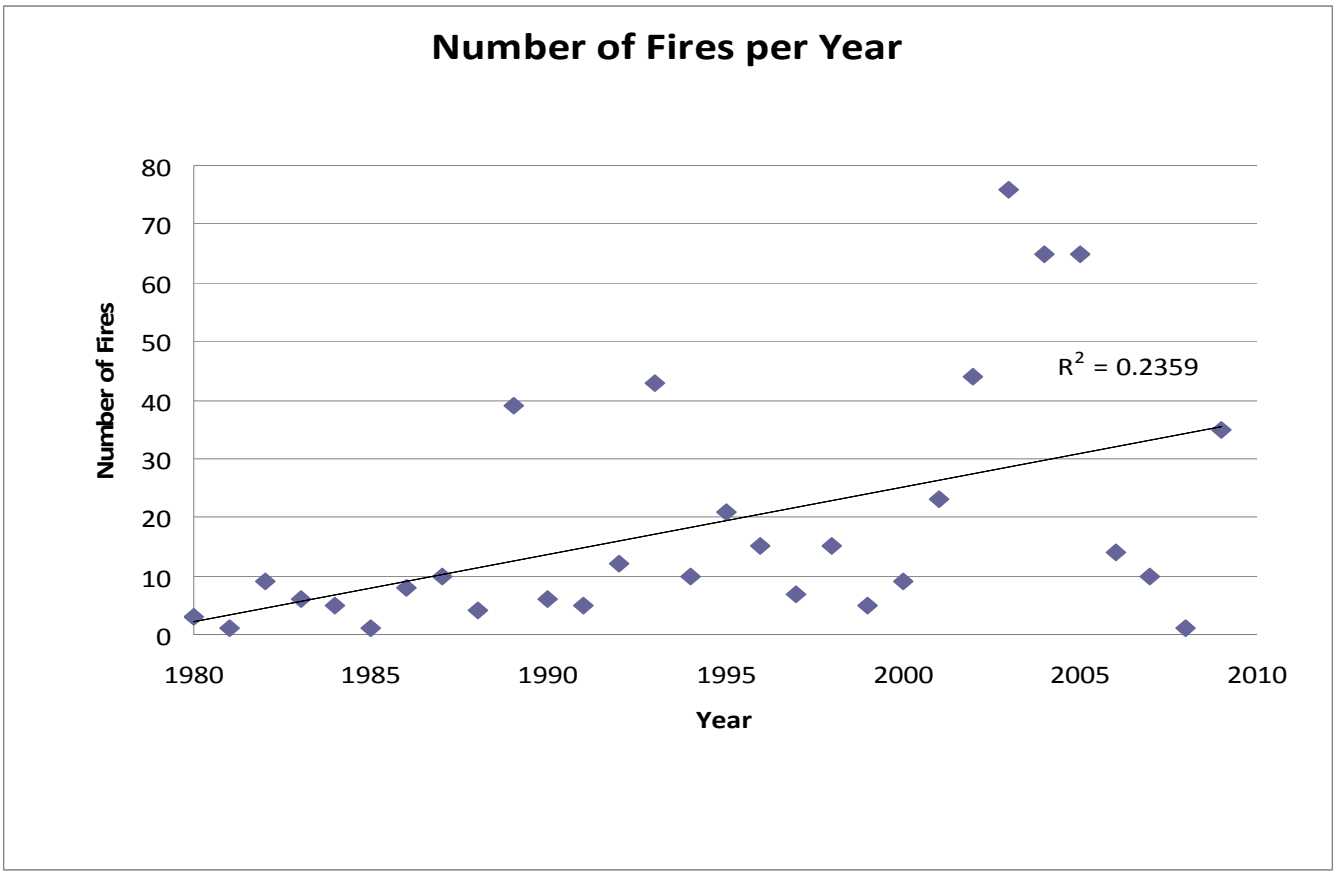
Recent winters have been consistent with climate change model projections indicating that during winter months, there would be a greatly elevated area of precipitation adjacent to Southeast Alaska in the Gulf of Alaska. The reason for the anticipated increase is because the atmosphere will have to absorb more moisture from the warming ocean through evaporation – moisture that turns into precipitation as the air is forced over our coastal mountains. Snowfall at lower elevations will generally decrease due to the warming trend. Juneau has documented a decrease in snowfall at sea level over the past sixty years even as overall precipitation increased.

Other studies indicate that the southern coastal regions of Alaska may experience up to a 10% reduction in annual rainfall due to Climate Change (US Global Change Research Program 2000). This may affect the City and Borough's production of potable water and electricity, as well as make the area more susceptible to wild fires (Karl et al. 2009). Preliminary data provided by the Tongass National Forest appears to indicate an increase in the number of wildland fires Forest-wide and somewhat of an increase in the size of fires (see Figure 2; USFS Fire Dispatch 2010). Residential and commercial developments in Sitka have resulted in many houses and neighborhoods integrated into heavily forested areas. Clearing for construction and the loss of "old growth" forest has resulted in less mature trees with more underbrush around residential areas. Warmer temps with increased transpiration will reduce stored water resources, even with increased rainfall. The change in conditions is hard to determine, but will have multiple effects:

- Changes in temperature and precipitation will affect coastal forest hydrology and salmon spawning streams important to subsistence, commercial, and sport fisheries.
- Changes in hydrologic systems may reduce or change hydroelectric power production capabilities

- Greater chance of forest fires in the City and Borough and insect infestations increasing in frequency and intensity. In the past decade, Alaska has witnessed a record loss of forests to fires and spruce bark beetles (State of Alaska 2009).

Figure 2: Number of Forest Fires from 1980 through 2009 on the Tongass National Forest



Mitigation/Adaptation Measures for Increase in Temperature – Change in Precipitation

- Ensure emerging businesses/industries are electric energy efficient, or have alternative power/heating means during low power generation periods; encourage continued energy efficient practices by citizens; investigate wind and/or tidal generators;
- Prepare contingency water conservation plans/practices for the City and Borough
- Investigate zoning changes that encourage non-flammable roofing materials; work with National Forest Service (NFS) to educate the public about firebreaks and clearing underbrush; establish burn bans when necessary; work with NFS and surrounding communities to explore the possibility of maintaining and using a regional fire boat for islands and remote cabin sites as needed.

CONCLUSION

If climate model projections prove to be even moderately accurate, global temperatures by the end of the next century will be higher than at any time during the last 120,000 years. With such unprecedented climate change, impacts to all parts of the climate system are likely to be substantial. Failure to introduce some form of global greenhouse gas emission reduction strategy will merely extend the time frame of anthropogenic climate change that humanity may already be witnessing. Preparation for and adaptation to changes in local climate will be crucial to protecting Sitka's physical and economic infrastructure.

2.3 Greenhouse Gas Emissions in Sitka

Climate Action Planning Process and Methodology

The Climate Action Plan Task Force used the Clean Air and Climate Protection software provided by ICLEI to prepare greenhouse gas emissions and forecasts. The software generates reports and charts depicting community-wide emissions and those of municipal government separate from the rest of the community. The separate municipal emissions inventory is for the purpose of establishing targets for the municipality that can realistically be achieved through governmental action, whereas community reductions will require the volunteer spirit and civic commitment of Sitka's citizens, as well as potential assistance from the City of Sitka.

This Climate Action Plan is for adoption and implementation by the city government. Measures and recommendations specifically target municipal operations and are for the purpose of helping the City meet greenhouse gas reductions of 25% (from 2003 level) by 2020. Some of the measures will also help to reduce community-wide emissions, such as land-use planning policies that reduce driving and outreach efforts designed to help residents and businesses minimize their "carbon footprint."

It is important to note that it is difficult to calculate emissions from energy with precision even though the software is a sophisticated and useful tool. The model depends on numerous assumptions, and there are some limitations associated with the quality and quantity of data. Therefore, specific numbers generated by the models are best viewed as approximations rather than exact values (City of Sitka 2008, especially pp. 12-13).

Assumptions that were made throughout the plan:

- Fuel prices would be $4 per gallon. This value was chosen because, while fuel prices fluctuate, they continue to rise because of increasing demand and reduced availability.
- eCO_2 and dollar savings will not be completely realized until full implementation of the initiative occurs.

Conversion Factors Used:

When you burn gas or diesel, you are simultaneously vaporizing it and chemically bonding it with oxygen in the air. Carbon dioxide — or CO_2 — is one carbon atom joined to two oxygen atoms. Oxygen is a little bit heavier than carbon, so when you stick two oxygen atoms onto every available carbon atom, you end up with an amount of CO_2 that is roughly triple the weight of the gasoline. Thus, one gallon of gas, weighing roughly 6.3 pounds, ends up at 19.6 pounds of CO_2 (Terrapass 2010). In terms of Sitka's electrical generation, CO_2 is produced when the City must use diesel to generate electricity. The electricity to CO_2 conversion factor below is based on the recent average use of diesel.

- 1 KWh = 0.00007 tons of eCO_2 - source CACP software provided to us from ICLEI
- In general 1 gallon of distillate fuel = 0.01 tons of eCO_2 (based on a combination of 1 gallon of diesel = 22.384 pounds eCO_2/gallon; 1 gallon of motor gasoline = 19.564 pounds eCO_2/gallon Source: EPA)

Examples:

eCO_2 produced (or reduced) by electricity: 245 kWh/year x 0.00007 tons of eCO_2/kWh = 0.01715 tons/year of eCO_2

eCO_2 produced (or reduced) by fuel consumption: 650 gallons of fuel/year x 0.01 tons of eCO_2/gallon = 6.5 tons/year of eCO_2

Summary of Sitka's Greenhouse Gas Emissions: 2003 and 2006

According to Sitka's inventory, during the baseline year of 2003, Sitka released 91,677 tons per year of equivalent CO_2 (tons per year eCO_2). The residential sector produced the greatest amount of emissions, 31%, with most of this produced by burning heating oil. Road and marine transportation sectors were similar, producing approximately 28% and 29% of community emissions. Commercial and industrial facilities were responsible for the remainder – nearly 15% of community emissions (City of Sitka 2008).

Municipal operations generated 3,732 tons per year of eCO_2 in 2003 (Table 2). City facilities were responsible for 81.6% of these emissions, with the city municipal vehicle fleet accounting for 14.7% of total emissions (City of Sitka 2008).

Table 2: Sitka's Municipal Emissions Summary 2003

	Equivalent eCO_2 (Tons per year)	Equivalent eCO_2 (%)	Cost ($)
Buildings- Electricity	66	1.77%	671,990
Buildings- Heating Oil	2,981	79.86%	302,393
Vehicle Fleet- Diesel	105	2.81%	14,461
Vehicle Fleet-Gasoline	445	11.92%	63,002
Employee Commute- Diesel	9	0.24%	
Employee Commute- Gasoline	111	2.97%	
Streetlights-Electricity	7	0.19%	103,504
Water/Sewage-Electricity	9	0.24%	86,311
Waste	-600	0.00%	
Total (Waste not Included)	**3,733**	**100%**	**1,241,661**

O'Connell also collected data for 2006 to provide information from an intermediate year. Community greenhouse gas emissions increased by 3,925 tons per year to a total of 95,620 tons per year of eCO_2 in 2006. Residential emissions remained at levels similar to 2003 and there was a decrease in emissions from the commercial and road transportation sectors. However, there was a substantial increase in emissions from the marine transportation sector – nearly 8,000 tons per year more than was produced in 2003 (City of Sitka 2008).

Municipal operations in 2006 produced 3,728 tons per year of the community total – nearly the same amount as in 2003. Between 2003 and 2006 total eCO_2 emissions remained nearly the same, decreasing by 5 tons per year. While most sectors of municipal operations actually increased their total emissions in this time period, the Building sector, the largest municipal contributor of greenhouse gases, decreased its emissions by 294 tons per year, leading to a decrease in the net-total of city emissions. Figure 7 of the emissions inventory shows the 10 greatest emissions contributors among city buildings for 2003 and 2006. While most buildings maintained similar energy consumption patterns between the baseline and intermediate year, some showed significant changes. Blatchley Middle School decreased total emissions by 385 tons per year of eCO_2. This is due to the fact that during this time period Blatchley added an electric heating system and supplemented their oil heating system with electricity, thus decreasing their annual heating oil use by 33,873 gallons.

Given the actions completed to improve energy efficiency (see section 3.1) and reduce fuel use, the Task Force explored why the City's eCO_2 emissions were not significantly lower in 2006. The Task Force recognized that the difference between 2003 and 2006 was a significant increase in diesel fuel for the vehicle fleet. Discussions with City Staff and others pointed to a very high snow-removal load in 2006 (S. Brylinsky and others, Pers. Comm. 2010). This unusually high snow load was accounted for in the development of this plan (see sections 1.0 and 2.5).

2.4 Sitka's Greenhouse Gas Emissions Reduction Targets

The consensus of the global climate science community is that greenhouse gas reductions should strive for levels that would prevent average global temperatures from rising more than 2º Celsius above pre-industrial levels. This temperature threshold would trigger a sharp rise in the risk of dangerous impacts.

The longer term goal endorsed by the world's leading climate scientists is to reduce greenhouse gas emissions to 80% below 1990s levels by 2050 to avoid exceeding the 2º C threshold. The shorter term goal set forth in the U.S. Mayors Climate Protection Agreement espoused the reduction goals set by the Kyoto Protocol – a reduction of 7% below 1990 levels by 2012. Although the Task Force does not have data on Sitka's 1990 emissions levels, the Task Force reviewed updated scientific findings and emission reduction targets adopted over the past year with the goal of meeting Kyoto Protocol targets.

City and Borough of Sitka Resolution 2009-37 directs the Task Force to set a 25% reduction target from 2003 levels which entails reducing greenhouse gas emissions from municipal operations by 933.25 tons annually in order to achieve a 25% reduction. Such a reduction could reduce fossil fuel consumption by up to 84,000 gallons per year, or a potential savings of up to $336,000 per year at four dollars per gallon for fuel.

Due to the addition of the Performing Arts Center, an additional 71 tons per year of eCO_2 not accounted for in the City's emissions inventory are now emitted by School operations. The Task Force compensated for this addition (see section 2.5 below for more information) and sought 1,005 tons per year of eCO_2 reductions to meet the overall goal. The City needs to recognize that any future development (in terms of increasing the number or size of municipal buildings) will increase the City's overall greenhouse gas emissions. Thus, to continue to meet the Assembly's goal, high efficiency standards and the availability of electric heat will be necessary in all new buildings and additions.

2.5 Adjustment to Baseline Data

The Task Force recognized that several adjustments to the baseline eCO_2 emissions are necessary to provide an accurate estimate of current and future municipal emissions based on additional information gathered after completion of the original emissions inventory.

The Task Force noted a significant decrease in heating oil used by buildings and increase in diesel fuel used by the vehicle fleet between the 2003 and 2006 emissions inventory results. The decrease in heating oil can be accounted for through implementation of numerous building energy reduction/energy efficiency projects (section 3.1). Discussions with City Staff and others pointed to a very high snow-removal load in 2006 (as first discussed in Section 2.3). The amount of snowfall in 2006 was greater than average, necessitating a greater consumption of fuel for clearing snow.

The overall reduction in eCO_2 emissions from buildings between 2003 and 2006 was 294 tons. Except as noted under Blatchley Middle School (section 3.2.2), these lowered emissions are expected to continue since the reduction is based on building efficiency upgrades that will continue to reduce emissions indefinitely. The unusually high use of diesel fuel to remove snow (that appeared in the 2006 inventory) is not expected to continue in most years. Thus, in an average year, the Task Force expects a continuing net reduction of about 144 tons per year of eCO_2 (estimating that ½ of the amount of additional fuel used (14,400 gallons) for snow removal would be needed in an average year). This continued savings of 144 tons per year of eCO_2 was included in Table 1 as a eCO_2 reduction that would help meet the City's goal.

