# City of Homer
# Climate Action Plan Implementation Project
# Final Report


Prepared for the City of Homer
by Deerstone Consulting and Joel Cooper
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And finally, we are grateful to the local citizens who donated more than $45,000 to the City of Homer to assist with Climate Action Plan implementation. This report was funded as a result of their extraordinary generosity.

## Acronyms and Key Terms

| | | | | | |
|---|---|---|---|---|---|
| A | = | Active | ID | = | Inactive Demand |
| ACCT | = | Account | I | = | Inactive |
| AD | = | Active Demand | KPC | = | Kenai Peninsula College |
| APT | = | Apartment | KVAR | = | Kilovars |
| AVE | = | Avenue | LN | = | Lane |
| BF | = | Ball Field | LGT | = | Light |
| BGC | = | Boys and Girls Club | LGTS | = | Lights |
| BLDG | = | Building | MAIN | = | Maintenance |
| BLVD | = | Boulevard | MMBtu | = | Million British Thermal Units |
| BTWN | = | Between | MV | = | Mercury Vapor |
| CG | = | Campground | MPS | = | Motor Pool Shop |
| CHLOR | = | Chlorine | MS | = | Maintenance Shop |
| CIR | = | Circle | N | = | North |
| COH | = | City of Homer | NA | = | Nearest Address |
| COM | = | Communications | NPA | = | Nearest Parcel Address |
| CT | = | Court | NR | = | Near |
| DANVI | = | Danview | P | = | Primary |
| DEPT | = | Department | PA | = | Parcel Address |
| DK | = | Dock | PH | = | Port & Harbor |
| E | = | East | PK | = | Park |
| EG | = | Emergency Generator | PL | = | Place |
| EMERG | = | Emergency | PR | = | Pressure Reducing |
| ESPB | = | Equipment Storage Pole Barn | PW | = | Public Works |
| FLT | = | Float | RR | = | Restroom |
| FRM | = | From | RD | = | Road |
| Gal | = | Gallons | RSVR | = | Reservoir |
| GEN | = | General | SL | = | Sewer Lift |
| GL | = | General Ledger | ST | = | Street |
| GOV | = | Government | STA | = | Station |
| H | = | High | STP | = | Sewer Treatment Plant |
| HERC | = | Homer Education and Recreation Center | SV | = | Sodium Vapor |
| | | | SYS | = | System |
| HMC | = | Hickerson Memorial Cemetery | W | = | West |
| HEA | = | Homer Electric Association | WKFL | = | Wisdom, Knowledge, Faith and Love |
| HPD | = | Homer Police Department | | | |
| HSC | = | Homer Spit Campground | WTP | = | Water Treatment Plant |
| HYW | = | Highway | X | = | Across |

# Introduction

This report represents another milestone in the City of Homer's commitment to address climate change at the local level while simultaneously reducing the City's expenditures on electricity and fuel. Other milestones are noted in the project chronology below.

As with the companion project "Money, Energy & Sustainability" (employee policy guide), this final report is intended to take the recommendations of the City of Homer Climate Action Plan to the next level, providing greater specificity based on more in-depth research and investigation to identify the most cost-effective energy efficiency projects and where possible, estimate savings and payback times. This project also provides the City of Homer with software tools and protocols to allow careful tracking and timely reporting of energy use in City buildings and facilities. Energy monitoring is an essential component of any program to reduce energy use, as noted in the aphorism, "You can't manage what you don't measure."

This project is not intended to be a final milestone; rather, it will be up to the mayor, city council, city manager, and department heads to use this report to accomplish additional goals and achieve real energy savings. It will be those future achievements that can be expected to reduce the City's greenhouse gas emissions and energy costs in a major way. Overall energy savings of 15% or more are entirely possible if this project is carried forward.

Likewise, this report provides recommendations on how the City might cover the up-front costs of energy efficiency upgrades—often a barrier to actually implementing projects that provide long-term savings—by using the Sustainability Fund and other sources of revenue.

The report also provides ideas and recommendations for engaging the broader Homer community in projects and initiatives that would help reduce energy use beyond the City's own operations.

Finally, this report includes a discussion of alternative energy options that the City of Homer might consider to reduce its use of fossil fuels and help make the transition to a new, cleaner, and stable priced sustainable energy future.

## Project Chronology

A timeline of the project history is listed below:

1) September 2006 – Mayor Jim Hornaday attends a national climate change conference in Girdwood, Alaska.
2) January 2007 – The Homer City Council passes Resolution 06-141(A) establishing a local Global Warming Task Force.
3) March 2007 – The City of Homer joins ICLEI—Local Governments for Sustainability.
4) December 2007 – The City of Homer Climate Action Plan (CAP) is approved by the City Council.
5) January 2008 – The City of Homer establishes a "sustainability fund." Resolution 08-07(A) establishes the fund as a fiduciary fund within the City's Chart of Accounts. Establishment of the Sustainability Fund was motivated in part by the donation of more than $45,000 by private individuals at the time that the Climate Action Plan was adopted.

6) July 2008 – The City of Homer contracts with Deerstone Consulting to assist with implementation of the Climate Action Plan.
7) June 2009 – CAP Implementation Project is extended. Brian Hirsch, President of Deerstone Consulting and CAP project leader takes a position with the National Renewable Energy Laboratory and contract is transferred to Joel Cooper who served as the CAP project manager for Deerstone.
8) June 2009 – City of Homer contracts with Joel Cooper to start up use of the U.S. Environmental Protection Agency's (EPA) Portfolio Manager program and make the City of Homer's greenhouse gas inventory compliant with ICLEI's new Local Government Operations Protocol.
9) September 2009 – CAP Implementation Project is extended through November and then again through December.
10) December 2009 – CAP Implementation Project final report released.

## Scope

The objective of this project is to assist with implementation of the City of Homer Climate Action Plan, with particular emphasis on tasks related to monitoring and reporting of energy/fuel use in City facilities and vehicles, identification and implementation of specific energy/fuel use reduction strategies, development of strategies for public outreach, identification of grant funding opportunities, and identification of strategies to grow the City of Homer Sustainability Fund. The following are the eight tasks listed in the project work plan.

1. Develop efficient, user-friendly record keeping system(s) for collecting and reporting data on City energy/fuel use (electricity, heating oil, propane, and vehicle fuel) and costs to allow month-to-month tracking as well as comparisons from year to year. Work with Finance and other City departments while developing the system(s) so that they are compatible with existing work-flow and processes. Create a guide to facilitate continuation of the record-keeping program after the end of the one-year contract.
2. Utilizing Clean Air and Climate Protection (CACP) software (provided by ICLEI), update greenhouse gas emissions data for "municipal government" operations to allow comparison of 2007 and 2008 emissions to the 2006 baseline. Investigate and make recommendation on the use of Portfolio Manager (provided by EPA/Energy Star) as a complementary tool to allow more in-depth energy use analysis. Create a guide to facilitate continuation of accurate emissions monitoring and reporting after the end of the one-year contract.

*Note: It was recommended (see section on Portfolio Manager in Chapter One) that the City use Portfolio Manager. In addition, ICLEI requested that cities update their greenhouse gas inventories using the Local Governmental Operations Protocol and updated CACP 2009 software. This resulted in the City of Homer contracting to 1) Upload City energy data into EPA Portfolio Manager and incorporate information on how to use this program into a user guide; 2) Make the City's greenhouse gas emissions inventory compliant with the new ICLEI protocol and incorporate information on how to use this protocol into a user guide.*

3. Research options, formulate recommendations, and assist in spearheading initiatives and programs aimed at growing the Sustainability Fund and establishing it as an ongoing source of funding for CAP implementation. As one of the options, establish a mechanism to identify and quantify all monetary savings that result from the energy/fuel efficiency and conservation measures and make recommendations on means to divert those savings into the Sustainability Fund to finance further improvements. Work with Finance and other City departments while developing the mechanisms so they are compatible with existing work-flow and processes.

4. Using Grants.gov, Grantstation.com, and other resources, keep abreast of grant funding opportunities for CAP implementation and work with the Special Projects Coordinator as needed to develop grant proposals.
5. Work with the Public Works Project Manager to identify opportunities for significant energy/cost savings in City buildings and facilities and undertake measures to capture those savings, utilizing funds in the Sustainability Fund as necessary to cover up-front costs.
6. Work with the Public Works Project Manager to review and revise the Fleet Replacement Schedule to facilitate transition to a more fuel-efficient vehicle fleet.
7. Work with the Special Projects Coordinator and other interested parties to develop a public education/outreach plan with the goal of reducing greenhouse gas emissions community-wide.
8. Explore opportunities and provide recommendations regarding the City's involvement in the development of alternative energy sources in Homer.

**The City of Homer**

The City of Homer, incorporated in 1964, operates as a First Class Municipality with an elected mayor and six-member city council. Homer's population first exceeded that of Seldovia in 1960, with 1,247 counted in the U.S. census at that time. The population grew to 2,209 in 1980 and 3,946 in 2000. In 2002, Homer annexed 4.6 square miles of land, bringing the total land area to 15 square miles and bumping the population up to 5,532. Since then, population has remained relatively flat within city limits (not counting seasonal residents). Long-range projections foresee further growth, however, with Homer continuing to serve as the commercial hub of the southern Kenai Peninsula.

The City of Homer employs approximately 110 people ranging from accountants to heavy equipment operators. Appendix 1 provides an employment history from 2006 though the proposed 2010 budget. City government is the fifth largest employer in Homer after the Kenai Peninsula School District, South Peninsula Hospital, Safeway, and South Peninsula Behavioral Health Service.

City of Homer facilities include the city hall, police station, fire hall, public library, public works complex, port and harbor building, small boat harbor, three dock facilities, animal shelter, sewer treatment plant, water treatment plant, and the Homer Education and Recreation Center (old intermediate school). The animal shelter, library, and water treatment plant were all built since 2004. Appendix 2 provides a complete list of City infrastructure with information on square feet and year built.

## City of Homer Climate and Weather Indicators

Table 1 below displays average monthly climate and weather indicators in Homer, Alaska. These indicators play a key role in determining how the City uses energy.

**Table 1 Average Monthly Climate and Weather Indicators in Homer Alaska-Temperature in Degrees Fahrenheit (Source: climate-zone.com)**

| Homer Temperature | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Avg. Temperature | 22.7 | 24.7 | 29.0 | 35.4 | 42.8 | 49.3 | 53.4 | 53.3 | 47.6 | 37.5 | 28.6 | 24.3 | 37.4 |
| Avg. Max Temperature | 28.5 | 31.2 | 35.9 | 42.2 | 50.0 | 56.3 | 60.5 | 60.4 | 54.7 | 43.8 | 34.5 | 30.1 | 44.0 |
| Avg. Min Temperature | 16.8 | 18.1 | 21.9 | 28.6 | 35.6 | 42.2 | 46.2 | 46.2 | 40.5 | 31.2 | 22.6 | 18.4 | 30.7 |
| Days with Max Temp of 90 F or Higher | 0.0 | 0.0 | 0.0 | 0.0 | < 0.5 | < 0.5 | 1.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 |
| Days with Min Temp Below Freezing | 29.0 | 25.0 | 27.0 | 22.0 | 9.0 | < 0.5 | 0.0 | < 0.5 | 4.0 | 18.0 | 25.0 | 28.0 | 186 |
| | | | | | | | | | | | | | |
| **Homer Heating and Cooling** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** | **Annual** |
| Heating Degree Days | 1311 | 1128 | 1116 | 888 | 688 | 471 | 360 | 363 | 522 | 853 | 1092 | 1262 | 10054 |
| Cooling Degree Days | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | | | | | | | | | | | | |
| **Homer Precipitation** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** | **Annual** |
| Precipitation (inches) | 2.4 | 2.1 | 1.7 | 1.3 | 1.1 | 1.0 | 1.5 | 2.2 | 3.3 | 3.2 | 2.6 | 2.8 | 25.4 |
| Days with Precipitation 0.01 inch or More | 13.0 | 11.0 | 11.0 | 9.0 | 10.0 | 9.0 | 11.0 | 13.0 | 16.0 | 15.0 | 12.0 | 15.0 | 145 |
| Monthly Snowfall (inches) | 10.3 | 12.0 | 9.4 | 3.1 | 0.4 | < 0.05 | 0.0 | 0.0 | < 0.05 | 2.4 | 7.2 | 13.0 | 57.8 |
| | | | | | | | | | | | | | |
| **Other Homer Weather Indicators** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** | **Annual** |
| Average Wind Speed | 8.0 | 8.0 | 8.0 | 8.2 | 8.4 | 7.9 | 7.3 | 6.9 | 7.3 | 7.5 | 8.0 | 7.9 | 7.8 |
| Clear Days | 8.0 | 7.0 | 6.0 | 5.0 | 4.0 | 4.0 | 3.0 | 5.0 | 5.0 | 5.0 | 6.0 | 7.0 | 65.0 |
| Partly Cloudy Days | 4.0 | 4.0 | 6.0 | 6.0 | 7.0 | 8.0 | 9.0 | 8.0 | 7.0 | 5.0 | 5.0 | 5.0 | 75.0 |
| Cloudy Days | 19.0 | 17.0 | 19.0 | 18.0 | 20.0 | 18.0 | 19.0 | 18.0 | 18.0 | 21.0 | 19.0 | 18.0 | 225 |
| Avg. Relative Humidity | 63.5 | 76.0 | 72.5 | 68.5 | 66.5 | 67.0 | 70.0 | 73.5 | 74.0 | 73.0 | 71.0 | 74.0 | 76.0 |

# Chapter One
# Energy Tracking

## Introduction

One of the most important tasks of this project was to, "*develop an efficient, user-friendly record keeping system(s) for collecting and reporting data on City energy/fuel use (electricity, heating oil, propane, and vehicle fuel) and costs to allow month-to-month tracking as well as comparisons from year to year.*" Simply put, the City of Homer cannot save energy and money unless it is known how much is being used.

Tracking energy use for all City facilities and equipment types is by no means an easy task, even for a small city like Homer. It requires the cooperation and collaboration of City staff from several departments as well as the staff of the energy providing companies (Table 2). As it turns out, not only was an efficient user friendly tracking system developed for the City of Homer, but the development process also helped improve billing efficiency and delivery tracking at the fuel and electric utilities. This is expected to save City of Homer staff time and reduce errors.

**Table 2 Energy Utilities used by the City of Homer**

| Utility | Address | Energy Type |
|---|---|---|
| **Homer Electric Association (HEA)** | 3977 Lake Street<br>Homer, AK 99603 | Electricity |
| **Suburban Propane** | 60970 East End Road<br>Homer, AK 99603 | Propane |
| **Petro Marine Services** | 4755 Homer Spit Road<br>Homer, AK 99603 | Heating and Transportation Fuel |

## Methods

Working with City staff and the staff at the energy utility providers, data of electricity and fuel use and cost was compiled for the entire city infrastructure and vehicle fleet. Appendix 2 provides a table of City facilities and equipment, Appendix 3 provides a table of electricity account information, and Appendix 4 provides a table of fuel account and fuel tank information. Vehicle data will be discussed in more detail in chapter 5.

Compiling these tables revealed the many challenges of tracking energy use. Duplicated naming; different naming of the same account, facility, or equipment within departments and the utility providers; pooling of fuel delivery data; and electric meters measuring multiple facilities and equipment made it challenging to create accurate lists and to associate energy use with the appropriate facility or equipment. In several instances, we found that hundreds and even thousands of gallons of fuel were associated with the wrong facility due to name mislabeling.

To assure the energy tracking system(s) are compatible with existing work-flow and processes and that task 1 & 2 of the contract work plan would be completed, a review of computer programs (Table 3) used by the City and the energy utilities was conducted.

**Table 3 Computer programs Used by the City of Homer, Energy Utilities, ICLEI, and EPA**

| Computer Program | Organization |
|---|---|
| Caselle Accounting Program | City of Homer Finance Department |
| MP2 Building Tracking System | City of Homer Department of Public Works |
| Petro Vend K800 fuel monitoring system | City of Homer Department of Public Works |
| Microsoft Access Reporting Tool | Homer Electric Association |
| Microsoft Access | Suburban Propane |
| Excel Spreadsheets | Petro Marine Services |
| The Clean Air and Climate Protection Software (CACPS) | ICLEI - Local Governments for Sustainability |
| Portfolio Manager | Environmental Protection Agency |

It was determined that relational databases developed in Excel would provide the most flexibility in terms of program compatibility and would allow data to be easily imported into all necessary programs used for energy and carbon tracking. Tracking data in Excel also allows for an easy transition to future programs that may be used by the City. In addition, graphing capabilities and efficiencies are maximized utilizing Excel since most programs recommend moving tabular data into Excel for graphing.

Three databases were developed. The Energy Tracking System is the main database and is designed to track annual and monthly energy use and cost for all City facilities and equipment by City GL accounting numbers, departments and divisions. Data can also be tracked by energy type and tables can be generated for simple upload of data into ICLEI's 2009 CACP software and EPA's online Portfolio Manger database. All graphs and tables in the results section of this chapter were created using this database. A facilities database was also created to compile and track utility account information and facility details like square footage, year built, and number of computers. A vehicle tracking database was also created and is discussed in chapter 5.

In order to ensure timely and accurate compilation of energy information a data flow noted in Table 4 was worked out between the energy utility providers and the City of Homer Finance Department. Following this process and schedule will allow the City's designated Energy Manager to provide monthly energy reports to City staff. In addition the electronic transfer of electricity data has begun to save the Finance Department time and money.

## Portfolio Manager

Portfolio Manager is an interactive energy management tool that allows the user to track and assess energy and water consumption across their entire portfolio of buildings in a secure online environment. Portfolio Manager can help the City set investment priorities, identify under-performing buildings, verify efficiency improvements, and receive EPA recognition for superior energy performance.

Portfolio Manager provides a powerful tool to manage the energy of properties a local government (or other entity) owns, manages, or holds for investment. For a growing list of facility types, energy performance may be rated against a peer group of facilities, with adjustments for climate, facility size, hours of operation, and number of occupants.

Portfolio Manager provides a big picture of how much energy is being used and by which facilities, how energy performance compares to similar facilities, and progress reports for established energy reduction goals. Centralized and decentralized organizations benefit equally from the ability to share facility specific energy information in a secure environment.

Energy managers may centrally view all facilities and all energy data, which otherwise is maintained at a local level. Energy managers may also group facilities together and track their progress separately. All users of Portfolio Manager may also customize their own views allowing them to see the information they value most.

Details and reports from Portfolio Manager will be submitted with Portfolio Manager contract deliverables.

**Table 4 City of Homer Tracking Systems Data Flow**

| Step # | ELECTRICITY DATA | PETRO MARINE FUEL DATA | SUBURBAN PROPANE FUEL DATA | WATER DATA[1] |
|---|---|---|---|---|
| 1 | City facility electric meter(s) is read by HEA. | Fuel is delivered to city facility fuel tank. | Fuel is delivered to city facility fuel tank. | City water meter is read by City meter reader |
| 2 | Reading(s) are compiled by HEA. | A fuel delivery ticket is generated by the fuel delivery driver. | A fuel delivery ticket is generated by the fuel delivery driver. | Readings are compiled via laptop computer meter tech, then the meter reading file is downloaded to main computer for billing by finance billing department. |
| 3 | An electronic spreadsheet of electrical usage, costs and account data is sent to Laurie Moore in the COH Finance Department on the first of each month. | The fuel delivery ticket is processed by Petro Marine and an invoice is sent to COH Accounts Payable. | The fuel delivery ticket is processed by Suburban Propane and then mailed to the COH Accounts Payable within 1-2 days after delivery. Invoice mailed 30 days after delivery. | Meter readings are uploaded into the Caselle billing software by Finance personnel. Monthly billings are created the 3rd week of each month, Bills are sent to departments via in-house courier |
| 4 | Accounting supervisor forwards the data to the Energy Manager (or designated staff person) for input into the Energy Tracking System, Portfolio Manager, and CACP software. | Delivery ticket and invoice copy are sent to the Energy Manager (or designated staff person) by the 5th of every month for input into the Energy Tracking System, Portfolio Manager, and CACP software | Delivery ticket and invoice copy are sent to the Energy Manager (or designated staff person) by the 5th of every month for input into the Energy Tracking System, Portfolio Manager, and CACP software | Accounting supervisor forwards the data to the Energy Manager (or designated staff person) for input into the Energy Tracking System and Portfolio Manager |
| 5 | Energy Manager (or designated staff person) compiles data into the Energy Tracking System, Portfolio Manager, and CACP software. | | | |
| 6 | Energy Manager (or designated staff person) generates energy reports for each city equipment type and submits them to city staff (i.e. Department Heads and Maintenance staff) | | | |

## Data Findings

This next section provides a summary of energy use and costs for the City of Homer. Readers should consider the following when reviewing the data in this report.

- All graphs and tables were generated using the Energy Tracking System developed for the City.
- Fuel data reported is based on fuel deliveries to the fuel tanks, unless otherwise noted, and is not an actual metered or a direct measurement of fuel use.

[1] Water data is currently not being tracked and is not reported in this report, but it is recommended that the City of Homer track water use in the future to save on water and energy costs associated with water

- All electricity and fuel yearly totals are based on the delivery dates and meter reading dates for that year and do not reflect an exact calendar year or an exact calendar month.
- Totals may not sum exactly due to rounding.
- 2006 is considered the base year for tracking greenhouse gas emissions, energy use, and energy costs.
- 2008 data, the last complete year, is used to provide a breakdown of annual energy use and costs.
- Data for 2009 was provided to show whether facilities are tracking towards more or less energy use or costs than 2008 or the base year of 2006.

**Total Energy Use and Costs**

Table 5 and Figures 1 and 2 show the City of Homer's total energy use and cost from January 2006 through October 2009 by energy type and show the following:

- There was a 3.40 % increase in total energy use in 2007 from 2006.
- Energy use continued to increase by 2.28 % in 2008 from 2007 and increased 5.76% from 2006 numbers.
- In 2007 energy costs increased by 5.11 %.
- 2008 costs increased dramatically by 18.99% from 2007 and were up 25.07 % from 2006 costs.
- Total energy use through September 2009 is showing a 2.91% decrease (Figure 1), but costs are showing a 11.37% increase.

**Table 5 City of Homer Total Energy Use in MMBtu and Cost by Energy Type from 2006 to October 2009**

| | 2006 | | 2007 | | 2008 | | 2009[1] | |
|---|---|---|---|---|---|---|---|---|
| Energy Type | Sum of Energy (MMBtu)[2,3] | Sum of Energy Cost | Sum of Energy (MMBtu) | Sum of Energy Cost | Sum of Energy (MMBtu) | Sum of Energy Cost | Sum of Energy (MMBtu) | Sum of Energy Cost |
| **Electricity** | 19,156 | $729,787 | 20,151 | $771,038 | 20,327 | $849,369 | 16,402 | $888,736 |
| **Fuel Oil (#1 and #2 )** | 9,794 | $176,055 | 10,226 | $185,385 | 10,068 | $246,505 | 7,502 | $121,495 |
| **Gasoline[4]** | 3,799 | $84,341 | 4,063 | $93,435 | 4,559 | $134,031 | 2,950 | $68,571 |
| **Propane** | 522 | $14,230 | 438 | $14,294 | 424 | $17,428 | 105 | $3,924 |
| **Diesel[4]** | 2,294 | $41,047 | 1,898 | $34,771 | 2,236 | $60,257 | 1,257 | $29,197 |
| **Grand Total** | **35,566** | **$1,045,459** | **36,777** | **$1,098,925** | **37,615** | **$1,307,590** | **28,216** | **$1,111,923** |

Figure 3 shows a breakdown of 2008 total energy use by selected facilities and divisions. Wastewater facilities are the City's biggest energy consumers at 15.2 % followed by Port and Harbor facilities at 14%. It should be noted in this chart that Port and Harbor does not include the Fish Dock, Restrooms or the Port Maintenance buildings. The restrooms are included in the Parks and Recreation total and the maintenance buildings are included Public Works Maintenance Facilities based on the City's departmental divisions. The Fish Dock which uses 8.5 % of the City's total energy was broken out from Port and Harbor because of its high percentage. Gasoline used to power the City's vehicle fleet accounts for 12.1% of the City's total

[1] Heating Fuel Oil (# 1 & #2) and Propane deliveries are through September 2009 and kWhs used are through October 2009.
[2] To convert to MMBtu the following conversion factors were used: Electricity kWh x 0.003412; Fuel Oil and Diesel gallons x 0.138676; Gasoline gallons x 0.124225; and Propane gallons x 0.091039. (Source: Clean Air and Climate Protection 2009 Software)
[3] 2006- 2009 Fuel gallon numbers are deliveries to the fuel tanks.
[4] Totals are for deliveries to Gasoline and Diesel Fuel Islands at the Public Works Complex only and do not include fuel from when vehicles fueled up at other locations.

energy use in 2008. Table 37 provides total percent energy use in MMBtu for all individual facilities. Figure 4 provides a 2008 breakdown of total energy costs by the same selected facilities and divisions.

**Figure 1 City of Homer Annual and Monthly Total Energy Use in MMBtu from 2006 through October 2009**

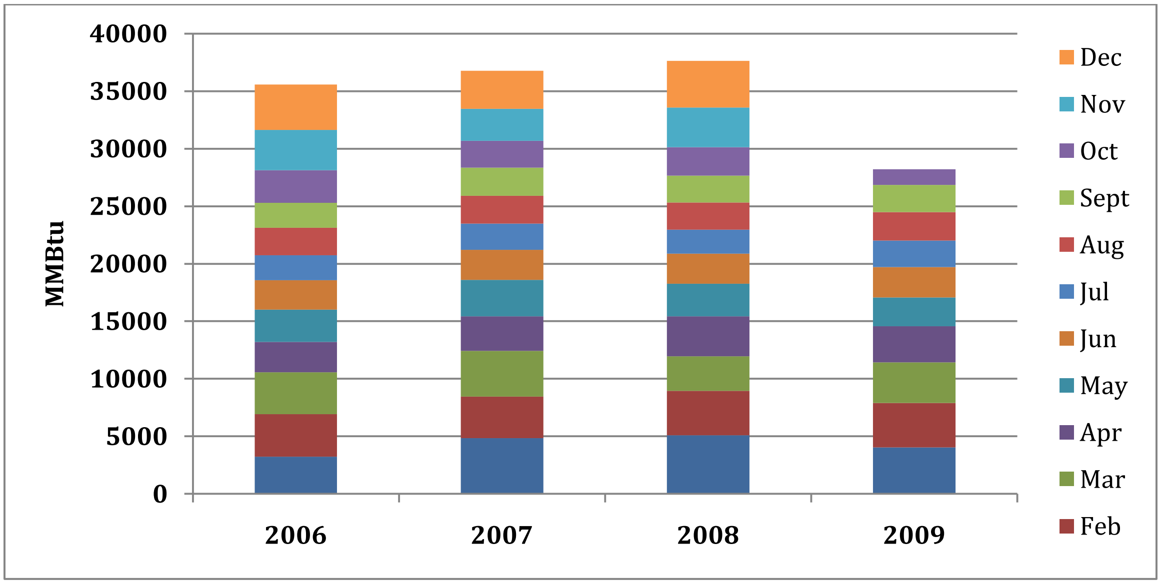



**Figure 2 City of Homer Total Energy Costs by Energy Type from 2006 through October 2009**

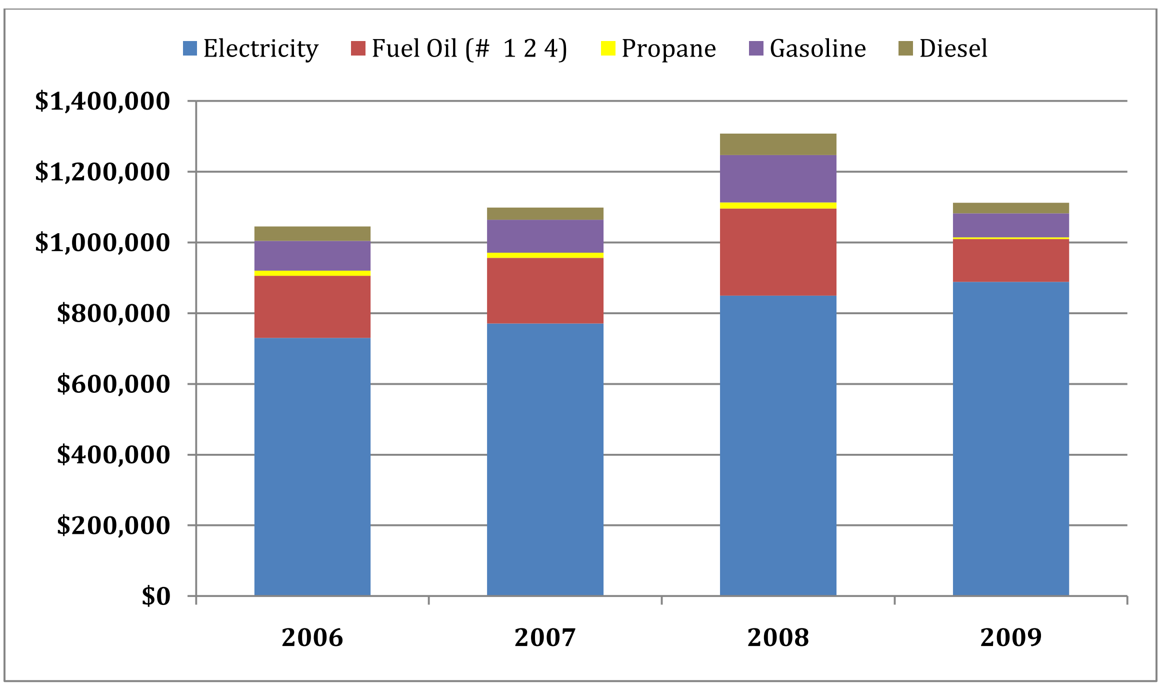


**Figure 3 City of Homer 2008 Total Energy Use[1] in MMBtu by Selected Facilities and Divisions[2]**

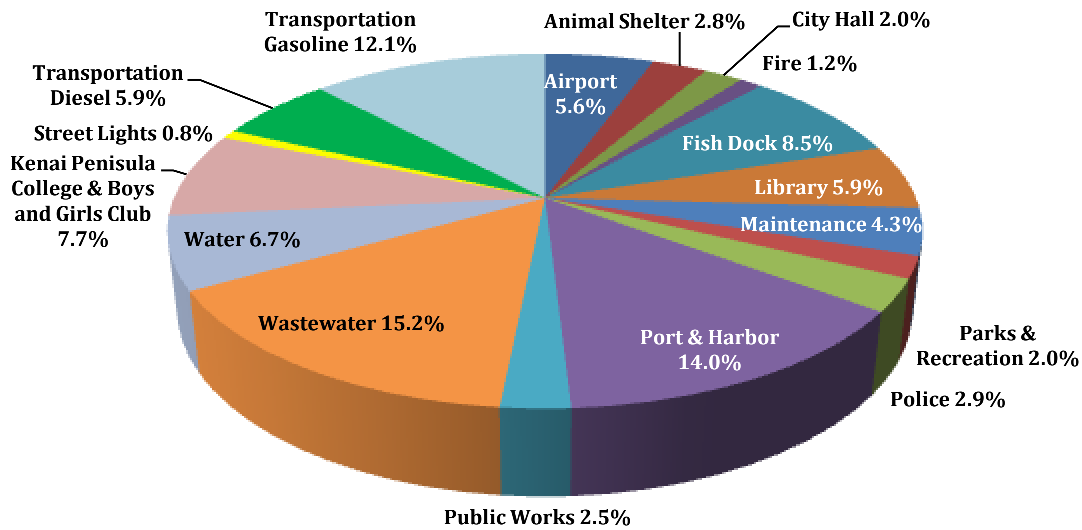
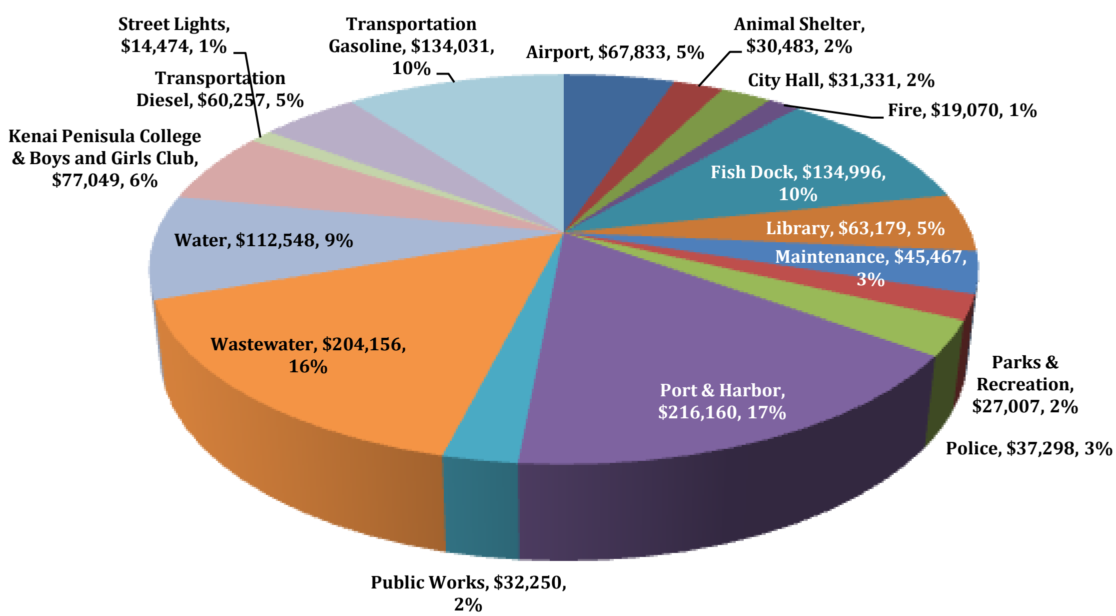



**Figure 4 City of Homer 2008 Total Energy Costs[1] for Selected Facilities and Divisions[2]**

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[1] Heating Oil and Propane use is based on fuel deliveries to fuel tanks. Totals for deliveries to the Gasoline and Diesel Fuel Islands at the Public Works Complex do not include fuel from when vehicles fueled up at other locations.
[2] Since all Port and Harbor High Mast Lights are not metered separately they are not split up and are included in the Port and Harbor total. Table 23 provides a complete breakdown of Port and Harbor facilities and High Mast Lights that are metered separately.

Table 6 is quite telling in regards to what type of energy the City uses the most and where reduction and savings can be made. This table shows that electricity use accounted for nearly 54% of the City's total energy consumption and 65% of the total energy costs for 2008.

**Table 6 City of Homer Percent Total Energy Use and Costs by Energy Type for 2006 - 2008**

| Energy Type | Values | 2006 | 2007 | 2008 |
|---|---|---|---|---|
| **Electricity** | Sum of Energy Cost | 69.81% | 70.16% | 64.96% |
| | Sum of Energy (MMBtu) | 53.86% | 54.79% | 54.04% |
| **Fuel Oil (# 1 & #2)** | Sum of Energy Cost | 16.84% | 16.87% | 18.85% |
| | Sum of Energy (MMBtu) | 27.54% | 27.81% | 26.77% |
| **Gasoline** | Sum of Energy Cost | 8.07% | 8.50% | 10.25% |
| | Sum of Energy (MMBtu) | 10.68% | 11.05% | 12.12% |
| **Diesel** | Sum of Energy Cost | 3.93% | 3.16% | 4.61% |
| | Sum of Energy (MMBtu) | 6.45% | 5.16% | 5.95% |
| **Propane** | Sum of Energy Cost | 1.36% | 1.30% | 1.33% |
| | Sum of Energy (MMBtu) | 1.47% | 1.19% | 1.13% |
| **Total Sum of Energy Cost** | | **100.00%** | **100.00%** | **100.00%** |
| **Total Sum of Energy (MMBtu)** | | **100.00%** | **100.00%** | **100.00%** |

## Electricity Use and Costs

There are many variables that go into calculating electric costs and all these variables ultimately determine the cost per kWh for any given individual account. The City of Homer has two types of accounts, demand and non-demand. In general, demand accounts consume more energy and are higher value accounts, in part because of a "demand charge" that is associated with peak times of energy use. At least theoretically, these demand accounts represent energy savings opportunities if improved energy management could reduce peak demand and thus, monthly demand charges. Appendix 3 provides HEA account information for all inactive and active City accounts from 2006 to the present and Appendix 5 provides maps for all electric meter and street light locations. Table 7 provides a breakdown of charges for selected City of Homer HEA accounts for October 2009.

**Table 7 Breakdown of Electricity Charges on Selected City of Homer HEA Accounts for October 2009**

| | AIRPORT TERMINAL | FISH DOCK | HERC-02 PW MAIN SHOP | PR STA @ A-FRAME |
|---|---|---|---|---|
| **Account Type** | Demand | Demand | Non-Demand | Non-Demand |
| **HEA kWh Used** | 23960 | 96200 | 1987 | 513 |
| **HEA Energy Charge = kWh used x current rate** | $2,475 | $9,937 | $250 | $65 |
| **HEA Demand Charge** | $312 | $2,451 | NA | NA |
| **HEA KVAR Charge`** | NA | $70 | NA | NA |
| **HEA Security Light kWh** | NA | NA | 134 | NA |
| **HEA Security Light Charge** | $0 | $0 | $32 | $0 |
| **HEA Customer Charge** | $150 | $150 | $24 | $24 |
| **HEA Regulatory Cost Charge** | $10.35 | $41.56 | $0.86 | $0.22 |
| **HEA Wholesale Power Cost Adj. Charge** | $471 | $1,891 | $39 | $10 |
| **Total Calculated HEA Cost** | $3,418 | $14,541 | $346 | $99 |
| **Cost per kWh** | $0.14 | $0.15 | $0.16 | $0.19 |

Ultimately it is kWh used that drives the electricity costs for any given facility, but other costs such as the wholesale power cost adjustment (WPCA) are driven by fuel prices. WPCA is essentially a "pass through" adjustment, on top of the base rate, that merely reflects quarterly changes in fuel prices (primarily natural gas) that is used to generate the electricity that HEA sells to its ratepayers. Figures 5 show the trends from August 2005 to October 2009 of the WPCA for the Fish Dock and Figure 6 shows regulatory cost trends for the same facility and time period.

**Figure 5 HEA Wholesale Power Cost Adjustment Charges for the Fish Dock from Aug. 2005 – Oct. 2009**

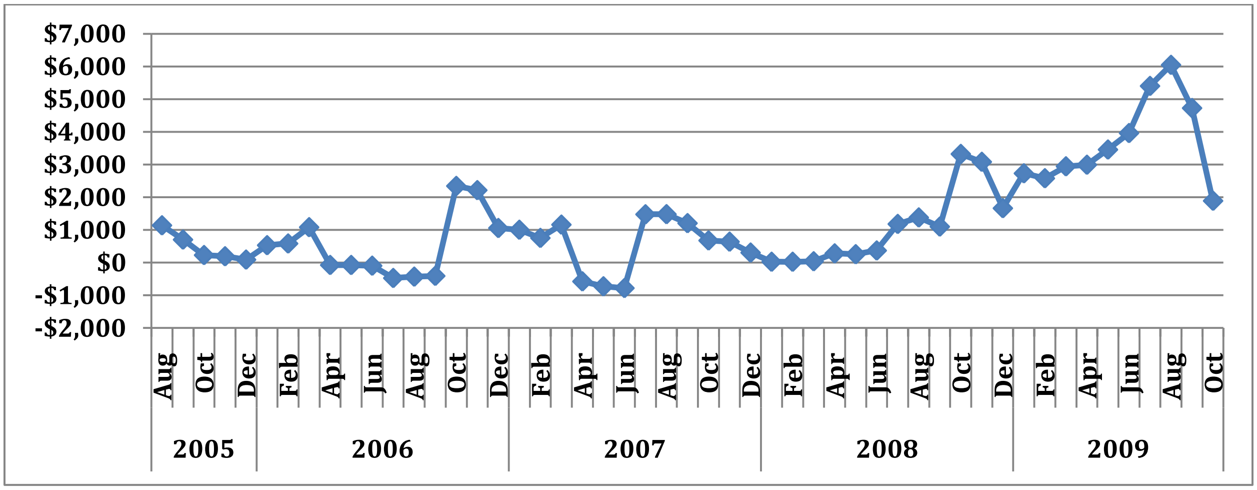



**Figure 6 HEA Regulatory Cost Charges for the Fish Dock from Aug. 2005 – Oct. 2009**

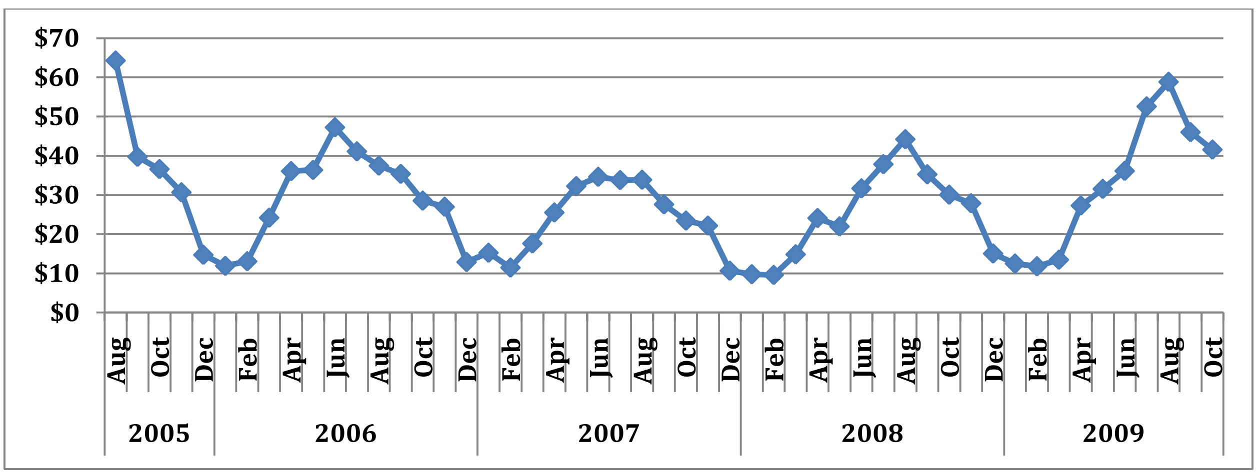



Figure 7 shows demand charge trends for the Fish Dock and is reflective of the commercial fisheries seasonal use of the facility. Electricity use increased by 5.19% in 2007 and by 0.87% in 2008 as shown in Table 8. 2008 usage was up 6.11% from 2006, but we see a 2.54% decrease in usage through October 2009. Total electricity costs increased by 5.65% and 10.16% in 2007 and 2008 respectively. Total electricity costs are up 16.39% from 2006. Figure 8 provides a breakdown of electricity usage by selected facilities for 2008 and shows that the Port and Harbor facilities and the Fish Dock use just over 41% of the City's total electricity. Wastewater facilities are the next largest user at 21.8 % and include the City's largest electricity user (Table 9), the Sewer Treatment Plant, which uses 20% of the City's total.

**Figure 7 HEA Demand Charges for the Fish Dock from Aug. 2005 – Oct. 2009**

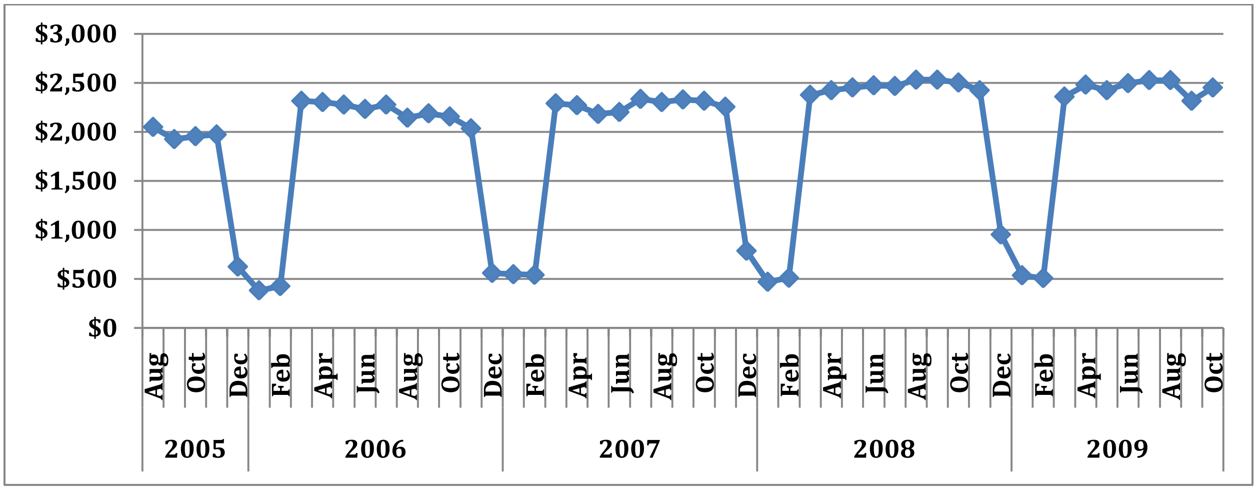
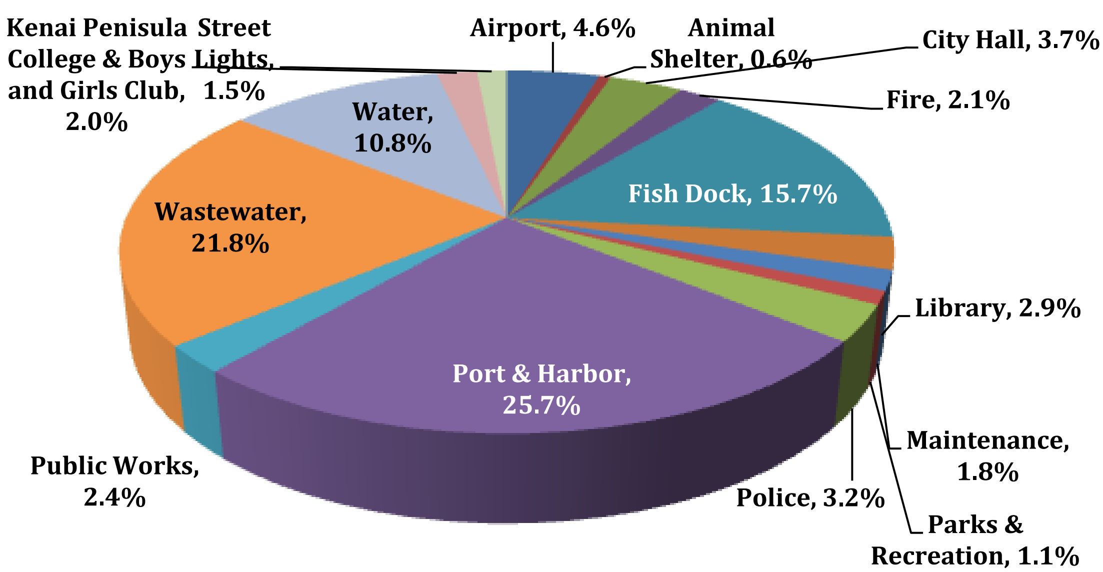



**Table 8 City of Homer Change in Electricity Use and Cost from 2006 – 2008**

| Year | Sum of kWh used | % Difference of kWh Used from Previous Year | % Difference of kWh Used from 2006 | Sum of Electricity Costs | % Difference of Electricity Cost from Previous Year | % Difference of Electricity Cost from 2006 |
|---|---|---|---|---|---|---|
| **2006** | 5,614,323 | | | $729,787 | | |
| **2007** | 5,905,946 | 5.19% | 5.19% | $771,038 | 5.65% | 5.65% |
| **2008** | 5,957,577 | 0.87% | 6.11% | $849,369 | 10.16% | 16.39% |

**Figure 8 City of Homer 2008 Total Electricity Use by Selected Facilities and Divisions[1]**




[1] Since all Port and Harbor High Mast Lights are not metered separately they are not split up and are included in the Port and Harbor total. Table 23 provides a complete breakdown of Port and Harbor facilities and High Mast Lights that are metered separately.

**Table 9 City of Homer Largest Electricity Using Facilities for 2008 by Percent of Total City kWhs Used**

| Facility | Sum of kWh Used | % of Total City kWh Use | Sum of Electricity Cost | % of Total City Electricity Cost | Average Cost per kWh |
|---|---|---|---|---|---|
| SEWER TREATMENT PLANT | 1,192,400 | 20.01% | $153,316 | 18.05% | $0.13 |
| FISH DOCK | 934,300 | 15.68% | $134,996 | 15.89% | $0.14 |
| SYS #1 FLT & H MAST LGT#1 | 656,840 | 11.03% | $86,690 | 10.21% | $0.14 |
| SYSTEM #5 (LIGHT/FLOAT) | 629,520 | 10.57% | $85,073 | 10.02% | $0.14 |
| POLICE STA/JAIL/FIRE HALL | 317,800 | 5.33% | $45,074 | 5.31% | $0.14 |
| AIRPORT TERMINAL | 275,760 | 4.63% | $37,287 | 4.39% | $0.14 |
| WATER PUMP STA @ CROSSMAN | 233,280 | 3.92% | $33,703 | 3.97% | $0.15 |
| CITY HALL | 218,940 | 3.67% | $31,331 | 3.69% | $0.15 |
| PUBLIC LIBRARY | 167,840 | 2.82% | $24,564 | 2.89% | $0.15 |
| OLD WATER TREATMENT PLANT | 155,680 | 2.61% | $24,118 | 2.84% | $0.15 |
| PUBLIC WORKS OFFICE & SHOP | 145,840 | 2.45% | $21,296 | 2.51% | $0.15 |
| HIGH MAST LGTS #2,3, & 4 | 127,320 | 2.14% | $19,284 | 2.27% | $0.15 |
| HERC-01 KPC AND BGC | 119,520 | 2.01% | $18,740 | 2.21% | $0.16 |
| VARIOUS LOCATIONS (LIGHTS) | 74,160 | 1.24% | $11,864 | 1.40% | $0.16 |

### Heating Fuel Use and Costs

Heating fuels can be challenging to manage in cold weather climates and require a blending of fuels to prevent gelling in the tanks. Table 10 provides a breakdown of the different fuels delivered to the City fuel tanks and their price per gallon based on last fuel delivery of that fuel. To maintain consistency with the CACP software all heating fuel oil used a conversion factor 0.138676 to convert to MMBtus (i.e. gallons x 0.138676). For a more accurate Btu content for fuels delivered to City fuel tanks, the City will need to work with Petro Marine to get Btu content for each batch of blended fuel as it is delivered. Price of fuels and current temperatures affects what fuel is delivered. Jet A #1 heating fuel is the primary fuel delivered to City fuel tanks. If Ultra Low Sulfur #2 diesel is at a lower price than it will be delivered in place of Jet A #1 heating fuel. However, since Jet A #1 heating fuel has a lower freezing point it will be delivered during colder temperatures regardless of price. Timing of delivery, usage and whether the tank is above or below ground also determines whether which fuel is delivered.

**Table 10 Types of Heating Fuel Oil Delivered to City of Homer Fuel Tanks**

| Jet A # 1 Heating Fuel | Price Per Gallon[1] | Heating Oil[2] | Price Per Gallon | Jet A # 1 Heating Fuel (Low Sulfur)[2] | Price Per Gallon | Heating Oil (Low Sulfur)[2] | Price Per Gallon | Jet A #1 Heating Fuel (Ultra-Low Sulfur)[2] | Price Per Gallon | Heating Oil (Ultra-Low Sulfur) | Price Per Gallon[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DF1 | $2.675 | DF2 | $2.37 | DFLS1E | $2.62 | DFLS2 | $2.62 | DFUL1 | $3.17 | DFUL2 | $3.416 |
| DF1E[3] | $2.675 | DF2E | $2.38 | DFLS1H | $2.99 | DFLS2H | $2.63 | DFUL1E | $3.89 | DFUL2E | $3.416 |
| DF1H[4] | $2.675 | | | | | | | DFUL1H | $ 3.12 | DFUL2H | $3.416 |
| DF1W[5] | $2.675 | | | | | | | | | | |

[1] Price per gallon is for City of Homer current contract price effective 11/20/2009
[2] Fuel is no longer delivered. Price is for last fuel delivery.
[3] E is Petro Marine's code for Equipment.
[4] H is Petro Marine's code for Heating tax. The City is not levied a tax for any fuel.
[5] W is Petro Marine's code for Highway tax. The City is not levied a tax for any fuel.

Table 11 provides a breakdown of the City's heating fuel use from largest to smallest user for 2008. The facility housing the Kenai Peninsula College and Boys & Girls Club used near 25% of the heating fuel delivered to the City and the Public Library used 15% for 2008. These two facilities along with the Airport Terminal, Sewer Treatment Plant, and the Animal Shelter used nearly three quarters of the heating fuel delivered to the City in 2008.

**Table 11 City of Homer Heating Fuel Oil Using Facilities (Largest to Smallest) for 2008 by Percent of Total City Gallons Delivered**

| Space Name | Sum of Gallons Delivered | % of Total Gallons Delivered | Sum of Heating Fuel Cost | % Total Heating Fuel Cost |
|---|---|---|---|---|
| HERC-01 KPC AND BGC | 18,010 | 24.81% | $58,309 | 23.65% |
| PUBLIC LIBRARY | 10,889 | 15.00% | $35,399 | 14.36% |
| AIRPORT TERMINAL | 8,354 | 11.51% | $30,546 | 12.39% |
| SEWER TREATMENT PLANT | 8,125 | 11.19% | $28,000 | 11.36% |
| ANIMAL SHELTER | 6,795 | 9.36% | $25,368 | 10.29% |
| PORT & HARBOR MAIN SHOP | 4,518 | 6.22% | $15,900 | 6.45% |
| HERC-02 PW MAIN SHOP | 4,428 | 6.10% | $13,983 | 5.67% |
| POLICE STA/JAIL | 3,218 | 4.43% | $10,478 | 4.25% |
| PUBLIC WORKS OFFICE & SHOP | 2,181 | 3.00% | $7,389 | 3.00% |
| RR AT RAMP # 4 | 1,225 | 1.69% | $4,327 | 1.76% |
| RR @ RAMP #6 AND SYS #4 | 1,157 | 1.59% | $4,193 | 1.70% |
| OLD LIBRARY | 857 | 1.18% | $2,821 | 1.14% |
| RR AT LAUNCH RAMP | 854 | 1.18% | $3,076 | 1.25% |
| MOTOR POOL SHOP | 731 | 1.01% | $2,557 | 1.04% |
| RR BY HARBORMASTER OFFICE | 334 | 0.46% | $856 | 0.35% |
| EQUIPMENT STORAGE POLE BARN | 305 | 0.42% | $1,008 | 0.41% |
| WATER PUMP STA @ CROSSMAN | 271 | 0.37% | $1,008 | 0.41% |
| PH HARBORMASTER OFFICE | 252 | 0.35% | $921 | 0.37% |
| OLD WATER TREATMENT PLANT-EG | 98 | 0.13% | $365 | 0.15% |
| **Totals** | **72,602** | **100.00%** | **$246,505** | **100.00%** |

Table 12 shows City propane use has been decreasing with deliveries down 16.11% in 2007, 3.18% in 2008 and 18.78 % from 2006. Propane deliveries continue to drop significantly in 2009 with only 1,159 gallons delivered through September, a 68.49% decrease when compared to same period in 2008. The Old Water Treatment Plant is the largest consumer having 2778 gallons of propane delivered in 2008. Heating fuel deliveries were down 1.55% in 2008 after a 4.41% increase in 2007 (Table 12). Figure 9 shows heating fuel deliveries increasing by 7.22% through September 2009.

**Table 12 City of Homer Change in Heating Fuel Oil and Propane Use and Cost from 2006 – 2008**

| Energy Type | Energy Unit | Year | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|
| Propane | gal | 2006 | 5,739 | | | $14,230 | | |
| | | 2007 | 4,815 | -16.11% | -16.11% | $14,294 | 0.45% | 0.45% |
| | | 2008 | 4,662 | -3.18% | -18.78% | $17,428 | 21.92% | 22.47% |
| Fuel Oil (#1 & #2) | gal | 2006 | 70,626 | | | $176,055 | | |
| | | 2007 | 73,742 | 4.41% | 4.41% | $185,385 | 5.30% | 5.30% |
| | | 2008 | 72,602 | -1.55% | 2.80% | $246,505 | 32.97% | 40.02% |

Figure 10 illustrates how energy costs could have increased in 2008 even when many facilities decreased their fuel consumption.

**Figure 9 City of Homer Annual and Monthly Total Heating Fuel Oil Deliveries from 2006 through September 2009**

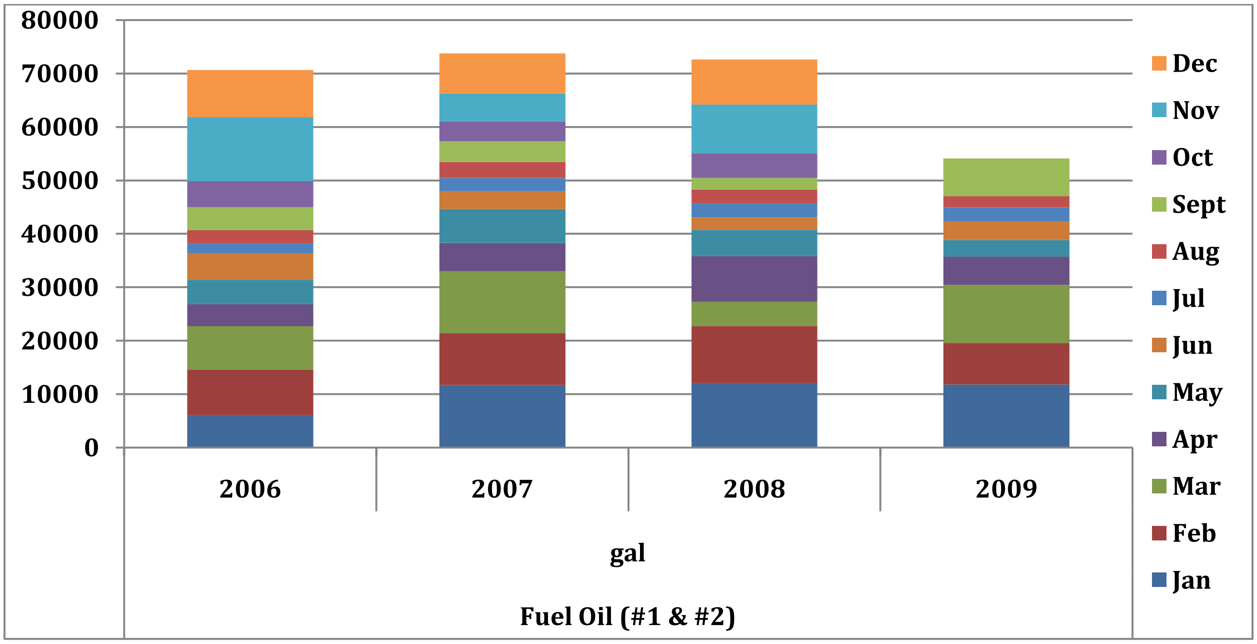
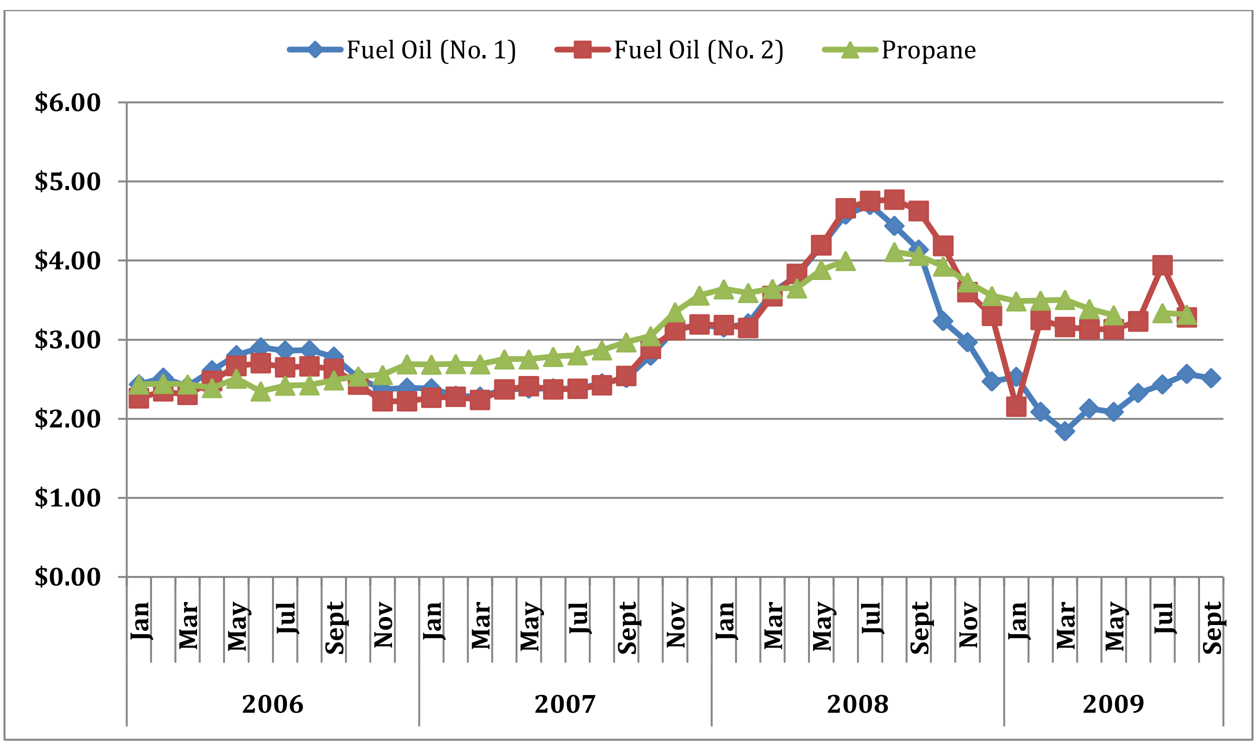



**Figure 10 Heating Fuel Oil and Propane Prices from January 2006 to September 2009**



### Airport Terminal

In 2008 electricity use for the Airport Terminal increased by 0.63% and heating fuel deliveries decreased by 4.01% as shown in Table 13. Reflective of the high fuel prices in 2008, fuel costs increased by 39.8% despite the decrease in deliveries and was a big factor as to why total energy costs were $67,883 for that year (Figure 11). Figure 12 shows heating fuel deliveries for 2009 are on track to exceed 2008 and are up 26.96% from 2008 during the January-September period. Figure 13 shows electricity use in 2009 increasing by 2.39% for the January-October period and that usage is on track to exceed 2008.

**Table 13 Airport Terminal Change in Energy Use and Costs from 2006 -2008**

| Year | Energy Type | Energy Unit | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Cost from Previous Year | % Difference of Cost from 2006 |
|---|---|---|---|---|---|---|---|---|
| **2006** | **Electricity** | kWh | 273,720 | | | $33,231 | | |
| | **Fuel Oil (#1 & #2 )** | gal | 8,724 | | | $20,991 | | |
| **2007** | **Electricity** | kWh | 274,040 | 0.12% | 0.12% | $33,750 | 1.56% | 1.56% |
| | **Fuel Oil (#1 & #2 )** | gal | 8,703 | -0.24% | -0.24% | $21,850 | 4.09% | 4.09% |
| **2008** | **Electricity** | kWh | 275,760 | 0.63% | 0.75% | $37,287 | 10.48% | 12.20% |
| | **Fuel Oil (#1 & #2 )** | gal | 8,354 | -4.01% | -4.24% | $30,546 | 39.80% | 45.52% |

**Figure 11 Airport Annual and Monthly Total Energy Costs from 2006 – October 2009**

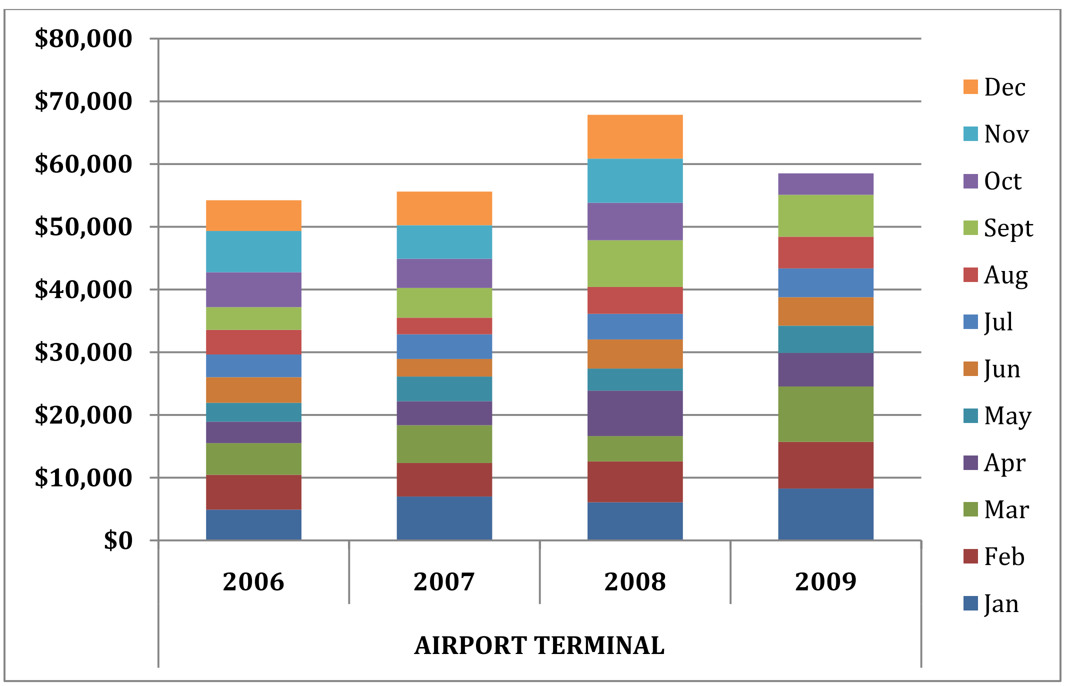


**Figure 12 Annual and Monthly Heating Fuel Oil (#1 & #2) Deliveries in Gallons for the AIRPORT TERMINAL from 2006 through September 2009**

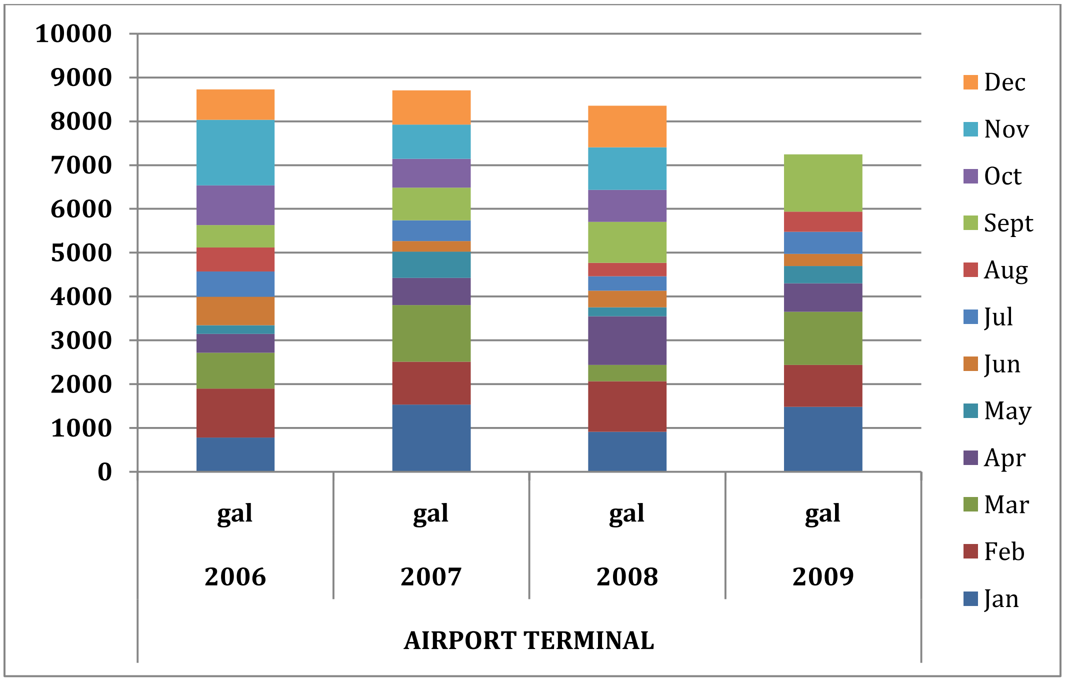
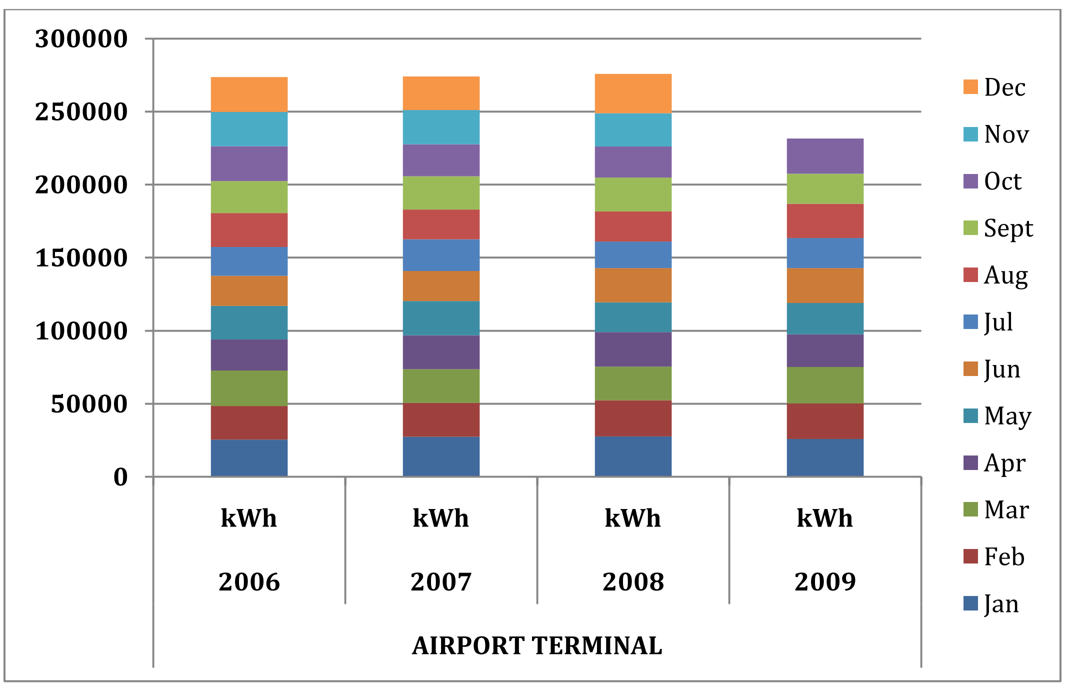



**Figure 13 Annual and Monthly Electricity Usage in kWh for the AIRPORT TERMINAL from 2006 through October 2009**



## Animal Shelter

In 2008 electricity use for the Animal Shelter decreased by 1.9% and heating fuel deliveries decreased by 18.06% as shown in Table 14. 2008 fuel costs increased by 22.02% despite the decrease in deliveries and was big factor as to why total energy costs were $30,438 for that year (Figure 14). Figure 15 shows heating fuel deliveries for 2009 are on track to increase, up 2.82% from 2008 during the same period. Figure 15 shows electricity use in 2009 decreasing by 14.22% for the January-October period.