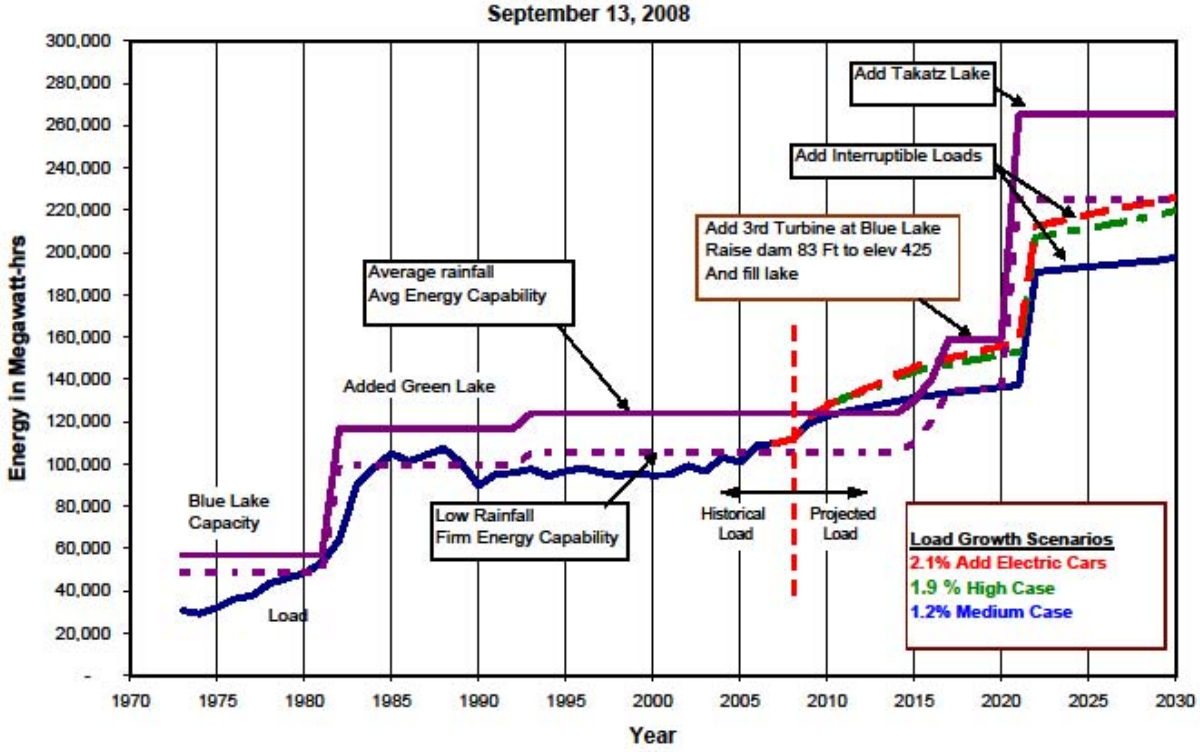
Sitka High School's Performing Arts Center was completed in July 2008. That building and its energy use were not accounted for in the 2003 or 2006 emissions inventories. On average, an approximate 10% increase in diesel fuel use was observed with the addition of the Performing Arts Center (to the High School's current fuel use); operation of the building emitted an average of about 71 tons of eCO_2 per year. The fuel and electricity needed to operate that facility will need to be added to the City's carbon footprint and additional energy/fuel savings will need to be found to compensate for the additional emissions of this building. To reach the City's emissions inventory goal, 1,005 tons of eCO_2 (934 tons + 71 tons) will need to be reduced yearly.

Additionally, the Community Hospital was omitted from the City's emissions inventory despite the fact that it is a City-owned building. This building has its own maintenance department and the City does not track its maintenance or fuel use. While this building and its staff were not considered during the inventory nor discussed here in a substantial way, actions by the City and the Hospital that reduce fuel consumption by 22% or more and conserve electricity would help meet the City's overall CAP goal. The hospital uses about 46,000 gallons diesel per year for heating. If the hospital added electric heat, 145 tons per year of eCO_2 could be reduced (assuming 30% of oil used). This equates to about $184,000 (at $4/gal) in fuel use per year. A 2002 cost estimate for the addition of an electric heating system at the hospital was about $150,000.

2.6 55,000 Tons of eCO_2: Sitka's Electricity Shortfall

Historically, electricity generation from diesel has produced 1% or less of Sitka's electricity (City of Sitka 2008). Recent estimates indicate that diesel now produces about 1 to 2% of Sitka's electricity (Brewton, Pers. Comm 2008). But if the load on the electrical system increases through a combination of alternative building heat systems, residential conversions to electric heat and electric cars, system loads may require supplemental power generation that currently relies on diesel (see Figure 1).

Figure 1: Sitka's Electric Energy Requirements and Resources (1973-2030)



Source: City and Borough of Sitka Electric Department

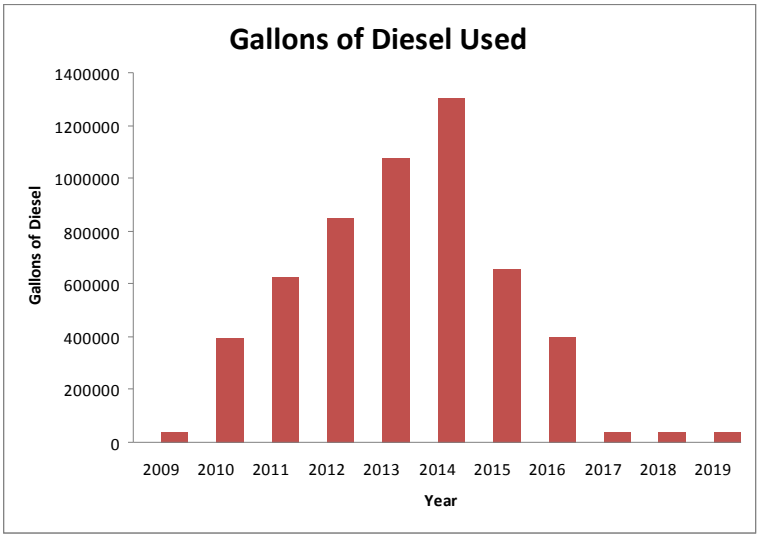
According to the Electric Department's 2008 Energy Plan, the demand for power will exceed supply starting around 2010 while the community waits for the Blue Lake hydroelectric project to be completed. The plan projects an annual increase in demand of 3%. If the price of heating oil increases dramatically over the next decade, demand for electricity will rise as well. Figure 1 shows projected energy demand (blue, green and red lines) largely being met by hydroelectric power generation (purple and blue lines) except between 2010 and 2017, where the shortfall will be met by greatly increasing the amount of power generated by burning diesel. These projections were based on construction of a dam at Takatz Lake and a cost of $3.00 per gallon. It is highly likely the cost of diesel will be much higher during this time frame, creating a greater shortfall as people try to switch to less expensive electric heating.

Projected diesel use for 2009 to 2019 is approximately 5.5 million gallons at a cost of $22,000,000 (Table 3) vs. the current trend of about 440,000 gallons for 1999 to 2009. Starting in 2017 the electric generation capacity is again expected to meet 99% of the City and community's needs. ****Note:** As of 5/2010, Sitka has not exceeded normal diesel use and design work on the Blue Lake Dam may bring the project on line one year earlier than projected in this data.** We typically use about 40,000 gallons of diesel generation a year to meet energy shortfalls and to stabilize the power frequency. The Climate Action Plan helps the City arrive at the goal of a 25% reduction in eCO_2 from our 2003 level by January 2020. However, we will have a very expensive and high eCO_2 spike (54,716 tons over 11 years, see Figure 2) due to the electricity shortfall,

Table 3: Gallons of Diesel Used/Tons of eCO_2 from Electricity Generation

Year	Gallons	Appx. Tons of eCO_2 to Generate Electricity
2009	40,000	400
2010	394,500	3,945
2011	627,929	6,279
2012	849,929	8,499
2013	1,075,786	10,758
2014	1,304,786	13,048
2015	659,286	6,593
2016	399,429	3,994
2017	40,000	400
2018	40,000	400
2019	40,000	400
Total	5,471,645	54,716

Figure 2: Electricity Shortfall (fuel use if generators are not replaced)



Coping with the Short Term Electricity Shortage

The extremely inefficient old diesel generators will be put to increasingly hard use through 2012, when the department plans on replacing them with new units to be housed in a new building. This replacement is dependent on grant funding. The Task Force supports and recommends implementation of the Electric Department's plan to replace the current, older model generators with newer, far more efficient generators. The new generators will be about 22% more efficient than the old generators at a cost of about $5 million. The Task Force recommends the City reassess this short-term increase in diesel generation outside of the Climate Action Plan. Possible measures include:

- Continue to encourage citizens and businesses to maintain and use their efficient diesel heaters as needed until the Blue Lake project is completed.
- Provide additional information to Sitka's citizens and businesses about the coming electricity shortfall and what it will mean to their electric rates.
- Increase education and provide signs on Sitka's "Power Supply Status" (red, yellow, green light)
- Extreme Conservation Measures: Similar to those adopted in Juneau when their hydropower was knocked out by avalanche.
- Encourage conservation through electric rate adjustment (see Appendix B, 1.1.1).
- Diversification and decentralization of energy supplies.
- Development of alternative energy sources, such as wind, ocean heat pumps, and geothermal resources.
- Promote research and possibly stockpile alternative fuels, such as fish-based biodiesel. Silver Bay Seafoods is planning on operating a fish meal plant at the industrial park. This plant would process fish waste from all processors and allow for a source of fish oil. The Alaska Center for Energy and Power has been successfully running generators on fish oil and fish/diesel mixtures. Examples can be seen at www.uaf.edu/acep

Keeping Up with Demand

The City's projections do not include new conservation measures or any energy sources besides dams and diesel generators. Investing in renewable energy generation, such as wind, ocean heat exchangers, and geothermal, would add diversity and stability to our power generation portfolio. Planning now for major community-wide conservation measures beyond the scope of the Climate Action Plan would greatly reduce the cost and eCO_2 emissions.

3.0 Emissions Reduction Measures

This section addresses energy conservation with an emphasis on heating, lighting, and powering equipment within buildings as well as on transportation, purchasing and waste, and other measures. Heating oil is a major source of municipal carbon emissions. Consequently, a primary objective of this Climate Action Plan is to provide recommendations that will increase building efficiency and substitute electric heat sources for oil heat where feasible.

Sitka is fortunate in that it generates the majority of its energy from hydropower. Because of hydropower, electricity use in city facilities produces a comparatively modest amount of greenhouse gas emissions. For example, in 2003, electricity use for buildings, streetlights and water was responsible for 82 tons per year of greenhouse gas emissions - 2.2% of total emissions from municipal operations (City of Sitka 2008). There was a slight but notable increase in 2006 as municipal electricity use was responsible for 91 tons per year of greenhouse gas emissions, or slightly more than 2.4% of total municipal emissions.

The quandary for the Task Force, then, was how to make a transition to increased electricity usage in order to minimize fossil fuel consumption without increasing the use of diesel to create electricity. The Task Force concluded that increased energy conservation and improved energy efficiency must accompany the transition away from heating oil.

The Task Force came up with proposals through 4 processes:

1) reviewing and taking items directly from energy audits of City and School buildings,
2) taking direct recommendations from City and School staff and plans (City of Sitka 2009), Assembly, and some City commission members,
3) through our research into other City's climate action plans, and
4) through individual proposals from the community or Task Force members.

This section first addresses measures applicable to city and schools facilities because facilities are the major source of emissions. Measures described in energy audits are first, followed by heating and other energy efficiency projects. The section goes on to address transportation measures that can reduce emissions from the Sitka's second largest emission sector. Subsequent sections address waste and purchasing, energy conservation, planning, zoning, community outreach, and policy. These latter sections will not yield high levels of emission reductions. But the Task Force believes that these recommendations are equally important because of the need to offset the increased load on the electrical system in order to minimize the use of diesel for electricity generation.

All initiatives included in Chapter 3 of the Plan are recommendations from the Task Force. As further research into initiatives occurs and other products and processes are developed, new initiatives not included in this Plan may be developed and implemented, and initiatives proposed by this Plan may be dropped because of infeasibility or extreme costs. The intent of the Plan is to meet the goal shown in Section 2.4 using whatever initiatives are most feasible and cost-effective, whether they are in this Plan or developed in the future.

3.1 Actions Already Accomplished

Sitka has completed a number of projects over the past eleven years that are and will continue to reduce heating oil and electricity consumption. Between 2002 and 2006, the City of Sitka spent over $2.8 million on municipal energy conservation/ greenhouse gas emissions reduction projects that ranged from roof and insulation replacement to installing electric boilers. The city set up Direct Digital Control (DDC) systems for heating/ventilation at several facilities in order to provide these facilities with programmable and automatic adjustments to heat and ventilation. A 2005 library retrofit produced savings as well as increased comfort (C. Wilbur, Interview 2/25/2009). Additional funds were spent roofing/insulating schools and installing an electric boiler at Blatchley Middle School (see Appendix D for past activities pre-2007). The Task Force assumed that all projects completed in or before 2006 were included and counted in the 2003/2006 emissions inventory – any benefits gained from these projects would be reflected in those numbers.

Since 2006, seven major energy conservation projects have been accomplished at a cost of $1.8 million to the City (and their partners). These projects are saving approximately 41,340 kWh/year of electricity and about 8,950 gallons/year of diesel fuel. The total eCO2 reduction from these projects is about 95 tons/year. As the Task Force looked at reaching a goal of 25% reduction from 2003 levels, this amount (95 tons per year of eCO_2) was subtracted from the goal. Three additional completed projects, energy audits on City buildings, an energy audit for Blatchley Middle School, and an automatic meter reading fund do not save energy or eCO_2 directly, but will lead to savings as the actions related to them are implemented.

Table 4: Energy Conservation Actions Already Accomplished; Projects Completed after 2006

Item	Building	Year Accomplished	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	eCO_2 Reduction (Tons per year)[1]
Install Control System	Airport	2007	$145,000	0	2,289	22.89
Replace Roof/ Increase Insulation	Airport	2007	$893,000			
Optimize HVAC controls	Airport	2008	$160,000			
Turn off Supply Fan SF-3	Airport	2009	$200	3,300	220	2.43
Replace Control System	Animal Shelter	2007	$17,413	13,900	237	3.34
Replace Roof/ Increase Insulation	WWTP	2008	$503,000	24,140	6,204	63.73
Roundabout	Vehicles	2009	N/A	0	1,040	10.4
Total	-	-	$1,801,613	41,340	9,990	102.79

[1] t this report, carbon dioxide is measured in terms of equivalent carbon dioxide (eCO_2); it includes the carbon dioxide formed by using gas and diesel (in vehicles and for heating) plus the carbon dioxide formed by the use of diesel to generate electricity.

The City also approved and participated in the construction of a roundabout/removal of a 4-way stop at a main Sitka intersection (July 2009). City studies estimate a community fuel reduction of about 80,000 gallons/yr due to the relief of congestion. The City's motor vehicle fleet (107 vehicles) is approximately 1.3% of total motor vehicles in Sitka (estimated to be 8,171 vehicles) (Alaska Division of Motor

Vehicles 2007). The City's fuel savings that can be attributed to the roundabout's reduced stopping requirements is estimated to be about 1,040 gallons per year (i.e. 1.3% of 80,000 gallons).

3.2 Recommendations from Energy Audits

Sitka's facilities generate the majority of municipal eCO_2. In 2003, building heating generated 2,981 tons per year of eCO_2 and building electricity generated 66 tons per year of eCO_2 (City of Sitka 2008). In 2003, electricity use in municipal buildings cost $670,990.00 (City of Sitka 2008). Energy audit initiatives focus on conservation of electricity and heating oil at municipal facilities. Implementing these and other energy conservation measures has two benefits – it reduces the cost of municipal operations and reduces the chances of over-taxing the City's hydropower-generated electricity while allowing for use of electricity for heating systems and vehicles.

Sitka contracted to have energy audits completed on eight municipal buildings in 2009: Sitka Airport, Centennial Building, City Hall, Fire Hall, Library, Public Services Office/Shop, Senior Center, and Waste Water Treatment Plant. These audits and the recommendations for projects from these audits form the backbone of this Climate Action Plan. At a cost of $3,750 each, they are a tremendous value. The recommendations contained in them move us toward the carbon reduction goal the city has set for itself in the most cost-effective manner possible. The data they have provided, in terms of data and cost projections, has been invaluable to the compilation of the Climate Action Plan.

Although reducing carbon emissions from Sitka's schools involves measures that are similar to those needed to reduce emissions from Sitka's municipal operations, this Climate Action Plan addresses schools separately for two reasons: Sitka's four schools continue to be the most significant emitters with the high school being the highest emitter, and the school district has its own maintenance department and funding sources. Carbon emission reductions in schools will be addressed by working with school district personnel as much as or more than municipal departments.

One school building, Blatchley Middle School, was audited in 2010. While over 26 projects were proposed in the energy audit for BMS, all of these projects will need to be implemented to maintain the current eCO_2 emissions at the school. This is further explained below under section 3.2.2, Schools.

3.2.1 City Buildings – Energy Audit Initiatives 107 tons/yr eCO_2

The City of Sitka hired Alaska Energy Engineering, LLC to complete energy audits on eight City buildings in 2009 at a cost of $30,000

The Task Force had originally proposed to prioritize projects by implementation cost, life cycle savings, and eCO_2 reduction. However, with the realization that the Plan would be unable to meet the emissions reduction goal without completing all medium and high priority projects in the energy audits, the Task Force determined all the medium and high priority projects from the audit should be included in the Plan.

RECOMMENDATION: Implement City Energy Audit Initiatives ***Public Buildings***

Measure Status: Ongoing and Proposed

Responsible Department: Public Works

eCO_2 Savings: 107 tons per year

Fourteen initiatives from the 2009 City Building energy audit are beginning to be implemented or are planned to occur between Fiscal Year (FY) 2010 and FY 2012. Initiatives range from setting computers to sleep mode and turning off unused computers to retrocommissioning six City buildings. The eCO_2 reduction would be 48 tons per year (see Table 5). The complete list of planned city building initiatives needed to meet this reduction is shown in Appendix A, as Table A-1.

Table 5: Summary of City Building Energy Audit Initiatives-Planned

	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Life Cycle Savings	eCO_2 Reduction (Tons per year)
TOTAL Planned Initiatives	$185,165	86,370	4,200	$257,300	48

Most initiatives from the 2009 energy audits have not yet been scheduled or budgeted for. If implemented before 2020, the remaining thirty-one medium and high priority initiatives from the 2009 energy audit would yield an eCO_2 reduction of 59 tons per year at a cost of $225,500 (see Table 6, below). The complete list of unbudgeted city building initiatives needed to meet this reduction is shown in Appendix A, as Table A-2.

Table 6: Summary of City Building Energy Audit Initiatives-Unbudgeted

	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Life Cycle Savings	eCO_2 Reduction (Tons per year)
TOTAL Unbudgeted Initiatives	$225,500	92,777	5,270	$215,400	59

Method: Some actions will involve educating employees and asking for their support of actions. In other cases, smaller initiatives may be completed by City staff. For larger projects, contracts with builders will be necessary.

Calculations:

- Actions proposed are only those that were already planned or were described as medium or high priority in the energy audits.

3.2.2 School Buildings – Energy Audit Initiatives 0 tons/yr eCO_2

Blatchley Middle School is the only school that has an energy audit in Sitka. The audit was completed in 2010. While over 26 projects were proposed in the energy audit for BMS, all of these projects will need to be implemented to maintain the current eCO_2 emissions at the school. The audit found that the building is currently under-ventilated. In a note to the Task Force from Jim Rehfeldt of Alaska Energy Engineering, LLC, Jim explained, "Increasing the ventilation to proper levels—a likely scenario once the renovation project is completed-will significantly increase fuel oil use…I estimate that fuel oil use will increase to 66,900 gallons per year. It is from this baseline of 66,900 gallons per year that I evaluated the energy savings of the [energy audit initiatives]. I calculate that [these initiatives] will reduce fuel use by [about] 25,300 gallons, which results in an annual consumption of 41,600 gallons." (J. Rehfeldt, Pers. Comm. 2010). The heating fuel use is a net increase of 3,400 gallons of diesel per year. The items proposed for Blatchley will not count towards the goal because all of these energy-saving projects are needed to offset necessary ventilation adjustments that will increase the building's heating load. If all of these items are not completed, the City should expect a rise in the schools' energy use and eCO_2 production.

RECOMMENDATION: Implement Blatchley Middle School Energy Audit Initiatives ***Schools***

Measure Status: Ongoing and Proposed

Responsible Department: Sitka School District and Public Works

eCO_2 Savings: Net 0 tons per year

Several initiatives from the 2010 energy audits are being planned and budgeted for at Blatchley Middle School. The 26 initiatives from the 2010 energy audit would cost approximately $1.5 million with a life cycle savings of about $1.7 million (see Table 7, below). The complete list of initiatives needed to stay at net 0 eCO_2 is shown in Appendix A, as Table A-3.

Table 7: Summary of Blatchley Middle School Energy Audit Initiatives

	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Life Cycle Savings
TOTAL BMS Initiatives	$1,458,358	740,007	26,178	$1,679,228

Method: Some actions will involve educating school staff and asking for their support of actions. In other cases, smaller initiatives may be completed by school staff. For larger projects, contracts with builders will be necessary. Consider performance contracting for the entire set of projects.

Calculations:

- Actions proposed are all from the energy audit.

Note: Observations by building users find that the heat is constantly on in the building. Due to the current ventilation issues and excessive heat in the building, many windows are left open during the winter. There is a possibility that with correct ventilation and heating, comfort would increase and fewer windows would be opened and less heating would be necessary. Users of the building may need information and education to change their current behavior.

3.3 Other Initiatives: Facility Heating

In 2003, heating generated 2,981 tons per year of eCO_2 and building electricity generated 66 tons per year of eCO_2 (City of Sitka 2008). Together, these emissions constituted 81.6% of municipal emissions during the baseline year and heating oil was responsible for nearly all of the building emissions (79.9% of the annual total).

While energy audit activities will help the City save money and move towards the greenhouse gas emission reduction goal, more far-reaching measures will be needed to reach the goal and to set the City up to take advantage of the future availability of electricity, reduce the effects of fluctuating oil costs, and further reduce its emissions. The Task Force proposes the addition of an electric heating option to City and School buildings.

As an example of the benefits of this heating option, in 2006, municipal building sector emissions declined by 294 tons per year from 2003 levels. The decline was primarily attributable to the installation of an electric boiler at Blatchley Middle School and the City/State building. The electric boiler enabled the school to decrease its annual heating oil use by 33,873 gallons at a cost of a little under $300,000. Blatchley's emissions dropped from 800 tons per year in 2003 to just over 400 tons per year in 2006 (City of Sitka 2008). The percentage of emissions resulting from heating buildings declined to 71.7% from 2003.

The addition of electric heating in some buildings is simpler and less costly than in other buildings. Buildings with room for the electric boiler in their current space will be less costly than those needing a separate structure to house the electric boiler. The electric baseboard and unit heaters proposed for some buildings will not require substantial space, but will require re-wiring.

Any future development (in terms of increasing the number or size of municipal buildings) will increase the City's overall greenhouse gas emissions. Thus to continue to meet the Assembly's goal, high efficiency standards and the availability and use of electric heat will be necessary in all new buildings and additions. All new construction design should include space, wiring, and equipment for an electric boiler or other electric heating device. The ability to use electric heat in the future (once additional electrical capacity is developed) will allow the City to use excess hydroelectricity and more quickly pay off any debts on that development, as well as provide further opportunities for substantial greenhouse gas reductions.

3.3.1 City Buildings Heating up to 144 tons/yr eCO_2

RECOMMENDATION: Add Electric Heating Option-City Buildings Electric/Public Works

Measure Status: Proposed

Responsible Department: Electric Department/Public Works

eCO_2 Savings: 144 tons (all buildings 30% electric heat)

Install electric boilers in 7 City buildings and electric baseboard or unit heaters in 2 City buildings alongside the current fuel boilers. This would allow the city to turn the boilers on at times when the hydroelectric system has surplus electricity. Using excess electricity will increase the revenue paid to the debt service especially in the colder, rainy season when the hydroelectric dams typically overflows. Centennial Hall is recommended as the highest priority, followed by the Fire Hall and the other buildings.

Consider using heat pump technology in smaller buildings to drastically reduce the amount of electricity needed to heat the building. Air-to-air heat exchangers provide equivalent heat using 25% of the electricity of conventional, or conduction electric heat.

Method: The Electric and Public Works Departments would determine methods to purchase and install these items.

Table 8: Add Electric Heating Option – City Buildings

Building	Implementation Cost	Energy Increase (kWh/Yr)	Energy Reduction (Gal/Yr)	Yearly Savings in Dollars[1]	eCO_2 Reduction (Tons/yr)
Centennial Hall	$49,000 (2002)	88,643	2,190	$866	15.7
Fire Hall	Est. $150,000	111,484	2,754	$375	19.7
Public Services Center	Est. $200,000	98,005	2,421	($3,119)	17.3
Sawmill Cove Admin.	Est. $100,000	78,127	1,930	($1,621)	13.8
WWTP	Est. $100,000	110,876	2,739	($569)	19.6
Airport*	Est. $500,000	214,516	5,300	$743	38
Library*	$44,000 (2002)	65,656	1,622	($33.91)	11.6
Animal Shelter**	Est. $40,000	34,862	861	$379	6.2
Corrosion Control Building**	Est. $50,000	21,139	248	$154	1.8
Total	Est. $1,233,000	823,308	20,065	N/A	143.7

[1] Assumes fuel at $4/gal. and electric price at current rate

* Will require construction of an added building to house electric boiler;
**Using electric baseboard and unit heaters (rewiring required)

Calculations/Assumptions:

- The Task Force assumed that electric heat could only be used to replace about 30% of the diesel used by these buildings (based on past data from Blatchley Middle School)
- Yearly savings based on $4/gal fuel; higher fuel costs provide better payback
- Schedule additions to coincide with availability of electricity; the electric option will be logical preparation for the Takatz Lake Hydroelectric project.

3.3.2 School Buildings Heating up to 376 tons/yr eCO_2

RECOMMENDATION: Add Electric Heating Option-School Buildings ***Schools/ Electric Dept.***

Measure Status: Proposed (and Ongoing)

Responsible Department: Sitka School District and Electric Dept.

eCO_2 Savings: 376 tons per year

Complete installation of 1.5 MW electric boiler at Sitka High School. The majority of equipment and materials for this installation has been purchased and are ready for installation. It is doubtful sufficient hydroelectric generation will be available to operate the electric heat year round. However, during a typical fall and early winter season, the City often spills water at the lakes. Utilization of electric heat at that time would certainly reduce some oil usage while increasing electric revenues.

Install similar electric boilers at Keet Gooshi Heen and Baranof Elementary School; utilize electric heat when excess power is available. These replacements should be timed to coincide with increased electricity availability.

Method: City would work with the school district to purchase and install these items.

Table 9: Add Electric Heating Option – Schools

Building	Implementation Cost	Energy Increase (kWh/Yr)	Energy Reduction (Gal/Yr)	Yearly Savings in Dollars[1]	eCO_2 Reduction (Tons per year)
Sitka High School	Appx. $500,000 - parts are paid for; labor is budgeted	763,494	21,377	($1,744)	214
Keet Gooshi Heen	Estimated at $230,000	299,394	8,383	($3,495)	83
Baranof E.S.	$170,000 (2002 est.)	281,034	7,869	($928)	79
TOTAL	Est. $900,000	1,343,922	37,629		376

[1] Assumes fuel at $4/gal. and electric price at current rate

Calculations/Assumptions:

- The Task Force assumed that electric heat could only be used to replace about 30% of the diesel used by these buildings (based on past data from Blatchley Middle School)
- Total cost is low due to the previous purchase of SHS equipment

3.4 Other Energy Efficiency Measures

The following energy efficiency activities are ongoing or will help the City and School District save money and move towards the greenhouse gas emission reduction goal. These measures focus on initiatives not covered by the sections on energy audits and heating.

3.4.1 Other City Energy Efficiency Initiatives 90 tons/yr eCO_2

Other City energy efficiency proposals are being considered or being implemented. Projects range from small scale to large scale. Large scale proposals are described in the attached information sheets. Smaller scale projects like the two described below also provide energy and cost savings.

Sitka uses LEED standards as best management practices for operation and maintenance for its facilities and has been a member of the Green Building Council (C. Wilbur, Pers. Comm. 2/25/2009).

There is substantial interest in alternative energy projects in Sitka; however few individuals have a true understanding of the cost and knowledge of the technical complexities to install a renewable system. A renewable energy pilot project, under the direction of the Electric Department technical staff, could procure and install a demonstration project, such as solar, wind or biomass that would provide renewable energy for a city facility. The intent would be to provide a hands-on project for the general public to use as a basis to make a decision about private investment in renewable energy. With the Electric Department installing the project, the City would have accurate cost information and technical abilities to truly demonstrate what is involved to install such a system.

RECOMMENDATION: Diesel Generator Replacement ***Energy***

Measure Status: Initial stage begun; EPA permit application and associated monitoring

Responsible Department: Electric Dept.

eCO_2 Savings: 88 tons per year

Replace existing generators with new, more efficient units in a new building. The Electric Department projections call for considerably more diesel generation between 2010 and 2020 as demand grows while additional hydroelectric generation is constructed. The department has embarked on a course of action they hope will result in replacement of the generators by 2013.

Due to increasing demand during the Blue Lake expansion project, projected diesel usage between 2010 and 2019 is ~5.5 million gallons. If the new generators come on line by January 1, 2013, the 22% increased efficiency will save approximately 783,043 gallons of diesel ($3,132,000 at $4/gal) and avoid 7,830 tons eCO_2. By 2019, when the community returns to our average annual rate of 40,000 gallons a year of diesel generation, the annual savings will be 8,800 gallons ($35,000/year at $4/gal) and 88 tons per year of eCO_2.

Payback Period: This measure is estimated to cost up to $5 million. Almost 50% of the cost of this project ($3,132,000) will be paid back through fuel conservation between 2013 and 2016, when diesel generation use will peak before the completion of the Blue Lake expansion project. From 2017 onward, the anticipated savings of 8,800 gallons at $4/gallon shows an additional 53 years to retire the remainder of the investment. Additional factors to consider in calculating the payback period include the%age of the project that is grant funded, and the high probability that generator efficiency and the cost of diesel fuel will exceed current predictions by 2013. Grants for generator replacement have been identified and EPA permits for increased diesel use have been applied for.