**Table 14 Animal Shelter Change in Energy Use and Costs from 2006 -2008**

| Year | Energy Type | Energy Unit | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|
| 2006 | Electricity | kWh | 38,437 | | | $4,994 | | |
| | Fuel Oil (#1) | gal | 8,064 | | | $20,320 | | |
| 2007 | Electricity | kWh | 35,723 | -7.06% | -7.06% | $4,746 | -4.96% | -4.96% |
| | Fuel Oil (#1 ) | gal | 8,293 | 2.83% | 2.83% | $20,790 | 2.31% | 2.31% |
| 2008 | Electricity | kWh | 35,045 | -1.90% | -8.82% | $5,115 | 7.77% | 2.43% |
| | Fuel Oil (#1) | gal | 6,795 | -18.06% | -15.74% | $25,368 | 22.02% | 24.84% |

**Figure 14 Animal Shelter Annual and Monthly Total Energy Costs from 2006 – October 2009**

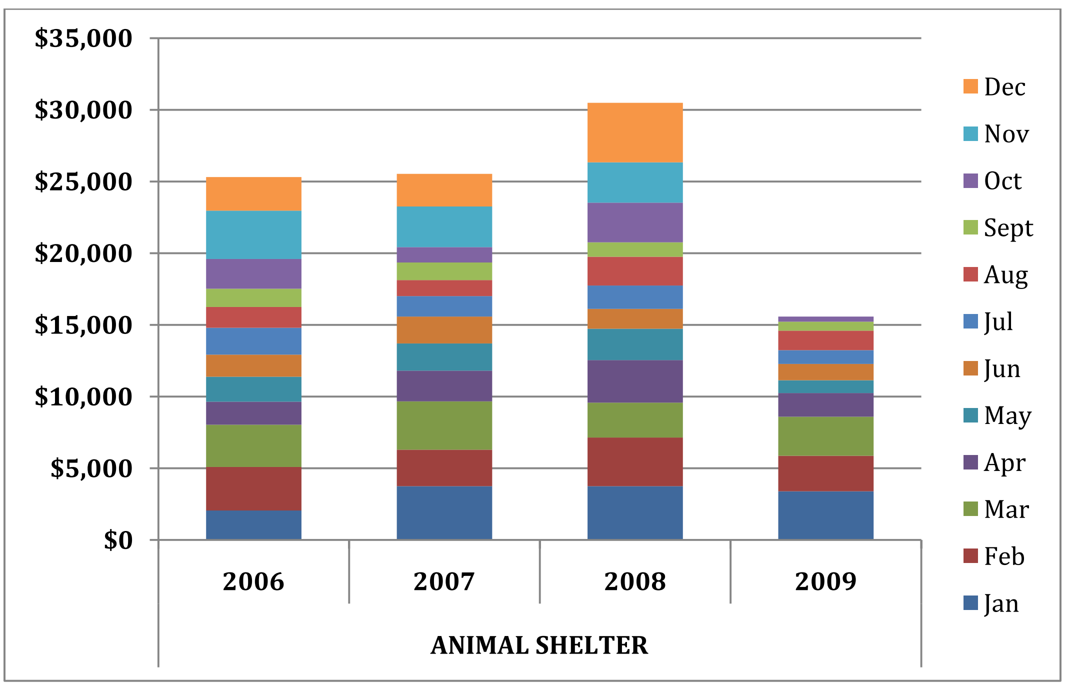


**Figure 15 Annual and Monthly Heating Fuel Oil (#1) Deliveries in gallons for the ANIMAL SHELTER from 2006 through Sept. 2009**

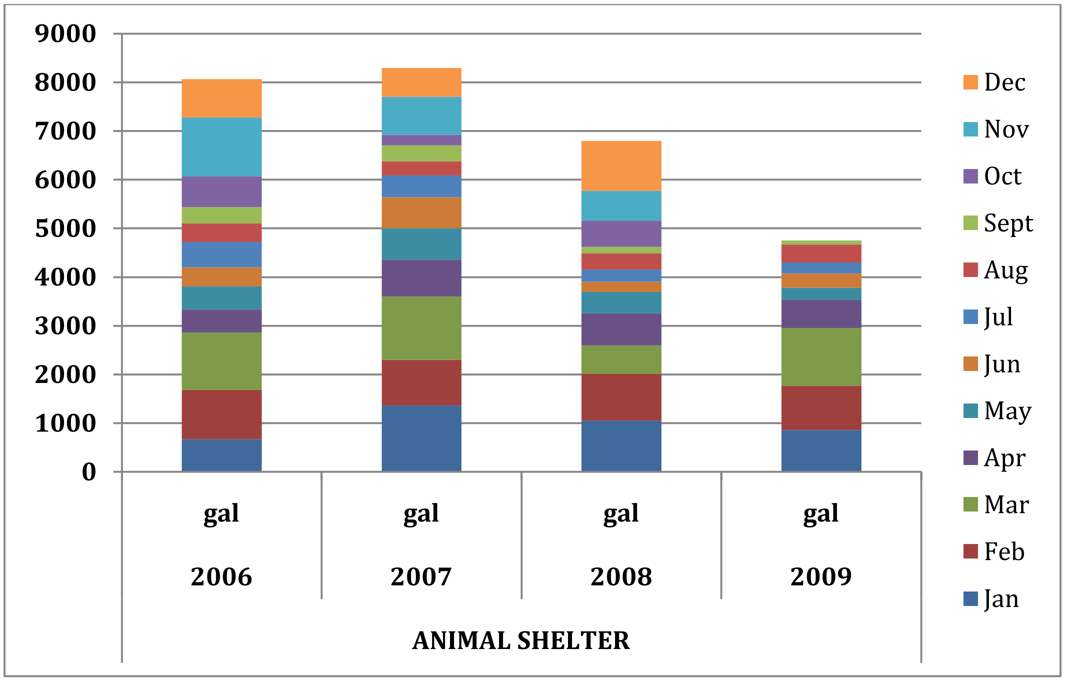
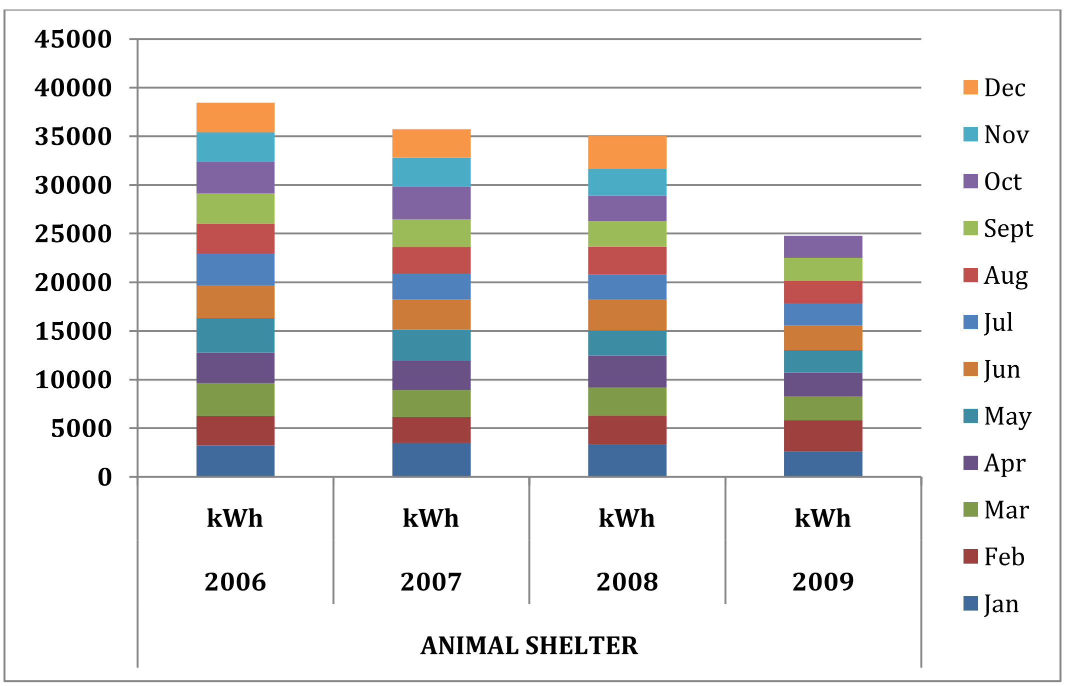



**Figure 16 Annual and Monthly Electricity Usage in kWh for the ANIMAL SHELTER from 2006 through October 2009**



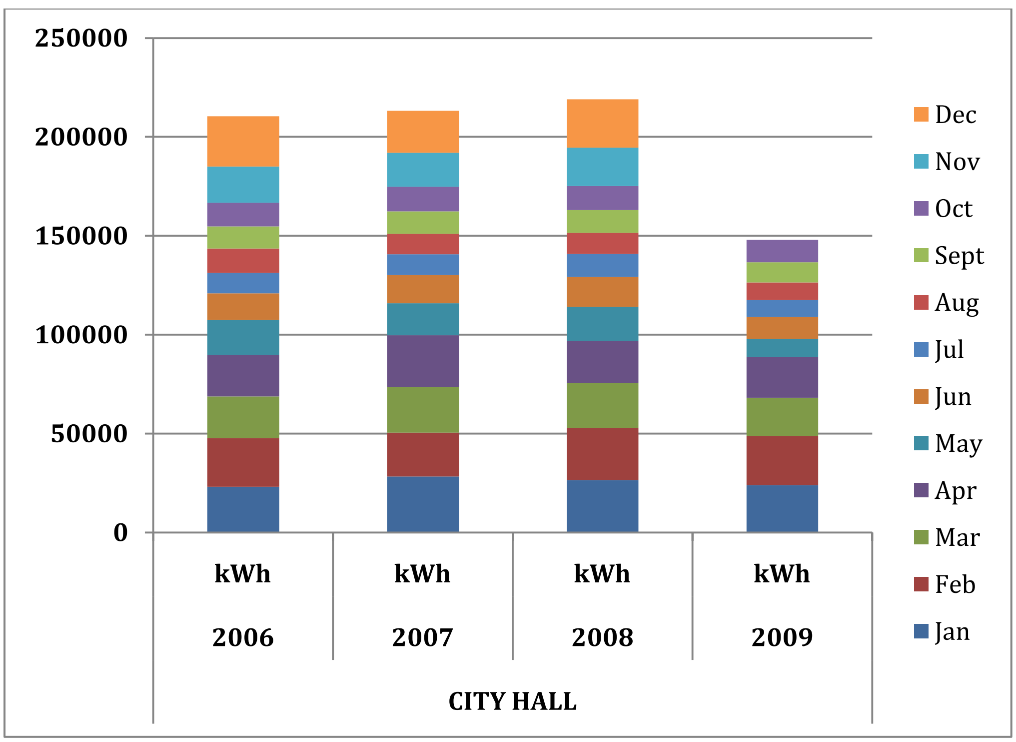
**City Hall**

In 2008 electricity use increased by 2.67% and costs were up 11.78% (Table 15) for City Hall. 2008 usage shows a 4.05% increase from 2006. Figure 17 shows that electricity usage is down with January-October usage showing a 15.61% decrease. City Hall added fuel use into its operations when it brought an emergency generator on line in September 2009 and had 180 gallons of fuel delivered.

**Table 15 City Hall Change in Energy Use and Costs from 2006 -2008**

| Year | Energy Type | Energy Unit | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|
| **2006** | **Electricity** | kWh | 210,420 | | | $27,590 | | |
| **2007** | **Electricity** | kWh | 213,240 | 1.34% | 1.34% | $28,029 | 1.59% | 1.59% |
| **2008** | **Electricity** | kWh | 218,940 | 2.67% | 4.05% | $31,331 | 11.78% | 13.56% |

**Figure 17 Annual and Monthly Electricity Usage in kWh for CITY HALL from 2006 through October 2009**



**Kenai Peninsula College and Boys and Girls Club**

The facility housing the Kenai Peninsula College and Boys and Girls Club (HERC-01) reduced electricity use by 7.03% while increasing fuel deliveries by 11.56% in 2008 (Table 16). Electricity usage is on a downward trend and was down 12.07% in 2008 as compared to 2006. The increase in fuel use along with the high fuel cost caused total energy costs for this facility to peak at $77,049 in 2008 (Figure 18). Figure 19 shows that fuel usage is on track to increase with deliveries up 1.83% for the January-September period. Figure 20 shows electricity continuing its downward track with use down 9.8% through October 2009.

**Table 16 Kenai Peninsula College and Boys and Girls Club Change in Energy Use and Costs from 2006 -2008**

| Year | Energy Type | Energy Unit | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|
| **2006** | **Electricity** | kWh | 135,920 | | | $18,764 | | |
| | **Fuel Oil (#1 )** | gal | 16,687 | | | $43,302 | | |
| **2007** | **Electricity** | kWh | 128,560 | -5.41% | -5.41% | $18,083 | -3.63% | -3.63% |
| | **Fuel Oil (#1)** | gal | 16,144 | -3.25% | -3.25% | $41,178 | -4.91% | -4.91% |
| **2008** | **Electricity** | kWh | 119,520 | -7.03% | -12.07% | $18,740 | 3.63% | -0.13% |
| | **Fuel Oil (#1)** | gal | 18,010 | 11.56% | 7.93% | $58,309 | 41.60% | 34.66% |

**Figure 18 Kenai Peninsula College and Boys and Girls Club Annual and Monthly Total Energy Costs from 2006 – October 2009**

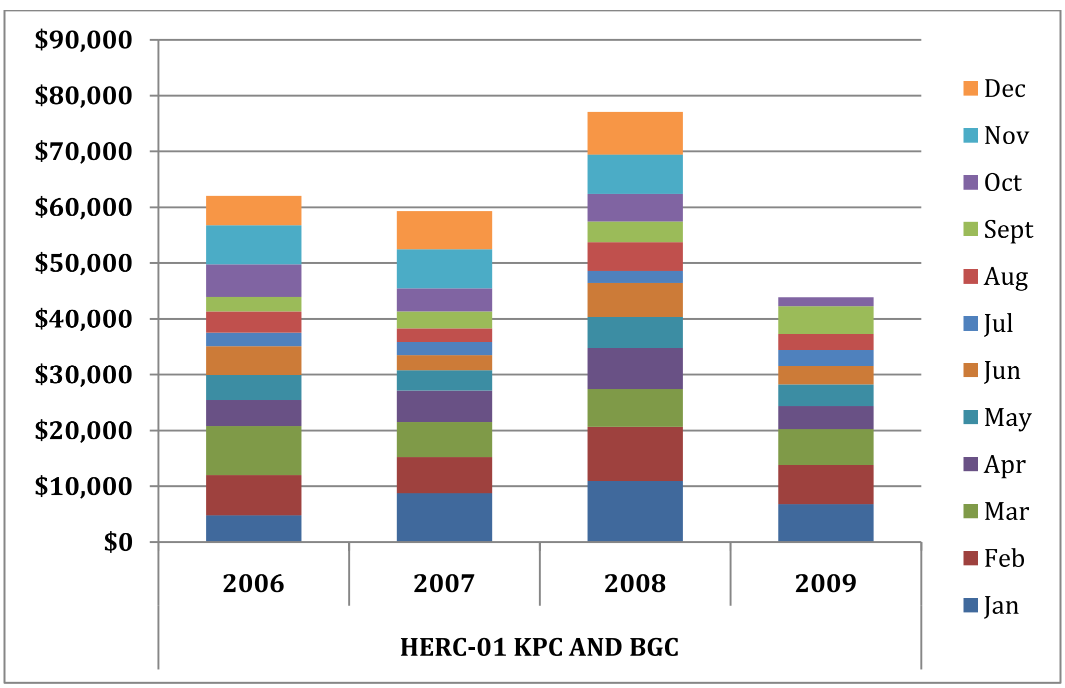


**Figure 19 Annual and Monthly Heating Fuel Oil (#1) Deliveries in gallons for Kenai Peninsula College and Boys and Girls Club (HERC-01 KPC AND BGC) from 2006 through September 2009**

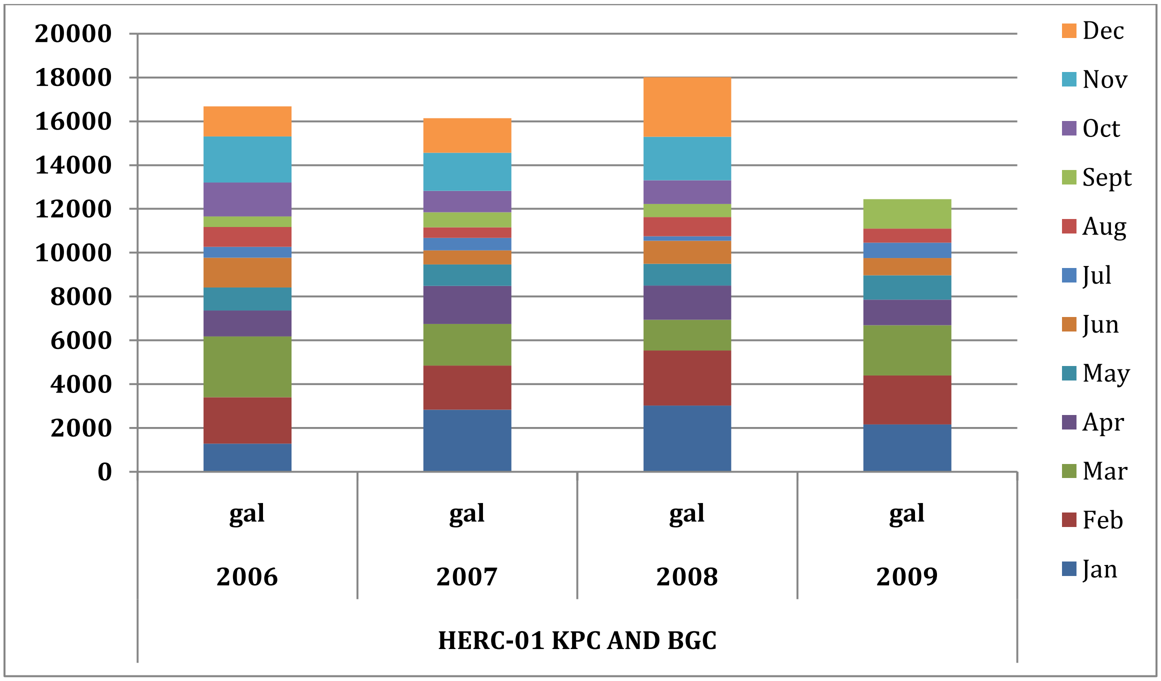
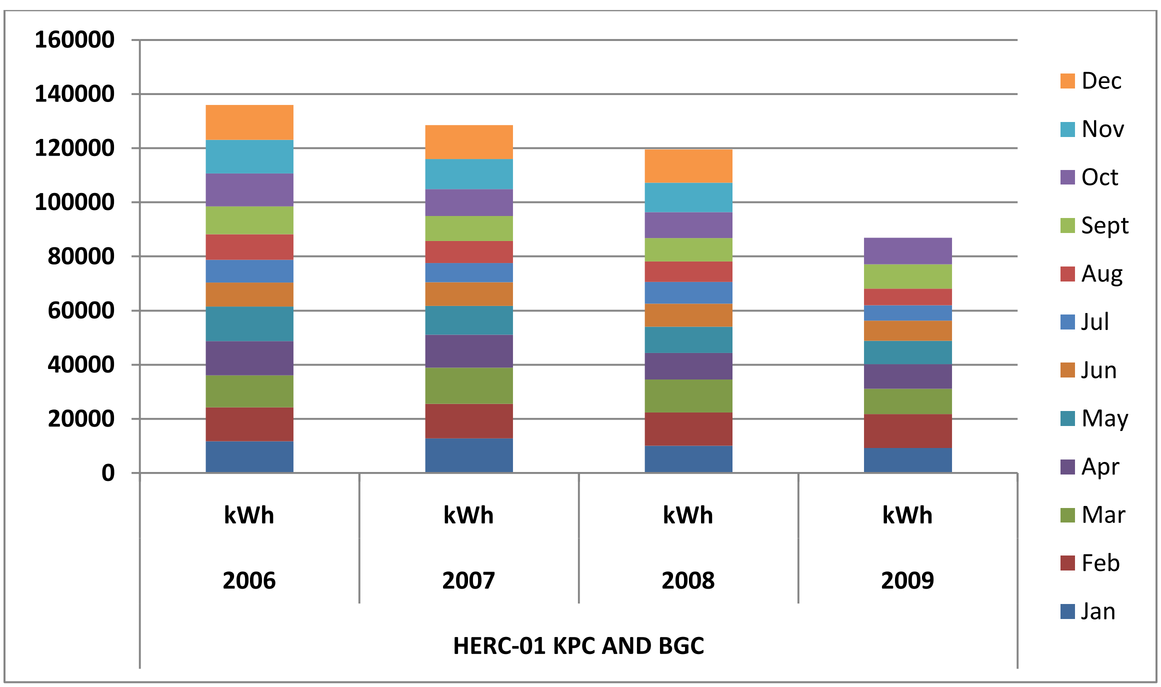



**Figure 20 Annual and Monthly Electricity Usage in kWh for Kenai Peninsula College and Boys and Girls Club (HERC-01 KPC AND BGC) from 2006 through October 2009**



## Parks and Recreation

Parks and Recreation facilities total electricity usage has been on a downward trend with usage decreasing by 20.38% in 2007 and by 2.62% in 2008 compared to 2006 (Table 19). Table 17 shows the change in electricity use and costs for individual Parks and Recreation facilities from 2006-2008. Three facilities showed electricity use increases in 2008 - KAREN HORNADAY PK/CG/BF (20.84%); RR AT RAMP #6 AND SYS #4 (23.9%); and RR AT LAUCH RAMP(38.6%). All other facilities show a decrease in usage with BEN WALTERS PARK showing the largest decrease of 75.22%. Annual and monthly electricity usage trends for City parks are shown in Figure 21 and for Homer Spit restrooms in Figure 22.

**Table 17 Parks and Recreation Facilities Change in Electricity Use and Costs from 2006 -2008**

| Equipment Type | Space Name | Year | Sum of Electricity Use (kWh) | % Difference of Electricity Use from Previous Year | % Difference of Electricity Use from 2006 | Sum of Electricity Cost | % Difference of Electricity Cost from Previous Year | % Difference of Electricity Cost from 2006 |
|---|---|---|---|---|---|---|---|---|
| **Campground** | **HSC FEE COLLECTION BLDG** | 2006 | 997 | | | $300 | | |
| | | 2007 | 1,062 | 6.52% | 6.52% | $378 | 25.86% | 25.86% |
| | | 2008 | 1,001 | -5.74% | 0.40% | $308 | -18.54% | 2.53% |
| **Cemetery** | **HICKERSON MEMORIAL CEMETARY** | 2006 | 0 | | | $288 | | |
| | | 2007 | 0 | | | $312 | 8.33% | 8.33% |
| | | 2008 | 0 | | | $264 | -15.38% | -8.33% |
| **Park** | **BEN WALTERS PARK** | 2006 | 17,020 | | | $2,344 | | |
| | | 2007 | 5,057 | -70.29% | -70.29% | $908 | -61.28% | -61.28% |
| | | 2008 | 1,253 | -75.22% | -92.64% | $452 | -50.17% | -80.70% |
| | **KAREN HORNADAY PK/CG/BF** | 2006 | 6,376 | | | $1,041 | | |
| | | 2007 | 3,531 | -44.62% | -44.62% | $732 | -29.70% | -29.70% |
| | | 2008 | 4,267 | 20.84% | -33.08% | $917 | 25.34% | -11.88% |
| | **WKFL PARK GAZEBO** | 2006 | 1,684 | | | $502 | | |
| | | 2007 | 692 | -58.91% | -58.91% | $382 | -23.78% | -23.78% |
| | | 2008 | 646 | -6.65% | -61.64% | $365 | -4.52% | -27.22% |
| **Restroom** | **RR AT RAMP #6 AND SYS #4** | 2006 | 29,520 | | | $5,446 | | |
| | | 2007 | 21,760 | -26.29% | -26.29% | $4,518 | -17.04% | -17.04% |
| | | 2008 | 26,960 | 23.90% | -8.67% | $5,391 | 19.33% | -1.00% |
| | **RR AT FISHING LAGOON** | 2006 | 4,456 | | | $774 | | |
| | | 2007 | 3,876 | -13.02% | -13.02% | $783 | 1.09% | 1.09% |
| | | 2008 | 3,274 | -15.53% | -26.53% | $747 | -4.57% | -3.53% |
| | **RR AT LAUNCH RAMP** | 2006 | 1,251 | | | $440 | | |
| | | 2007 | 1,399 | 11.83% | 11.83% | $462 | 4.96% | 4.96% |
| | | 2008 | 1,939 | 38.60% | 55.00% | $553 | 19.77% | 25.72% |
| | **RR AT RAMP # 4** | 2006 | 2,575 | | | $591 | | |
| | | 2007 | 3,800 | 47.57% | 47.57% | $769 | 30.04% | 30.04% |
| | | 2008 | 3,316 | -12.74% | 28.78% | $745 | -3.15% | 25.94% |
| | **RR BY HARBORMASTER OFFICE** | 2006 | 23,288 | | | $3,100 | | |
| | | 2007 | 28,226 | 21.20% | 21.20% | $3,814 | 23.00% | 23.00% |
| | | 2008 | 24,931 | -11.67% | 7.06% | $3,631 | -4.79% | 17.11% |

Heating fuel oil deliveries have been on upward trend with deliveries increasing by 0.68% in 2007 and 42.77% in 2008. Table 18 shows change in heating fuel and propane use for individual Parks and Recreation facilities from 2006-2008 and Figure 23 shows fuel delivery trends through September 2009 for the Homer Spit restrooms. Table 19 shows a complete accounting of Parks and Recreation facilities energy use and costs from 2006–October 2009.

**Table 18 Parks and Recreation Facilities Change in Heating Fuel Oil and Propane Use and Costs from 2006–2008**

| Equipment Type | Space Name | Energy Type | Year | Sum of Energy Consumption (gallons) | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|---|
| Campground | HSC FEE COLLECTION BLDG | Propane | 2006 | 192 | | | $467 | | |
| | | Propane | 2007 | 402 | 109.38% | 109.38% | $1,134 | 143.02% | 143.02% |
| | | Propane | 2008 | 290 | -27.81% | 51.15% | $1,182 | 4.22% | 153.28% |
| Restroom | RR @ RAMP #6 AND SYS #4 | Fuel Oil (# 1 & #2) | 2006 | 698 | | | $1,655 | | |
| | | Fuel Oil (# 1 & #2) | 2007 | 788 | 12.97% | 12.97% | $1,895 | 14.55% | 14.55% |
| | | Fuel Oil (#2) | 2008 | 1,157 | 46.85% | 65.91% | $4,193 | 121.23% | 153.41% |
| | RR AT LAUNCH RAMP | Fuel Oil (# 1 & #2) | 2006 | 471 | | | $1,119 | | |
| | | Fuel Oil (# 1 & #2) | 2007 | 667 | 41.67% | 41.67% | $1,602 | 43.18% | 43.18% |
| | | Fuel Oil (# 1 & #2) | 2008 | 854 | 28.04% | 81.39% | $3,076 | 91.99% | 174.89% |
| | RR AT RAMP # 4 | Fuel Oil (# 1 & #2) | 2006 | 706 | | | $1,671 | | |
| | | Fuel Oil (# 1 & #2) | 2007 | 843 | 19.49% | 19.49% | $2,049 | 22.64% | 22.64% |
| | | Fuel Oil (# 1 & #2) | 2008 | 1,225 | 45.34% | 73.66% | $4,327 | 111.14% | 158.94% |
| | RR BY HARBORMASTER OFFICE | Fuel Oil (# 1) | 2006 | 610 | | | $1,537 | | |
| | | Fuel Oil (# 1) | 2007 | 203 | -66.73% | -66.73% | $476 | -69.04% | -69.04% |
| | | Fuel Oil (# 1 & #2) | 2008 | 334 | 64.63% | -45.23% | $856 | 79.87% | -44.32% |

**Figure 21Annual and Monthly Electricity Usage at City of Homer Parks from 2006 through October 2009**

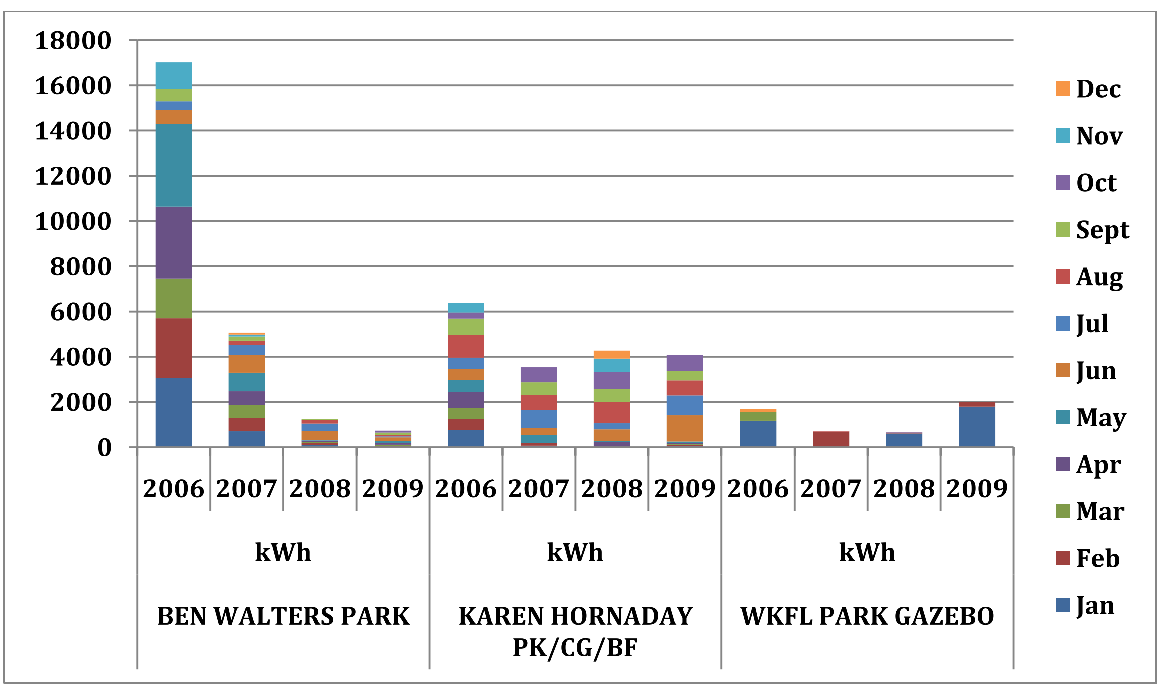


**Figure 22 Annual and Monthly Electricity Usage at Restrooms on the Homer Spit from 2006 through October 2009**

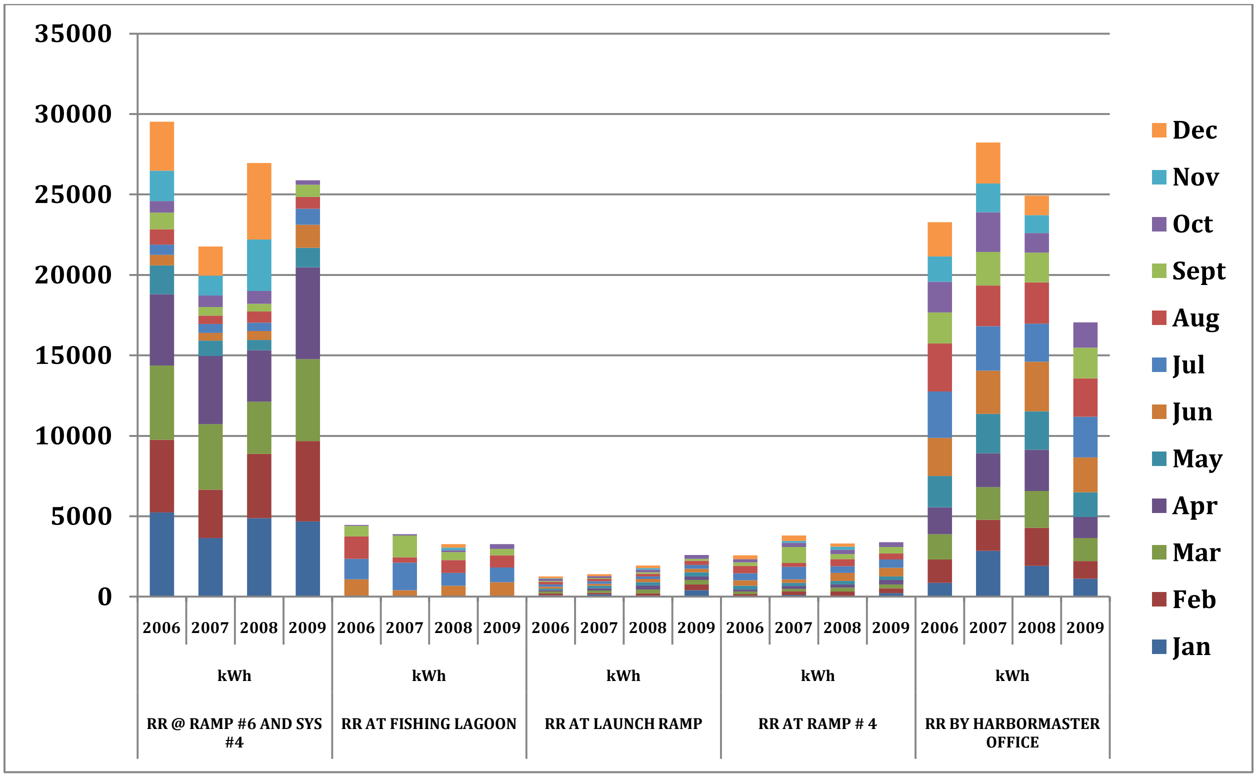



**Figure 23 Annual and Monthly Heating Fuel Oil Deliveries at Restrooms on the Homer Spit from 2006 through September 2009**