Based on:

3% per year increase in demand for electricity

$4.00/gallon cost of diesel in 2013

Installation of generators capable of 22% greater efficiency by 2013

Return to present minimal usage of generators (40K gallons) by 2017

1 gallon of diesel emits 0.01 tons per year of eCO_2

Additional benefits:

- Improved air quality due to improved efficiency and better equipment

Special Note: Extreme conservation practices taken between 2012 and 2014 will reduce impending financial and environmental problems associated with this measure.

RECOMMENDATION: Conversion to Energy-efficient Streetlights ***Energy***

Measure Status: Proposed (partially ongoing)

Responsible Department: Electric Dept.

eCO_2 Savings: 2.6 – 2.9 (estimated at 2.6) tons per year for 75 bulb replacement (32-36 for 900 bulb replacement)

This project would be a continuation of a street light replacement project partially funded by an Energy Efficiency and Conservation Block Grant (EECBG) from the Department of Energy. The City & Borough of Sitka presently operates around 900 street and security lights of various sizes. The most common is the 150 watt High Pressure Sodium (HPS) lamp and there are about 450 of these lamps installed. The City started a pilot street light replacement project consisting of installation of new energy efficient types of street lights at a few locations to allow public evaluation of the technology. The City will meter each individual light to ensure accurate energy consumption data and promote a public campaign for input on the quality and effectiveness of the lights. A major mistake some municipalities have made is focusing on the energy savings without recognizing the quality of the light.

Based on the engineering evaluation of energy data and public input, the City would then proceed with implementation of a full street light replacement project. It is estimated the City could replace 75 HPS street lights with energy efficient LED lights for approximately $48,750 with an estimated energy savings of 42,750 kWh per year. It is estimated the City could replace 75 HPS lights with energy efficient magnetic induction lights for approximately $32,250 with an estimated energy savings of 38,000 kWh per year. All the HPS streetlights on the State roads are under the control of Alaska Dept. of Transportation & Public Facilities and as such require State approval before they are replaced with alternative fixtures. The early focus on this measure would be to replace all City owned HPS fixtures with new energy efficient fixtures.

Method: Replacements would be made by Electric Department staff.

Table 10: Streetlight replacement options

	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Life Cycle Savings	eCO_2 Reduction (Tons per year)
Street light replacement - 900 LEDs	$628,200	513,000	N/A	$580,500	35.9
Street light replacement - 900 magnetic induction	$349,200	456,300	N/A	$886,500	31.9

3.4.2 Other School Energy Efficiency Initiatives 13 tons/yr eCO_2

Several other City energy efficiency proposals are being considered or being implemented. Projects range from small scale to large scale.

RECOMMENDATION: Energy Efficient Remodel of Pacific High School Schools

Measure Status: Awaiting Funding

Responsible Department: Sitka School District

eCO_2 Savings: 13 tons per year

Cost: 30% match of capital improvement grant = $900,000

Pacific High School (PHS) would like to be a model of Sitka's potential to be carbon neutral. The school's location on Lincoln Street provides the ideal opportunity to showcase Sitka's resolve to make a difference in reducing eCO_2 emissions to tourists and the public. Pacific High students and staff plan to do much of the design work, and would like to pursue LEED certification.

In 2003, PHS consumed 3,390 gallons of fuel at a cost of $3,855, with an average price of $1.15/gallon; at a future projected price of $4.00/gallon, it would have cost $13,560. In 2008, they consumed 4,491 gallons of fuel at a cost of $15,271; during this time fuel prices ranged from $4.47 to $2.42 per gallon.

Remodeling will also reduce the school's electric consumption and increase its heating efficiency. Currently, the school building is inefficient. Heat sinks in PHS include the front door (single glazing, no thermal break, and inefficient weather stripping); an arctic entrance here would provide savings. The school walls are insulated below optimal R-values of R-25 to R-30. The roof is insulated below recommended values of R-50 to R-60. The windows are double-paned, but without a thermal break and have worn seals. The boiler has no flu damper and loses heat when not in use. The building has no air handling unit and is under-ventilated; windows and doors are kept open to compensate. The school needs to replace the manual thermostat with digital controls. The school has three classrooms which are used most of the day. Janitors turn off the lights at night, but occupancy sensors would help in the bathrooms.

If PHS uses energy efficient measures during its redesign, coupled with an electric baseboard heating system, the projected heating bill would range from $13,157 to $13,789 (including both electric and oil heat costs). The small size of the school could allow for more electric (heat) consumption and would reduce the heating bill further.

An implementation cost of $900,000 is at the high end of a grant amount. PHS is trying to partner with the Vo-Tech Youth Build program to bring down the costs for the city.

Calculations/Assumptions:

- While full conversion to electric heat is preferred the Task Force assumed that electric heat would replace about 35% of the diesel used.
- PHS's design is comparable to the Career Center located next door. It has an electric baseboard heating system, which is recommended for PHS. PHS is 38% larger than the Career Center. On average, the electric boiler at the Career Center accounts for 40% to 65% of the building's electricity usage. Projected annual consumption for PHS can be estimated from this information
- Estimate used fuel prices at $4.00/gallon, PHS's 2008 heating bill minus 35%, then adding 38% of the Career Center's electric consumption.

3.5 Other Initiatives: Transportation up to 100 tons/yr of eCO_2

Municipal transportation sector emissions increased between 2003 and 2006. The main factor appeared to be the heavy snow in 2006 and the increased need for snow removal (see Section 2.5). Gas and diesel-fueled vehicles were responsible for nearly 15% of total municipal emissions in 2003 and approximately 22.5% of total municipal emissions in 2006 (City of Sitka 2008). The inventory indicates that these emissions may level off over time due to projected changes in average vehicle emissions. The city spent slightly more than $77,000 to fuel its vehicles in 2003 and more than twice that amount - nearly $166,000 - in 2006.

It is also notable that city employee commutes generate another 120 tons per year of eCO_2 - slightly more than 3% of total municipal emissions. Finally, it is important to point out that transportation sector emissions do not include all emissions associated with fossil-fuel driven transportation. Even though air travel, ferry travel, and marine shipping are significant sources of greenhouse gas emissions, local government has little influence over these sectors and it would also be difficult to accurately approximate emissions from these sectors (City of Sitka 2008).

The City currently owns a total of about 107 vehicles (Table 11). Replacement of vehicles is limited; approximately 12 passenger vehicles are expected to be replaced between 2010 and 2020 (Fitzsimmons 2010). Heavy trucks, light trucks, and pickups were not considered for replacement with hybrid vehicles or all-electric vehicles (due to the recognized need for large trucks to do heavy work). The current emission reductions are based on the current expected vehicle replacement rate. This evaluation considers comparisons of actual emissions during transportation (but not during the entire life cycle of the vehicle). Therefore, all-electric vehicles are considered to have zero emissions.

FIGURES AND TABLES

Table 11. City and Borough of Sitka VEHICLE TYPES in 2006 and projected for 2020.

	2006			***2020***				
Car type	**Number of vehicles**			**Number of vehicles**				
	Gasoline	Diesel	Total	Gasoline	Diesel	Hybrid	All-electric	Total
Auto full-size	7	0	7	4	0	2	1	7
Passenger vehicle	23	10	33	17	10	2	1	30
Light truck/SUV/Pickups	44	2	46	40	2	0	0	42
Heavy Truck	2	19	21	2	19	0	0	21
Total	76	31	107	63	31	4	2	100

Note: 2020 vehicle totals are based on the City and Borough adopting "Right Sizing" and "Hybrid/Electric Vehicle Purchase" recommendations (pages 31-32).

Table 12. City and Borough of Sitka FUEL CONSUMPTION in 2006 and projected for 2020.

	2006		***2020***			
Car type	**Total gallons fuel**		**Total gallons fuel**			
	Gasoline	Diesel	Gasoline	Diesel	Hybrid*	All-electric
Auto full-size	8,670	0	4,325	0	1,238	0
Passenger vehicle	11,252	6,449	8,541	5,630	1,238	0
Light truck/SUV/Pickups	23,146	1,108	20,206	967	0	0
Heavy Truck	1,021	27,042	891	23,608	0	0
Total	44,089	34,599	33,963	30,205	2,476	0

*assumes that hybrids have a 50% fuel savings (vs. conventional vehicles)

Added Information about Electric/Hybrid Vehicles:

- Commercial all-electric vehicles are likely to be available within the next few years
- Sitka already has several all-electric vehicles and hybrid vehicles in use (i.e. demonstration and community awareness has already begun)
- Sitka's relatively level terrain bodes well for all-electric vehicles, which generally have less powerful motors than conventional vehicles (same for relatively low speed limits)
- Widespread use of all-electric vehicles in Sitka would need to be phased in only after additional hydroelectric capacity is added
- Strong community cooperation could help with issues such as scheduling recharging periods (for night-time and day-time users); strong community support and environmental ethic should favor a transition to all-electric vehicles.
- Policy incentives (local, state, and/or federal) could assist with all-electric vehicle implementation

RECOMMENDATION: "Right Size" City Vehicle Fleet *Transportation*

Measure Status: Proposed

Responsible Department: City Administrator with Department Staff input

eCO_2 Savings: 34.63 Tons per year

Financial Savings by 2020 (Fuel Only): $14,284

Current vehicles in every department would be evaluated to determine if the number, size and the fuel type of the vehicles are appropriate based on the frequency and type of use. Overall, the City may determine that 23 (33 total) passenger and 44 (46 total) Light Truck/SUV/Pickup vehicles are excessive to their needs. A minimal 6% overall reduction in the City and Borough 107 vehicle fleet can net a large return in savings and eCO_2 reduction (these savings are based on the assumption that a reduction in the vehicle fleet will net a proportional decrease in usage, thereby reducing average gasoline consumption by the municipal fleet). Additionally, where feasible, the City will purchase smaller, more fuel efficient vehicles for each department. In the future, when upgrading the fleet, the City would take into account the main use of the vehicle and will purchase the smallest and most fuel-efficient vehicle in the class required for the job (see additional proposals concerning vehicle fleet transition to hybrid/all electric).

- Reduction of Gasoline Passenger Vehicles from 23 to 20: 3 x 489 gal/yr = 1467 gallons
- Reduction of Light Trucks/SUVs/Pickups from 44 to 40: 4 x 526 gal/yr = 2104 gallons
- Financial Savings from avoided fuel costs: 3571 gallons at @$4/gal = $14, 284
- eCO_2 reduction: 3571 gallons of gasoline x 19.4 lbs eCO_2/gal gas (most smaller vehicles use gas, not diesel) = 69,277 lbs.
- Total Implementation Cost: $0
- Payback: No costs incurred to reduce fleet.

Co-Benefits

- Reduced Maintenance Costs
- Potential income from sale of excess vehicles
- Better Air Quality
- Reduced insurance costs
- More efficient operating practices

Success Stories

The governor of the State of California ordered the sale of 15% of the state's vehicle fleet in July of 2009 to reduce surplus and address complaints about the unnecessary use of state vehicles by employees. This reduction is estimated to save California $24 million.

The City of Vancouver, City of Victoria, and City of Toronto have all gone through vehicle and fleet right-sizing efforts. They have reduced the amount of their capital investment in vehicles and lowered eCO_2 emissions as a result.

RECOMMENDATION: Hybrid and Electric Vehicle Purchases ***Transportation***

Measure Status: Proposed

Duration: Phased in between 2010 and 2020

Responsible Department: All Departments purchasing full size and passenger vehicles

eCO_2 Savings: 26.2 tons per year

Financial Savings: $10,800 per year (assumes $4.00 per gallon fuel cost)

Replacement of 6 passenger vehicles with conventional hybrid vehicles (4) and all-electric vehicles (2) will save approximately 2,700 gallons of gasoline per year (3.4% of current fuel consumption).

Passenger vehicles and auto full-size vehicles would be considered for replacement with either conventional hybrid or all-electric vehicles. By 2020, we would expect about 4 hybrid vehicles and 2 all-electric vehicles in the CBS fleet. This is based on a replacement schedule of 12 vehicles over a 10 year period (where 6 of the replacements would continue to be convention gasoline or diesel vehicles). If this replacement schedule were realized, in year 2020 approximately 6% of CBS vehicles would be "alternative fuel" vehicles.

Vehicle replacement strategies for hybrid and/or all-electric vehicles would depend on specific needs as these vehicles are being phased into the CBS fleet over the next 10 years. For example, all-electric vehicles could be used to replace light duty vehicles (i.e. passenger cars) with limited driving ranges, while hybrids could replace larger vehicles. It would also be important to review the availability and prices of specific models throughout the 10 year replacement period. Given the difficulty in projecting what types and models of new vehicles will be available between now and year 2020, in this report we do not make specific recommendations regarding vehicle replacement.

*As replacements occur, consider research showing limited to no fuel savings through the use of hybrids in local (other SE Alaska cities) situations.

Calculations:

- total fuel consumption by City and Borough of Sitka fleet in 2006: approx. 78,688 gallons/year
- Hybrid vehicles would achieve a fuel efficiency (miles per gallon) of approximately twice the fuel efficiency of conventional (gasoline) vehicles.
- expected fuel reduction: 2,700 gallons per year (3.4% of vehicle fuel consumption)
- expected eCO_2 reductions (based on 19.4 lbs. per gallon): 26.2 tons per year

Additional benefits:

- Improved air quality due to reduced combustion of fossil fuels

RECOMMENDATION: Increase fuel efficiency ***Transportation***

Measure Status: Proposed

Duration: Phased in between 2010 and 2020

Responsible Department: All Departments purchasing full size and passenger vehicles

eCO_2 Savings: 7.6 tons per year

Financial Savings: $3,144 per year (assumes $4.00 per gallon fuel cost)

Increase fuel efficiency by purchasing more fuel efficient models when replacing 6 conventional (gasoline) vehicles for the city fleet as well as when replacing any light trucks/SUVs/pickups. This measure will save an estimated 1% of current fuel consumption.

Vehicles could potentially have greater fuel-efficiency in year 2020 than today (2010). This is based on a reasonable expectation of rising fuel prices over the next 10 years, and the response by automakers to make vehicles less costly to operate. If this trend occurs, fuel consumption could be reduced for City and Borough of Sitka vehicles in year 2020, even with no reduction in fleet driving miles. Vehicles affected could include trucks, SUVs, and heavy duty vehicles, as well as some passenger vehicles.

The estimated fuel savings for this measure is 786 gallons per year (approximately 1% of current fleet-wide fuel consumption). The bulk of this savings would be realized from the 6 new conventional (i.e. gasoline powered) vehicles that would be purchased over the next 10 years with some contribution from replacement of light trucks/SUVs/pickups.

Calculations:

- total fuel consumption by City and Borough of Sitka fleet in 2006: approx. 78,688 gallons per year
- fuel reduction due to increased efficiency of new vehicles: estimated to be 1% of total
- expected fuel reduction: 786 gallons per year
- expected eCO_2 reductions (based on 19.4 lbs. per gallon): 7.6 tons per year

Additional benefits:

- Improved air quality due to reduced combustion of fossil fuels
- Reduced fuel costs of close to $3,144 per year

RECOMMENDATION: Reduce Vehicle Idling ***Transportation***

Status of this Measure: proposed

Duration: phased in between 2010 and 2020

Responsible Department: All Departments

eCO_2 Savings: 19 tons per year

$ savings: $7,860 per year (assumes $4.00 per gallon fuel cost)

Practices to reduce vehicle idling will be encouraged for all City and Borough of Sitka vehicles. When fully implemented, this measure could save up to 3,930 gallons per year (2.5% of current fleet-wide fuel consumption).