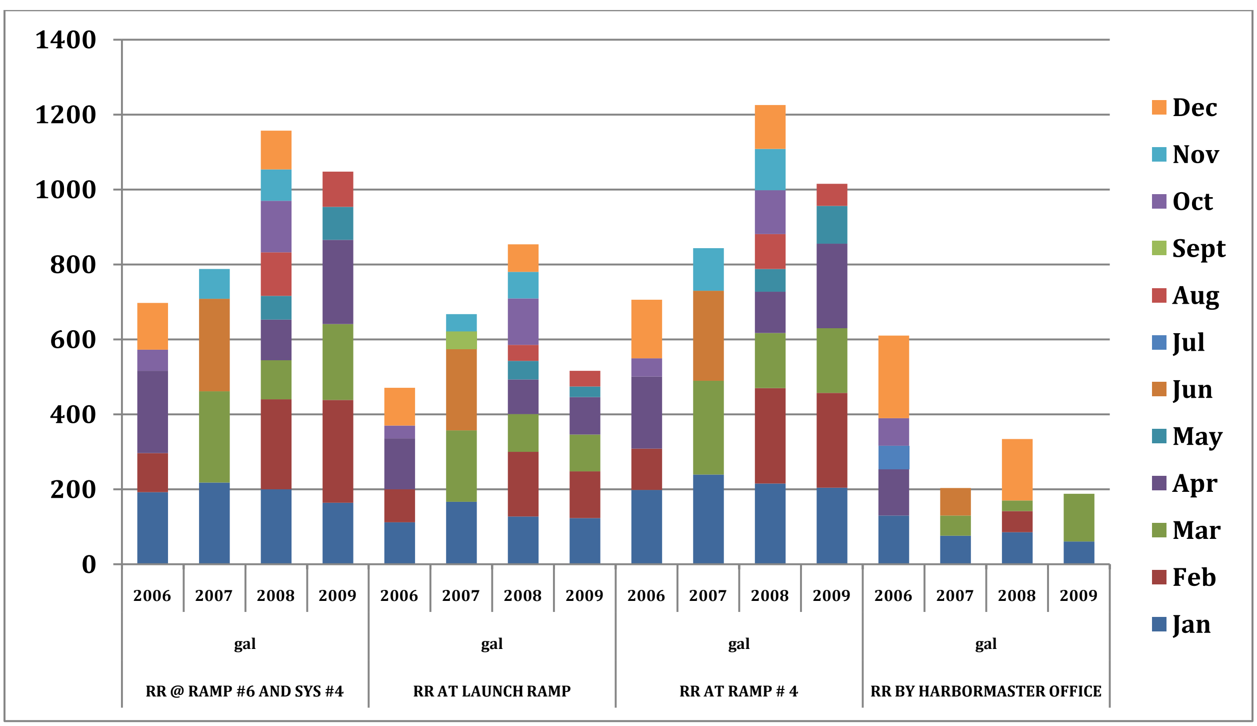


**Table 19 Parks and Recreation Facilities Energy Use and Cost from 2006 through October 2009**

| | | | | 2006 | | 2007 | | 2008 | | 2009[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment Type | Space Name | Energy Type | Energy Unit | Sum of Energy Consumption[2] | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost |
| **Campground** | **HSC FEE COLLECTION BLDG** | Electricity | kWh | 997 | $300 | 1,062 | $378 | 1,001 | $308 | 430 | $239 |
| | | Propane | gal | 192 | $467 | 402 | $1,134 | 290 | $1,182 | 159 | $533 |
| **Campground Total Energy Cost** | | | | | **$767** | | **$1,512** | | **$1,490** | | **$772** |
| **Cemetery** | **HICKERSON MEMORIAL CEMETARY** | Electricity | kWh | 0 | $288 | 0 | $312 | 0 | $264 | 0 | $240 |
| **Park** | **KAREN HORNADAY PK/CG/BF** | Electricity | kWh | 6,376 | $1,041 | 3,531 | $732 | 4,267 | $917 | 4,071 | $912 |
| | **RR AT BEN WALTERS PARK** | Electricity | kWh | 17,020 | $2,344 | 5,057 | $908 | 1,253 | $452 | 734 | $365 |
| | **WKFL PARK GAZEBO** | Electricity | kWh | 1,684 | $502 | 692 | $382 | 646 | $365 | 1,995 | $650 |
| **Park Total** | | **Electricity** | **kWh** | **25,080** | **$3,886** | **9,280** | **$2,022** | **6,166** | **$1,734** | **6,800** | **$1,926** |
| **Restroom** | **RR @ RAMP #6 AND SYS #4** | Electricity | kWh | 29,520 | $5,446 | 21,760 | $4,518 | 26,960 | $5,391 | 25,880 | $6,289 |
| | | Fuel Oil (#1 & or #2 )[3] | gal | 698 | $1,655 | 788 | $1,895 | 1,157 | $4,193 | 1,048 | $2,143 |
| | **RR AT FISHING LAGOON** | Electricity | kWh | 4,456 | $774 | 3,876 | $783 | 3,274 | $747 | 3,261 | $780 |
| | **RR AT LAUNCH RAMP** | Electricity | kWh | 1,251 | $440 | 1,399 | $462 | 1,939 | $553 | 2,589 | $708 |
| | | Fuel Oil (#1 & or #2 ) | gal | 471 | $1,119 | 667 | $1,602 | 854 | $3,076 | 516 | $1,056 |
| | **RR AT RAMP # 4** | Electricity | kWh | 2,575 | $591 | 3,800 | $769 | 3,316 | $745 | 3,393 | $830 |
| | | Fuel Oil (#1 & or #2 ) | gal | 706 | $1,671 | 843 | $2,049 | 1,225 | $4,327 | 1,015 | $2,073 |
| | **RR BY HARBORMASTER OFFICE** | Electricity | kWh | 23,288 | $3,100 | 28,226 | $3,814 | 24,931 | $3,631 | 17,057 | $3,198 |
| | | Fuel Oil (#1 & or #2 ) | gal | 610 | $1,537 | 203 | $476 | 334 | $856 | 188 | $352 |
| **Restroom Total Fuel Oil (#1 & #2 )** | | Fuel Oil (#1 & #2 ) | **gal** | **2,484** | **$5,982** | **2,501** | **$6,023** | **3,571** | **$12,452** | **2,767** | **$5,625** |
| **Restroom Total Electricity** | | **Electricity** | **kWh** | **61,090** | **$10,352** | **59,061** | **$10,345** | **60,420** | **$11,067** | **52,180** | **$11,805** |
| **Restroom Total Energy Cost** | | | | | **$16,333** | | **$16,368** | | **$23,519** | | $17,430 |
| **Grand Total Propane** | | **Propane** | **gal** | **192** | **$467** | **402** | **$1,134** | **290** | **$1,182** | **159** | **$533** |
| **Grand Total Fuel Oil (#1 & #2 )** | | Fuel Oil (#1 & #2 ) | **gal** | **2,484** | **$5,982** | **2,501** | **$6,023** | **3,571** | **$12,452** | **2,767** | **$5,625** |
| **Grand Total Electricity** | | **Electricity** | **kWh** | **88,320** | **$15,313** | **70,778** | **$13,574** | **68,747** | **$13,827** | **60,818** | **$14,714** |
| **Grand Total Energy Cost** | | | | | **$21,275** | | **$20,213** | | **$27,007** | | $20,368 |

[1] Heating Fuel Oil (# 1 & #2) and Propane deliveries are through September 2009 and kWhs used are through October 2009.
[2] 2006- 2009 Heating Fuel Oil (#1 & #2) and Propane gallon numbers are deliveries to the fuel tanks.
[3] The Fuel Oil (# 2) delivery on 2/15/06 of 302.8 gallons to restrooms at Ramp # 4, Ramp #6, and the Launch Ramp was pooled together. Data was divided between the three restrooms based on delivery average.

## Police and Fire Department Facilities

It is difficult to measure energy usage for the Police and Fire Department facilities since the Fire Hall and the Police Station/Jail electricity usage are measured on the same electric meter. Usage is divided 40% Fire Hall, 40 % Police Station, and 20% Jail. The Fire Hall had electricity measured on its own account and meter through August 2006 when it was hooked up to the Police Station meter. The Police Station and Jail electricity usage is divided 80% Police Station and 20% Jail through August 2006. Table 21 shows a 3.29% increase in electricity use in 2008 for the Fire Hall, Police Station, and Jail, but the only reason the percentage is the same is because the split of kWh is done by percentage and not by actual measurement. It is recommended that an electric sub meter be placed on the Fire Hall to get an accurate reading of usage, especially since this facility heats with electricity. Figure 24 shows electricity usage for these facilities decreasing by 4.22% in 2009 for the January–October period. Table 20 and Figure 25 show a dramatic increase (107.86%) in fuel deliveries in 2008 for the police station, but a 43.77% decrease in the January through September period in 2009. Table 21 shows energy use and costs for all Police and Fire Department facilities from 2006–October 2009.

**Table 20 Police and Fire Departments Change in Energy Use and Costs from 2006–2008**

| Space Name | Year | Energy Type | Energy Unit | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|---|
| HPD COM ON HOMER SPIT RD | 2006 | **Electricity** | kWh | 1,163 | | | $431 | | |
| | 2007 | **Electricity** | kWh | 1,711 | 47.12% | 47.12% | $503 | 16.88% | 16.88% |
| | 2008 | **Electricity** | kWh | 1,393 | -18.59% | 19.78% | $478 | -5.08% | 10.94% |
| FIRE HALL | 2006 | **Electricity** | kWh | 134,716 | | | $18,969 | | |
| | 2007 | **Electricity** | kWh | 123,072 | -8.64% | -8.64% | $17,040 | -10.17% | -10.17% |
| | 2008 | **Electricity** | kWh | 127,120 | 3.29% | -5.64% | $19,070 | 11.91% | 0.53% |
| JAIL | 2006 | **Electricity** | kWh | 41,136 | | | $5,361 | | |
| | 2007 | **Electricity** | kWh | 61,536 | 49.59% | 49.59% | $7,746 | 44.48% | 44.48% |
| | 2008 | **Electricity** | kWh | 63,560 | 3.29% | 54.51% | $8,668 | 11.91% | 61.68% |
| POLICE STA/JAIL | 2006 | **Fuel Oil (#1 & #2 )** | gal | 1,403 | | | $3,501 | | |
| | 2007 | **Fuel Oil (#1 & #2 )** | gal | 1,548 | 10.34% | 10.34% | $3,868 | 10.48% | 10.48% |
| | 2008 | **Fuel Oil (#1 )** | gal | 3,218 | 107.86% | 129.35% | $10,478 | 170.92% | 199.31% |
| POLICE STATION | 2006 | **Electricity** | kWh | 126,848 | | | $16,241 | | |
| | 2007 | **Electricity** | kWh | 123,072 | -2.98% | -2.98% | $15,491 | -4.61% | -4.61% |
| | 2008 | **Electricity** | kWh | 127,120 | 3.29% | 0.21% | $17,336 | 11.91% | 6.75% |

**Figure 24 Annual and Monthly Electricity Usage in kWh for the Fire Hall, Jail, and Police Station**

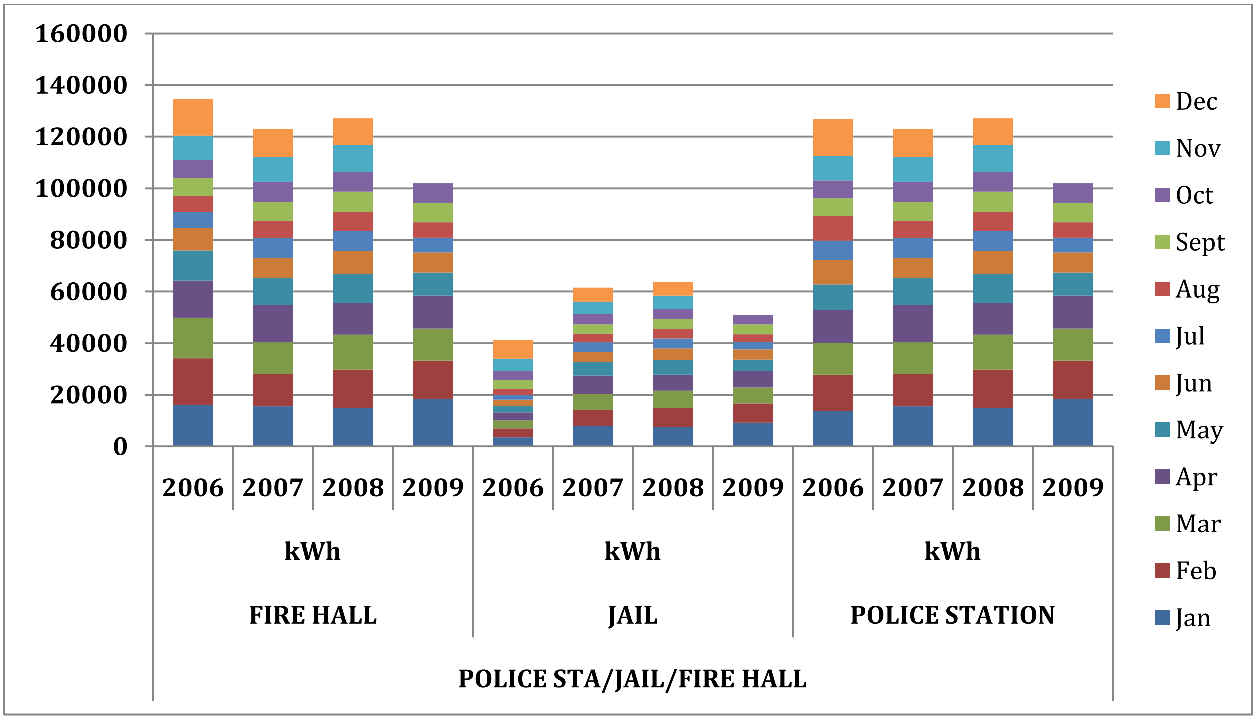
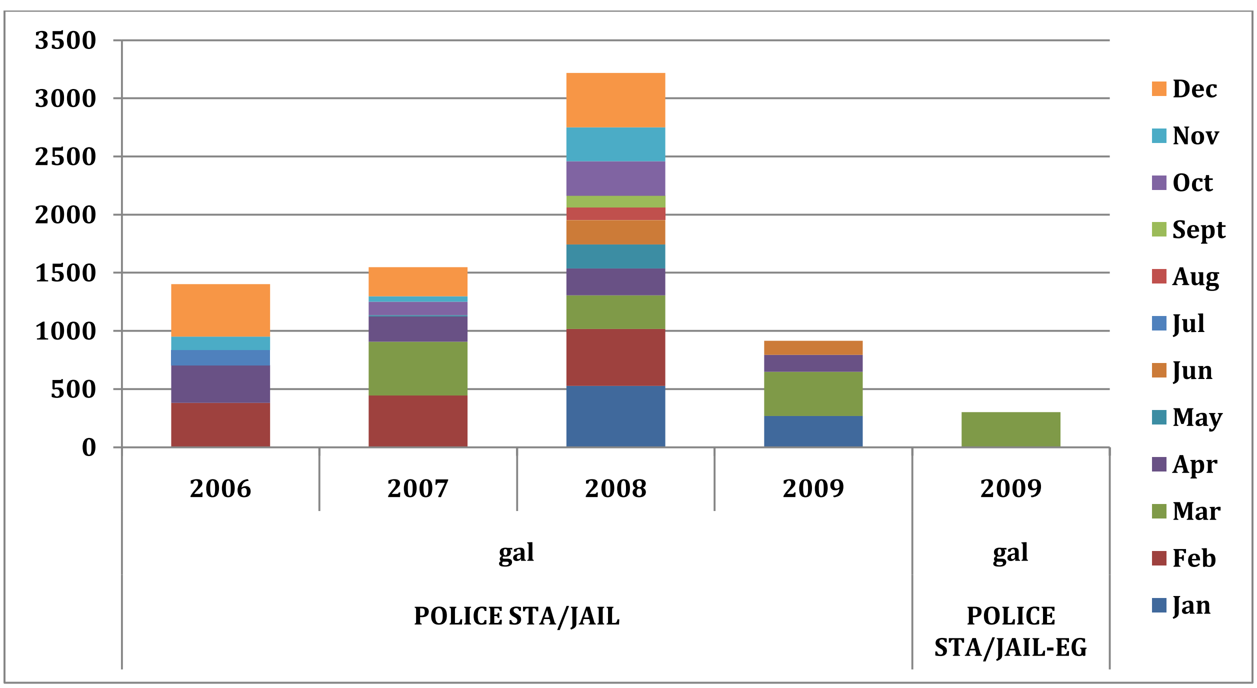



**Figure 25 Annual and Monthly Heating Fuel Oil (#1 & #2) Deliveries in Gallons for the Police Station and Jail**



## Table 21 Police and Fire Department Facilities Energy Use and Cost from 2006 through October 2009

| | | | | 2006 | | 2007 | | 2008 | | 2009[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment Type | Space Name | Energy Type | Energy Unit | Sum of Energy Consumption[2] | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost |
| Facility | FIRE HALL | Electricity | kWh | 134,716 | $18,969 | 123,072 | $17,040 | 127,120 | $19,070 | 101,920 | $20,067 |
| | JAIL | Electricity | kWh | 41,136 | $5,361 | 61,536 | $7,746 | 63,560 | $8,668 | 50,960 | $9,278 |
| | POLICE STA/JAIL | Fuel Oil (#1 & #2 ) | gal | 1,403 | $3,501 | 1,548 | $3,868 | 3,218 | $10,478 | 915 | $1,840 |
| | POLICE STA/JAIL-EG | Fuel Oil (#1 ) | gal | | | | | | | 301 | $559 |
| | POLICE STATION | Electricity | kWh | 126,848 | $16,241 | 123,072 | $15,491 | 127,120 | $17,336 | 101,920 | $18,557 |
| **Facility Total Fuel Oil (#1 & #2 )** | | **Fuel Oil (#1 & #2 )** | **gal** | **1,403** | **$3,501** | **1,548** | **$3,868** | **3,218** | **$10,478** | **1,216** | **$2,399** |
| **Facility Total Electricity** | | **Electricity[3]** | **kWh** | **302,700** | **$40,571** | **307,680** | **$40,277** | **317,800** | **$45,074** | **254,800** | **$47,902** |
| **Facility Total** | | | | **304,103** | **$44,072** | **309,228** | **$44,145** | **321,018** | **$55,552** | **256,016** | **$50,301** |
| **Communications** | **HPD COM ON HOMER SPIT RD** | **Electricity** | **kWh** | 1,163 | $431 | 1,711 | $503 | 1,393 | $478 | 995 | $417 |
| **Siren** | **WARNING SIREN HOMER SPIT RD[4]** | **Electricity** | **kWh** | | | | | 640 | $338 | 476 | $330 |
| **Grand Total Fuel Oil (#1 & #2 )** | | **Fuel Oil (#1 & #2 )** | **gal** | **1,403** | **$3,501** | **1,548** | **$3,868** | **3,218** | **$10,478** | **1,216** | **$2,399** |
| **Grand Total Electricity** | | **Electricity** | **kWh** | **303,863** | **$41,002** | **309,391** | **$40,781** | **319,833** | **$45,890** | **256,271** | **$48,649** |
| **Grand Total Energy Cost** | | | | | **$44,503** | | **$44,648** | | **$56,368** | | **$51,048** |

[1] Fuel Oil (#1 & #2) deliveries are through September 2009 and kWhs used are through October 2009.
[2] 2006–2009 Fuel Oil (# 1 & #2) gallon numbers are deliveries to the fuel tanks.
[3] Electricity usage for the Fire Hall and the Police Station/Jail is measured on the Police Station electric meter. Usage is divided 40% Fire Hall, 40 % Police Station, and 20% Jail. The Fire Hall had electricity measured on its own account and meter through August 2006 when it was hooked up to the Police Station meter. The Police Station and Jail electricity usage is divided 80% Police Station and 20% Jail through August 2006.
[4] The Warning Siren on Homer Spit Road has a Finance Code for City Hall (100-140-5217).

## Port and Harbor Facilities

Port and Harbor facilities electricity use increased by 1.38% in 2008 and is up 6.99% from 2006 (Table23). Table 22 shows the change in electricity use and costs for individual Port and Harbor facilities from 2006–2008. The Fish Dock showed a slight increase of 0.61% in 2008, but is up 7.11% from 2006 usage. System #1 Float usage increased 7.81% in 2008 and is up 12.82% from 2006. System #5 Float, the Port and Harbor's second largest electricity user, has been decreasing in electricity use with a 5.1% decrease in 2008 over 2007 and down 3.15% from 2006.

**Table 22 Port and Harbor Facilities Change in Electricity Use and Costs from 2006 -2008**

| Equipment Type | Space Name | Year | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|
| Dock | DEEP WATER DOCK | 2006 | 11,440 | | | $3,342 | | |
| | | 2007 | 11,240 | -1.75% | -1.75% | $3,357 | 0.45% | 0.45% |
| | | 2008 | 10,960 | -2.49% | -4.20% | $3,444 | 2.59% | 3.06% |
| | MAIN DK INSIDE PIONEER DK | 2006 | 13,960 | | | $2,054 | | |
| | | 2007 | 17,000 | 21.78% | 21.78% | $2,418 | 17.70% | 17.70% |
| | | 2008 | 12,840 | -24.47% | -8.02% | $1,972 | -18.44% | -4.00% |
| | PIONEER DOCK EAST | 2006 | 200 | | | $3,653 | | |
| | | 2007 | 240 | 20.00% | 20.00% | $3,713 | 1.64% | 1.64% |
| | | 2008 | 680 | 183.33% | 240.00% | $3,292 | -11.33% | -9.88% |
| Facility | FISH DOCK | 2006 | 872,300 | | | $110,309 | | |
| | | 2007 | 928,600 | 6.45% | 6.45% | $120,433 | 9.18% | 9.18% |
| | | 2008 | 934,300 | 0.61% | 7.11% | $134,996 | 12.09% | 22.38% |
| | PH HARBORMASTER OFFICE | 2006 | 54,705 | | | $7,087 | | |
| | | 2007 | 48,479 | -11.38% | -11.38% | $6,363 | -10.21% | -10.21% |
| | | 2008 | 39,181 | -19.18% | -28.38% | $5,660 | -11.06% | -20.14% |
| | PORT & HARBOR MAIN SHOP | 2006 | 41,120 | | | $5,371 | | |
| | | 2007 | 40,080 | -2.53% | -2.53% | $5,318 | -0.98% | -0.98% |
| | | 2008 | 44,120 | 10.08% | 7.30% | $6,279 | 18.08% | 16.91% |
| | PORT & HARBOR USED OIL BLDG | 2006 | 9,211 | | | $1,416 | | |
| | | 2007 | 7,486 | -18.73% | -18.73% | $1,221 | -13.75% | -13.75% |
| | | 2008 | 16,562 | 121.24% | 79.81% | $2,641 | 116.28% | 86.54% |
| Grid | WOOD GRID | 2006 | 1,118 | | | $425 | | |
| | | 2007 | 1,100 | -1.61% | -1.61% | $425 | -0.20% | -0.20% |
| | | 2008 | 1,277 | 16.09% | 14.22% | $462 | 8.93% | 8.71% |
| Harbor | SYS #1 FLT & H MAST LGT#1 | 2006 | 582,200 | | | $71,797 | | |
| | | 2007 | 609,280 | 4.65% | 4.65% | $75,062 | 4.55% | 4.55% |
| | | 2008 | 656,840 | 7.81% | 12.82% | $86,690 | 15.49% | 20.74% |
| | SYSTEM #5 (LIGHT/FLOAT) | 2006 | 650,000 | | | $81,036 | | |
| | | 2007 | 663,360 | 2.06% | 2.06% | $81,592 | 0.69% | 0.69% |
| | | 2008 | 629,520 | -5.10% | -3.15% | $85,073 | 4.27% | 4.98% |
| Light | HIGH MAST LGT #7 @ RAMP #6 | 2007[1] | 29,746 | | | $3,979 | | |
| | | 2008 | 53,811 | 80.90% | | $7,753 | 94.84% | |
| | HIGH MAST LGTS #2,3, & 4 | 2006 | 124,020 | | | $17,287 | | |
| | | 2007 | 120,480 | -2.85% | -2.85% | $16,838 | -2.60% | -2.60% |
| | | 2008 | 127,320 | 5.68% | 2.66% | $19,284 | 14.53% | 11.55% |

[1] kWh is from May –December.

Figure 26 shows the Fish Dock on track to increase its electricity usage in 2009 with a 1.41% increase in usage in the January–October period. Figure 27 shows electricity usage for High Mast Lights # 2, 3, 4, and 7. Figure 28 shows usage trends for the Dock facilities and Figure 29 shows electricity usage for the System #1 and System #5 Harbor Floats. Both floats are continuing their respective trends with System #1 Float on track for an increase and System #5 a decrease in 2009. Table 23 provides a complete breakdown of Port and Harbor facilities energy use and cost from 2006 through October 2009.

**Figure 26 Annual and Monthly Electricity Usage at the Fish Dock**

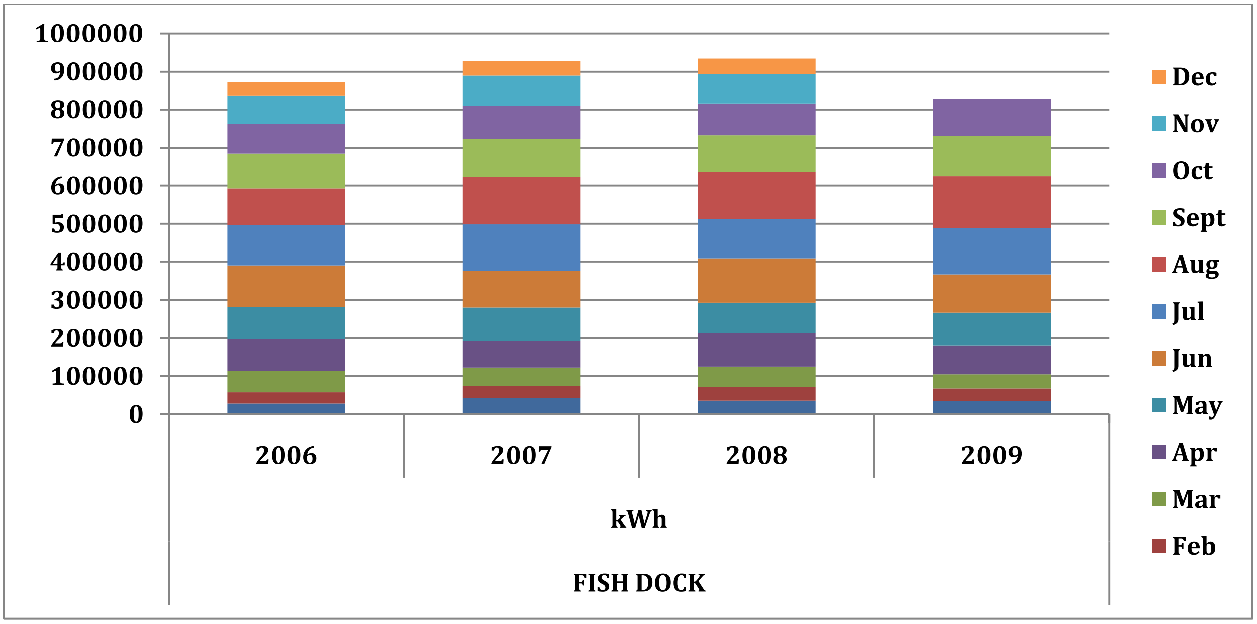
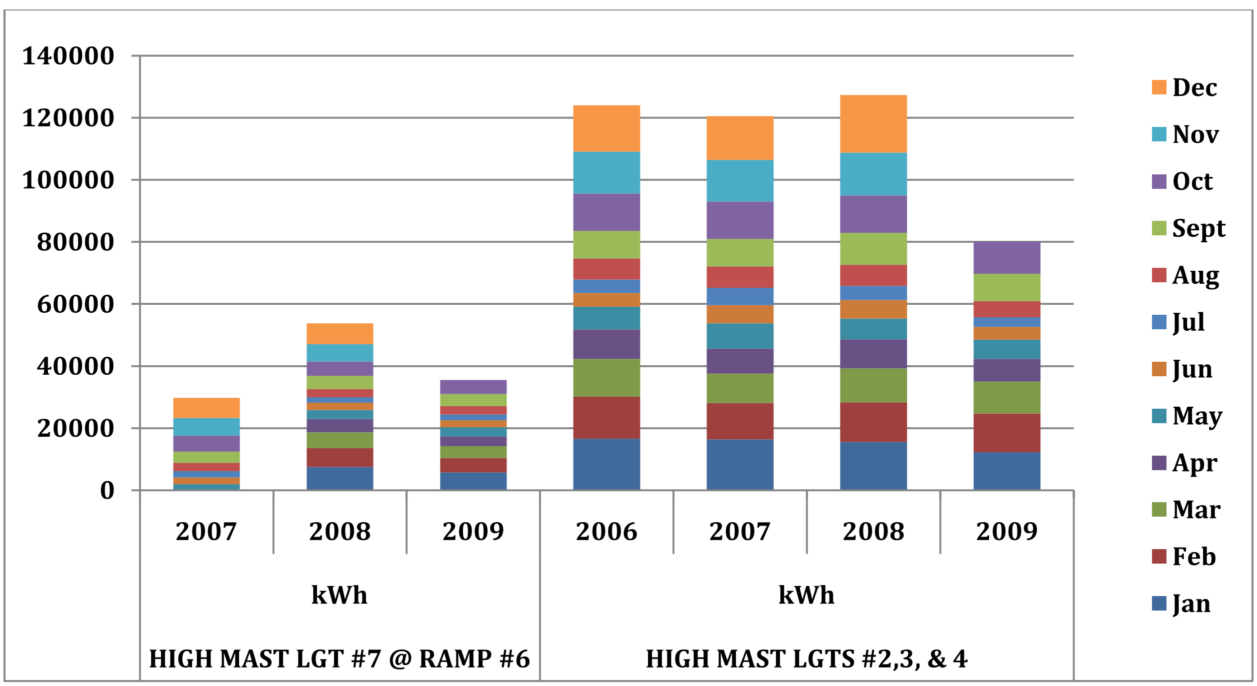



**Figure 27 Annual and Monthly Electricity Usage for High Mast Lights #7 and High Mast Lights 2, 3, and 4**[1]




[1] Includes usage for Ramp #4 Power Shed.

**Figure 28 Annual and Monthly Electricity Usage at Port and Harbor Dock Facilities**

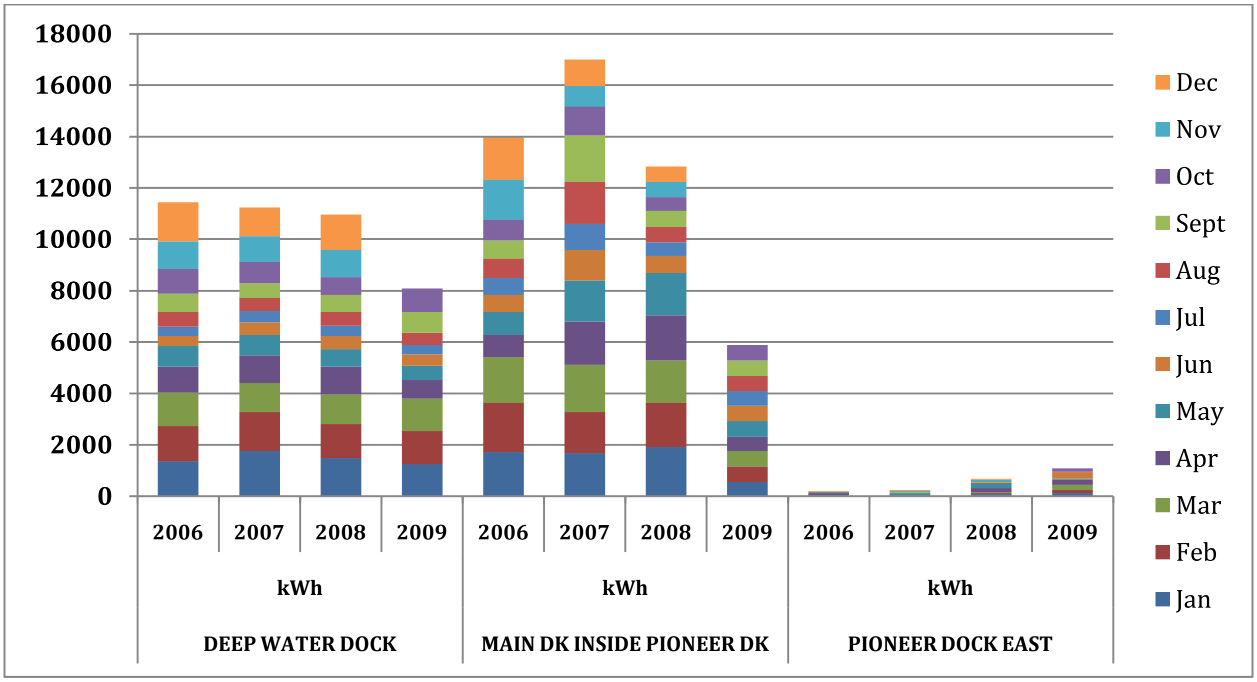



**Figure 29 Annual and Monthly Electricity Usage at the System # 1 and System #5 Harbor Floats**

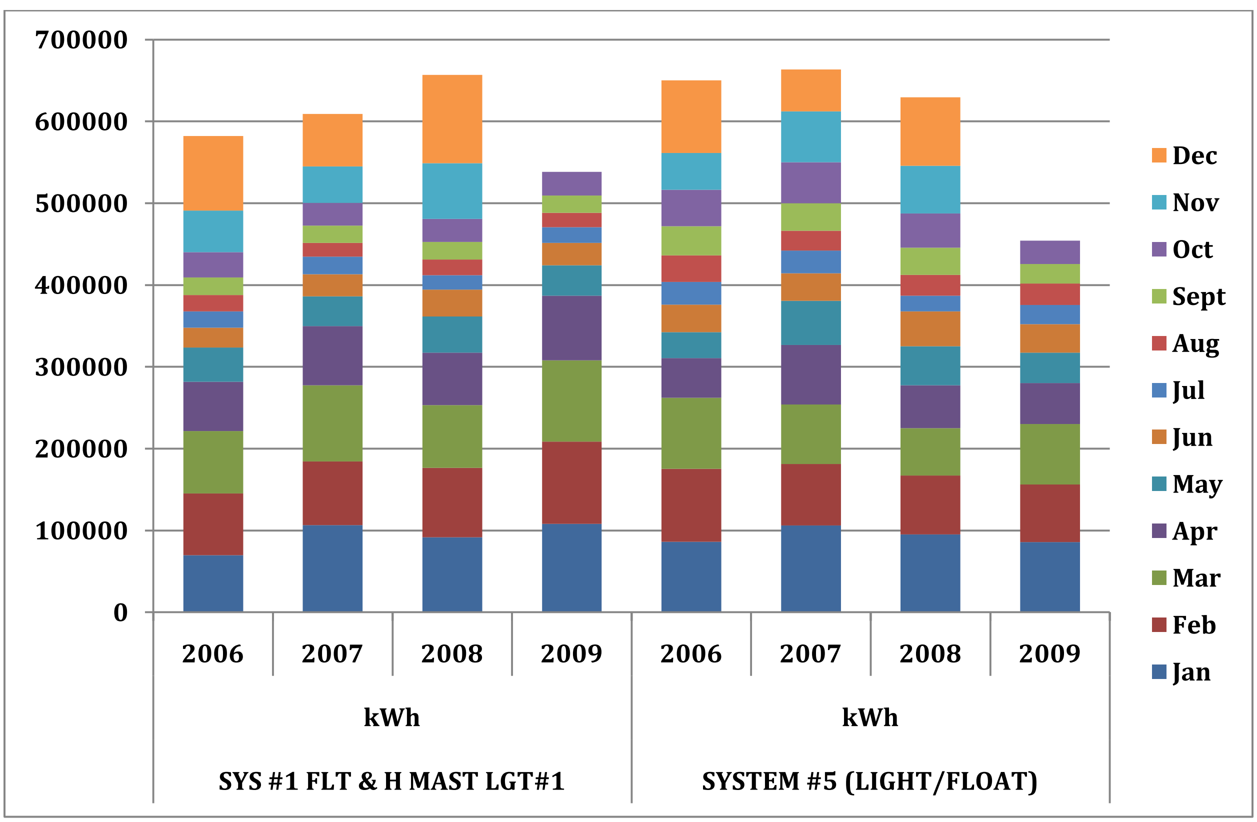


**Table 23 Port and Harbor Facilities Energy Use and Cost from 2006 through October 2009**

| | | | | 2006 | | 2007 | | 2008 | | 2009[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment Type | Space Name | Energy Type | Energy Unit | Sum of Energy Consumption[2] | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost |
| **Facility** | **FISH DOCK** | Electricity | kWh | 872,300 | $109,738 | 928,600 | $119,944 | 934,300 | $134,717 | 827,200 | $143,967 |
| | **FISH DOCK KVAR Cost** | Electricity | | | $572 | | $489 | | $279 | | $410 |
| | **PH HARBORMASTER OFFICE** | Electricity | kWh | 54,705 | $7,087 | 48,479 | $6,363 | 39,181 | $5,660 | 33,312 | $6,261 |
| | | Fuel Oil (#1 ) | gal | 87 | $224 | 165 | $401 | 252 | $921 | 404 | $1,069 |
| **Facility Total Electricity** | | **Electricity** | **kWh** | **927,005** | **$117,396** | **977,079** | **$126,796** | **973,481** | **$140,656** | **860,512** | **$150,638** |
| **Facility Total Energy Cost** | | | | | **$117,620** | | **$127,197** | | **$141,577** | | **$151,707** |
| **Dock** | **DEEP WATER DOCK** | Electricity | kWh | 11,440 | $3,342 | 11,240 | $3,357 | 10,960 | $3,444 | 8,080 | $3,112 |
| | **EAST - SHORE TIE** | Electricity | kWh | 0 | $1,800 | 0 | $1,800 | 0 | $1,320 | | |
| | **MAIN DK INSIDE PIONEER DK** | Electricity | kWh | 13,960 | $2,054 | 17,000 | $2,418 | 12,840 | $1,972 | 5,880 | $1,277 |
| | **PIONEER DOCK EAST** | Electricity | kWh | 200 | $1,853 | 240 | $1,913 | 680 | $1,972 | 1,080 | $1,747 |
| | **WEST - SHORE TIE** | Electricity | kWh | 0 | $1,800 | 0 | $1,800 | 0 | $1,320 | | |
| **Dock Total** | | **Electricity** | **kWh** | **25,600** | **$10,850** | **28,480** | **$11,289** | **24,480** | **$10,029** | **15,040** | **$6,136** |
| **Grid** | **STEEL GRID** | Electricity | kWh | 0 | $288 | 0 | $288 | 0 | $288 | 0 | $240 |
| | **WOOD GRID** | Electricity | kWh | 1,118 | $425 | 1,100 | $425 | 1,277 | $462 | 632 | $353 |
| **Grid Total** | | **Electricity** | **kWh** | **1,118** | **$713** | **1,100** | **$713** | **1,277** | **$750** | **632** | **$593** |
| **Harbor** | **SYS #1 FLT & H MAST LGT#1** | Electricity[3] | kWh | 582,200 | $71,797 | 609,280 | $75,062 | 656,840 | $86,690 | 538,160 | $98,008 |
| | **SYSTEM #5 (LIGHT/FLOAT)** | Electricity[4] | kWh | 650,000 | $81,036 | 663,360 | $81,592 | 629,520 | $85,073 | 454,400 | $82,774 |
| **Harbor Total** | | **Electricity** | **kWh** | **1,232,200** | **$152,834** | **1,272,640** | **$156,654** | **1,286,360** | **$171,763** | **992,560** | **$180,782** |
| **Light** | **HIGH MAST LGT #7 @ RAMP #6** | Electricity | kWh | | | 29,746 | $3,979 | 53,811 | $7,753 | 35,497 | $6,619 |
| | **HIGH MAST LGTS #2,3, & 4** | Electricity[5] | kWh | 124,020 | $17,287 | 120,480 | $16,838 | 127,320 | $19,284 | 80,160 | $16,247 |
| | **RAMP #4 SPIT STREET LIGHTS** | Electricity | kWh | 2,754 | $300 | 11,016 | $1,243 | 7,558 | $906 | | |
| **Light Total** | | **Electricity** | **kWh** | **126,774** | **$17,588** | **161,242** | **$22,060** | **188,689** | **$27,942** | **115,657** | **$22,866** |
| **Grand Total Fuel Oil (#1 or #2 )** | | **Fuel Oil (#1 )** | **gal** | **87** | **$224** | **165** | **$401** | **252** | **$921** | **404** | **$1,069** |
| **Grand Total Electricity** | | **Electricity** | **kWh** | **2,312,697** | **$299,381** | **2,440,541** | **$317,512** | **2,474,287** | **$351,141** | **1,984,401** | **$361,015** |
| **Grand Total Energy Cost** | | | | | **$299,605** | | **$317,913** | | **$352,062** | | **$362,084** |

[1] Fuel Oil (# 1) deliveries are through September 2009 and kWhs used are through October 2009.
[2] 2006- 2009 Fuel Oil (# 1) gallon numbers are deliveries to the fuel tanks.
[3] Electricity usage is for System # 1 float (B-H floats) and High Mass Light #1.
[4] Electricity usage is for System # 5 float and High Mast Lights #5 & #6.
[5] Electricity usage is for High Mast Lights #2, #3, & #4 and Ramp #4 Power Shed.

## Public Library

The new Public Library provides a good example of the change over from an old to a new facility. The new library opened in September of 2006 and the old facility was sold and accounts closed in the summer of 2008. Figure 30 shows both the Old and New Public Libraries total energy costs. Table 24 shows the new Public Library decreasing electricity usage by 9.51% and fuel deliveries by 4.51% in 2008. Figure 31 shows the new Public Library trending downward with electricity use showing a 5.34% decrease through October 2009. Fuel deliveries are also continuing to decrease with a 26.33% reduction through September 2009 as shown in Figure 32. Both trends are reflective of some of the energy measures taken and are discussed in Chapter 4 and Appendix 9. These figures also show the energy usage of old Public Library as it is taken off line. Table 25 shows New and Old Public Library Energy Use and Cost from 2006 through October 2009.

**Table 24 New Public Library Change in Energy Use and Costs from 2006 -2008**

| Year | Energy Type | Energy Unit | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | Sum of Energy Cost | % Difference of Energy Cost from Previous Year |
|---|---|---|---|---|---|---|
| **2006** | **Electricity** | kWh | 57,240 | | $8,760 | |
| | **Fuel Oil (#1)** | gal | 5,296 | | $13,322 | |
| **2007** | **Electricity** | kWh | 185,480 | | $24,497 | |
| | **Fuel Oil (#1 )** | gal | 11,403 | | $28,942 | |
| **2008** | **Electricity** | kWh | 167,840 | -9.51% | $24,564 | 0.27% |
| | **Fuel Oil (#1 )** | gal | 10,889 | -4.51% | $35,399 | 22.31% |

**Figure 30 New and Old Public Library Annual and Monthly Total Energy Costs from 2006–October 2009**

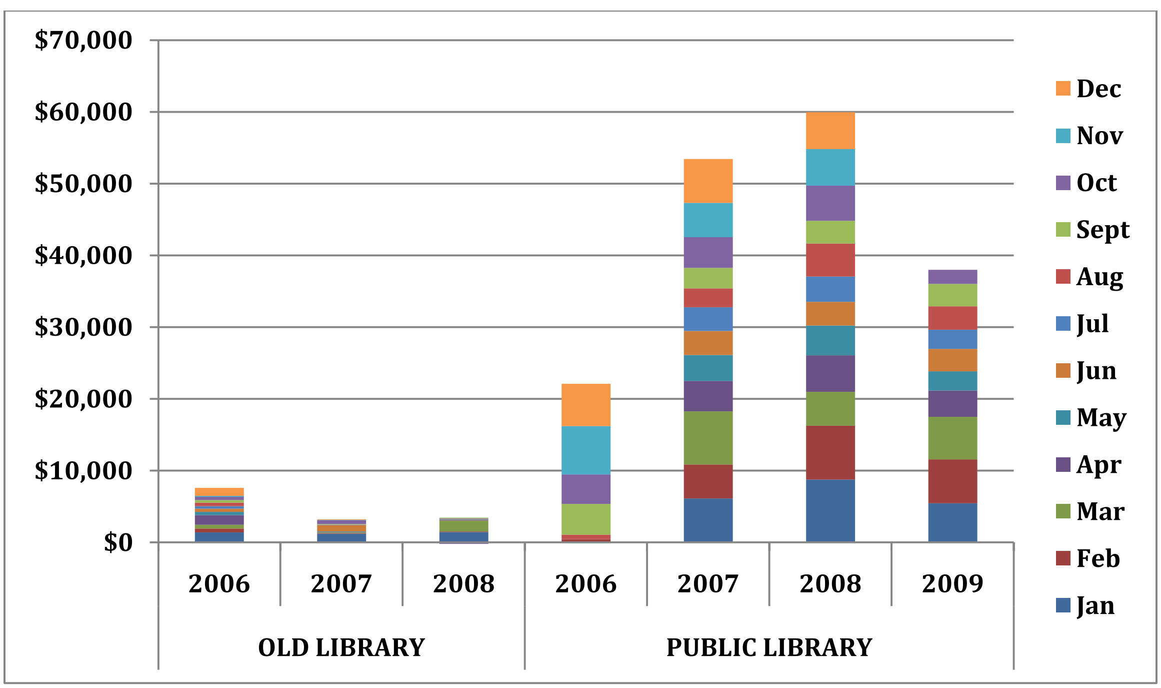


**Figure 31 Annual and Monthly Electricity Usage in kWh for the New and Old Public Library**

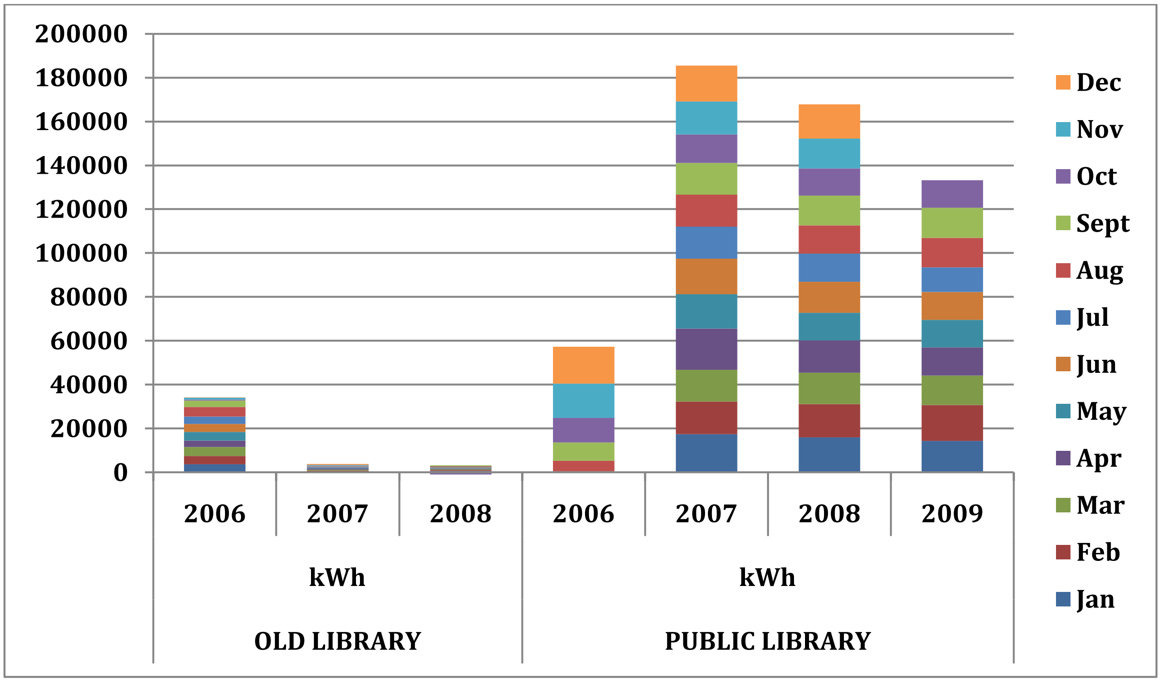



**Figure 32 Annual and Monthly Heating Fuel Oil (#1) Deliveries in Gallons for the New and Old Public Library from 2006 through September 2009**

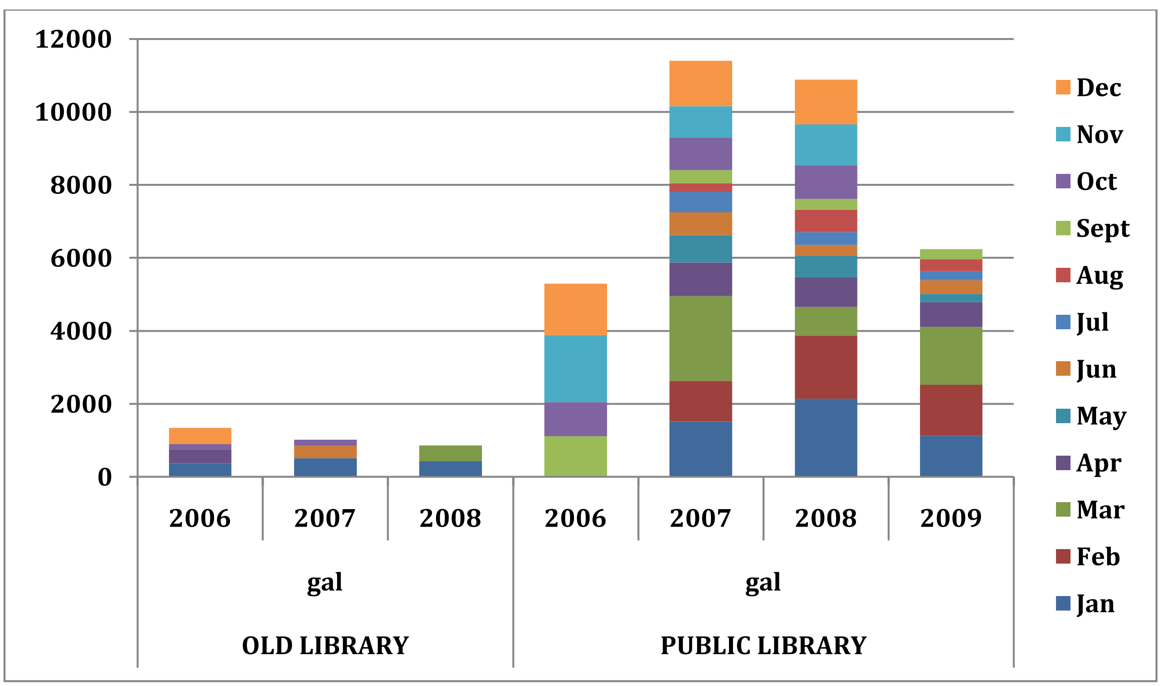


**Table 25 New and Old Public Library Energy Use and Cost from 2006 through October 2009**

| | | | | 2006 | | 2007 | | 2008 | | 2009[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Equipment Type** | **Space Name** | **Energy Type** | **Energy Unit** | **Sum of Energy Consumption[2]** | **Sum of Energy Cost** | **Sum of Energy Consumption** | **Sum of Energy Cost** | **Sum of Energy Consumption** | **Sum of Energy Cost** | **Sum of Energy Consumption** | **Sum of Energy Cost** |
| Facility | **OLD LIBRARY** | Electricity | kWh | 34,232 | $4,288 | 3,867 | $749 | 2,198 | $395 | | |
| | | Fuel Oil (#1 ) | gal | 1,343 | $3,330 | 1,019 | $2,466 | 857 | $2,821 | | |
| | **PUBLIC LIBRARY** | Electricity | kWh | 57,240 | $8,760 | 185,480 | $24,497 | 167,840 | $24,564 | 133,280 | $25,032 |
| | | Fuel Oil (#1) | gal | 5,296 | $13,322 | 11,403 | $28,942 | 10,889 | $35,399 | 6,240 | $12,968 |
| **Grand Total Fuel Oil (#1 or #2 )** | | **Fuel Oil (#1 )** | **gal** | **6,639** | **$16,653** | **12,422** | **$31,408** | **11,746** | **$38,220** | **6,240** | **$12,968** |
| **Grand Total Electricity** | | **Electricity** | **kWh** | **91,472** | **$13,048** | **189,347** | **$25,246** | **170,038** | **$24,959** | **133,280** | **$25,032** |
| **Grand Total** | | | | | **$29,701** | | **$56,654** | | **$63,179** | | **$38,000** |

[1] Fuel Oil (# 1) deliveries are through September 2009 and kWhs used are through October 2009.
[2] 2006- 2009 Fuel Oil (# 1) gallon numbers are deliveries to the fuel tanks.

### Public Works

The Public Works facilities have a similar issue as the Police and Fire Department buildings in that there is one electric meter measuring usage for multiple structures. One electric meter measures usage for the Public Works Office and Shop, Motor Pool Shop, and the Equipment Storage Pole Barn. It is recommended that the Motor Pool Shop and Equipment Storage Pole have sub-meters put in to better track usage in these facilities. Table 26 provides a breakdown of change in energy use and costs from 2006–2008 for these three facilities. Electricity usage for the three facilities increased by 3.35% in 2007 and 4.53% in 2008, but is decreasing in 2009 (Figure 33) by 6% for the January–October period.

**Table 26 Public Works Facilities Change in Energy Use and Cost from 2006 through 2008**

| Space Name | Energy Type | Energy Unit | Year | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|---|
| EQUIPMENT STORAGE POLE BARN | Fuel Oil (# 1) | gal | 2007 | 804 | | | $2,020 | | |
| | | gal | 2008 | 305 | -62.04% | | $1,008 | -50.09% | |
| MOTOR POOL SHOP | Fuel Oil (# 1 & #2) | gal | 2006 | 716 | | | $1,673 | | |
| | Fuel Oil (# 1) | gal | 2007 | 571 | -20.32% | -20.32% | $1,323 | -20.93% | -20.93% |
| | Fuel Oil (# 1) | gal | 2008 | 731 | 28.19% | 2.14% | $2,557 | 93.25% | 52.80% |
| PUBLIC WORKS OFFICE & SHOP | Electricity[1] | kWh | 2006 | 135,000 | | | $18,349 | | |
| | | kWh | 2007 | 139,520 | 3.35% | 3.35% | $19,032 | 3.73% | 3.73% |
| | | kWh | 2008 | 145,840 | 4.53% | 8.03% | $21,296 | 11.90% | 16.06% |
| | Fuel Oil (# 1) | gal | 2006 | 3,370 | | | $8,740 | | |
| | Fuel Oil (# 1) | gal | 2007 | 2,708 | -19.65% | -19.65% | $6,889 | -21.17% | -21.17% |
| | Fuel Oil (# 1) | gal | 2008 | 2,181 | -19.47% | -35.29% | $7,389 | 7.25% | -15.46% |

The Public Works Office and Shop heat with both electricity and heating fuel oil. Table 26 shows heating fuel oil has the opposite trend as the electricity usage. Heating fuel oil deliveries decreased by 19.65% in 2007 and 19.47% in 2008, but have shown an 18.14% increase (Figure 34) for the January–September 2009 period.

The Motor Pool Shop is a great example of turning a waste product into an energy source. Waste oil collected from the vehicle fleet is utilized in the shop heater. This reflects the lower quantity of fuel delivered (Table 26 and Figure 34) to that facility, but the quantity of waste oil burned is not tracked and therefore savings cannot be calculated. It is recommended that the amount of waste oil be tracked in order to calculate savings in the future. During interviews with the Motor Pool Shop the idea of burning the waste oil collected at the Harbor and the Homer Landfill was discussed. Unfortunately it was determined that the waste oil collected at these facilities is contaminated with a multitude of other substances that the general public **should not** put in these collection tanks and would foul the waste oil burner.

[1] Electric meter measures usage for the Public Works Office and Shop, Motor Pool Shop and the Equipment Storage Pole Barn.

**Figure 33 Annual and Monthly Electricity Usage for Public Works Office and Shop, Motor Pool Shop and the Equipment Storage Pole Barn from 2006 through October 2009**

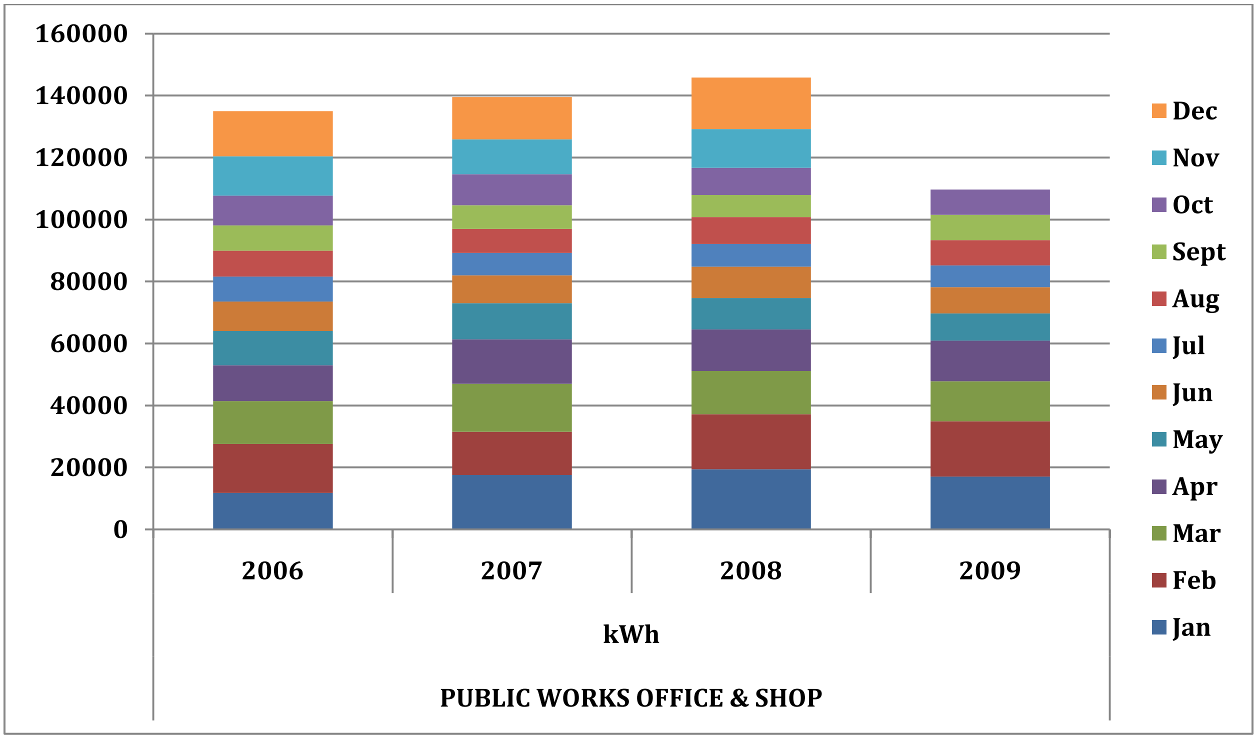
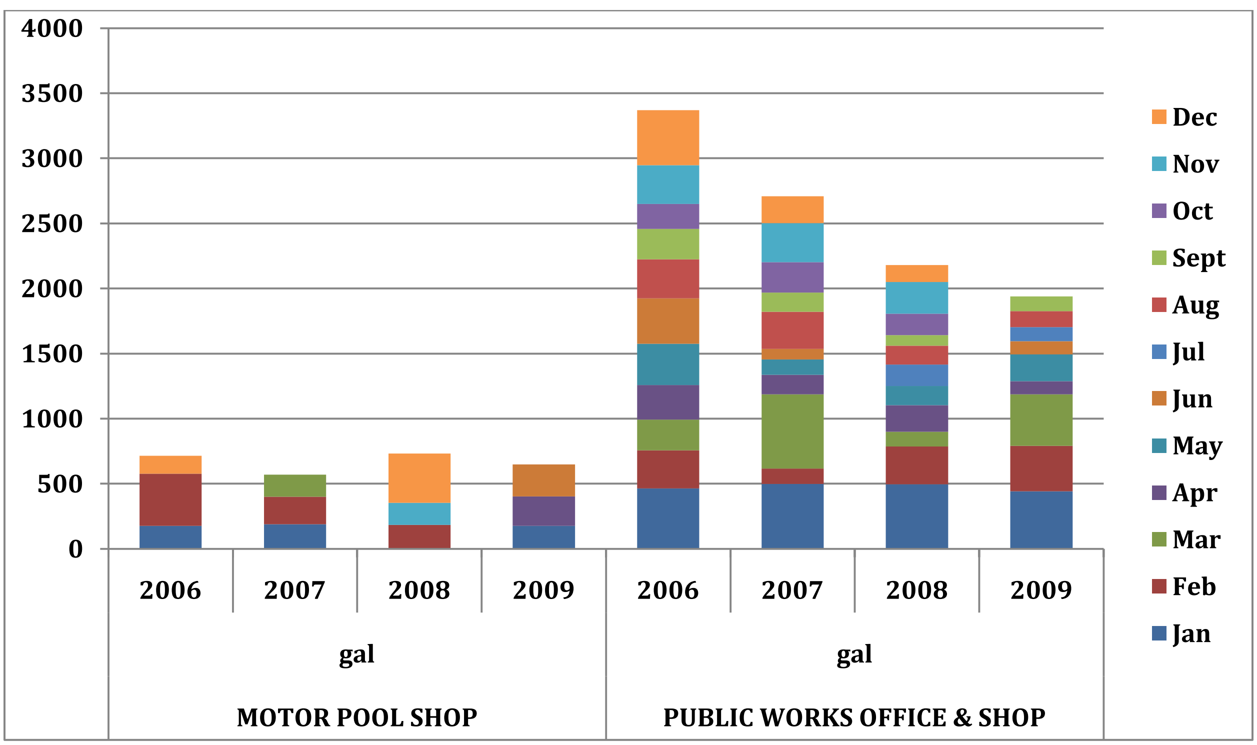



**Figure 34 Annual and Monthly Heating Fuel Oil (#1& #2) Deliveries in gallons for Public Works Office and Shop and the Motor Pool Shop from 2006 through September 2009**



All three Public Works maintenance facilities have shown increases in electricity usage for 2008 (Table 27 and Figure 35). The Port and Harbor Used Oil Building showed the most dramatic increase. It more than doubled its usage with a 121.24% increase in 2008. The HERC-02 PW Maintenance Shop increased its usage by 9.53% and the Port and Harbor Maintenance Shop increased by 10.08% for the same year. 2008 data shows usage up 79.81% for the Port and Harbor Used Oil Building, 23.36% for the HERC-02 PW Maintenance Shop, and 7.3% Port and Harbor Maintenance Shop from 2006 usage. Figure 35 shows electricity usage through October 2009 is tracking to decrease in HERC-02 PW Maintenance Shop by 19.65% and by 8.62% for the Port and Harbor Maintenance Shop. The Port and Harbor Used Oil Building continues to show a usage increase in 2009 by 26.34% through October.

Heating fuel oil deliveries also showed a significant increase in 2008. Table 27 and Figure 35 show deliveries up 42.89% and 12.5% for the Port and Harbor Maintenance Shop and HERC-02 PW Maintenance Shop respectively. The large increase in 2008 deliveries for the Port and Harbor Maintenance Shop might not be as significant as it seems following a 33.68% delivery decrease in 2007 and deliveries for this facility are down 5.24% from 2006 numbers. Figure 36 shows deliveries are up slightly up by 0.63% during the January –September 2009 period for the Port and Harbor Maintenance Shop. 2008 data shows fuel deliveries for the HERC-02 PW Maintenance Shop are up 23.36% from 2006 deliveries, but January–September data shows the facility tracking a 21.68% decrease in 2009.

**Table 27 Public Works Maintenance Facilities Change in Energy Use and Cost from 2006 through 2008**

| Space Name | Energy Type | Energy Unit | Year | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|---|
| **HERC-02 PW MAIN SHOP** | Electricity | **kWh** | 2006 | 36,790 | | | $4,987 | | |
| | | | 2007 | 41,438 | 12.63% | 12.63% | $5,626 | 12.82% | 12.82% |
| | | | 2008 | 45,385 | 9.53% | 23.36% | $6,663 | 18.42% | 33.60% |
| | Fuel Oil (# 1) | **gal** | 2006 | 3,758 | | | $9,603 | | |
| | | | 2007 | 3,936 | 4.74% | 4.74% | $9,707 | 1.08% | 1.08% |
| | | | 2008 | 4,428 | 12.50% | 17.83% | $13,983 | 44.06% | 45.61% |
| **PORT & HARBOR MAIN SHOP** | Electricity | **kWh** | 2006 | 41,120 | | | $5,371 | | |
| | | | 2007 | 40,080 | -2.53% | -2.53% | $5,318 | -0.98% | -0.98% |
| | | | 2008 | 44,120 | 10.08% | 7.30% | $6,279 | 18.08% | 16.91% |
| | Fuel Oil (# 1 & #2 ) | **gal** | 2006 | 4,768 | | | $11,723 | | |
| | | | 2007 | 3,162 | -33.68% | -33.68% | $7,375 | -37.08% | -37.08% |
| | | | 2008 | 4,518 | 42.89% | -5.24% | $15,900 | 115.58% | 35.63% |
| **PORT & HARBOR USED OIL BLDG** | Electricity | **kWh** | 2006 | 9,211 | | | $1,416 | | |
| | | | 2007 | 7,486 | -18.73% | -18.73% | $1,221 | -13.75% | -13.75% |
| | | | 2008 | 16,562 | 121.24% | 79.81% | $2,641 | 116.28% | 86.54% |

**Figure 35** Annual and Monthly Electricity Usage for **Public Works Maintenance Facilities from 2006 through October 2009**

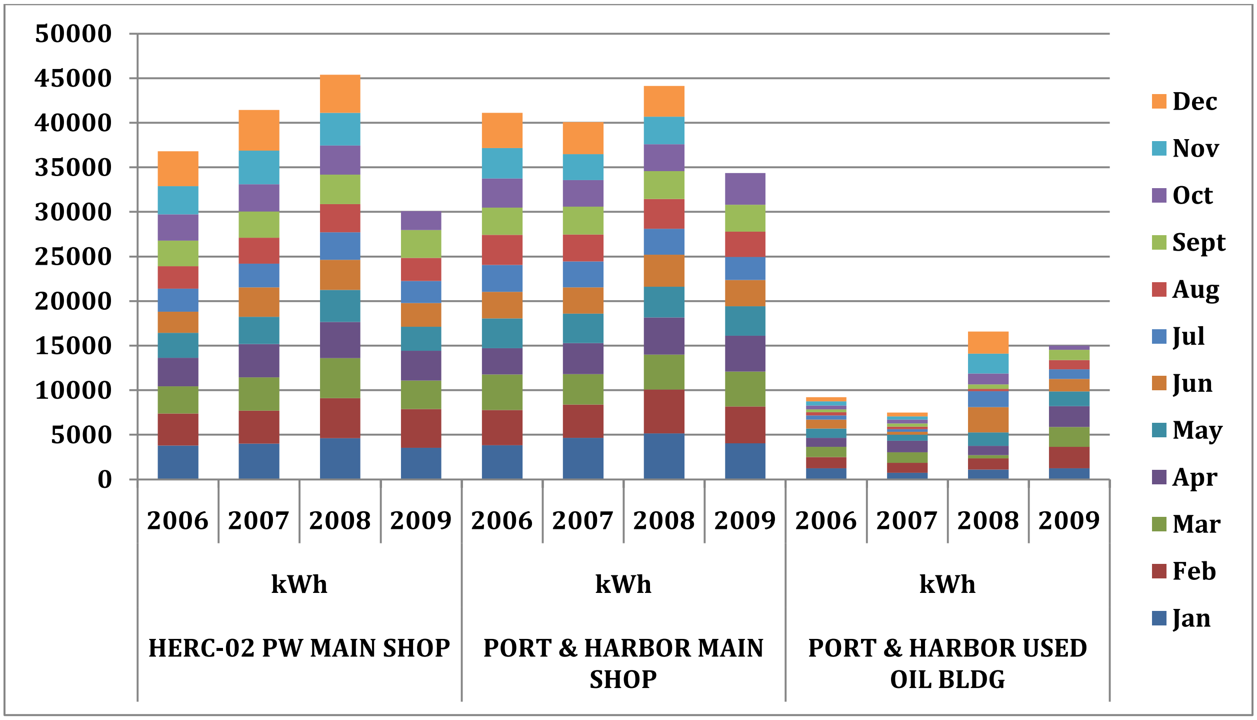
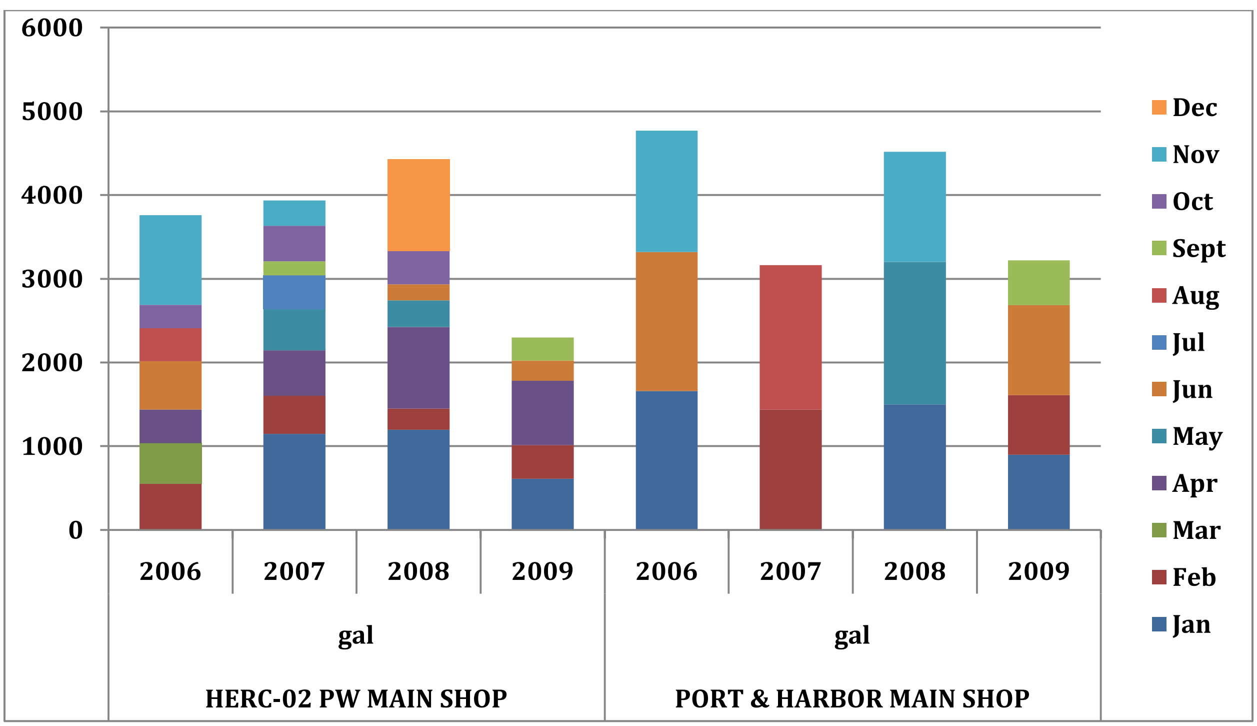



**Figure 36 Annual and Monthly Heating Fuel Oil (#1& #2) Deliveries for HERC-02 PW Maintenance Shop and the Port and Harbor Maintenance Shop from 2006 through September 2009**



**Street Lights**

Table 28 provides a breakdown of City Street and security lights electricity usage and costs from 2006 through October 2009. Appendix 4 provides maps of the location of street lights and Appendix 6 provides a list of the street lights billed in HEA account number 277852. Lights in this account are charged a flat monthly rate and kWh usage. These rates appear to be appropriate based on lights that are metered. Table 29 provides street light rates for all five different light types.