Reduced vehicle idling should not be overlooked as an opportunity for increased fuel efficiency. Reduced idling has been recognized as being important in improving air quality and health, as well as saving fuel (www.idlefreeVT.org). It has been estimated that between 5 and 7% of total fuel used in private vehicles can be attributed to idling (Taylor 2003), and that idling reduction programs could reduce consumer fuel use by up to 1.8%.

This measure will also include other fuel conservation measures, including driving fewer miles when possible, making fewer trips, monitoring tire pressures, and/or carpooling whenever feasible.

Calculations:

- total fuel consumption by City and Borough of Sitka fleet in 2006: approx. 78,688 gallons per year
- fuel reduction due to reduced idling and other conservation measures: estimated to be 2.55% of total
- expected fuel reduction: 1,965 gallons per year
- expected eCO_2 reductions (based on 19.4 lbs. per gallon): 19 tons per year

Additional benefits:

- Improved air quality due to reduced combustion of fossil fuels
- Reduced fuel costs of close to $7,860 per year

RECOMMMENDATION: Commuter Transit Reimbursement Program *Transportation*

Measure Status: Proposed

Responsible Department: City Administrator

eCO_2 Savings: 12.6 Tons per year

U.S. Public Law 101-509 authorizes Federal agencies to use appropriated funds to pay all or a portion of their employees' public transportation costs, provided such payments are in conjunction with existing programs encouraging the use of public mass transportation. The City and Borough of Sitka could adopt a similar measure to encourage the use of the Community Ride bus system, reducing the number of single –occupancy vehicles on the road for the purpose of transiting to/from work. This proposal assumes 5 City employees per week would use multi-trip (1-day) passes.

Participants would receive a monthly transit benefit equal to their actual bus fare commuting cost, maximum $25 per week.

Calculations:

eCO_2 reduction: 1 gallon per person, per day, gasoline usage for travel only to/from place of work = 1300 gallons of gasoline x 19.4 lbs eCO_2 /gal = 25,220 lbs.

Total Implementation Cost: $6500/yr (5 City employees per day, per 52 weeks = 1300 all day bus passes at $5 per pass)

Co-Benefits

- Greater utilization of existing mass transit programs
- Improved air quality
- Potential tax benefit for City and Borough
- Reduced traffic congestion at peak periods

Success Stories

The Regional Transportation District in partnership with GO Boulder offers a bus pass program especially for neighborhoods called the **Neighborhood Eco (NECO) Pass**. As of November 2009, 45 neighborhoods in Boulder and one in Lafayette offer the NECO Pass to more than 7,100 eligible households and 11,000 residents.

Go Green is a project developed in British Columbia, Canada to provide alternatives to single-occupancy vehicle transportation and to help create a cleaner environment. This program was the first of its type to be started in Canada.

Idle-free Vermont. Internet reference: http://www.idlefreevt.org/.

Taylor, G.W.R. 2003. Review of the Incidence, Energy Use and Costs of Passenger Vehicle Idling. Final Report, Prepared for: Office of Energy Efficiency. Natural Resources Canada. 40 p.

3.6 Other Initiatives: Purchasing and Waste Reduction

Purchasing and waste go hand-in-hand, since almost everything that is tossed as garbage was at one time acquired through deliberate purchase. While it is not always practical to reduce the quantity of purchased goods, selecting recyclable, durable, or re-usable products will lead to less landfilling and less methane and carbon dioxide emissions. In this way, thoughtful procurement guidelines lead to greenhouse gas reductions.

Waste reduction strategies primarily seek to prevent or reduce the release of methane at landfills and other facilities by diverting recyclable and compostable material from the waste stream. As a greenhouse gas, methane is more than 20 times more powerful than carbon dioxide. (It is also the primary ingredient in natural gas, and if it is burned, it is far less harmful than other fossil fuels, such as coal.) In some cities, methane capture at landfill sites serves not only to reduce greenhouse gas pollution, it also provides a relatively efficient fuel source.

In Sitka the waste sector is reported as producing negative emissions. In Sitka's Greenhouse Gas Emissions Inventory our waste production was assigned a negative value (of -2,423 tons per year of eCO_2). It is surprising that an island community that ships its garbage hundreds of miles via barge and truck can have negative carbon output. This is explained by the fact that all of Sitka's waste (other than sewage sludge from the waste water treatment plant) is shipped to the Roosevelt Regional Landfill in Washington, a facility that has a methane recovery rate of approximately 95%. This means that the vast majority of the methane produced by Sitka's decomposing waste is captured and burned to produce electricity, the final result being that more carbon equivalent is buried and trapped in the landfill than is added to the atmosphere. The balance remains negative even when emissions produced from shipping the waste from Sitka to Roosevelt are taken into account. However, if it was possible to quantify the emissions produced in the entire life cycle of our community's waste, specifically from upstream energy use, this component of the inventory would be significantly larger. Consider the following example of upstream energy use: To produce high-grade office paper, a paper manufacturer uses gasoline powered machinery to cut down trees (which store carbon), diesel trucks to carry the lumber to the paper mill, fossil fuels or wood products to power the mill, and more diesel trucks to distribute the product to customers.

The same avoided emissions from methane burning can be obtained by reducing, recycling, and reusing our municipal solid waste on our island. We need not ship our waste to Washington to reduce our carbon dioxide output. By reducing the amount of waste we ship out, and by storing carbon in the form of compost, we realize even greater savings than shipping our waste to the highly efficient Washington landfill. This can be achieved by using the compost material generated by organic waste diversion for use in producing agricultural products and replacing imported synthetic fertilizers.

Recycling leads to CO_2 reductions at the material extraction and manufacturing levels, as well as methane reductions at the landfill. Similarly, composting leads to methane reductions and produces a product that can be used in place of manufactured chemical fertilizers. An emphasis on waste reduction also helps promote a culture of conservation and sustainability with broad environmental and economic benefits.

3.6.1 City Purchasing and Waste Policies 37 tons/yr eCO_2

RECOMMENDATION: Curbside Recycling ***Municipal Waste***

Measure Status: Proposed

Responsible Department: Public Works

eCO_2 Savings: 3.12 tons per year

Institute curbside recycling. Each dwelling and business will be provided with a blue receptacle for paper, cardboard, plastic, aluminum, and tin cans, which will be picked up every other week using existing trucks and staff. Garbage will be picked up every other week. This will increase the amount of material recycled by a minimum of 15%, from the current 5.5% of the waste stream to 7.7%.

Item	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Payback Period	Annual Savings	eCO_2 Reduction (Tons per year)
Curbside Recycling	$20,000 initial investment + $10,000/yr	N/A	N/A	19 mos	$18,700 gross $8,700 net	3.1

Method: Contract with Rabanco and subcontractor Stragier Sanitation.

Cost: $30,000: $10,000 for recycling containers, $10,000 for additional labor, and $10,000 for implementation costs (new container shipping, storage, and distribution).

Annual Cost Savings: $18,700 per year: $16,500 in avoided waste shipping costs and an increase of $2,200 in recycling income, based on 2009 prices.

Feasibility: Existing equipment and a slightly increased workforce are capable of adapting to this plan. It is anticipated that there will be some initial resistance from the public that can be overcome through education and successful implementation of the plan. Residents will learn how to reduce waste, or if not, opt for additional waste service. A new contract will need to be negotiated with Rabanco and Stragier Sanitation.

Calculations for initiatives in the waste and purchasing recommendations are based on the following figures:

- $91,073 average monthly barge cost (2009)= $1,092,876 ($1.2 million in 2009)
- 567 tons average monthly waste (2009) = 6,804/yr /$1.2 m = $176/ton
- 6,804 tons/year x 1.65% = ~94 tons/year reduction in waste
- $63,000 low winter invoice; $116,000 high summer invoice
- 15% increase in recycling, from 5.5% of the MSW to 7.65%, a net increase of 1.65%
- 1.65% decrease in waste barged out
- 2009 recycling report form Stragier x 12/2010 recycling prices = ~$40,000 income/credit
- eCO_2 reduction: 3.1 tons per year eCO_2 will be reduced. (Assume .033 tons of eCO_2 released per ton of trash)
- 94 tons per year x .033 = 3.1 tons per year eCO_2 reduction

RECOMMENDATION: Materials Reuse Center ***Municipal Waste***

Measure Status: Proposed

Responsible Department: Public Works

eCO_2 Savings: .5 tons per year

Approximately 1.5% of the municipal solid waste (MSW) stream can be diverted via a Materials Reuse Center. This measure will consist of a three-sided metal shed (20'x 20' on with a concrete footing and a gravel floor) installed adjacent to the transfer station that will serve as a "Materials Reuse Center". Items that are of obvious value will be removed from the waste stream and placed in the facility for sale to the general public. Typical materials include lumber, furniture, fixtures, and household goods. These items will be sold on site for modest prices, typically 25% of new prices. All income will be paid to the City.

Item	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Payback Period	Annual Savings	eCO_2 Reduction (Tons per year)
Materials Reuse Center	$32,000 ($12,000 initial investment + $20,000/yr)	N/A	N/A	19 months	$25,000 gross $5,000 net	0.5

It is estimated that an additional 0.5 Full Time Equivalent position will be required to oversee the flow of materials into and out of the Materials Reuse Center. It should be noted that this practice currently takes place on an informal basis, but the majority of reusable materials go south. The increased cost of the contracted service, currently provided by Stragier, will be exceeded by avoided costs (shipping materials to landfilling in Washington) and by sales of materials.

Calculations:

- $20 per sq. ft. for the metal building + $10 sq. ft. for the concrete footing = $30 per sq. ft. = $12,000
- $15,000 annual waste shipping savings + $10,000 annual sales of materials = $25,000 income/savings
- $20,000 cost of a .5 FTE materials handler

RECOMMENDATION: Municipal Composting — *Municipal Waste*

Measure Status: Proposed

Responsible Department: Public Works

eCO_2 Savings: 22.5 tons per year

For every 1% of waste not shipped to Washington, the city saves approximately $10,000 and 2.25 tons per year of carbon dioxide emissions. Approximately 20% of the municipal solid waste (MSW) stream can be composted using simple technologies. This proposed measure assumes a 10% diversion of organic material from the solid waste stream. This includes food wastes from the grocery stores, schools, hospitals, senior centers, and the commercial kitchens associated with these faculties. Two more important components are waste fish carcasses from sport fishing and chipped wood waste from local tree services. This measure only addresses the waste collected by the city's enterprise program, and accordingly does not address the millions of pounds of fish waste that are presently pumped out, or hauled out, to sea by local fish processors. Additional compostable materials include wooden pallets, sheetrock and some construction waste. The City currently pays about $.06 a pound to ship waste south, or about $1,250,000 a year. This measure assumes that the city pay a private contractor $.06 a pound to divert organic waste into a composting facility, which will also benefit horticultural efforts in Sitka by greatly increasing the amount of affordable soil amendments available. It is assumed that the private contractor will bear the implementation and operating costs.

Item	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Annual Savings	eCO_2 Reduction (Tons per year)
Municipal Composting	$125,000/yr	N/A	N/A	$125,000 gross $0 net	22.5

RECOMMENDATION: Ban Yard Waste from Garbage Pick Up ***Municipal Waste***

Measure Status: Proposed

Responsible Department: Public Works

eCO_2 Savings: 11.2 tons per year

Yard waste typically makes up 10 – 15% of the solid waste stream. Currently residents dispose of yard wastes through natural decomposition, burning, and depositing materials in Sitka facilities such as the independently operated Overburden site. To discourage burning/encourage yard waste composting, a container could be made available for this purpose at the recycling center and outreach/education efforts should be made to educate the public about this preferred waste method. The yard waste container can be dumped at facilities such as Overburden and/or be chipped and composted. Both of these alternatives would pay local contractors about $.05 a pound for handling the material, representing a savings of $.01 a pound from not shipping the materials to Washington State. Assuming that banning the disposal of yard waste in weekly pickups was able to divert 5% (385 tons per year) of the solid waste stream from being shipped to Washington at ~$.01 a pound savings, the city would reduce shipping costs by $7,700/year but with similar costs incurred for implementation and monitoring.

Item	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Annual Savings	eCO_2 Reduction (Tons per year)
Yard Waste Ban	$7,700	N/A	N/A	$0 net	11.2

RECOMMENDATION: Maintain Parks with Non-Chemical Inputs ***Procurement***

Measure Status: Proposed

Responsible Department: Parks and Recreation

eCO_2 Savings: Unknown

Chemical fertilizers, pesticides, and herbicides all have high carbon footprints and their transportation to Sitka incurs additional carbon and financial costs. Formal adoption of non-chemical and locally procured inputs (i.e. compost for fertilizer and vinegar from local stores for use as an herbicide) will reduce our carbon footprint, improve the health of our citizens, build soil quality, reduce pollution and keep the over $10,000 spent annually on synthetic inputs in our community. The substitution of a compost-based fertilizer, especially on the larger areas (ball parks), would enhance the health of the soil and those using these recreation areas. An initial investment in a compost spreader ($10,000 including shipping) will be necessary for application to the large acreage of turf maintained by Parks and Recreation. While locally purchased soil amendments will likely be less expensive than synthetics, the increased labor for application will keep the annual costs at about $10,000. This pays Sitkans for labor instead of importing products from the lower 48.

Item	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Annual Savings	eCO_2 Reduction (Tons per year)
Park Maintenance	$10,000	N/A	N/A	$0 net	Unknown

3.7.1 School Purchasing and Waste Policies 5 tons/yr eCO_2

RECOMMENDATION: Compost School Food Waste ***Municipal Waste***

Measure Status: Proposed

Responsible Department: Sitka School District

eCO_2 Savings: 5.0 tons per year

The Sitka School District spends almost $50,000 annually for waste disposal, of which approximately 30% by weight is food waste. A modest lunchroom-based separation program would save the school system over $10,000 a year in waste collection fees and reduces the city's waste disposal costs. A portion of these savings can be used to cover the additional labor needed to oversee the collection of waste in the lunch rooms. An outside contractor would be required to operate a commercial composting system and pick up the waste on a daily basis. While the daily pickup will only be between 200 and 500 lbs, the annual total will be over 151 tons per year. Additional benefits include educational opportunities for students and production of valuable compost for the Parks and Recreation Department as well as for local food production.

Item	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Payback Period	Annual Savings	eCO_2 Reduction (Tons per year)
Recycle School Food Waste	$5,000/yr	N/A	N/A	6 months	$10,000/yr ($5,000/yr net)	5.0

RECOMMENDATION: Serve Locally Caught Fish in Schools *School Procurement*

Measure Status: Proposed

Responsible Department: Sitka School District

eCO_2 Savings: Unknown

The Sitka School District contracts for food services via a contract from Nana Management Services. Virtually none of the food served is produced in Sitka. The environmental and health costs of food transported hundreds or thousands of miles have been well documented. At present, Sitka has no agricultural producers capable of supplying the school system's needs. Plans for commercial greenhouses may remedy this situation. Sitka, however, has a thriving fishing fleet that typically sells fresh caught salmon for $2.50/lb to the processing plants. Additionally, the longline fleet delivers sufficient bycatch whitefish to provide local fish once a week to all the schools, which is sometimes ground into gurry and dumped at sea due to a lack of procurement procedures. Working with the local food service contractor and processors, fresh and frozen locally harvested fish can replace "fish sticks" at competitive prices, with significant nutritional and local economic benefits.