**Table 28 City of Homer Street Light Electricity Use and Cost from 2006 through October 2009**

| | | 2006 | | 2007 | | 2008 | | 2009[1] | |
|---|---|---|---|---|---|---|---|---|---|
| Space Name | Energy Unit | Sum of Electricity Use | Sum of Electricity Cost | Sum of Electricity Use | Sum of Electricity Cost | Sum of Electricity Use | Sum of Electricity Cost | Sum of Electricity Use | Sum of Electricity Cost |
| LGT@ RANGEVIEW & WRIGHT ST[2] | kWh | 1,127 | $431 | 1,199 | $440 | 1,189 | $452 | 805 | $387 |
| LGTS ON HEATH ST[3] | kWh | 3,885 | $778 | 3,317 | $701 | 3,726 | $799 | 3,144 | $817 |
| RR AT BISHOPS BEACH[4] | kWh | 1,153 | $487 | 1,375 | $518 | 1,160 | $454 | 1,408 | $504 |
| VARIOUS LOCATIONS (LIGHTS)[5] | kWh | 74,160 | $10,657 | 74,160 | $11,093 | 74,160 | $11,864 | 59,370 | $9,297 |
| **Total** | **kWh** | **80,325** | **$12,353** | **80,051** | **$12,752** | **80,235** | **$13,569** | **64,727** | **$11,005** |

**Table 29 Homer Electric Association Street Light Rates**

| Light Type | Light Type | kWh per Month | Rates from 1/2005 to 2/2006 | Rates from 2/2006 to 5/2007 | Rates from 5/2007 to 8/2007 | Rates from 8/2007 to 4/2008 | Rates from 4/2008 to 6/2009 | Rates from 6/2009 to Present |
|---|---|---|---|---|---|---|---|---|
| 01 | 175 Watt Mercury Vapor | 67 | $13.09 | $14.14 | $14.79 | $14.92 | $15.89 | $15.60 |
| 02 | 250 Watt Sodium Vapor | 96 | $15.45 | $16.69 | $17.46 | $17.61 | $18.75 | $18.41 |
| 03 | 250 Watt Mercury Vapor | 96 | $15.45 | $16.69 | $17.46 | $17.61 | $18.75 | $18.41 |
| 04 | 400 Watt Sodium Vapor | 153 | $15.45 | $16.69 | $17.46 | $17.61 | $18.75 | $18.41 |
| 05 | 400 Watt Mercury Vapor | 153 | $15.45 | $16.69 | $17.46 | $17.61 | $18.75 | $18.41 |

[1] kWhs used are through October 2009.
[2] This account is for one 250 Watt Light
[3] This account is for three 250 Watt Lights
[4] This account is for one 250 Watt Light and a Warning Siren. Light was billed a flat rate of 96 kWh per month from January 2006 – November 2007. December 2007 begins metered account with light and siren.
[5] HEA account # 277852 bills street lights at various locations at a flat rate and kWh usage (see Table xx). From January 2006 – January 2009 the City was billed for 54 Lights (175 Watt MV = 3; 250 Watt SV = 32; 400 Watt SV = 4; 400 Watt MV = 15) were billed. From February 2009 – October 2009 the City was billed for 50 Lights (175 Watt MV = 3; 250 Watt SV = 26; 400 Watt SV = 3; 400 Watt MV = 18) were billed.

## Water Utilities

The Water Utilities primarily use electricity and usage for all facilities and equipment is shown in Tables 30, 31, and 32. Electricity use for all Water Utilities facilities and equipment increased by 10.3% in 2007 and then decreased by 2.43% in 2008 and is up 7.63% from 2006 usage. Usage is showing a 6.94% increase for the January–October 2009 period (Table 32).

Table 30 and Figure 37 show the electricity usage in 2008 increased at the Water Pump Station on the Homer Spit by 64.18% and by 24.74% at the Old Water Treatment Plant, while usage was down 17.17% at the Water Pump Station on Crossman Ridge. 2008 data show the Old Water Treatment Plant electricity usage is up 33.33% from 2006 usage and Figure 37 shows usage continuing to increase by 23.76% through October 2009. The Water Pump Station on the Homer Spit shows a 38.08% decrease while the Water Pump Station on Crossman Ridge shows a 9.88% increase in usage through October 2009 (Figure 37). Propane usage at the Old Water Treatment Plant has been trending downward with decreases of 29.77% in 2007, 28.69% in 2008, and a 91.98% through September 2009 (Table 30 and Figure 38). Fuel oil deliveries for the emergency generators can be found in Table 30.

**Table 30 Water Utility Facilities Change in Energy Use and Cost from 2006 through 2008**

| Space Name | Energy Type | Energy Unit | Year | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|---|
| OLD WATER TREATMENT PLANT | Electricity | kWh | 2006 | 116,760 | | | $16,604 | | |
| | | | 2007 | 124,800 | 6.89% | 6.89% | $17,604 | 6.02% | 6.02% |
| | | | 2008 | 155,680 | 24.74% | 33.33% | $24,118 | 37.00% | 45.25% |
| | Propane | gal | 2006 | 5,547 | | | $13,763 | | |
| | | | 2007 | 3,896 | -29.77% | -29.77% | $11,366 | -17.41% | -17.41% |
| | | | 2008 | 2,778 | -28.69% | -49.92% | $10,331 | -9.11% | -24.94% |
| OLD WATER TREATMENT PLANT-EG | Fuel Oil (# 1) | gal | 2006 | 118 | | | $283 | | |
| | | | 2007 | 90 | -23.64% | -23.64% | $288 | 1.51% | 1.51% |
| | | | 2008 | 98 | 8.77% | -16.95% | $365 | 26.79% | 28.71% |
| WATER PUMP STA @ CROSSMAN | Electricity | kWh | 2006 | 253,800 | | | $32,386 | | |
| | | | 2007 | 281,640 | 10.97% | 10.97% | $36,380 | 12.33% | 12.33% |
| | | | 2008 | 233,280 | -17.17% | -8.09% | $33,703 | -7.36% | 4.06% |
| OLD WATER TREATMENT PLANT-EG | Fuel Oil (# 1) | gal | 2006 | 291 | | | $699 | | |
| | | | 2007 | 275 | -5.50% | -5.50% | $878 | 25.64% | 25.64% |
| | | | 2008 | 271 | -1.45% | -6.87% | $1,008 | 14.88% | 44.33% |
| WATER PUMP STA @ HOMER SPIT | Electricity | kWh | 2006 | 41,741 | | | $7,461 | | |
| | | | 2007 | 35,637 | -14.62% | -14.62% | $6,537 | -12.38% | -12.38% |
| | | | 2008 | 58,508 | 64.18% | 40.17% | $10,119 | 54.79% | 35.63% |

Electricity usage trends for all the pressure reducing stations show a 16.84% increase in 2007, a 13.09% decrease in 2008 and usage up 1.55% from 2006. Usage through October 2009 is tracking towards a 3.17% decrease (Table 32). Table 31 shows change in usage for 2006–2008 and Figure 39 shows annual and monthly electricity usage for all pressure reducing stations through October 2009.

**Figure 37 Annual and Monthly Electricity Usage at Old Water Treatment Plant and Water Pump Stations from 2006 through October 2009**

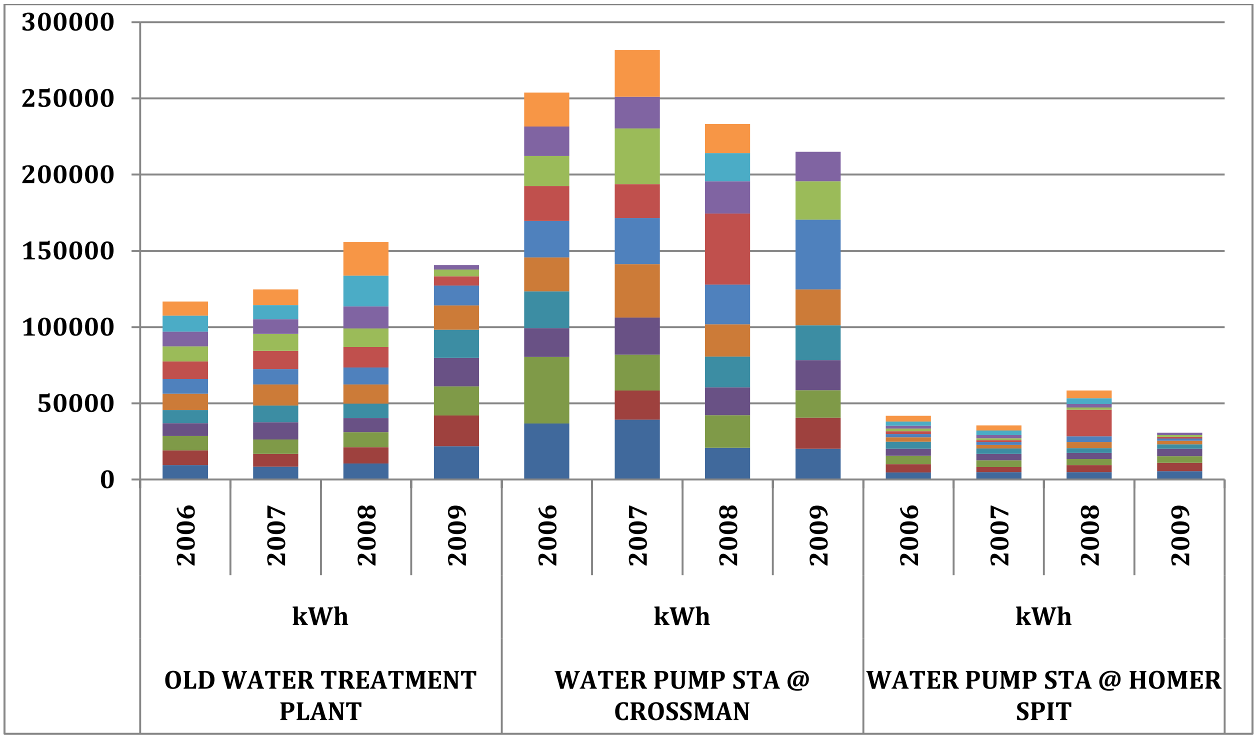



**Figure 38 Annual and Monthly Old Water Treatment Plant Propane Usage from 2006 through May 2009**

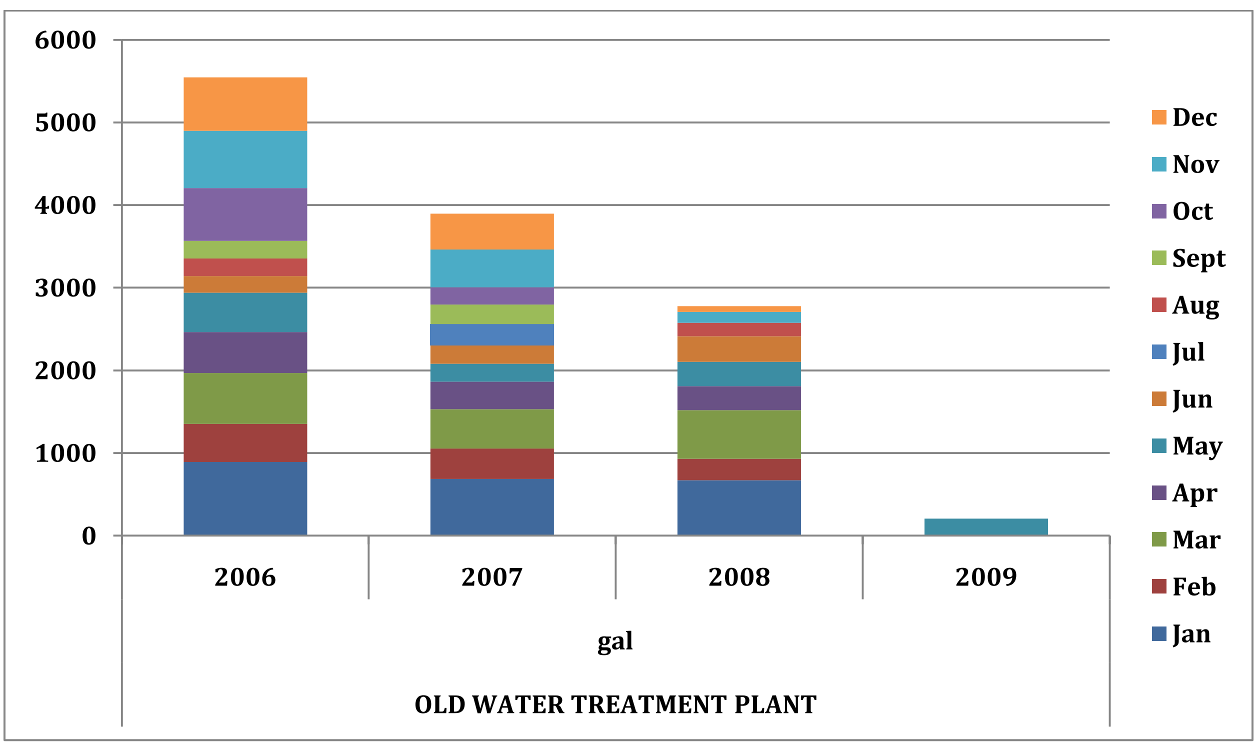


**Table 31 Pressure Reducing Stations Change in Electricity Use and Cost from 2006 through 2008**

| Space Name | Year | Sum of Electricity Usage (kWh) | % Difference of Electricity Usage from Previous Year | % Difference of Electricity Usage from 2006 | Sum of Electricity Cost | % Difference of Electricity Cost from Previous Year | % Difference of Electricity Cost from 2006 |
|---|---|---|---|---|---|---|---|
| PR STA @ A-FRAME | 2006 | 15,438 | | | $2,205 | | |
| | 2007 | 14,581 | -5.55% | -5.55% | $2,104 | -4.62% | -4.62% |
| | 2008 | 13,397 | -8.12% | -13.22% | $2,095 | -0.40% | -5.00% |
| PR STA @ BARNETT | 2006 | 12,065 | | | $1,777 | | |
| | 2007 | 15,202 | 26.00% | 26.00% | $2,183 | 22.87% | 22.87% |
| | 2008 | 14,983 | -1.44% | 24.19% | $2,259 | 3.48% | 27.15% |
| PR STA @ BARTLETTT-SOUNDVIEW | 2006 | 6,736 | | | $1,220 | | |
| | 2007 | 6,470 | -3.95% | -3.95% | $1,095 | -10.25% | -10.25% |
| | 2008 | 7,008 | 8.32% | 4.04% | $1,241 | 13.34% | 1.72% |
| PR STA @ BEAR CREEK | 2006 | 3,450 | | | $717 | | |
| | 2007 | 4,871 | 41.19% | 41.19% | $898 | 25.27% | 25.27% |
| | 2008 | 3,117 | -36.01% | -9.65% | $699 | -22.23% | -2.58% |
| PR STA @ EAST HILL-HOEDL | 2006 | 12,689 | | | $1,839 | | |
| | 2007 | 11,897 | -6.24% | -6.24% | $1,768 | -3.86% | -3.86% |
| | 2008 | 11,516 | -3.20% | -9.24% | $1,875 | 6.07% | 1.97% |
| PR STA @ EFFLER | 2006 | 10,123 | | | $1,490 | | |
| | 2007 | 7,986 | -21.11% | -21.11% | $1,280 | -14.09% | -14.09% |
| | 2008 | 6,059 | -24.13% | -40.15% | $1,064 | -16.93% | -28.63% |
| PR STA @ HEA | 2006 | 14,006 | | | $2,007 | | |
| | 2007 | 12,345 | -11.86% | -11.86% | $1,822 | -9.25% | -9.25% |
| | 2008 | 9,914 | -19.69% | -29.22% | $1,627 | -10.70% | -18.96% |
| PR STA @ HILLTOP | 2006[1] | 7,478 | | | $1,262 | | |
| | 2007 | 21,272 | | | $2,949 | | |
| | 2008 | 14,729 | -30.76% | 96.96% | $2,252 | -23.64% | 78.39% |
| PR STA @ JEEP SALES | 2006 | 3,731 | | | $754 | | |
| | 2007 | 6,249 | 67.49% | 67.49% | $1,057 | 40.21% | 40.21% |
| | 2008 | 4,975 | -20.39% | 33.34% | $971 | -8.12% | 28.82% |
| PR STA @ KACHEMAK WAY | 2006 | 7,805 | | | $1,253 | | |
| | 2007 | 6,908 | -11.49% | -11.49% | $1,139 | -9.12% | -9.12% |
| | 2008 | 7,414 | 7.32% | -5.01% | $1,273 | 11.77% | 1.58% |
| PR STA @ LAKESIDE | 2006 | 5,008 | | | $904 | | |
| | 2007 | 4,826 | -3.63% | -3.63% | $892 | -1.41% | -1.41% |
| | 2008 | 6,606 | 36.88% | 31.91% | $1,176 | 31.86% | 30.00% |
| PR STA @ LUCKY SHOT | 2006[1] | 358 | | | $339 | | |
| | 2007 | 4,914 | | | $900 | | |
| | 2008 | 5,130 | 4.40% | 1332.96% | $982 | 9.13% | 189.73% |
| PR STA @ MAIN & DANVIEW | 2006 | 11,727 | | | $1,734 | | |
| | 2007 | 9,367 | -20.12% | -20.12% | $1,445 | -16.67% | -16.67% |
| | 2008 | 8,650 | -7.65% | -26.24% | $1,481 | 2.51% | -14.58% |
| PR STA @ MID-HILL | 2006[1] | 4,888 | | | $796 | | |
| | 2007 | 12,866 | | | $1,883 | | |
| | 2008 | 9,480 | -26.32% | 93.94% | $1,575 | -16.38% | 97.84% |
| PR STA @ RIDGELINE STATION | 2006 | 16,857 | | | $2,409 | | |
| | 2007 | 12,908 | -23.43% | -23.43% | $1,902 | -21.05% | -21.05% |

[1] Usage is not for a complete year.

| Space Name | Year | Sum of Electricity Usage (kWh) | % Difference of Electricity Usage from Previous Year | % Difference of Electricity Usage from 2006 | Sum of Electricity Cost | % Difference of Electricity Cost from Previous Year | % Difference of Electricity Cost from 2006 |
|---|---|---|---|---|---|---|---|
| | 2008 | 10,107 | -21.70% | -40.04% | $1,532 | -19.46% | -36.42% |
| **PR STA @ STERLING** | 2006 | 11,359 | | | $1,638 | | |
| | 2007 | 19,852 | 74.77% | 74.77% | $2,818 | 72.06% | 72.06% |
| | 2008 | 14,029 | -29.33% | 23.51% | $2,297 | -18.49% | 40.24% |
| **PR STA @ SWITCHBACK** | 2006 | 11,649 | | | $1,684 | | |
| | 2007 | 11,252 | -3.41% | -3.41% | $1,679 | -0.30% | -0.30% |
| | 2008 | 12,564 | 11.66% | 7.85% | $1,942 | 15.64% | 15.29% |
| **PR STA @ TESORO METER VAULT** | 2006 | 9,431 | | | $1,463 | | |
| | 2007 | 11,288 | 19.69% | 19.69% | $1,704 | 16.45% | 16.45% |
| | 2008 | 7,471 | -33.81% | -20.78% | $1,294 | -24.06% | -11.57% |
| **PR STA @ WEST HILL** | 2006 | 11,119 | | | $1,623 | | |
| | 2007 | 11,557 | 3.94% | 3.94% | $1,718 | 5.83% | 5.83% |
| | 2008 | 13,349 | 15.51% | 20.06% | $2,211 | 28.69% | 36.20% |
| **PR STA@OHLSON LN/FAT OLIVES** | 2006 | 5,406 | | | $955 | | |
| | 2007 | 5,246 | -2.96% | -2.96% | $934 | -2.16% | -2.16% |
| | 2008 | 3,637 | -30.67% | -32.72% | $770 | -17.59% | -19.37% |

**Figure 39 Annual and Monthly Electricity Usage at the Pressure Reducing Stations in 2008**

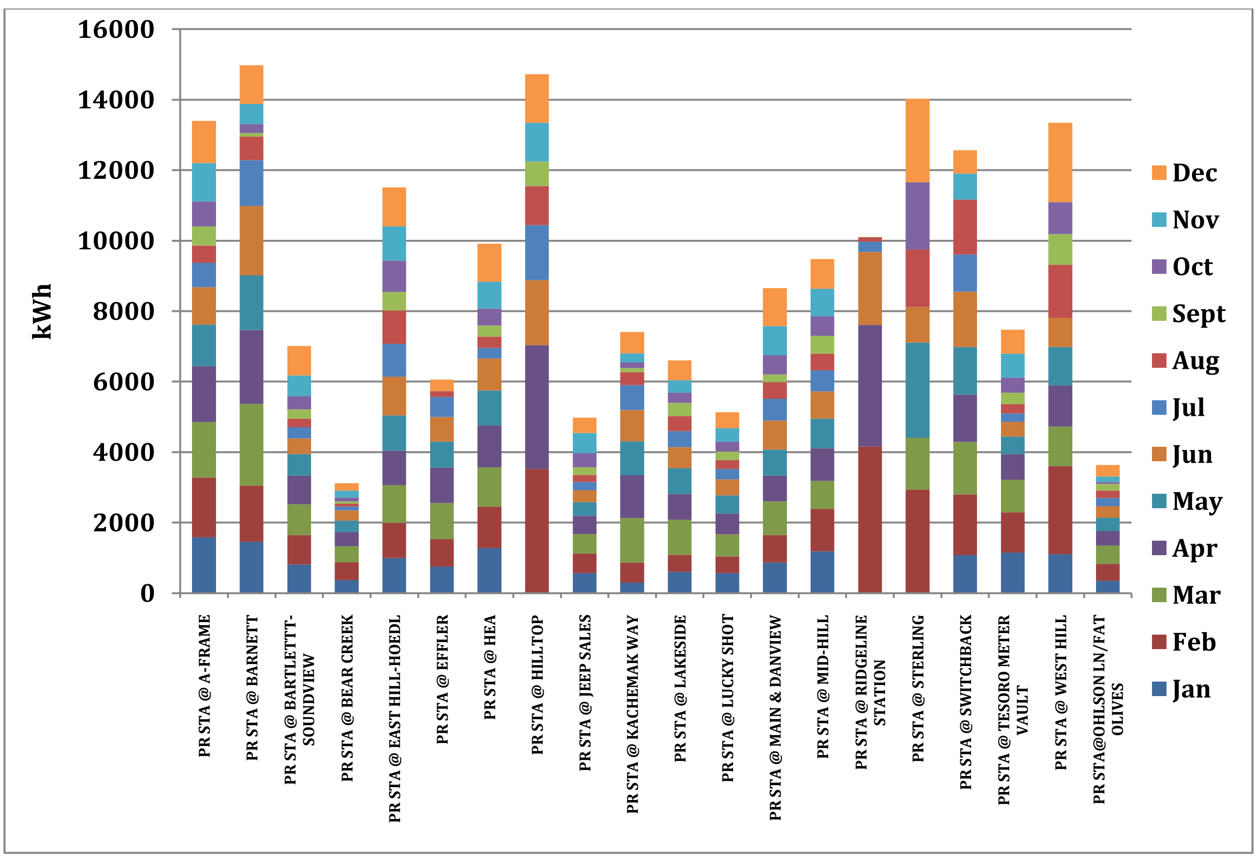


**Table 32 Water Utilities Energy Use and Cost from 2006 through October 2009**

| | | | | 2006 | | 2007 | | 2008 | | 2009[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Equipment Type** | **Space Name** | **Energy Type** | **Energy Unit** | **Sum of Energy Consumption[2]** | **Sum of Energy Cost** | **Sum of Energy Consumption** | **Sum of Energy Cost** | **Sum of Energy Consumption** | **Sum of Energy Cost** | **Sum of Energy Consumption** | **Sum of Energy Cost** |
| **Facility** | **NEW WATER TREATMENT PLANT** | Electricity | kWh | | | | | | | 15,160 | $4,203 |
| | **OLD WATER TREATMENT PLANT** | Electricity | kWh | 116,760 | $16,604 | 124,800 | $17,604 | 155,680 | $24,118 | 140,640 | $26,983 |
| | | Propane | gal | 5,547 | $13,763 | 3,896 | $11,366 | 2,778 | $10,331 | 207 | $676 |
| | **OLD WATER TREATMENT PLANT-EG** | Fuel Oil (#1 ) | gal | 118 | $283 | 90 | $288 | 98 | $365 | 106 | $265 |
| **Facility Total Electricity** | | **Electricity** | **kWh** | **116,760** | **$16,604** | **124,800** | **$17,604** | **155,680** | **$24,118** | **155,800** | **$31,186** |
| **Facility Total Energy Cost** | | | | | **$30,650** | | **$29,258** | | **$34,814** | | **$32,127** |
| **Booster Station** | **BSTER STA@ FIREWEED AVE 250** | Electricity | kWh | | | 1,042 | $172 | 7,756 | $1,341 | 6,494 | $1,428 |
| | **STREAM HILL BOOSTER STATION** | Electricity | kWh | | | | | | | 0 | $47 |
| **Booster Station Total Electricity** | | **Electricity** | **kWh** | | | **1,042** | **$172** | **7,756** | **$1,341** | **6,494** | **$1,475** |
| **Meter Vault** | **MTRVAULT@ EAST END/EAST HILL** | Electricity | kWh | 5,058 | $917 | 5,380 | $960 | 4,981 | $950 | 2,857 | $774 |
| **RWPS** | **WATER PUMP STA @ CROSSMAN** | Electricity | kWh | 253,800 | $32,386 | 281,640 | $36,380 | 233,280 | $33,703 | 214,920 | $59,356 |
| | | Fuel Oil (#1 ) | gal | 291 | $699 | 275 | $878 | 271 | $1,008 | | |
| | **WATER PUMP STA @ HOMER SPIT** | Electricity | kWh | 41,741 | $7,461 | 35,637 | $6,537 | 58,508 | $10,119 | 30,768 | $7,344 |
| **RWPS Total Electricity** | | **Electricity** | **kWh** | **295,541** | **$39,847** | **317,277** | **$42,917** | **291,788** | **$43,822** | **245,688** | **$66,700** |
| **RWPS Total Energy Cost** | | | | | **$40,546** | | **$43,795** | | **$44,830** | | **$66,700** |
| **PR Station Total Electricity** | | Electricity | kWh | 181,323 | $28,070 | 211,857 | $32,169 | 184,135 | $30,613 | 151,638 | $32,237 |
| **Grand Total Propane** | | **Propane** | **gal** | **5,547** | **$13,763** | **3,896** | **$11,366** | **2,778** | **$10,331** | **207** | **$676** |
| **Grand Total Fuel Oil (#1 and #2 )** | | **Fuel Oil (#1 )** | **gal** | **409** | **$982** | **365** | **$1,165** | **369** | **$1,373** | **106** | **$265** |
| **Grand Total Electricity** | | **Electricity** | **kWh** | **598,682** | **$85,439** | **660,356** | **$93,822** | **644,340** | **$100,844** | **562,477** | **$132,372** |
| **Grand Total Energy Cost** | | | | | **$100,183** | | **$106,353** | | **$112,548** | | **$133,313** |

[1] Fuel Oil (# 1) and Propane deliveries are through September 2009 and kWhs used are through October 2009.
[2] 2006- 2009 Fuel Oil (# 1) and Propane gallon numbers are deliveries to the fuel tanks.

### Wastewater Utilities

Electricity use for all wastewater facilities has increasing trend with usage increasing 2.65% in 2007 and 1.83% in 2008, up 4.52% from 2006, but is showing a 8.93% in the January–October 2009 period (Table 34). Figure 40 and Table 33 shows the Sewer Treatment Plant, the City's largest electricity consumer, with an increase in usage of 2.4% in 2007 and 2.98% in 2008, but a 9.19% decrease through October 2009. Figure 41 shows annual and monthly heating fuel deliveries for the Sewer Treatment Plant from 2006 through September 2009. Figure 42 shows the annual and monthly electricity usage trends for the sewer lifts. Table 33 shows change in energy use and costs for all wastewater facilities from 2006–2008 and Table 34 provides a complete breakdown of energy use and costs through October 2009.

**Figure 40 Annual and Monthly Electricity Usage for the Sewer Treatment Plant from 2006 through October2009**

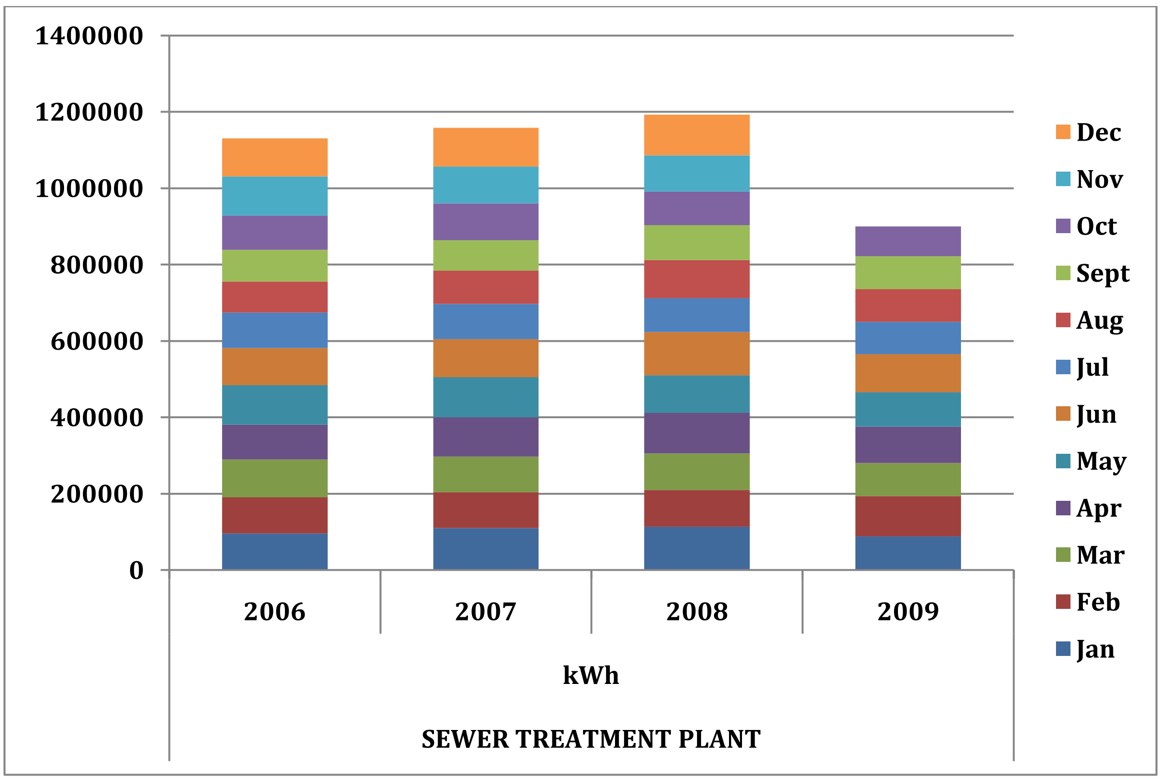


**Figure 41 Annual and Monthly Heating Fuel Oil (#1& #2) Deliveries for the Sewer Treatment Plant**

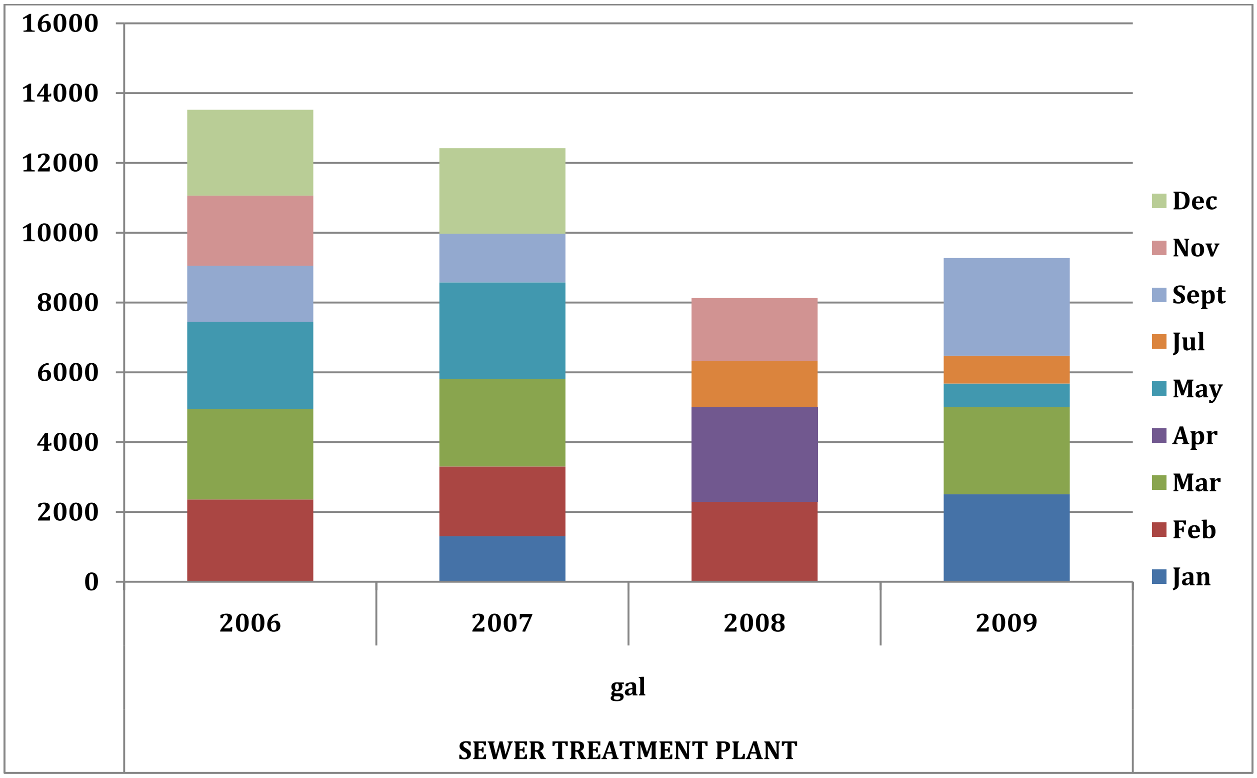



**Figure 42 Annual and Monthly Electricity Usage for the Sewer Lifts from 2006 through October 2009**

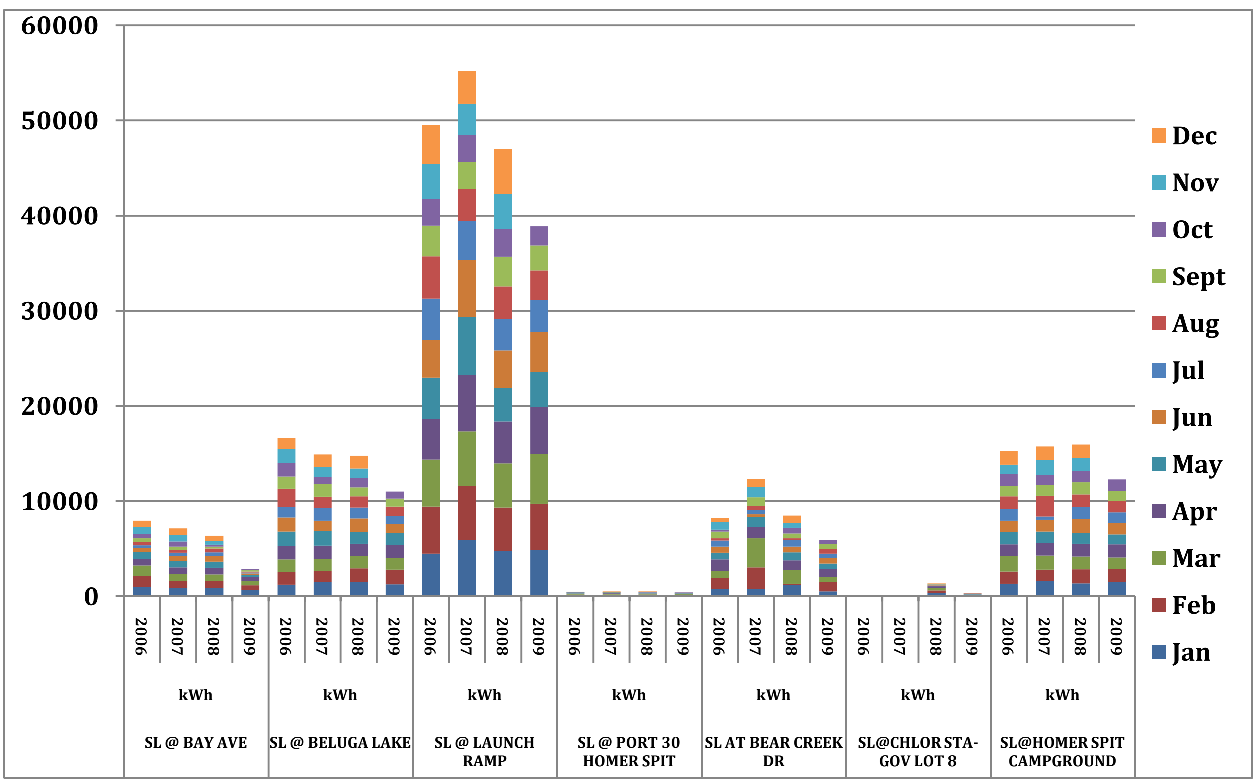


**Table 33 Wastewater Utility Facilities Change in Energy Use and Cost from 2006 through 2008**

| Space Name | Energy Type | Energy Unit | Year | Sum of Energy Consumption | % Difference of Energy Consumption from Previous Year | % Difference of Energy Consumption from 2006 | Sum of Energy Cost | % Difference of Energy Cost from Previous Year | % Difference of Energy Cost from 2006 |
|---|---|---|---|---|---|---|---|---|---|
| **SEWER TREATMENT PLANT** | **Electricity** | kWh | 2006 | 1,130,800 | | | $130,645 | | |
| | | | 2007 | 1,157,920 | 2.40% | 2.40% | $134,901 | 3.26% | 3.26% |
| | | | 2008 | 1,192,400 | 2.98% | 5.45% | $153,316 | 13.65% | 17.35% |
| | **Fuel Oil (#2)** | gal | 2006 | 13,517 | | | $32,362 | | |
| | **Fuel Oil (#1 & #2)** | gal | 2007 | 12,422 | -8.10% | -8.10% | $31,389 | -3.01% | -3.01% |
| | **Fuel Oil (#1 & #2)** | gal | 2008 | 8,125 | -34.59% | -39.89% | $28,000 | -10.80% | -13.48% |
| **STP LAB & OFFICE** | **Propane** | gal | 2007 | 517 | | | $1,794 | | |
| | | | 2008 | 1,593 | 208.18% | | $5,914 | 229.70% | |
| **LGT BAY AVE THAW CABLE** | **Electricity** | kWh | 2006 | 14,993 | | | $2,175 | | |
| | | | 2007 | 13,037 | -13.05% | -13.05% | $1,937 | -10.95% | -10.95% |
| | | | 2008 | 13,301 | 2.03% | -11.29% | $2,019 | 4.21% | -7.20% |
| **SL @ BAY AVE** | **Electricity** | kWh | 2006 | 7,950 | | | $1,285 | | |
| | | | 2007 | 7,120 | -10.44% | -10.44% | $1,178 | -8.30% | -8.30% |
| | | | 2008 | 6,349 | -10.83% | -20.14% | $1,136 | -3.64% | -11.64% |
| **SL @ BELUGA LAKE** | **Electricity** | kWh | 2006 | 16,640 | | | $2,320 | | |
| | | | 2007 | 14,888 | -10.53% | -10.53% | $2,146 | -7.51% | -7.51% |
| | | | 2008 | 14,781 | -0.72% | -11.17% | $2,307 | 7.49% | -0.59% |
| **SL @ LAUNCH RAMP** | **Electricity** | kWh | 2006 | 49,536 | | | $6,346 | | |
| | | | 2007 | 55,206 | 11.45% | 11.45% | $7,134 | 12.41% | 12.41% |
| | | | 2008 | 46,980 | -14.90% | -5.16% | $6,718 | -5.83% | 5.85% |
| **SL @ PORT 30 HOMER SPIT** | **Electricity** | kWh | 2006 | 489 | | | $350 | | |
| | | | 2007 | 505 | 3.27% | 3.27% | $352 | 0.55% | 0.55% |
| | | | 2008 | 517 | 2.38% | 5.73% | $358 | 1.86% | 2.41% |
| **SL AT BEAR CREEK DR** | **Electricity** | kWh | 2006 | 8,211 | | | $1,288 | | |
| | | | 2007 | 12,340 | 50.29% | 50.29% | $1,865 | 44.83% | 44.83% |
| | | | 2008 | 8,463 | -31.42% | 3.07% | $1,434 | -23.11% | 11.36% |
| **SL@CHLOR STA-GOV LOT 8** | **Electricity** | kWh | 2006 | 0 | | | $288 | | |
| | | | 2007 | 0 | | | $288 | 0.00% | 0.00% |
| | | | 2008 | 1,341 | | | $457 | 58.78% | 58.78% |
| **SL@HOMER SPIT CAMPGROUND** | **Electricity** | kWh | 2006 | 15,234 | | | $2,161 | | |
| | | | 2007 | 15,754 | 3.41% | 3.41% | $2,264 | 4.77% | 4.77% |
| | | | 2008 | 15,936 | 1.16% | 4.61% | $2,484 | 9.72% | 14.96% |

### Table 34 Wastewater Utilities Energy Use and Cost from 2006 through October 2009

| | | | | 2006 | | 2007 | | 2008 | | 2009[1] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment Type | Space Name | Energy Type | Energy Unit | Sum of Energy Consumption[2] | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost | Sum of Energy Consumption | Sum of Energy Cost |
| Facility | SEWER TREATMENT PLANT | Electricity | kWh | 1,130,800 | $130,645 | 1,157,920 | $134,901 | 1,192,400 | $153,316 | 899,920 | $151,856 |
| | | Fuel Oil (#1 & or #2 ) | gal | 13,517 | $32,362 | 12,422 | $31,389 | 8,125 | $28,000 | 9,276 | $22,116 |
| | STP LAB & OFFICE | Propane | gal | | | 517 | $1,794 | 1,593 | $5,914 | 793 | $2,715 |
| **Facility Total Energy Cost** | | | | | **$163,008** | | **$168,083** | | **$187,230** | | **$176,687** |
| Sewer Lifts | SL @ BAY AVE | Electricity | kWh | 7,950 | $1,285 | 7,120 | $1,178 | 6,349 | $1,136 | 2,867 | $777 |
| | SL @ BELUGA LAKE | Electricity | kWh | 16,640 | $2,320 | 14,888 | $2,146 | 14,781 | $2,307 | 10,992 | $2,213 |
| | SL @ LAUNCH RAMP | Electricity | kWh | 49,536 | $6,346 | 55,206 | $7,134 | 46,980 | $6,718 | 38,862 | $7,258 |
| | SL @ PORT 30 HOMER SPIT | Electricity | kWh | 489 | $350 | 505 | $352 | 517 | $358 | 400 | $314 |
| | SL AT BEAR CREEK DR | Electricity | kWh | 8,211 | $1,288 | 12,340 | $1,865 | 8,463 | $1,434 | 5,932 | $1,297 |
| | SL@CHLOR STA-GOV LOT 8 | Electricity | kWh | 0 | $288 | 0 | $288 | 1,341 | $457 | 353 | $305 |
| | SL@HOMER SPIT CAMPGROUND | Electricity | kWh | 15,234 | $2,161 | 15,754 | $2,264 | 15,936 | $2,484 | 12,288 | $2,421 |
| **Sewer Lifts Total** | | Electricity | kWh | **98,060** | **$14,038** | **105,813** | **$15,227** | **94,367** | **$14,894** | **71,694** | **$14,585** |
| Flushing Station | KACHEMAK DR-FLUSHING STATION | Electricity | kWh | | | | | 17 | $13 | 631 | $357 |
| Stormwater | LGT BAY AVE THAW CABLE | Electricity | kWh | 14,993 | $2,175 | 13,037 | $1,937 | 13,301 | $2,019 | 11,675 | $2,447 |
| **Grand Total Propane** | | **Propane** | **gal** | | | **517** | **$1,794** | **1,593** | **$5,914** | **793** | **$2,715** |
| **Grand Total Fuel Oil (#1 & #2 )** | | **Fuel Oil (#1 & #2 )** | **gal** | **13,517** | **$32,362** | **12,422** | **$31,389** | **8,125** | **$28,000** | **9,276** | **$22,116** |
| **Grand Total Electricity** | | **Electricity** | **kWh** | **1,243,853** | **$146,859** | **1,276,770** | **$152,065** | **1,300,085** | **$170,242** | **983,920** | **$169,246** |
| **Grand Total Energy Cost** | | | | | **$179,221** | | **$185,247** | | **$204,156** | | **$194,077** |

[1] Fuel Oil (#1 & #2) and Propane deliveries are through September 2009 and kWhs used are through October 2009.
[2] 2006- 2009 Fuel Oil (#1 & #2) and Propane gallon numbers are deliveries to the fuel tanks.

## Recommendations for Improving Energy Tracking and Energy Management

### Personnel

Below is a summary of Energy Star's description of an Energy Director and his/her duties. It is recommended that the City of Homer designate an employee or hire an Energy Director (often referred to as an Energy Manager) who can spend at least 25 hours a week to manage the Revolving Energy Fund (see Chapter 3 for a more detailed discussion) and keep energy-tracking and reporting systems up to date.

> **Appointing an Energy Director (Source: Energy Star .gov)**
> Organizations seeing the financial returns from superior energy management continuously strive to improve their energy performance. Their success is based on regularly assessing energy performance and implementing steps to increase energy efficiency.
>
> No matter the size or type of organization, the common element of successful energy management is commitment. Organizations make a commitment to allocate staff and funding to achieve continuous improvement. To establish their energy program, leading organizations form a dedicated energy team and institute an energy policy.
>
> Appointing an Energy Director is a critical component of successful energy programs. An Energy Director helps an organization achieve its goals by establishing energy performance as a core value. The Energy Director is not always an expert in energy and technical systems. Successful Energy Directors understand how energy management helps the organization achieve its financial and environmental goals and objectives. Depending on the size of the organization, the Energy Director role can be a full-time position or an addition to other responsibilities.

The Energy Director's key duties often include:

- Coordinating and directing the overall energy program
- Acting as the point of contact for senior management
- Increasing the visibility of energy management within the organization
- Drafting an Energy Policy
- Assessing the potential value of improved energy management
- Creating and leading the Energy Team
- Securing sufficient resources to implement strategic energy management
- Assuring accountability and commitment from core parts of the organization
- Identifying opportunities for improvement and ensuring implementation (including staff training)
- Measuring, tracking, evaluating, and communicating results
- Obtaining recognition for achievements

**Energy and Vehicle Tracking**

In order to improve energy and vehicle tracking the following strategies are recommended.

- Maintain consistent account, facility and equipment names, and facility addresses throughout all City Departments.
- Create a policy for all departments to ensure that Quality Assurance and Quality Control measures are implemented when handling energy and vehicle data and financial information:
    1. Staff has been appropriately trained in the use of computer programs,
    2. Data have been accurately transcribed and recorded,
    3. Appropriate procedures have been followed,
    4. Electronic and hard-copy data show one-to-one correspondence, and
    5. Data are consistent with expected trends.
- Communicate to the Energy Director prior to when a facility or piece of equipment is coming on or off line.
- Involve Energy Director in planning and maintenance decisions.
- Install electric sub meters and fuel meters at the following locations:

| Facility | Fuel Meter | Electric Sub Meter | Notes |
|---|---|---|---|
| AIRPORT TERMINAL | x | | |
| ANIMAL SHELTER | x | | |
| HERC-01 KPC AND BGC | x | | |
| POLICE STA/JAIL | x | | to track heating system upgrade |
| PUBLIC LIBRARY | x | | tie into local monitoring system |
| CITY HALL | | x | sub meter Heat |
| FISH DOCK | | x | sub meter fish grinder, maybe cranes |
| FISH DOCK-KVAR | | x | sub meter and or an alarm recorder |
| FIRE HALL | | x | |
| MOTOR POOL SHOP | | x | |
| EQUIPMENT STORAGE POLE BARN | | x | |
| STP LAB AND OFFICE | | x | |
| WATER & SEWER MS | | x | |

- Track how much waste oil is burned in the Motor Pool Shop heater.
- Track all vehicle fueling events that to do not take place at the City Fuel Island.
- Identify equipment on larger vehicles and track fuel usage for this equipment.

# Chapter Two
# Greenhouse Gas Emissions

## Introduction

The second task of this project was to update the green house gas emissions data for "municipal government" operations to allow comparison of 2007 and 2008 emissions to the 2006 baseline. This chapter reports on the City of Homer's greenhouse gas emissions from 2006 through 2008. It should be noted that the 2006 greenhouse gas emissions data has been updated and reconfigured in this report and replaces the data reported in the December 2007 City of Homer Climate Action Plan (CAP). Due to problems with labeling of fuel tanks, etc., the 2006 data reported in the CAP actually overstated the City's GHG emissions by almost 14.1%. Assessing the City's progress in meeting its target reductions of 12% by 2012 and 20% by 2020 will require recalculating the 2000 baseline (extrapolating from the new 2006 data).

Since the Climate Action Plan was completed in December of 2007, ICLEI has updated and improved its Clean Air and Climate Protection Software (CACP) software. CACP 2009 was released in March of 2009. CACP 2009 is a one-stop emissions management tool that calculates and tracks emissions and reductions of greenhouse gases (carbon dioxide, methane, nitrous oxide) and criteria air pollutants (NOx, SOx, carbon monoxide, volatile organic compounds, PM10, PM 2.5) associated with electricity, fuel use, and waste disposal. In addition, a Local Government Operations Protocol for the quantification and reporting of greenhouse gas emissions inventories was developed by ICLEI in partnership with the California Air Resources Board, the California Climate Action Registry, and the Climate Registry. The protocol was released in September 2008.

## Methods

Using the Local Government Operations Protocol and the online CACP 2009 user guide, energy data was compiled into tables using the energy, facility, and vehicle tracking systems developed for the City. The tables were copied out of the CACP 2009 software by sector for each year (2006–2008) to create spreadsheets for uploading data. Data was then queried in the tracking systems to match the sector layout in CACP 2009 and copied and pasted into the upload spreadsheets.

## Data Findings

Table 35 and Figures 43 summarizes the City of Homer's total equivalent CO2 (tonnes) emissions[1] by sector for 2006 through 2008. Figure 44 shows the percent of total equivalent CO2 (tonnes) by sector for 2008 only. Appendix 7 provides a detailed greenhouse gas emissions report for all City facilities and vehicle fleet from 2006 through 2008. Total equivalent CO2 (tonnes) increased by 5.32% in 2007. In 2008 total equivalent CO2 (tonnes) increased by 0.82%. Total equivalent CO2 (tonnes) emissions for 2008 are up 6.19% from the 2006 base year.

[1] Greenhouse gas emissions (carbon dioxide, methane, nitrous oxide) and criteria air pollutants (NOx, SOx, carbon monoxide, volatile organic compounds, PM10, PM 2.5) are expressed as CO2 equivalents for monitoring and comparison purposes.

**Table 35 City of Homer Total Equivalent CO2 (tonnes) by Sector for 2006 through 2008**

| Sector | 2006 | 2007 | 2008 |
|---|---|---|---|
| Airport Facilities | 242 | 242 | 240 |
| Buildings and Facilities | 973 | 1069 | 1081 |
| Port Facilities | 1362 | 1396 | 1433 |
| Solid Waste Facilities | 16 | 17 | 18 |
| Streetlights & Traffic Signals | 124 | 142 | 157 |
| Vehicle Fleet | 346 | 388 | 402 |
| Wastewater Facilities | 831 | 843 | 818 |
| Water Delivery Facilities | 372 | 396 | 381 |
| **Grand Total** | **4266** | **4493** | **4530** |

**Figure 43 City of Homer Total Equivalent CO2 (tonnes) by Sector for 2006 through 2008**

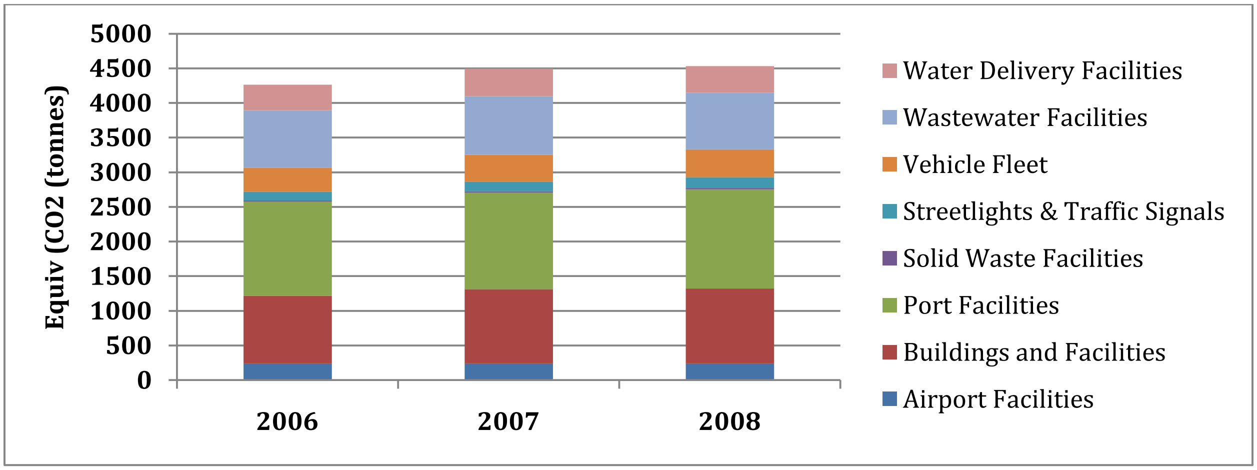
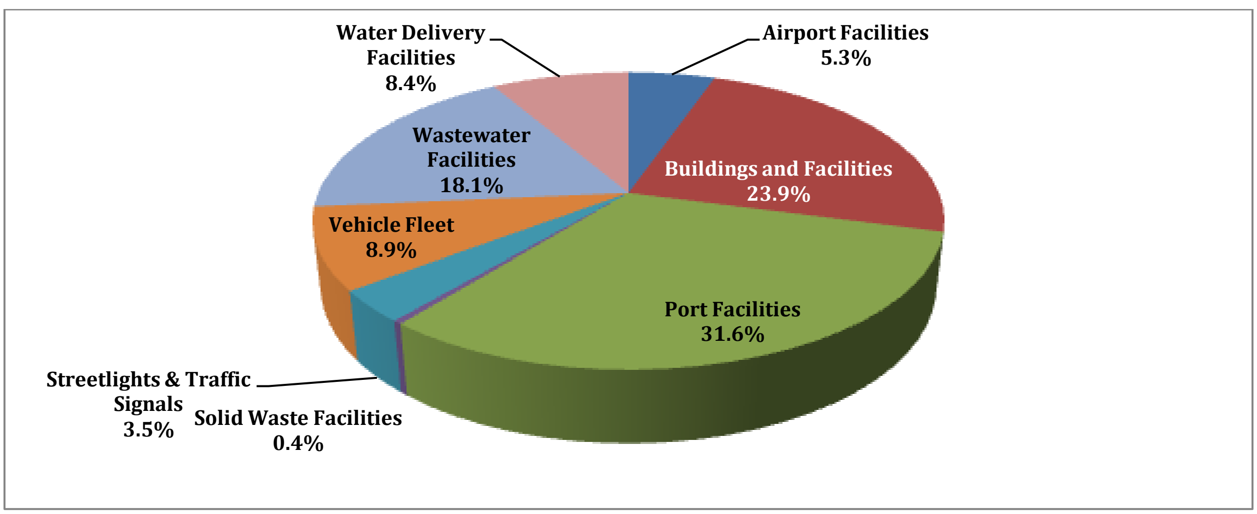



**Figure 44 City of Homer Percent of Total Equivalent CO2 (tonnes) by Sector for 2008**



# Chapter Three
# Funding

## Introduction

The City of Homer established a "sustainability fund" in January 2008, as the first step in implementing the Climate Action Plan that was adopted the previous month. Resolution 08-07(A) established the fund as a fiduciary fund within the City's Chart of Accounts and further specified that the City Council "may establish a formal set of program regulations as needed."

Establishment of the Sustainability Fund was motivated in part by the donation of more than $45,000 by private individuals at the time that the Climate Action Plan was adopted. Since then, the City Council has appropriated an additional $30,000 to the fund ($15,000 for 2008 and $15,000 for 2009). However, no formal guidelines have been developed on how to utilize or grow the fund. The recommendations below are intended to provide guidance in this regard. It should be noted that, absent annual budget allocations, the establishment and maintenance of such a fund is integral to the ongoing implementation of the Climate Action Plan and is a growing national trend among municipalities (and businesses) that are pursuing sustainability goals.

## Paying for energy and climate-related projects

It is fortunate that Homer joined ICLEI–Local Governments for Sustainability in 2007, as the association with other local governments has provided a wealth of information, training, and networking opportunities over the last two and a half years. Another source of information has been the U.S. EPA State and Local Climate and Energy Office. ICLEI and the EPA have individually and in partnership sponsored several workshops and webinars and disseminated reports and case studies relevant to the question of how to pay for climate action/energy plan implementation. City of Homer staff and consultants have attended some of these workshops and webinars since the CAP was adopted.

In addition, Deerstone consultants have identified the following helpful web sites and resources for funding opportunities: EPA Guide: Programs, Tools and Resources to Help Local Governments Implementing Your Climate Action Plans: http://www.epa.gov/region09/sustainable-cities/EPA_Programs_Directory-LocalGov-v3.pdf; and EPA Office of Air and Radiation Grants and Funding Sources: http://www.epa.gov/air/grants_funding.html. The most helpful funding listservs identified include Grants.gov, alternative energy and climate change funding resource listserv by laurie.e.brown@comcast.net, and USDA rural development funding sources listserv by karen.dearlove@ak.usda.gov.

If there is a silver lining to the dark cloud of escalating energy costs, it has been to motivate state and local governments to develop programs to increase energy efficiency and promote energy conservation. The enormous interest in this topic over the last couple of years, including development of programs to fund energy retrofits, renewable energy projects, and community outreach, has created models that other cities and states can emulate. Revolving loan funds, sometimes referred to as **Revolving Energy Funds (REFs)**, have emerged as one of the most popular and successful financing tools.

## Revolving Energy Funds

Simply put, an REF uses initial (seed) money to finance energy efficiency projects that can be expected to pay for themselves within a few years. Savings are estimated or calculated and some portion is put back into the REF to provide money for new projects. In this way, money "revolves" out of the fund to cover up-front costs for new projects and back into the fund as savings are realized. Some governments only fund projects that will pay for themselves over time; others fund mostly projects of that nature but reserve some portion of the fund to cover other types of projects that help meet broader goals, such as community education or green business start-up, that do not provide direct paybacks to the fund but do increase local prosperity and energy self-reliance.  Criteria to determine the types of projects funded by an REF would be set by the governing entity, such as a City Council, that is responsible for the expenditure and collection of the revolving funds.

Energy efficiency measures are well suited to use of an REF because of the up-front investment required to achieve long-term savings. "Working capital" provided by such a fund can be leveraged to purchase equipment or improve building envelopes that otherwise wouldn't be accomplished. If energy prices continue to escalate, the accrued savings compared to the status quo of not implementing efficiency measures will further increase and can be used to further expand the sustainability fund.

The following recommendations for a City of Homer Revolving Energy Fund are based primarily on information found in the ICLEI resource guide "Revolving Energy Fund" (2008) and additional information from the City of Ann Arbor, Michigan, which has utilized an REF since 1998. For purposes of this report, it will be assumed that the Sustainability Fund will become a Revolving Energy Fund if these recommendations are implemented.

### Management

The City of Homer needs to identify a city employee with responsibility for managing the REF. Activities will include publicizing the program, collecting and tracking applications, and working with a small committee to decide which projects to finance. In most cities (and large corporations), REF activities fall under the purview of an "Energy Director" or "Sustainability Coordinator," the same person who also monitors energy use, produces reports for department heads, writes energy-related grants, interfaces with the public, and in general works to implement the city's Climate Action/Energy Plan.

It is recommended that the City of Homer designate an employee who can spend at least 25 hours a week to manage the REF and keep energy-tracking and reporting systems up to date. After the initial seed money is invested and begins to achieve energy and cost savings, it is possible that the REF itself could be used to at least partially fund the City employee position—or perhaps expand into a full-time position as justified by workload—much as the initial investment in the Sustainability Fund and hiring a contractor to begin implementation of the CAP can be expected to pay for itself through these recommendations and other cost savings identified through their work.

The ICLEI resource guide on REFs states, "From existing REFs, we know that having a dedicated individual responsible for supporting and coordinating fund operations drastically increases the REF's chance of success." Like energy efficiency measures themselves, in general, a dedicated energy manager pays for him/herself once the up-front investment is made because of the cost savings achieved over time, especially with high and increasing energy prices.

<u>REF parameters</u>. Revolving Energy Funds can be focused narrowly or more broadly. An example of a narrow focus would be to fund energy efficiency upgrades in City buildings when the project can be expected to pay for itself in five years or less. An example of a broad focus would be to include non-City projects and those that have longer payback times or no monetary payback at all but that provide other "dividends" (e.g., community education, recycling programs, or those that pass money through to non-profit organizations or businesses that employ community members and generate additional tax revenue either directly or indirectly).

It is recommended that the City of Homer establish a REF that is neither very narrow nor very broad such that the benefits are widely distributed and the program becomes widely supported throughout the community. (It can always be broadened or narrowed later if resources permit or dictate.) Parameters might include:

REF funds will support municipal projects only (focused on City of Homer buildings, facilities, vehicles, renewable energy development, and outreach activities).

70% of REF funds will be allocated to projects with an estimated payback period of 5 years or less. 20% of funds will be allocated to projects with an estimated payback period greater than 5 years but less than 15 years, including renewable energy development. 10% of funds will be allocated to projects that are not expected to pay for themselves, including community outreach.

REF funds will not be used to cover the entire cost of hybrid/electric vehicle purchase. However, they may be used to cover the marginal cost difference between a hybrid/electric vehicle and similar gasoline-engine vehicle.

No single project can receive more than 50% of the available REF monies annually.

**Seed money**

To ensure success, the City of Homer REF needs to begin operation with a healthy balance. It is recommended that the City place $200,000 or more into the fund immediately and then set a goal of raising an additional $100,000 - $200,000 by the end of 2010. The following strategies could be used:

It is expected that the City of Homer Sustainability Fund will have a balance of approximately $17,000 at the end of 2009. The amount could be boosted to $200,000 by transferring relatively small amounts from existing City depreciation and capital project reserves. (See Table 36 for a list of possible sources of REF seed money in existing City accounts.)

Use of depreciation funds as seed money for the REF is easily justified in that the projects to be funded through the REF will correct deficiencies in buildings and facilities to increase overall performance and extend the useful life of those facilities, thus reducing the rate of depreciation. In some cases, old inefficient equipment (e.g., vehicles) will be retired and replaced with equipment that is far more efficient and in better condition, to provide improved service and fuel efficiency for many more years. We believe these are entirely appropriate and justifiable uses for depreciation funds.

**Table 36 Potential Sources of Funds for Revolving Energy Fund**

| Fund | Dept. # | Department | Description | 2010 estimated beginning $ balance | % | Amount to REF |
|---|---|---|---|---|---|---|
| **156** | 370 | Animal Shelter | Depreciation Reserve | 5,000 | 5 | 250 |
| | 375 | General | Depreciation Reserve | 866,921 | 5 | 43,346 |
| | 384 | City Hall | Depreciation Reserve | 41,265 | 5 | 2,063 |
| | 385 | Parks & Rec | Reserve | 72,814 | 5 | 3,641 |
| | 388 | Airport Terminal | Depreciation Reserve | 36,191 | 5 | 1,810 |
| | 390 | Library | Depreciation Reserve | 53,095 | 5 | 2,655 |
| | 393 | Fire | Depreciation Reserve | 91,472 | 5 | 4,574 |
| | 394 | Police | Depreciation Reserve | 101,178 | 5 | 5,059 |
| | 395 | Public Works | Depreciation Reserve | 116,807 | 5 | 5,840 |
| | 396 | Leased Property | Depreciation Reserve | 206,801 | 5 | 10,340 |
| **170** | 733 | New City Hall | Project | 440,011 | 10 | 44,001 |
| **256** | | Water/Sewer | Depreciation Reserve | 3,913,016 | 3 | 117,390 |
| **456** | 380 | Port & Harbor | Depreciation Reserve | 963,691 | 5 | 48,185 |
| | | | **TOTALS** | **6,908,262** | | **289,154** |

Note: In addition to the fund sources listed above, the City budget also shows Capital Project Reserves for Consortium Library, Library Building, Library Expansion, and Animal Shelter totaling $246,432. The City Council might consider reallocating some or all of these funds to a Revolving Energy Fund.

The City of Homer should seek to raise additional money to bring the REF balance to $300,000 or greater. A possible source of such funding is through the U.S. Department of Energy's Energy Efficiency and Conservation Block Grant competitive grant program for municipalities and other local governments or other programs administered through the State Energy Office and Alaska Energy Authority. Direct federal funding is another possibility.

A small "sustainability fee," such as 1 cent per gallon, assessed on the sale of gasoline, propane, and/or diesel fuel within City limits, could also be used to increase the REF balance. If such a fee were imposed, the size of the REF would likely grow substantially, and perhaps at a certain size, such as $500,000 or $1 million, the Council should consider a much broader focus for use of REF monies and allow a portion to be spent on green business and/or non-profit development within the City. This could be accomplished through a competitive solicitation (i.e., grant proposals submitted to the City by local businesses and non-profits) or as part of the annual budget-making process that the Council currently employs in which local non-profits directly receive funds through public deliberation and transparent decision-making. Another possibility to consider if the REF increases in size because of an ongoing sustainability fee contribution is to open up the parameters such that perhaps only 50% (instead of 70%) of the REF funds would be required to support projects with a 5 year or less payback. Under any of these possible scenarios, it is recommended that the REF be initially seeded with already existing depreciation funds and only later, if success and public support can be clearly demonstrated, should the Council consider a "sustainability fee" to further grow and add flexibility to the REF.

Some cities have utilized "windfalls" or unexpected revenues to seed their REF. Examples would include state revenue sharing dollars that were not anticipated or sales/property tax revenues that exceed budget projections.

As this report is going to press, we have learned that the State of Alaska will be distributing American Recovery and Reinvestment Act ("stimulus") Energy Efficiency and Conservation Block Grant funding to local governments that did not qualify for direct EECBG formula funding from the federal Department of Energy. The City of Homer is in the group that did not receive direct federal funding but will receive funding through the State-administered program. The amount is not known at this time. However, it is known that Revolving Energy Funds are one of the eligible uses for EECBG funds.

A local "carbon offset" program is another possibility for raising funds, but would add to the administrative burden of the Energy Manager/Sustainability Coordinator. Once the program was set up, however, it could be largely automated to reduce administrative burden. Such a program, which would encourage voluntary contributions from local citizens, would be modeled after offset programs such as one sponsored by the State of Colorado, in which individuals calculate their greenhouse gas emissions (e.g., from vacation travel) and make a financial contribution either to the REF in general and/or to fund one or more specific projects that reduce greenhouse gas emissions by the same amount. The City could facilitate individuals' calculation of their greenhouse gas emissions by providing a "carbon calculator" on the City's website or linking to one that already exists on the Internet.

Our recommendation would be to consider establishing a local carbon offset program after the REF is well-established and it's clear that the Energy Manager has time to develop and administer the program in concert with other community outreach activities. It will be important that citizens understand the difference between a true offset program and the local program, which is unlikely to include independent, third-party verification. A partnership with the Homer Foundation would allow donors to deduct contributions from their federal income taxes and, if properly created, could ease the administrative burden on the Energy Manager.

Even without an offset program in place, the City of Homer could continue to accept private donations to the Sustainability Fund/REF. The importance of the original donations made in 2007 should be well-publicized to help encourage additional donations from individuals and businesses. For example, any carbon mitigation that emerges as a result of this effort has its origins in the original donations from 2007 and should be recognized as such. Clear rules, project selection criteria, tracking, and a well-respected Energy Manager will increase the appeal for individual donors to contribute to the REF.

**Repayment of Loans and Public Support**

REFs generally utilize one of two mechanisms to maintain a healthy fund balance. One is to charge interest on the repayment of loans and the other is to capture energy savings for a specified period of time.

The second method—capturing energy savings—is simpler and therefore recommended. The Homer City Council should consider the policy outlined by the City of Ann Arbor in its Municipal Energy Fund Bylaws. In this system, funded projects are required to pay the REF 80% of their energy savings each year for 5 years. After that, the individual prospects retain 100% of the savings.

In this fashion, projects with a shorter payback help cover the costs of more ambitious projects with longer payback periods. Establishing a fixed payment plan (e.g., 5 years) can seem unfair at first, particularly for facilities that install 2- or 3-year payback measures. However, fixed payment plans allow REFs to build resilience and allow for a wider portfolio of projects to be funded—and project implementers still benefit from reduced operating costs immediately (because they are allowed to keep 20% of the savings immediately) and over the long run.

Especially during the early phase of the REF, the first projects selected should be those that have the shortest payback. This will partly address the concern about “fairness” raised above since longer payback projects will have to wait to get funded while the shortest payback measures will be selected first. The shortest payback projects are typically noted as the “low hanging fruit” and can be leveraged to demonstrate program success so more difficult, i.e., higher hanging fruit, can eventually be reached.

Whenever possible, energy savings should be based on metered consumption. In cases where it is not possible to identify the effect of a particular measure based on meter data, estimated savings (from energy audits) should be used. To calculate savings, documenting current baseline consumption will be necessary. The energy tracking and database development efforts that have occurred as a result of the various contracts to begin implementation of the CAP should be maintained. These are necessary start-up costs to develop an REF that the City has already incurred, and with minimal maintenance, this effort can be leveraged for ongoing energy savings and advantageously position the City for future grant opportunities.

Effective and ongoing public outreach will be another crucial element for success. Awarded projects should agree to develop a brief (e.g., one page) description of the initiative for public distribution and inclusion on the City’s website.

The City of Ann Arbor’s Municipal Energy Fund Bylaws are recommended as a source of additional information on designing a REF. It should also be noted that as a member of ICLEI, the City of Homer is eligible for technical assistance in setting up an Energy Office and Revolving Energy Fund at discounted rates (ranging from $500 for a customized webinar; up to $2,750 plus travel costs for customized, in-person training).

## Energy Performance Contracting

Energy performance contracting is a construction and implementation method that allows a facility to complete energy-saving improvements within an existing budget by financing them with money saved through reduced energy expenditures. Facility owners (i.e. the City of Homer) make no up-front investments and instead finance projects through guaranteed annual energy savings.

To enter into an energy performance contract, the City of Homer would issue a Request for Qualifications and select a performance contractor, generally known as an energy service company (ESCO). Following a detailed energy analysis, the ESCO would design and install the needed improvements. The City would pay for the financed project over time out of savings realized by the improvements. Typically, the ESCO guarantees both the maximum project cost and the projected energy savings. Typical projects include energy management systems, interior and exterior lighting, boiler replacement, high-efficiency HVAC systems, LED traffic systems, and wastewater treatment plant pumps and motors.