Item	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Life Cycle Savings	eCO_2 Reduction (Tons per year)
Locally Caught Fish	Unknown	N/A	N/A	$0	Unknown

Success Stories

The Healthy Tomorrows Kodiak group is implementing a program to use locally caught seafood in the school lunch program. The program, named Fish to School, will start at the high school. Sitka could use their project as a learning tool for implementation of a similar project.

3.7 Other Initiatives: All Employees

One recommendation/request heard from several City staff members was to provide education to employees about energy conservation and sustainable business practices. While not all employees make decisions about what vehicle to purchase or how much insulation to put in a building, all employees do have the ability and initiative to make choices that reduce energy consumption. Education and incentives support employees making good choices and can lead to energy conservation at home as well as at work. These actions will not yield high levels of emission reductions, but they support the overall effort. The Task Force believes that these recommendations are especially important because of the need to offset the increased load on the electrical system in order to minimize the use of diesel for electricity generation.

Other Initiatives: Estimating Benefits

In the CAP sections above, the Task Force estimated actual costs (in dollars) or energy reductions (in terms of gallons of fuel or electricity/kilowatt hours) and reported those numbers. In other cases, particularly related to code changes, zoning changes, training, etc., the Task Force recognized that estimating specific values would be impossible. Instead, the Task Force used a 1 through 5 rating system; 1 being equal to the least benefit/most difficult/most costly/etc.; 5 being equal to the highest benefit/easiest/least expensive. The Task Force provided the initiatives and their ratings to City Staff for review and revision.

In general, the Task Force expected most education efforts and changes in zoning/code would be relatively inexpensive to the City (Implementation cost) because changing the code or zoning is mostly a paper exercise by the City staff. The Feasibility rating recognizes difficulty or ease of getting some of these initiatives through the process (for example, due to environmental reasons, permits, permissions, or passage through the Assembly). Energy reduction (in kWh or gallons) is self-explanatory, but hard to estimate since many code changes will reduce the community's energy use, but not necessarily the City government's use; this rating is reported in terms of "how much will we reduce energy use overall (City AND community)?" CO_2 reduction provides an equivalent that was used to compare reduced electricity vs. reduced fuel; it is based on energy reduction. Annual cost savings was looked at in terms of cost savings overall (not just the City's savings).

RECOMMENDATION: Energy/Fuel Conservation Training ***All Departments***

Measure Status: Proposed

Responsible Department: Recycling

Overall score: 22

Develop and provide comprehensive energy/fuel saving training (to promote "easy" energy conservation). Local, small-scale employee training, reminders, and a small brochure, emails or other formats (to include some “myth busting”) on various energy-saving methods and techniques such as turning off lights and computers, keeping doors closed, recycling, low-fuel-usage driving tips.

eCO_2 Savings: 3 – Most savings would be in electricity.

Cost: 5 – Training could be done quickly, in-house, possibly with volunteers, and use behavior audits described above. Training could be done in small doses via current communication methods-email, pay stubs, current meetings, word-of mouth. Training would lead to future behavior modification.

Annual Cost Savings: 5 – Training would lead to behavior changes that save energy/money

Payback Period: 5 – Behavior modifications of energy-wasting practices would lead to fast payback.

Feasibility: 4 – Energy-saving methods and techniques list would be developed, disseminate using currently used methods. Added training (on simple items) should likely occur. This initiative requires buy-in and interest of employees. Need to make sure that employees know that training is meant to educate and benefit them, not punish them.

Co-benefits: Training/brochure could be shared with other businesses in Sitka or shared with other small communities. US Forest Service may be developing training items that could be shared.

RECOMMENDATION: Energy and Fuel Saving Behavior Audits All Departments

Measure Status: Proposed

Responsible Department: All; oversight by Electric Dept

Overall score: 22

Conduct internal, informal audits of employee behaviors that save or waste energy as a learning/improvement opportunity. Observe and log employee behaviors for using energy in each building and office in Sitka. Have individuals use a check list to observe items like lights left on in unused rooms, computers left on and unused, doors left open to outside air, recycling behavior, 1-sided copying, etc. Best method would be to ask 1 or 2 individuals from each staff to visit a different staff's office to observe (be sure that these are unannounced visits); this would give the opportunity for staff to connect between departments while also giving observers a chance to learn better (or worse) energy conservation habits. Results would help to determine what employee training, reminders, and small brochure or other information would be beneficial.

eCO_2 Savings: 3 – Most savings would be in electricity

Cost: 5 – Audits could be done quickly, in-house, possibly with volunteers, and used to determine employee concerns and needs, energy-saving training needs and future behavior modification.

Annual Cost Savings: 5 – Audit would quickly show where behavior changes could save energy/money.

Payback Period: 5 – Behavior modifications of energy-wasting practices would lead to fast payback.

Feasibility: 4 – Once a list of items to look at is developed, checking buildings and behaviors should be relatively simple and fast. Audits may be needed during different seasons since habits change with temperature, light, etc. This initiative requires buy-in and interest of employees. Need to make sure that employees know that audits are meant to benefit them, not punish them.

Co-benefits: Audit procedure could be shared with other businesses in Sitka or shared with other small communities.

RECOMMENDATION: Employee Incentive Program for Saving Energy/Fuel All Departments

Measure Status: Proposed

Responsible Department: Finance

Overall score: 18

Develop an employee incentive program for implementing fuel and energy savings. This program would provide small but tangible incentives either for individuals, groups, buildings, or departments to reduce their energy and/or fuel use. Incentives might involve competitive efforts (and small prizes) between buildings to reduce electricity use per capita or between departments in reduction of fuel consumption in vehicles. Incentives for employee carpooling, improved recycling, etc. can improve educational efforts and morale while reducing energy costs for the City.

eCO_2 Savings: 3 – Most savings would be in electricity.

Cost: 4 – Appropriate, inexpensive incentives would need to be discussed and determined.

Annual Cost Savings: 4 – If employees like the program, energy-saving behavior will be reinforced through this appreciation effort.

Payback Period: 5 – Behavior modifications of energy-wasting practices would lead to fast payback.

Feasibility: 2 – It may be difficult to determine what provides motivation and would take some organization to plan a "contest". This initiative requires buy-in and interest of employees.

Co-benefits: Program idea could be shared with other businesses in Sitka or shared with other small communities.

3.8 Community Wide Measures: Planning, Zoning, Public Outreach, and Policy

This section on community wide measures recommends adjustments to planning and zoning and seeks to utilize public opportunities, funding, and education in order to increase community-wide reductions in greenhouse gas emissions. These reductions are outside of municipal reductions, but are under the management of the City and seek to reduce emissions mainly through small changes in current policy.

This section also recommends policy changes at state and federal levels to spur action at the highest levels of government as part of a global response to mitigate climate change.

In this section, the Task Force used a 1 through 5 rating system to determine costs and benefits of proposals - 1 being equal to the least benefit/most difficult/most costly/etc.; 5 being equal to the highest benefit/easiest/least expensive as described in section 3.7 above under Other Initiatives: Estimating Benefits. One important additional assumption - when the Task Force talks about zoning and development - they are talking about new developments.

Policy Recommendations:

With the mayor's signature on the U.S. Mayors Climate Protection Agreement in December of 2007, the City and Borough of Sitka agreed to:

> …urge the federal government and state governments to enact policies and programs to meet or beat the target of reducing global warming pollution levels to 7% below 1990 levels by 2012, including efforts to: reduce the United States' dependence on fossil fuels and accelerate the development of clean, economical energy resources and fuel-efficient technologies such as conservation, methane recovery for energy generation, waste to energy, wind and solar energy, fuel cells, efficient motor vehicles, and biofuels;

and

> …urge the U.S. Congress to pass bipartisan greenhouse gas reduction legislation that 1) includes clear timetables and emissions limits and 2) a flexible, market-based system of tradable allowances among emitting industries…

The Task Force recommends that:

- the City of Sitka enact and explicitly recognize that this plan serves as the rationale for investing in renewable energy development, energy efficiency, and energy use reductions projects that demonstrate how local actions can work towards reducing our community overall carbon footprint; and
- the City of Sitka use their investments and projects to articulate to state and federal decision makers how local governments, businesses, and citizens are taking action to reduce carbon emissions and act on global climate change challenges; and
- the City of Sitka urge state and federal decision makers to enact legislation that sets goals for action on carbon emission reduction, energy efficiency, and action on climate change, especially in ways that result in funding and financing opportunities for municipal governments, local businesses, and local homeowners to make investments towards the climate change goals; for example:

  > salmon-friendly hydroelectric or tidal power. And that the City recognizes and articulates the need to develop and help finances these renewable energy sources for long-term social, economic, and environmental sustainability for Sitka and other Alaskan communities;
  >
  > the City of Sitka integrate carbon emission reduction/action on climate change into its long-term community energy plan;

the City of Sitka articulate to state and federal decision makers the need to invest oil and gas tax revenues into energy efficiency and renewable energy investment; and

the City of Sitka continue to seek local opportunities to take action on climate change and reduce carbon emissions while using our local community's efforts to draw attention to climate change threats, opportunities for municipalities to take action, and the need for state and federal legislation and funding streams to assist municipal government's actions and initiatives.

RECOMMENDATION: Energy Efficient Affordable Housing ***Building Dept.***

Measure Status: Proposed

Responsible Department: Building Department

Overall score: 20

Ensure that 100% of City or Agency funded affordable housing projects incorporate energy efficiency/green building techniques. Proposals, contracts, and grants would be written to ensure that all new affordable housing projects will include high standards for energy efficiency, particularly as related to items such as insulation, windows, heating systems, and other efficiency items.

eCO_2 Savings: 4 – Savings would be in heating fuel and electricity.

Cost: 5 – City/agency is providing funds for these projects that will be paid back.

Annual Cost Savings: 4 – Energy savings accrue right away and every year thereafter.

Payback Period: 5 – Energy savings occur immediately.

Feasibility: 3 – It may be difficult to initially fund these programs since the cost of green building/high energy efficiency is currently higher than typical construction.

Co-benefits: Proposal benefits and reduces community eCO_2 production. Short-term costs are higher, long-term costs are substantially lower through reduced energy costs.

RECOMMENDATION: Green Building Education ***Building Dept.***

Measure Status: Proposed

Responsible Department: Building Department

Overall score: 16

Research and make available green building education materials. Make information available to builders and home owners. This program would provide green building and energy efficiency education and outreach efforts to builders and citizens, and involve the creation of informational material and workshops that outline available resources, contacts and strategies for energy efficiency.

eCO_2 Savings: 3 – Savings would be in heating fuel and electricity.

Proposal benefits and reduces community eCO_2 production. Short-term costs are higher, long-term costs are substantially lower through reduced energy costs.

RECOMMENDATION: Home Rehabilitation Loan Program Adjustment Building Dept.

Measure Status: Proposed

Responsible Department: Building Department

Overall score: 20

Incorporate energy-savings retrofits in at least 75% of all Home Rehabilitation Loan Program projects. 75% of contracts for home rehabilitation loans would be written to ensure that retrofits will include high standards for energy efficiency, particularly as related to items such as insulation, windows, heating systems, and other energy efficiency items.

eCO_2 Savings: 4 – Savings would be in heating fuel and electricity.

Cost: 5 – City/agency is providing funds for these projects that will be paid back.

Annual Cost Savings: 4 – Energy savings accrue right away and every year thereafter.

Payback Period: 5 – Energy savings occur immediately.

Feasibility: 3 – It may be difficult to initially fund these programs since the cost of green building/high energy efficiency is currently higher than typical construction.

Co-benefits: Proposal benefits and reduces community eCO_2 production. Short-term costs are higher, long-term costs are substantially lower through reduced energy costs.

RECOMMENDATION: Adjust Contract Bidding Public Works

Measure Status: Proposed

Responsible Department: Public Works Project Manager

Overall score: 20

Integrate energy efficiency into city contracts and consider modifying lowest cost bidding process to incorporate life cycle costs and energy efficiency to promote sustainability. All new proposals, contracts, and bidding process documents would be written to ensure that all projects will include high standards for energy efficiency. Lowest cost bidding would be modified to require all contracts and bidding to incorporate life cycle costs and energy efficiency.

eCO_2 Savings: 4 – Savings would be in heating fuel and electricity.

Cost: 5 – Initial cost is higher, but long-term costs are substantially reduced when improved energy efficiency is realized.

Annual Cost Savings: 4 – Energy savings accrue initially and every year thereafter.

Payback Period: 3 – Energy savings occur over time; often there is a premium paid for efficiency making the item initially more expensive. Long-term costs are reduced.

Feasibility: 3 – It may be difficult to convince departments to adjust their contracting.

Enforce/Strengthen Secondary Heat Source Requirement *Public Works*

Measure Status: Ongoing

Responsible Department: Public Works, Building Inspector

Overall score: 16

Enforce and strengthen the secondary heat requirement to improve community's adaptability to electricity shortfalls. Consider adding fines or other wording to strengthen the enforceability of the code. Require strong enforcement of this code. Remind residents that this requirement provides flexibility for the City and the residents during electricity shortfalls.

The following excerpt from The Sitka General Code is provided (Chapter 19.01- BUILDING CODE)

> ***19.01.030 International Residential Code Section R303.8—Required heating—Amended.***
>
> International Residential Code Section R303.8, Required heating, is amended to include the following paragraph:
>
> *"If a dwelling should be designed to use electricity as the primary energy source to provide heat to habitable spaces, a permanently installed code-compliant secondary heat source must be provided. The secondary heat source must be either a solid fuel-burning appliance, an oil-burning appliance, a compressed gas-burning appliance, or approved alternate heat source. The secondary heat source must be listed, be designed for general heating, and be capable of providing a heat output of no less than twenty thousand BTU/hr at design output."*

eCO_2 Savings: 4 – Savings would be in fuel used to run City's generators.

Cost: 3 – Cost to adjust code wording is minimal to the City; cost for enforcement is moderate.

Annual Cost Savings: 3 – Savings are generally limited to the community, not the City. However, for individuals who may be forced to heat with electricity under dramatically higher costs, savings accrue initially and every year thereafter.

Payback Period: 2 – During the short-term electricity shortfall, payback would occur immediately. Long-term costs are reduced for residents.

Feasibility: 4 – Proposal would have to pass through the assembly. Change in code would be limited.

Overview:

Energy Savings

- Depends on rate of adoption of alternate heating sources (i.e. wood energy) for secondary heat
- Depends on availability of hydroelectric power for new homes wishing to use electricity as primary energy source

Benefits

- Potentially increased availability of hydroelectric power for home heating
- Reduced greenhouse gas emissions if alternative heating sources (i.e. wood energy) replace fossil fuel systems
- Potentially greater awareness of alternative heating systems and options available for Sitka

RECOMMENDATION: Adjust New Development Zoning ***Planning***

Measure Status: Proposed

Responsible Department: Planning

Overall score: 20

Adjust new development zoning ordinances to allow for: compact development; increased zoning for smaller homes that are closer together; and increased mixed-use zoning and allow for development of small stores, etc. close to housing in new developments. This proposal is designed to help communities reduce their carbon footprint by reducing the amount of driving required.

eCO_2 Savings: 4 – Savings would be in fuel for transportation.

Cost: 5 – Cost to adjust code wording is minimal to the City.

Annual Cost Savings: 3 – Fuel savings is generally limited to the community, not the City. However, for individuals living in these zones, savings accrue initially and every year thereafter.

Payback Period: 4 – Due to the low cost of adjusting zone wording, payback would occur immediately. Long-term costs are reduced for residents.

Feasibility: 2 – Proposal would have to pass through the assembly. It may be difficult to convince individuals to allow for adjust the zones. However, since development and purchase of lots is just beginning in the benchlands, now is a good opportunity to institute smart-development concepts.

Co-benefits: Proposal benefits and reduces community eCO2 production. Smart development that puts parks, small stores, day care, and other developments near existing housing reduces the need for driving and increases walking/biking. This can lead to healthier individuals, less cars and congestion, and shift in future housing demand to smaller homes and lots, townhouses, and condominiums in neighborhoods where jobs and activities are close at hand.

Success Stories: In September 2007, the Urban Land Institute and the National Center for Smart Growth Research and Education at the University of Maryland published *Growing Cooler: The Evidence on Urban Development and Climate Change.* After reviewing dozens of empirical studies, the authors predict that if sprawling development continues to fuel growth in driving, the increase in total miles driven will overwhelm expected gains from vehicle efficiency and low-carbon fuels. Lead author Reid Ewing stated, “The research shows that one of the best ways to reduce vehicle travel is to build places where people can accomplish more with less driving.”

RECOMMENDATION: Adjust Code for Solar Panels ***Zoning***

Measure Status: Proposed

Responsible Department: Zoning

Overall score: 18

Adjust code to allow for solar panels higher or closer to edge of lot than current code. This proposal would allow for small adjustments to the code to allow solar panels to be slightly higher than current code allows or closer to current setbacks. While use of solar panels in Sitka is currently limited mainly to islands, it is a reasonable technology for use in Sitka. Allowing panels to be slightly higher or closer to setbacks than is currently allowed may make their use more feasible for some homeowners and businesses as they try to take full advantage of sun.

eCO_2 Savings: 2 – Savings would be in electricity; limited current interest in solar.

Cost: 5 – Cost to adjust code wording is minimal to the City.

Annual Cost Savings: 3 – Electricity savings is generally limited to the community, not the City. However, for individuals living in these zones, savings accrue initially and every year thereafter.

Payback Period: 4 – Due to the low cost of adjusting zone wording, payback would occur immediately. Long-term costs are reduced for residents.

Feasibility: 4 – Proposal would have to pass through the Assembly. Change in code would be limited. Since many solar panels are "roof" mounted (often on a small, raised bed), a small change in the code could benefit many people who may be interested).

Co-benefits: Increased use of solar power by individuals would reduce the electric load on the City, reducing the need for burning diesel. Proposal benefits and reduces community eCO_2 production.

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5.0 Appendix A. Energy Audit Initiatives

The following energy audit initiatives are those that are summarized in section 3.2 of this Plan. These items would all need to be implemented to meet the goal set by the Assembly.

- Table A-1 are planned activities arranged by the Fiscal Year or time frame planned for the item.
- Table A-2 is remaining medium and high priority audit items arranged with the highest eCO_2 saving initiatives at the top.
- Table A-3 is Blatchley Middle School initiatives arranged with a combination of the most cost-effective and highest eCO_2 saving initiatives at the top.

City Buildings

Table A - 1: City Building Energy Audit Initiatives-Planned

Item	Building	Status	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Life Cycle Savings	eCO2 Reduction (Tons/yr)
Set Computers to sleep mode	8 City Bldgs	Ongoing	$1,900.00	22130	0	$33,200.00	1.54
Turn off inactive computers	8 City Bldgs	Ongoing	$2,000.00	35600	0	$19,600	2.49
Install water conserving aerators	7 City Bldgs	Ongoing	$1,200	4,310	270	$33,300	3.30
Retrocommission (mostly HVAC) - includes controls and switches	Airport	FY 10	$25,000	4200	1200	$72,500	12.29
Retrocommission	Fire Hall	FY 10	$24,200	1900	600	$24,700	6.13
Retrocommission	Centennial Building	FY 10	$31,700	1600	630	$18,600	6.41
Retrocommission	Kettleson Library	FY 10	$19,600	550	310	$5,000	3.1385
Retrocommission	Wwtp	FY 10	$25,600	460	420	$7,300	4.2322
Retrocommission	Public Services	FY 10	$37,465	540	480	$12,100	4.84
Install Unit Heater Automatic Valves	Airport	FY '11	$1,200	0	100	$6,800	1
Install Unit Heater Automatic Valves	Fire Hall	FY '11	$800	0	60	$3,500	0.6
Boiler Flue Damper	Library	FY '11	$2,000	80	0	$3,400	0.01
Install Refrigeration Heat Recovery	Senior Center	FY '11	$9,500	15000	0	$11,400	1.05
Install Boiler Flue Damper	Airport	FY '12	$3,000	0	130	$5,900	1.3
TOTAL THIS SECTION			$185,165.00	86,370	4200	$257,300.00	48.3307

Table A – 2: City Building Energy Audit Initiatives-Unbudgeted

Item	Building	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Life Cycle Savings	eCO2 Reduction (Tons/yr)
Boiler Room Heat Recovery	Fire Hall	$15,500	8000	560	$14,800	6.16
Install Boiler Room Heat Recovery	Centennial	$15,500	0	600	$17,900	6
Install TSA Natural Cooling System	Airport	$9,500	2900	540	0	5.603
Install Boiler Room Heat Recovery	Psc Office/Shop	$16,500	0	500	$13,100	5
Replace Entrance Window and Door Glazing	Airport	$15,900	0	420	$16,200	4.2
Install Refrigeration Waste Heat Recovery	Airport	$7,500	0	410	$20,500	4.1
Boiler Room Heat Recovery	Wwtp	$13,000	0	410	$8,600	4.1
Boiler Room Heat Recovery	Library	$11,000	0	290	$3,600	2.9
Install Unit Heater Automatic Valves	Psc Office/Shop	$6,000	0	280	$15,300	2.8
Increase Roof Insulation	Fire Hall	$14,900	0	270	$6,000	2.7
Install Unit Heater Automatic Valves	Wwtp	$4,000	0	190	$10,200	1.9
Boiler Flue Damper	Wwtp	$6,000	0	160	$5,100	1.6
Replace Transformer	Wwtp	$19,200	21700	0	$16,600	1.519
Install Boiler Flue Damper	Psc Office/Shop	$6,000	0	150	$4,200	1.5
Install Boiler Flue Damper	Centennial	0	0	150	$4,000	1.5
Boiler Flue Damper	Fire Hall	$4,000	0	140	$5,300	1.4
Install VFD on AHU-1	City Hall	$7,300	15000	0	$11,800	1.05
Replace Entrance Glazing	Library	$4,900	0	75	$900	0.75
Variable Hold Room Air Flow	Airport	$11,800	9800	0	$800	0.686

Reduce Exterior Lighting	Centennial	$200	9700	0	$18,600	0.679
Install CUH Automatic Valves	Centennial	$800	0	60	$3,500	0.6
Replace Transformer	Airport	$7,500	7100	0	$4,200	0.497
Replace Entrance Doors	City Hall	$10,000	6700	0	$400	0.469
Replace Jetway Windows	Airport	$1,700	0	35	$1,000	0.35
Install Water-Conserving Shower Heads	Fire Hall	$200	0	30	$2,000	0.3
Replace HW Recirculating Pump	Wwtp	$600	3200	0	$4,700	0.224
Replace HVAC Motors	Centennial	$2,500	3200	0	$3,100	0.224
Install Computer Room Natural Cooling System	City Hall	$7,500	3200	0	0	0.224
Replace Entrance Doors	Senior Center	$3,000	2200	0	$500	0.154
Install Domestic HW Heater Demand Controls	Senior Center	$1,500	45	0	$1,700	0.00315
Install HW Heater Demand Controls	City Hall	$1,500	32	0	$800	0.00224
Perform Meeting Room HVAC Optimization Analysis	Centennial	0	0	0	0	0
Total this section		$225,500.00	92777	5270	$215,400.00	59.19439

Table A-3: Blatchley Middle School Energy Audit Initiatives – ALL items

Item	Implementation Cost	Energy Reduction (kWh/Yr)	Energy Reduction (Gal/Yr)	Life Cycle Savings	eCO2 Reduction (Tons/yr)
Optimize Pool HVAC (AHU-7)	$26,992	174800	5203	$622,066	64.266
Install Water Conservation Shower Heads	$2,000	12400	985	$78,324	10.72
Reduce Pool Temp	$200	22985	985	$108,810	11.46
Optimize Gym HVAC (AHU-1)	$19,592	31100	1260	$117,515	14.78
Pool Locker Heat Recovery	$89,465	36700	2340	$146,684	25.97
Install Swimming Pool Cover	$95,185	59100	3430	$249,522	38.437
Install Water Conserving Aerartors	$2,000	8040	470	$43,542	5.2628
Inactive Computers	$1,800	8500	0	$9,855	0.595
Optimize MPR (VU-2)	$17,592	15600	490	$41,246	5.992
Optimize Commons HVAC (AHU-4)	$16,652	11500	390	$27,694	4.705
Install Heat Recovery Library Area (VU-1)	$20,300	7740	510	$29,800	5.6418
Install UH Auto Valve	$1,800	770	45	$2,750	0.5039
Increase Heat Pipe Insulation	$5,750	2392	106	$5,594	1.22744
Install Gym Heat Recovery (AHU 2, 3)	$56,894	22623	969	$50,400	11.2736
Convert to Variable Speed Hydraulic Pump (CP-1, 2, 9, DHW)	$74,592	117782	0	$48,856	8.24474
Install Basement Interior Heat Recovery (VU-12)	$16,093	9482	406	$12,675	4.72374
Exterior Lighting Replacement	$13,539	8558	0	$5,286	0.59906
Upgrade HVAC Motors (AHU-1,2,3,6)	$5,080	3311	0	$1,701	0.23177
Optimize Music Room HVAC	$16,792	5814	160	$4,128	2.00698
Install Boiler Room Heat Recover	$35,592	4144	671	$10,108	7.00008
Replace Wood Shop Overhead Door	$6,000	1668	71	$1,911	0.82676
Install Home Ec heat recovery	$19,000	2329	100	$9,946	1.16303
Install Classroom Lighting Occupancy Sensors	$650	234	0	$329	0.01638
Replace Control System	$870,000	146190	6303	$47,337	73.2633
Unit Ventilation Demand Control Ventilation	0	10442	607	0	6.80094
Install Science Area Heat Recovery (AHU-6)	$44,798	15803	677	$3,149	7.87621
TOTAL THIS SECTION	$1,458,358.00	740007	26178	$1,679,228.00	313.58753

6.0 Appendix B - CAP Initiative Funding

6.1 Overview: Funding Options for Municipal eCO_2 Reducing Initiatives

Grant Funding:

- Grant funding from state and federal programs and private foundations (the recent EECBG grant is one example, another possibility is 2010 proposed State grants for "Performance Contracting")…see 6.1.2 below.

City-funded

- Most of the projects already implemented have been paid for by the City; this will likely be the major source of funding in the future (it makes sense – the money spent on energy conservation, saves money on energy – these items slowly pay for themselves).

New Funding Options (City-funded)

- Start a revolving energy/eCO_2 savings fund…see 6.1.2 below
- Use electricity rate adjustment to pay for community and municipal energy conservation projects - Adjust household electricity rates to slightly reduce electricity cost for lowest users, maintain rates for moderate users, increase rates for high users, increase rates more for highest users (another option - a Climate Action Plan tax modeled after Boulder, Colorado's innovative program. The CAP tax in Boulder, approved by voters, involves an agreement with the local investor-owned electric utility to assess a tax for residential, commercial, and industrial customers based on electricity usage. The tax is collected as part of the utility's normal billing process.)
- Start a local "carbon offset" fund – this fund would be a voluntary "energy savings account" that could be used to offset various eCO_2 increases by the City (for example, funds could be contributed by the City of Sitka to offset employee travel - calculated as, for example $1 per 100 miles of travel) or contributions could come from individuals and businesses who wish to reduce their carbon footprint by supporting projects aimed at reducing greenhouse gas emissions at the Municipal level or in the community at large (through education efforts or other future City collaborations). Offset funds would be used by the City to directly fund greenhouse gas emission-reducing initiatives. See: http://www.sfenvironment.org/our_programs/topics.html?ssi=6&ti=85 for an example.
- Create a per-gallon tax on all road-based fuel transferred within the City of Sitka

6.1.1. Grant Opportunities

http://www.swamc.org/html/about-swamc/vista-programs-raquo/energy-program/opportunities-resources.php

http://www.icleiusa.org/news-events/action-center/financing-staffing/funding-grant-opportunities/federal-and-national-funding

Check the websites above for updated compilations of financial and technical resources for consumers, businesses, local, tribal, and regional governments, and non-profit organizations seeking funding to reduce their energy costs through renewable or alternative energy projects and improved efficiency. While these are certainly not complete lists, they provide a comprehensive overviews of agencies and organizations offering funding, as well as technical, environmental, and economic resources. Check back at the website above early and often as applying for financing, especially through federal grants, can be a time-intensive project.

6.1.2 Revolving Fund

More information on a working revolving fund:
http://www.c40cities.org/bestpractices/energy/annarbor_fund.jsp

Ann Arbor, United States of America

An energy efficiency fund costing $500,000 over five years that is reducing eCO_2 emissions by 980+ tons annually

Summary

Ann Arbor's Energy Fund demonstrates that energy efficiency can pay for itself in the long term. Through an initial allocation of $500,000 over five years, and by capturing 80% of the resulting savings, the city has implemented energy efficiency projects in its buildings and throughout the city that pay back their investments in 3-5 years, eliminating the need for additional annual appropriations.

What is it?

Established in 1998, the Municipal Energy Fund is a self-sustaining source of funds, investing in energy-efficient Municipal projects – such as LED traffic and street lighting while also funding pilot projects like solar energy and electric vehicles - projects that are able to continually reduce operating costs and global warming emissions.

How was it set up?

- In 1981 the City of Ann Arbor's Energy Plan called for energy conservation to be promoted in City buildings.
- By 1988 the municipal bonding authority provided a $1.4 million energy bond to implement efficiency measures at 30 City facilities. The payments for this ten-year bond have been generated through energy cost savings.
- In July 1996, the City became a partner in the EPA's Green Lights program, committing it an efficiency survey all 100 buildings and facilities, and an upgrade 90% of the lighting that was identified as inefficient.
- State and public utility programs were used to perform many of the audits at little or no cost to the City, but it had difficulty finding funding to implement the recommended upgrades.
- In 1998, the final payment on the Energy Bond was made. Energy Bond payments of over $200,000/year had been included in the annual City budget for each of the last ten years.
- Instead of discontinuing the budget item, it was reduced by 50% to $100,000 for the next five years and used to establish a Municipal Energy Fund.

The City of Ann Arbor has just over 60 facilities, which pay about $4.5 million/year in energy costs. The $100,000/year initial funding has proven to be adequate, both for the energy saving opportunities available and for the fund management.

How does it work?

The Energy Fund finances itself by re-investing funds saved through energy efficiency measures into new energy saving projects.

The Fund is administered by the City's Energy Office under the supervision of a three-person board who approve funding, implement the projects, and often serve as project manager. The Office provides the board with information from energy audits along with applications from facility managers for projects requesting energy funds. The board reviews all applications and makes final decisions on what projects to fund each year. Decisions are based on:

- energy saving potential
- improvement of the facility environment
- educational or demonstrational value of the project

Over the nine-year period, it has invested in:

- LED traffic and pedestrian signals
- street light improvements
- parking garage lighting
- a boiler
- two electric vehicles
- solar energy demonstration projects

The City adopted the rule that any facility that utilizes the fund for energy improvements will pay back 80% of the projected energy savings for five years starting the first year after the energy saving measures were installed.

Establishing a five-year payment plan allows projects that have a shorter payback (three years or less) to help support projects that have a longer payback (over five years). At first glance this does not seem fair to the facilities that install three-year payback measures, since they will have paid back their loan after three years. However, the logic used is that they will continue to have the same level of energy savings in the fourth and fifth year, so their operating costs will be lower still. We feel this type of sharing is important to the overall accountability of the organization.

Financing

The City operates 60 facilities and spends $4.5 million per year on energy (out of an annual budget of $288 million in 2005). Most of the measures financed by the fund have payback periods of three to six years.

- In the fiscal year 1998-99, City Council approved the first $100,000 to be available, of which $87,000 was spent in the first year to update energy audits for 21 facilities and to implement lighting improvements at 14 of the facilities.
- During fiscal year 1999-00 these improvements generated $19,850 in energy savings of which $15,880 was re-invested in the Municipal Energy Fund. The money was transferred from the budgets of the facilities that received the energy improvements into the Energy Fund at the end of fiscal year 1999-00 and then available to finance further energy improvements in fiscal year 2000-01.
- The payments from these first year projects continued into the Energy Fund for 5 years, contributing $15,880/year or a total of $79,400 back to the fund.
- A second $100,000 was approved for fiscal year 1999-00 and was used to implement additional energy saving projects at City facilities generating another $15,000 in annual reimbursements.
- The energy savings from this second year of improvements were available to finance further energy saving projects in fiscal year 2001-02.
- For fiscal year 2001-02, $30,000 was available from reimbursements from the first two years of the program.
- The $100,000 budgeted annual contribution to the Fund was discontinued after the fiscal year 2003-04.
- From that point forward, the Fund has relied on payment of past projects to finance new projects.

Facility budgets are not impacted by the up-front costs of the energy improvements, which are covered by the Energy Fund. The annual payments are made from a portion (80%) of the resultant energy savings, allowing facility budgets to be reduced or to apply the remaining savings (20%) to further improve the facility or services.

Application

- The two critical components required to make an Energy Fund work are:
  An initial funding source (available for 3-5 years):

The level of the initial funding will depend on funds available and the number and condition of municipal facilities. The City of Ann Arbor has just over 60 facilities, which pay about $4.5 million/year in energy costs. The $100,000/year initial funding has proven to be adequate, both for the energy saving opportunities available and for the fund management.

A manager assigned to support and coordinate the fund and its projects.

- Ann Arbor was fortunate to have an opportunity to establish the Municipal Energy Fund when a ten-year bond had been paid off.
- Other cities may choose to provide funds for an Energy Fund simply because it is a good investment or can look for opportunities similar to Ann Arbor's to avoid significant budget increases.
- One opportunity may be connected to the deregulation of energy utilities in the United States. A portion of the money saved through the purchase of natural gas or electricity from alternate suppliers could be used to establish an Energy Fund.
- Ann Arbor has maintained an active Energy Office for over ten years, with an ongoing mission to improve energy efficiency at City facilities. This means that many of the best energy saving opportunities were already implemented before the creation of the Municipal Energy Fund.
- Most of the measures that have been financed by the Ann Arbor Municipal Energy Fund have payback periods of three to six years. For cities that have not been actively installing energy saving measures, there will be many opportunities available with payback periods of less than three years. This will contribute to a much quicker regeneration of an energy fund.
- The Energy Fund is used strictly for municipal programs aimed at improving energy efficiency at municipal facilities. However, the Energy Plan calls for the City to lead by example, and this type of fund should be feasible for many local businesses that own and operate a large number of facilities.

7.0 Appendix C - CAP Implementation

7.1 Implementation Options for Municipal eCO_2 Reducing Initiatives

Table C-1 displays all of the CAP initiatives from Chapter 3. This table is sorted by responsible department, then by recommended priority within each department. This table also displays the cost and annual savings expected based on implementation of all included initiatives. These annual savings could be used to fund a City "Energy Manager" (see description of duties below).

Recommendations for Implementation by the City Assembly

- Keep CAP implementation on the Assembly's agenda (monthly or quarterly) until an implementation plan is developed and begun.
- Support current staff in implementing CAP initiatives by supporting and funding initiatives included in the CAP.
- Appoint a CAP implementation team or individual to an existing or new City Board or Commission.
- Expand current internship program to include an annual position of CAP "Energy Manager"
- Fund a grant writer to acquire grant funding for a City "Energy Manager".
- Hire a grant-funded part-time or full-time staff person to be the City's "Energy Manager." Their job would be to:

  1) Look for, prepare, and submit energy conservation/energy development/etc. grant applications for funding to implement CAP measures, and provide oversight of grant-funded projects.
  2) track projects and accomplishments,
  3) track data on energy use, associated costs, and eCO_2 emissions in all City buildings, facilities, and vehicles and utilize software tools to track changes,
  4) Prepare requests-for-proposals for energy audits of City buildings, supervise the work, and implement the changes necessary to improve energy efficiency.
  5) Assist in investigating possible sources of renewable energy to be developed by the City of Sitka; e.g., hydroelectric generation, solar/wind power, biofuels, and tidal power.
  6) Implement and adjust proposals for upgrading the City vehicle fleet, instituting other changes in fleet operations to reduce the use of fossil fuels, and cooperate and assist with the public transportation system.
  7) Develop creative incentive or challenge programs aimed at encouraging employees to reduce their greenhouse gas emissions (energy/fuel use) on the job and in commuting to and from work.
  8) Work with Planning Department staff to address issues related to land use and transportation planning as they relate to climate change.
  9) Produce an Employee Sustainability Education Handbook and quick fact sheets with policy measures to reduce energy/fuel use in day-to-day work operations.
  10) Act as a liaison between the City Manager's office, other City departments, City advisory bodies, community and statewide organizations, and national/international organizations in efforts to address global climate change and sustainability.
  11) Assist in the sponsorship of community events and campaigns that address global warming, renewable energy, "green business practices/awards," etc.
  12) Draft correspondence, reports, news releases, brochures, fact sheets, opinion pieces, advertising, etc. to aid in the implementation of CAP measures, particularly those related to outreach and advocacy.
  13) Maintain up-to-date information on climate change issues on the City of Sitka website.

Table C-1: All Initiatives – Implementation Priorities by Department

Initiative	CAP Page	Responsible Party	Priority	Cost	Annual Savings	Date Implemented
Energy Efficient Affordable Housing Funding	49	Building Dept.	1	Low	Mod. High	
Home Rehabilitation Loan Program Adjustment	50	Building Dept.	2	Low	Mod. High	
Green Building Education	49	Building Dept.	3	Mod. Low	Mod. High	
Right Size City Vehicle Fleet	31	City Administrator	1	$0	$14,284	
Commuter Transit Reimbursement Program	35	City Administrator	2	$6,500/yr	N/A	
Conversion to Energy Efficient Streetlights (150 MI bulbs)	27	Electric Dept.	1	$58,200	$6,423	
Diesel Generator Replacement	26	Electric Dept.	2	$5,000,000	Savings vary	
Energy and Fuel Saving Behavior Audits	45	Electric Dept.	3	Low	High	
City Bldg.- Add Electric Heat	23	Electric Dept./Public Works	1	$1,233,000	Dependent on fuel cost	
Employee Incentive Program for Saving Energy and Fuel	46	Finance	1	Mod. Low	Mod. High	
Increase Fuel Efficiency	33	Fleet Manager	1	No additional cost	$3,144	
Reduce Vehicle Idling	34	Fleet Manager	2	No additional cost	$7,860	
Hybrid & Electric Vehicle Replacement	32	Fleet Manager	3	No additional cost	$10,800	
Maintain Parks with non-chemical Inputs	40	Parks and Recreation	1	$10,000 start- up plus $10,000/yr	$0*	
Adjust New Development Zoning	52	Planning	1	Low	Moderate	
Adjust Code for Solar Panels	53	Planning	2	Low	Moderate	
City Bldg. Energy Audit Initiatives	20, App. A	Public Works	1	$410,665	$18,908**	
Materials Reuse Center	38	Public Works	2	$12,000 start-up plus $20,000/yr	$5,000	
Curbside Recycling	37	Public Works	3	$20,000 start- up plus $10,000/yr	$8, 700	
Ban Yard Waste from Garbage	40	Public Works	4	$7,700/yr	$0*	
Municipal Composting	39	Public Works	5	$125,000/yr	$0*	
Enforce/Strengthen Secondary Heat Source Requirement	51	Public Works Building Inspector	1	Moderate	Moderate	
Adjust Contract Bidding	50	Public Works	1	Low	Mod. High	

Initiative	CAP Page	Responsible Party	Priority	Cost	Annual Savings	Date Implemented
		Project Manager				
Energy/Fuel Conservation Training	44	Recycling	1	Low	High	
Energy Efficient Remodel of Pacific High School	28	School District	1	Moderate	Moderate	
Serve Locally Caught Fish in Schools	42	School District	2	Unknown	Unknown	
Compost School Food Waste	41	School District	3	$5,000/yr	$5,000	
Schools – Add Electric Heat	24	School District & Electric Dept.	1	$900,000	Dependent on fuel cost	
Blatchley M.S. Energy Audit Initiatives	21, App. A	School District & Public Works	1	$1,458,358	$0*	
TOTAL					$80,119	

*** These projects pay for themselves, but do not make a profit (their annual savings pay for their costs)**

****Calculations are based on Life Cycle Savings divided by 25 years in the life cycle; this estimate is an approximation that includes cost, maintenance, energy savings, and an approximate 5% interest rate on savings**

8.0 Appendix D - CAP Monitoring

Step 5 of the ICLEI milestones for setting and meeting climate mitigation goals is monitor and verify results. ICLEI states that "Monitoring and verifying progress on the implementation of measures to reduce or avoid greenhouse gas emissions is an ongoing process. Monitoring begins once measures are implemented and continues for the life of the measures, providing important feedback that can be used to improve the measures over time. ICLEI's software provides a uniform methodology for cities to report on measures."

Climate Action Plan monitoring is used to verify progress, and to provide feedback on measures implemented. Monitoring of municipal greenhouse gas emissions and reductions for Sitka Municipal activities is relatively simple since it is based on total City fuel and electricity usage (items that are already important to and tracked by the City). Determining actual eCO_2 reductions by project is more complicated since multiple activities (with multiple benefits) may be occurring in the same building at the same time. Additionally, variables like weather conditions and amount of snow and snow removal, or amount of heat needed to keep a building warm, may increase or decrease eCO_2 emissions based on yearly fluctuations.

We recommend four tracking tasks on a yearly basis:

1) Track oil/diesel usage by building
2) Track electricity usage by building
    - Building Maintenance Superintendent (Chris Wilbur) would be responsible for this tracking for City buildings
    - Director of Maintenance for Sitka Schools (Mark Bautista) would be responsible for this tracking for School buildings
3) Track gas/diesel usage by vehicle size class
    - The Public Works Operations Manager/Fleet Manager would be responsible for this tracking for City vehicles
4) Update the table of climate actions with completion date and cost as projects are completed
    - All three individuals listed above would be responsible for reporting project completion; Chris Wilbur would compile responses in the CAP table.

The energy usage in 1), 2), and 3) above would be converted to eCO_2 (by doing calculations shown in Section 2.3). If only an overall check of moving towards emission goals was desired, eCO_2 totals from all City buildings, School buildings, and vehicles could be converted and added together. If data was converted by building and vehicle type, and then graphed as eCO_2 emissions by building/or vehicle type by year, the Staff and Assembly could better visualize the impact of individual projects (and better discover if unanticipated results are occurring). The eCO_2 results in combination with the projects completed that year (and the year before, since results might be more clear the following year) would be reported annually to the Assembly.

9.0 Appendix E - Past City Energy Efficiency Actions

The following actions were taken by the City and Borough of Sitka and the Sitka School District to save energy during or prior to the 2006 emissions inventory. These actions are included in the 2003 and/or 2006 greenhouse gas emissions inventory.

Table E-1: Energy Efficiency Actions Completed in or before 2006

Action	Building	Year completed
Replacing Roofs and Increase Insulation	Centennial Building	1994
Replacing Roofs and Increase Insulation	City Hall	Oct-06
Replacing Roofs and Increase Insulation	City State	Feb-02
Replace Roofs	Fire Hall	2003
Replacing Roofs and Increase Insulation	Marine Services	Jul-04
Replacing Roofs and Increase Insulation	Public Services	Jun-05
Replacing Roofs and Increase Insulation	SMC	Sep-03
Window and door seals	Airport	Mar-03
Window Replacement	Senior Center	Aug-04
Replace Control System	City State	2005
Replace Control System	Kettleson Library	Jun-05
Upgrade Control System	Public Services	Sep-01
Replace Control System	Centennial Building	Nov-99
Electric Boiler Installation	City State	Jun-05
New Roof/Increase Insulation	BES	2006
New Roof/Increase Insulation	BMS	2006
New Roof/Increase Insulation	SHS	2006
Electric Boiler Installation	BMS	2006

10.0 Appendix F - Initiatives Not Included in the CAP

The following initiatives were brought forward by the CAPTF, City Staff, or other individuals for potential inclusion in the Plan. These items were not included as recommendations in the plan due to low relative scores in the CAPTF's rating system, low prioritization by City staff, or the CAPTF's lack of resources to do adequate research to warrant inclusion in the Plan.

Many of these "not included" initiatives came out of other city's Climate Action Plans, and thus, are occurring in and benefiting other U.S. cities. These initiatives could be implemented if desired. Further research into these and other potential initiatives could be accomplished by a part or full time staff person dedicated to implementing the Plan.

- LEED Certification - provide to staff identified as needing this training for on-the-job use
- Require new buildings and retrofits conform to LEED standards
- Purchase idling monitors and use to educate/further implement reduced vehicle idling
- Renewable energy demo/pilot projects
- Electronic filing system
- Reduce/limit travel to essential travel – provide and use options for teleconference, video conference, online courses, webinars, call-in, carpool, etc.
- Paperless pay statements- Implement an electronic timesheet system for employees to track work time saving paper generation every 2 weeks and delivery.
- Educate public at all opportunities
- Find and designate City-owned land areas that could be used for planting and harvesting fruits, vegetables, and trees on a temporary or permanent basis
- Increase sidewalks/trails/bikeways
- GIS Mapping - map the Sitka shoreline at today's sea level and what would our shoreline look like at sea level increases of up to 6 ft in 1 ft increments
- Methane recovery system at WWTP
- Heat recovery system at MSC
- C&D Procedures and Certification training
- Street tree planting
- Open burn ban/incentive program for composting - Enforce and limit open burn permits to those where carbon footprint is calculated to be lower. Prohibit the burning of trash, recyclables and overburden.
- Police units on bicycles
- Construction and demolition recycling
- Local energy efficiency incentive program
- Institute similar electronic bid document system as the Southeast Conference does.
- Include public transportation system in annual City budget - support lowered/eliminated public transportation fares
- Electronic and consolidated billing notices - Consolidate utility, harbor and other city bills into one and make it paperless.
- Implement a green purchasing policy to promote the use of products made of recycled, reused, or compostable and toxic-free materials, use less packaging, and focus equipment/vehicle purchases on waste prevention.
- Expand recycling program to include all City facilities (for mixed paper, cardboard, and most plastics)
- Complete energy audits and energy upgrades on remaining City and School District Buildings.