The avoidance of up-front costs and the no-risk guarantee provided through energy performance contracting, an additional benefit is the simplicity that comes with having a single point of accountability.

Primary disadvantages are that in the long run, the City does not realize all the cost savings of implementing the energy saving measures as it would if they were financed through an internal Revolving Energy Fund. (After all, the ESCO needs to make a profit.) Another potential problem is that ESCOs seek out big contracts; e.g., a total contract (detailed audit plus improvements) totaling at least $1 million. Likewise, if the preliminary audit doesn't show potential energy savings of 15% or more, the ESCO might not be interested in a contract.

Despite the disadvantages, energy performance contracting has become very popular because of the low/no risk and no up-front financing requirements. (A high profile example is the renovation of the Empire State Building, a $20 million project expected to reduce energy costs by $4.4 million per year.) The State of Washington assists with performance contracting by pre-qualifying ESCOs and working with government agencies to ensure the best results. The Washington State Department of General Administration promotes energy performance contracting as "the most cost-effective process for completing building energy upgrades."

In the City of Homer's case, in which establishing baseline energy consumption for three years, an ongoing tracking system, and identifying cost effective energy saving measures have already been established, there may be some up-front cost savings from an ESCO's perspective that may allow for a smaller contract to still be profitable and worth their while. Yet these efforts would not substitute for a detailed energy audit and it is unclear if an ESCO would accept this data, as their profit would depend on the accuracy of another contractor's work. If the energy savings opportunities presented by the City of Homer's infrastructure are not of sufficient size to attract an ESCO now working or seeking work in Alaska, and the City of Homer still wants to pursue performance contracting, it may be possible and worthwhile to consider partnering with other local institutions, such as the hospital or college or public schools, to aggregate enough consumption and savings in the local area to be worth an ESCO's effort to pursue.

As this report is going to press, the Alaska Housing Finance Corporation is developing a program that will utilize $18 million in American Recovery and Reinvestment Act ("stimulus") money to allow every school district and municipality in the state the ability to use the State's energy performance master contract, thus providing a "turn-key energy savings program." The program is expected to be announced in spring 2010. We recommend that the City of Homer evaluate the program at that time and, if eligibility criteria are met, seriously consider applying.

Whether or not the City utilizes performance contracting, a Revolving Energy Fund would provide benefits in the form of increased flexibility and local control to cover a range of projects beyond those that could be accomplished under an energy performance contract.

In conclusion, the work already accomplished under the CAP implementation contracts effectively positions the City of Homer to successfully develop and institute a Revolving Energy Fund derived from remaining Sustainability Fund monies and depreciation accounts and should be able to pay for itself and a City employee over the long run to achieve sustained energy and cost savings.

# Chapter Four
# Potential Energy and Cost Savings

## Introduction

Identifying opportunities for significant energy/cost savings in City buildings and facilities was by far the most open-ended and time consuming task in this project. There were many other factors that limited the opportunity to fully identify the energy and cost saving potential for the entire City infrastructure. To begin with the Public Works Project Manager that the contractors were supposed to work with was not hired by the City. This placed a burden on other City staff and significantly increased the amount of time to collect the needed information. In addition, compiling the necessary energy data was significantly slowed due to the various formats and locations of City information. A complete and accurate account of fuel deliveries was not acquired until early November 2009 and that required working with fuel providers to supply the information. Much time and effort went into associating the fuel deliveries to the appropriate fuel tank—a key determination for identifying energy and cost savings for City buildings and facilities.

Another challenge was that the newest and supposedly most efficient building in the City's fleet—the new public library—required significant monitoring and analysis to address unexpectedly high energy costs. This was not planned for in the original scope of work yet became a compelling need for the City, and the contractors and local volunteers responded. The amount of time and effort that went into identifying and calculating cost saving projects for this new facility demonstrated that completing similar efforts for the entire City infrastructure was not realistic under the parameters of the existing contract.

With that understanding, the efforts here should be considered a good first step towards identifying potential energy and cost savings but by no means are the results discussed in this chapter a complete accounting of all projects that can be implemented across the City's infrastructure to achieve energy and cost savings.

## Methods

Using the energy tracking system developed for the City, a list of the largest to the smallest energy consumers for each year was compiled for all city facilities and equipment. Total percent energy use in MMBtu for 2008 can be found in Table 37. Tables 9 and 1 in Chapter 1 provide the largest to the smallest electricity and heating fuel oil (#1 and #2) consumers respectively for 2008. Monthly and annual energy use was also compiled for each facility using the energy tracking systems and provided to contractors for analysis. Additional information was gathered from meetings with City staff and through site visits to the facilities. Research was conducted to develop budgets for up-front capital costs of energy conservation measures and expected lifecycle savings. A prioritized projects list (Appendix 8) of recommendations was then developed for the City to consider in terms of achieving energy and cost savings from facilities' conservation measures.

**Table 37 City Of Homer 2008 Total Percent Energy Use in MMBtu by Facility and Equipment**

| Facility or Equipment | Total Percent Energy Use | Facility or Equipment | Total Percent Energy Use |
|---|---|---|---|
| SEWER TREATMENT PLANT | 14.197% | PR STA @ RIDGELINE STATION | 0.092% |
| GASOLINE FUEL ISLAND | 12.121% | PR STA @ HEA | 0.090% |
| FISH DOCK | 8.475% | PR STA @ MID-HILL | 0.086% |
| HERC-01 KPC AND BGC | 7.724% | HSC FEE COLLECTION BLDG | 0.079% |
| SYS #1 FLT & H MAST LGT#1 | 5.958% | PR STA @ MAIN & DANVIEW | 0.078% |
| DIESEL FUEL ISLAND | 5.945% | SL AT BEAR CREEK DR | 0.077% |
| SYSTEM #5 (LIGHT/FLOAT) | 5.710% | BSTER STA@ FIREWEED AVE 250 | 0.070% |
| AIRPORT TERMINAL | 5.581% | RAMP #4 SPIT STREET LIGHTS | 0.069% |
| PUBLIC LIBRARY | 5.537% | PR STA @ TESORO METER VAULT | 0.068% |
| POLICE STA/JAIL/FIRE HALL | 4.069% | PR STA @ KACHEMAK WAY | 0.067% |
| ANIMAL SHELTER | 2.823% | PR STA @ BARTLETTT-SOUNDVIEW | 0.064% |
| PUBLIC WORKS OFFICE & SHOP | 2.509% | PR STA @ LAKESIDE | 0.060% |
| WATER PUMP STA @ CROSSMAN | 2.216% | SL @ BAY AVE | 0.058% |
| OLD WATER TREATMENT PLANT | 2.121% | PR STA @ EFFLER | 0.055% |
| PORT & HARBOR MAIN SHOP | 2.066% | PR STA @ LUCKY SHOT | 0.047% |
| HERC-02 PW MAIN SHOP | 2.044% | MTRVAULT@ EAST END/EAST HILL | 0.045% |
| CITY HALL | 1.986% | PR STA @ JEEP SALES | 0.045% |
| HIGH MAST LGTS #2,3, & 4 | 1.155% | KAREN HORNADAY PK/CG/BF | 0.039% |
| VARIOUS LOCATIONS (LIGHTS) | 0.673% | LGTS ON HEATH ST | 0.034% |
| RR @ RAMP #6 AND SYS #4 | 0.671% | PR STA@OHLSON LN/FAT OLIVES | 0.033% |
| WATER PUMP STA @ HOMER SPIT | 0.531% | RR AT FISHING LAGOON | 0.030% |
| HIGH MAST LGT #7 @ RAMP #6 | 0.488% | PR STA @ BEAR CREEK | 0.028% |
| RR AT RAMP # 4 | 0.482% | HPD COM ON HOMER SPIT RD | 0.013% |
| PH HARBORMASTER OFFICE | 0.448% | SL@CHLOR STA-GOV LOT 8 | 0.012% |
| RR AT RAMP # 4 | 0.482% | WOOD GRID | 0.012% |
| PH HARBORMASTER OFFICE | 0.448% | BEN WALTERS PARK | 0.011% |
| PR STA @ BARNETT | 0.136% | LGT@ RANGEVIEW & WRIGHT ST | 0.011% |
| SL @ BELUGA LAKE | 0.134% | RR AT BISHOPS BEACH | 0.011% |
| PR STA @ HILLTOP | 0.134% | PIONEER DOCK EAST | 0.006% |
| PR STA @ STERLING | 0.127% | WKFL PARK GAZEBO | 0.006% |
| PR STA @ A-FRAME | 0.122% | WARNING SIREN HOMER SPIT RD | 0.006% |
| PR STA @ WEST HILL | 0.121% | SL @ PORT 30 HOMER SPIT | 0.005% |
| LGT BAY AVE THAW CABLE | 0.121% | KACHEMAK DR-FLUSHING STATION | 0.000% |
| MAIN DK INSIDE PIONEER DK | 0.116% | HICKERSON MEMORIAL CEMETARY | 0.000% |
| PR STA @ SWITCHBACK | 0.114% | PIONEER DOCK WEST | 0.000% |
| PR STA @ EAST HILL-HOEDL | 0.104% | STEEL GRID | 0.000% |
| DEEP WATER DOCK | 0.099% | **Grand Total** | **100.000%** |

## Results

The results below utilize a price of $2.675 per gallon for Jet A / #1 Heating Fuel as per City contract (effective date 11/20/2009) with Petro Marine Services to calculate fuel savings. The cost per kWh for October 2009 for each facility was used to calculate electricity savings. An hourly labor rate of $85 dollars was used to calculate labor costs unless a bid was submitted with one number for labor and materials.

### Animal Shelter

Table 37 shows two projects identified so far for the Animal Shelter. These projects still need more information before energy savings and payback periods can be fully calculated. Because of the nature of this facility, air exchanges are an important safety feature as well as a large consumer of energy. Improving this air handling and heating system could save significant fuel and money, though dollar amounts have not been estimated.

**Table 38 Animal Shelter Potential Energy Savings Projects**

| Project | Project Details | Notes |
|---|---|---|
| **Improve HRV system, add heat exchanger to warm incoming air with the exhaust air** | Heating the incoming air with the waste heat will reduce the load on the heating system and save fuel and electricity | Need contractor to inspect. Recommend Control Contractors |
| **Fresh air mixing system. Because of the function of this facility, a lot of air exchanges are needed, therefore mixing warm exhaust air with fresh incoming air will have a large effect on energy use** | Currently 100 % outside air is supplied without mixing. Controlled mixing of exhaust and fresh air can be monitored and controlled by CO2 and temperature sensors and automatic cycles keeping air quality high and reducing energy use. | Waiting for cost estimate numbers. An estimated 136 gallons of fuel can be saved annually resulting in $364 of annual savings. |

### Kenai Peninsula College and Boys and Girls Club

Table 37 identifies one project that has the potential to save up to 484 gallons of heating fuel resulting in $1296 of potential savings per year. In addition, Public Works staff has installed a timer to control the six 400 watt lights in the parking lot to reduce the time the lights are on and result in some savings in electrical costs.

**Table 39 Kenai Peninsula College and Boys and Girls Club Potential Energy Savings Projects**

| Project | Project Details | Notes |
|---|---|---|
| **Automate pneumatic heating controls and add an Outside temperature reset** | The existing controls only partially function. By replacing the existing controls with electronically operated controls greater precision and more even heating will accrue. The Outside temperature reset will allow the heating system to respond more effectively to temperature changes. | Adding electronic controls will allow integration into a city wide energy monitoring system. Waiting for cost estimate numbers. An estimated 484 gallons of fuel can be saved annually resulting in $1,296 of annual savings. |

### Airport Terminal

Table 38 on the following page lists energy saving projects for the Airport totaling $2,475 worth of potential annual savings. The quickest payback item is to separate lighting zones so as to reduce the run time of high pressure sodium (HPS) lights, which use significant electricity. Variable frequency drives for the main air handling unit and for the boiler circulation pumps are quite costly but will result in reduced electricity and heating fuel consumption. Associated savings are difficult to calculate and thus, the fuel savings is conservatively estimated as zero here, though in reality the savings should be notable. Because of this assumption of zero fuel savings, new variable frequency drives for the boiler circulation pumps only show a “payback” of 24.6 years, which would likely not be worth doing just for the electricity savings. Including all items noted, the average payback is 9.3 years at current energy prices, and 8.5 years at 25% energy price escalation.

### Table 40 Airport Terminal Potential Energy Saving Project Estimations

| Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|
| **Separate Baggage area lighting switching** | The baggage areas have two types of lighting. Fluorescent wall fixtures and HPS ceiling fixtures. The HPS ceiling fixtures are not needed most of the time. By separating the switching they can be controlled as needed. | | $610 | $189 | $0 | $189 | 3.2 | 2.9 | 2.7 | 2.6 |
| **VARIABLE FREQUENCY DRIVES FOR Main Air handling unit, AHU Control Contractor method** | Installing a Variable Frequency Drive on the Main AHU, controlled by a building Pressure Sensor and a CO2 sensor will allow the air handler fan to be demand sensitive, when demand is low the motor can ramp down to a slower speed and save considerable electricity and fuel | Heating Fuel Savings still needs to be calculated | $14,945 | $2,010 | $0 | $2,010 | 7.4 | 6.8 | 6.2 | 5.9 |
| **Install occupancy sensors on 3 vending machines, Snack Miser brand** | Installing occupancy sensors the 3 vending machines that do not use refrigeration will save 100 watts an hour per unit when they are off, in this situation a majority of the time | | $410 | $35 | $0 | $35 | 11.7 | 10.6 | 9.8 | 9.4 |
| **Install Freezer curtains on three luggage bay doors** | Installing freezer curtains on the garage doors in the luggage will reduce unit heater run time when the doors remain open and add an additional seal to the doors | | $5,125 | $22 | $361 | $383 | 13.4 | 12.2 | 11.1 | 10.7 |
| **Techmar Method- VARIABLE FREQUENCY DRIVES FOR Boiler CIRCULATION PUMPS, Eayrs Plumbing** | Installing a Variable Frequency Drive on both Boiler circulation pumps controlled by a Differential Pressure Sensor will allow the pump and boiler system to be demand sensitive, when most zones are closed the pump can ramp down to a slower speed and save considerable electricity and fuel. | These are stand alone pumps with their own sensors, not connected to existing digital monitoring system. Fuel savings not computed, to many variables. | $5,370 | $218 | $0 | $218 | 24.6 | 22.4 | 20.5 | 19.7 |
| | | **Totals** | **$26,460** | **$2,475** | **$26,460** | **$2,475** | **9.3** | **8.5** | **9.3** | **8.5** |

### City Hall

Table 39 provides details for City Hall potential energy saving projects. City Hall is electrically heated, so it was necessary to determine the amount of electricity used for space heating as compared to other electrical uses. There are numerous building envelope improvements that can be implemented to save electrical heat.

### Parks and Recreation

Table 40 lists potential energy saving projects for the restrooms in the harbor area. In addition, the City can save $264 a year by closing the Hickerson Memorial Cemetery electric account. Records show this facility has not been using any electricity for the past four years, but pays $24 a month for having the account open.

### Table 41 City Hall Potential Energy Savings Projects

| Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|
| **Replace T12 Fluorescent tubes with T8 tubes** | Maintenance has been replacing T12 tubes as the fixtures fail. Replace T12 fluorescent tubes and fixtures with T8 tubes | The tubes and ballast needs to be changed. Some fixtures will need to be repaired or replaced during the changeover. This cost is included in this estimate. This project would be performed by an electrical contractor. | $9,048 | $3,273 | $0 | $3,273 | 2.8 | 2.5 | 2.3 | 2.2 |
| **Insulated shades for Lower entry area** | Installing easy opening insulated shades will increase the R- Value by at least 3.5 and reduce radiation loss through the dark glass at night | | $2,715 | $352 | $0 | $352 | 7.7 | 7.0 | 6.4 | 6.2 |
| **Improving baseboard heating control** | Installing some additional thermostats at critical locations the existing heating system can be used more effectively | Waiting on equipment costs numbers | | | | | | | | |
| | | **Totals** | **$11,763** | **$3,625** | **$0** | **$3,625** | **3.2** | **3.0** | **2.7** | **2.6** |

### Table 42 Harbor Restrooms Potential Energy Savings Projects

| Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|
| **Insulate Hot water pipes, Improve cold air return of Furnace system** | Insulating the hot water copper piping will greatly reduce heat loss and keep the heat where it is needed. The cold air return from the hot air Furnace pulls through the utility area and not directly from the rooms, this causes cold outside air to be mixed in with the return. By reducing the heating of outside air the boiler will heat more effectively. | Need contractor to inspect. Recommend Control Contractors, Mike | | | | | | | | |
| **Add grid tied wind generator** | Installing a wind generator will save and make power. This is a very good wind area, estimated 12 mph average. | | $20,222 | $1,056 | $0 | $1,056 | 19.1 | 17.4 | 16.0 | 15.3 |

## Police Department

Table 41 identifies one project with $2,906 worth of potential savings and 8.4 year payback period with current fuel and electric rates.

**Table 43 Police Department Potential Energy Savings Project**

| Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|
| **Replace upper hot air furnace with a boiler, keep lower Furnace for redundancy** | By replacing the upper Furnace with a boiler, two electric hot water heaters can be eliminated and their electrical load. The boiler will use duct heaters and heat through the existing ductwork. The boiler system will use about 20% less fuel for the same heating. | | $24,510 | $1,314 | $1,592 | $2,906 | 8.4 | 7.7 | 7.0 | 6.7 |

**Port and Harbor**

Table 42 lists five projects totaling $24,120 worth of potential annual savings at current energy prices. These represent substantial savings with very short payback times and/or low capital cost and should be implemented as soon as possible. The suggested insulation and sealing of the foundation skirting will undoubtedly provide fuel savings though the cost and amount of savings has not been calculated here because this would likely be a project put out to bid.

It should also be noted that these measures were primarily identified by the Harbormaster and his staff, who are a good example of energy efficiency “champions” on the City’s staff who know their facilities very well and have unique insight for making improvements to the work environment. In general, the contractors met many City staff champions who have similar insight and commitment to improve the City and their workplaces.

The following savings were achieved during the course of this project.

- $3,600 worth of annual savings was realized by closing the electricity accounts for the East and West Shore ties for the Pioneer Dock. These accounts were active despite the fact that they were not using any electricity and were being charged a $150 monthly demand account customer charge for each account for having these accounts open. This accomplishment was a direct result of poring over billing records and matching accounts as part of this project.
- $1,243 dollars worth of annual savings was realized by closing the Ramp # 4 street light account, which was also a direct outcome of analysis from this project.
- Photo cell adjustment in the high mast lights has resulted in a 15% reduction in kWhs and nearly a 17% reduction in electricity costs for the high mast lights. This percentage is based on usage and costs for Jan-Oct 2008 as compared to Jan-Oct 2009. Extrapolating savings based on the High Mast Light # 7 account, this resulted ina $8,241 worth of savings for this 10 month period for all seven lights. Extrapolating to a 12-month period results in annual savings of $10,171.

In addition, the City can save $264 a year by closing the Steel Grid electricity account. Records show this facility has not been using any electricity for the past four years, but pays $24 a month for having the account open. The Steel Grid usage is actual being measured on the SYS #1 FLT & H MAST LGT#1 electricity meter. A recent phone call to the Port and Harbor Department confirmed that they are in the process of shutting this account down.

## Table 44 Port and Harbor Potential Energy Savings Projects

| Facility Name | Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **FISH DOCK** | Remove 8 transformers that power 8 dockside 15 amp 120 volt receptacles | The 8 transformers rated at 5 kw each consume 500 watts of electricity per hour each, with no load. This is a major parasitic load. | | $3,400 | $5,803 | $0 | $5,803 | 0.6 | 0.5 | 0.5 | 0.5 |
| **ICE PLANT** | Installing digital controls for the ice machine boost system | The digital controls will automate the operation more and allow closer regulation of the equipment, this will reduce energy use and safety and reduce the labor cost | | $12,510 | $16,650 | $0 | $16,650 | 0.8 | 0.7 | 0.6 | 0.6 |
| **PH HARBORMASTER OFFICE** | Disconnecting the overhead radiant ceiling heaters and replace with an oil fired Toyo stove. Replace 3 windows and 1 door SE side of office | The overhead radiant heater provides make up heat that the existing Toyo oil stove cannot handle. By adding a second smaller Toyo oil stove at the far end of the office the heat will be distributed more effectively. The fuel is less expensive than electricity for the same heat. The improvements of the windows and door will help save additional fuel | Fuel oil use will increase by 226 gallons. Electric will be less | $1,494 | $2,247 | -$605 | $1,642 | 0.9 | 0.8 | 0.8 | 0.7 |
| **PH HARBORMASTER OFFICE** | Insulate and seal foundation skirting. | The foundation skirting leaks a lot of air and is poorly insulated. The inside surface is irregular and hard to seal, spray on Urethane foam may be effective | Requires contractor Bid or estimate | | $0 | $0 | $0 | #DIV/0! | #DIV/0! | | |
| **PORT & HARBOR MAIN SHOP** | Air Compressor timer | The shop air compressor is powered up most of the time. It is very important to have full air when the workers show up in the morning. By installing a timer the unit could be turned off 10 hours per day and still be ready at 6:00 am | | $280 | $25 | $0 | $25 | 11.2 | 10.2 | 9.4 | 9.0 |
| | | | **Totals** | **$17,684** | **$24,724** | **-$605** | **$24,120** | **0.7** | **0.7** | **0.6** | **0.6** |

**Public Library**

In response to the Library Advisory Board's requests to review energy use in the new library, Deerstone Consulting worked with Bill Smith, a local mechanical administrator, to do a thorough analysis of the building structure, heating system, ventilating system, and building management system as they relate to energy consumption and maintaining indoor air quality. It should be noted that Mr. Smith volunteered his time on this project. Appendix 9 contains his report.

Table 43 lists several potential energy savings projects totaling $12,701 in potential annual savings. All of the suggested changes except for installing a point-of-use water heater in the staff restroom would result in heating fuel savings and not electrical savings. An important theme that emerged from detailed analysis of the library was that the building management system (BMS) could be improved with very little capital expenditures yet significant cost savings could be achieved when accompanied with proper staff training. These activities should be implemented as soon as possible to realize maximum savings.

The single most expensive measure identified was installing easy opening insulated shades to be used especially at night. This would also likely require some staff involvement to achieve full savings as the shades would need to be closed each night.

During the course of the project it was determined that the City was over charged $278.67 on the Old Library electricity account. This amount was credited back to the City.

**Table 45 Public Library Potential Energy Savings Projects**

| Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|
| **Turn Off Snow Melt Sidewalk** | Program BMS, Turn off pumps & controls | Would require more snow removal effort, in addition to already manually maintained sidewalks | $85 | $0 | $4,027 | $4,027 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Restroom Fan control** | Install occupancy sensors and signal to BMS | | $575 | $0 | $1,930 | $1,930 | 0.4 | 0.3 | 0.3 | 0.3 |
| **Close air supply to meeting rooms** | Programming, damper setting | Part of reprogram building | $170 | $0 | $342 | $342 | 0.6 | 0.6 | 0.5 | 0.5 |
| **Turn off heat to fan coils** | Programming, valve turning | Part of reprogram building | $340 | $0 | $591 | $591 | 0.7 | 0.7 | 0.6 | 0.6 |
| **Turn Off Entry Cabinet Unit Heater** | Manual switch off and close valve | | $170 | $0 | $266 | $266 | 0.8 | 0.7 | 0.7 | 0.7 |
| **Other Stage 1 Improvements (5 to 10% savings)** | Reprogram, reset, monitor | Mainly Maintenance staff work, training and monitoring | $1,700 | $0 | $2,548 | $2,548 | 0.9 | 0.8 | 0.7 | 0.7 |
| **Turn Off Air Handling Unit (AHU)** | Reprogram Building Management System | No contractor cost if done in-house. Staff operates windows and monitors air quality. Staff operates AHU as needed. | $3,570 | $0 | $3,809 | $3,809 | 1.2 | 1.1 | 1.0 | 1.0 |
| **Turn Off Water Heater, Install Point of Use WH in Staff Restroom** | Manual shutdown of WH and Recirc pump, re-pipe & Install new WH | Cold water only in public restrooms | $2,110 | $840 | $0 | $840 | 2.5 | 2.3 | 2.1 | 2.0 |
| **Repair AHU Valve** | Disassemble, repair as needed | Normal maintenance | $270 | $0 | $106 | $106 | 3.3 | 3.0 | 2.7 | 2.6 |
| **Replace oil burner** | purchase, install, tune burner | | $2,195 | $0 | $765 | $765 | 3.7 | 3.3 | 3.1 | 2.9 |
| **Insulated shades for Lower south windows** | Installing easy opening insulated shades will increase the R- Value by at least 3.5 and reduce radiation loss through the dark glass at night | | $10,352 | $0 | $762 | $762 | 17.4 | 15.8 | 14.5 | 13.9 |
| **Monitor all building functions** | Create logs of more sensors and actions | Savings hard to calculate | $170 | $0 | $0 | $0 | | | | |
| **Monitor oil burners** | Install sensors, signal to BMS | Savings hard to calculate | $490 | $0 | $0 | $0 | | | | |
| | | **Totals** | **$22,197** | **$840** | $11,861 | $12,701 | **1.7** | **1.6** | **1.5** | **1.4** |

**Water Utilities**

Table 44 list potential energy saving measures for the 20 pressure reducing stations (see Table 29) utilized to move water throughout the City. Estimates were made for one station and then multiplied by 20. Savings and costs may vary from station to station. All the stations are heated electrically. The savings would be achieved by installing an outside air temperature sensor to keep the heaters turned off when the outside temperature is above 50°F. Additionally, it may be possible to generate most of the electrical heat on-site through installation of small hydro turbines where the pressure reducing valves are currently located, thus achieving even greater savings. The City is currently investigating this through a project funded by the Alaska Energy Authority. This renewable energy effort is discussed further in Chapter 7 below.

### Table 46 Water Utilities Potential Energy Savings Projects

| Facility | Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PRESSURE REDUCING STATIONS- Typical Vault | Add outside air temperature sensor to turn off Vault heating when outside temperature is above 50 deg F. Adding removable pipe insulation will keep condensation down an reduce the heat load | The pressure reducing vaults have 3 kW heaters that cycle on regularly even when outside air temps are above 50 F. By turning off the heater during this time substantial electricity can be saved while still keep the vaults dry of condensation. Pipe insulation will also keep condensation down. | There are 20 pressure reducing stations. Equipment cost would be $150 per station and 4 hours labor per station. | $9,800 | $1,254 | $0 | $1,254 | 7.8 | 7.1 | 6.5 | 6.3 |
| CITY WATER PLANT & MAINTENCE BUILDINGS | Use hydro turbines at some pressure reducing stations to heat the maintenance and water plant buildings | During upgrades to the pressure reducing station, hydro turbines can be installed to reduce the pressure and generate electricity that can be used to heat the buildings along the existing water line | Waiting on numbers from Public Works Director | | | | | | | | |

## Light Replacement

Although lighting replacement projects are often the best energy saver with quick payback, the calculation of the benefit will require an extensive examination on a building-by-building basis. Following is a discussion of three important and useful tools that could be used to facilitate this process.

Using the *Cooper Lighting Energy Solutions*, lighting replacement projects cost/benefit ratios may be quickly calculated with generalized assumptions. Alternatively, the variety of City buildings with mixtures of fixture types, varied hours of use, and differing visual acuity needs may each be addressed in detail. A simple payback analysis for Homer City Hall was performed and results are included in Table 41 and Appendix 8.

The *Lighting Retrofit Workbook* is an excellent, thorough, and down-to-earth guide that was prepared by Lawrence Berkeley Laboratory for the U.S. Department of Energy, Federal Energy Management Program and published by the National Park service. This step-by-step manual addresses most of the lighting issues faced by the City of Homer. The workbook contains worksheets, but the self-calculating and more sophisticated *Cooper Lighting Energy Solutions* Excel worksheets should be used.

The *Advanced Lighting Guidelines 2003,* which was prepared by the California Energy Commission, is a 445 page intensively detailed document enabling a close examination of a complex topic. The Guidelines are organized in seven broad chapters dealing with Lighting and Human Performance, Lighting Impacts and Polices, Lighting Design Considerations, Applications, Light sources and Ballast Systems, Luminaires and Light Distribution, and Lighting Controls.

### Cooper Lighting Energy Solutions

The Cooper Lighting Energy Solutions tool is a full resource auditing tool that uses Excel spreadsheets that are capable of quick calculations with generalized assumptions or intricately detailed analysis of varied lighting environments. Computations include:

- Payback Analysis
- Payback Analysis: Controls
- Payback Analysis: Multiple System
- Payback Analysis: Multiple Luminaires
- Energy Analysis
- Retrofit Opportunity Estimator
- Cost of Waiting
- Lighting Power Density (w/sqft) & EZ EPAct
- Lighting Power Density (ASHRAE 90.1 2004)
- EPAct Certification Form
- Environmental Impact
- Scotopic/Photopic Impact
- Scotopic/Photopic Impact on Two Systems
- Coefficients of Utilization Table
- Luminaire Count Estimator
- Common Footcandle Recommendations
- Footcandle Estimator
- Maintained Illumination over System Life
- 10 Year Maintenance Cost Estimator
- Maintenance Cost Estimator
- Maintenance Factors
- Productivity Impact of Lighting Retrofit
- Impact of Lighting Retrofit on HVAC Costs
- F-BAY System Comparison

Stair Lite

Tips for a Successful Energy Audit

Lighting System Audit Forms

- Site Background
- Fixture Information
- Fixture Detail

Retrofit Luminaire Selector

Target Efficacy Rating (Revised LER)

Input Watt Finder

Cash Flow Benefit of Financing

Helpful Website Links

**Lighting Retrofit Workbook**

The Lighting Retrofit Workbook is 96 pages and contains the following:

Introduction

Overview

Lighting Retrofit Benefits

Common Lighting Problems

Section 1: Four Things To Do First

- 1.1A-lamps
- 1.2Halogen torchieres
- 1.3Exit signs
- 1.4Controls

Section 2: Lighting Audit

- 2.1Application area worksheet
- 2.2Audit worksheet
- 2.3Example audit worksheet
- 2.4Audit summary form

Section 3: Target Areas

- 3.1Office lighting
- 3.2Exhibit lighting .
- 3.3Hallways and corridors
- 3.4Bathroom .
- 3.5Sales/store
- 3.6Lobby
- 3.7Parking lot lighting
- 3.8Exterior lighting
- 3.9Auditorium lighting
- 3.10Remote buildings
- 3.11Closets/maintenance rooms

Section 4: Implementation Guidelines

- 4.1 How to select new hardware
- 4.2 Additional points to consider when selecting a new fixture
- 4.3 Where to find technical assistance
- 4.4 Where to find financial assistance .
- 4.5 Where to purchase recommended technologies

Section 5: Routine Maintenance Program

Appendices

Manufacturer and technology database

Glossary

**Advanced Energy Guidelines:**

The Advanced Energy Guidelines tool is an electronic copy only that is 445 pages and contains the following:

Lighting and Human Performance

Lighting Impacts and Polices

Lighting Design Considerations

Applications

Light sources and Ballast Systems

Luminaires and Light Distribution

Lighting Controls

**How much energy can we save? From U.S. DOE Federal Energy Management Program**
Spectrally Enhanced Lighting - Field Evaluation Reveals Significant Energy Savings

A new report released by the U.S. Department of Energy documents field test evaluation results of spectrally enhanced lighting technology used in three buildings. Spectrally Enhanced Lighting is a lighting design technique that can save 20% more energy than commonly used T8/electronic ballasted fluorescent lighting systems. Properly designed systems can achieve 50% savings over T12 and magnetically ballasted lighting systems. These savings are achieved by using naturally occurring visual efficiencies gained through the use of lighting whose color spectrum is more like daylight than most commonly used light sources, which are more yellow in appearance than Spectrally Enhanced Lighting. The visual benefits from the enhanced spectrum include higher levels of brightness perception and visual acuity when measured at the same foot-candle level. These visual benefits were discovered during the 1990's in US Department of Energy (DOE) research studies, which demonstrated these effects as a naturally occurring result of the eye's response to shifting the color of light to include more blue in the spectrum.

## Personnel Recommendations for Maintaining City Facilities

Operating and maintaining the City facilities and equipment is by far the most important function of the City, and to do so requires adequate staff and proper training. Interviews with Public Works and Port and Harbor staff and site visits to City facilities revealed that the maintenance and motor pool operations are challenged and potentially understaffed and inadequately trained to keep up with the changing and aging infrastructure. The motor pool also has space limitations that affect the maintenance schedule of the vehicle fleet which in turn affects the life span and operation efficiency of the vehicle fleet. EPA and the Department of Energy estimate that buildings can save five to twenty percent annually on their energy bills by implementing Operations & Maintenance best practices, but the staff and training need to be in place. Several guides and reports for Operations & Maintenance best practices can be found at:
http://www.energystar.gov/index.cfm?c=business.bus_om_reports

It is recommended that the City consider the following for maintaining its facilities and equipment:

- Increase motor pool staff by one full time position.
- Increase building maintenance staff by one full time position.
- Move Port and Harbor Maintenance division from Public Works Department to Port and Harbor Department to increase efficiency.
- Increase Ice Plant staff by one half-time position for winter maintenance.
- Increase water and sewer maintenance staff by one full time position.
- Develop and implement a long term plan for maintenance staff to be further trained for the facilities and equipment they are maintaining.
- Develop and implement a plan to provide adequate space for the motor pool shop to maintain the City Fleet.

Though in aggregate these are significant staff additions, perhaps some staff can be cross-trained so that these individuals can meet various short-term or seasonal needs, and/or the hiring can take place gradually so it is not such a budget strain on City finances.

## Conclusion

This chapter identifies significant and relatively easy to achieve energy saving measures that can provide long term budget savings for the entire City. Several of the measures were not fully calculated in terms of potential savings but were merely enumerated as possible actions. Including eliminating dormant electric accounts with HEA, this amounts to well over $66,000 in savings each year, though of course this must be balanced against the capital expenditures required to achieve some of the savings identified.

As discussed above, an energy service company would likely conduct its own audit to identify energy saving measures that it would implement to earn a fee and save the City money. Even if the City decides to pursue performance contracting as described in Chapter 3, some measures could be implemented sooner, without a performance contract, to begin reducing energy use and costs immediately.

Finally, it should be noted that this is not a comprehensive list of energy saving measures. Considerable effort was applied to assess the public library, and this necessarily took time and effort away from similar detailed assessments of other buildings. Nonetheless, this chapter represents an examination of the City infrastructure and offers preliminary recommendations. Additional and detailed energy audits would likely identify further energy saving measures with more accurate costs and payback times. This would be an ideal activity for an ESCO.

# Chapter Five
# Fleet Energy Use and Replacement Schedule

## Introduction

Deerstone Consulting was contracted by the City of Homer to assist in the implementation of the City's Climate Action Plan (CAP). An important concern in any energy management and/or climate action plan is use of vehicles, which are major energy consumers and greenhouse gas (GHG) emitters. Further, as energy prices have dramatically increased over the past few years, reducing the cost of fueling these vehicles has also emerged as a major factor in fiscal management.

The City of Homer owns and maintains a fleet of vehicles to perform essential city government functions, including street maintenance, law enforcement, and general transportation of city employees. This report provides collected data on City of Homer vehicle fleet fuel usage based on miles driven and/or hours of use and discusses fleet replacement scheduling and options.

All GHG emissions for the City fleet, both totals and on a vehicle-by-vehicle basis, are calculated using CACP software (Clean Air and Climate Protection).

Fleet replacement is discussed because once a vehicle is purchased, there is a limited range of options for conserving fuel based almost exclusively on effective operation and maintenance (O&M). As market pressures continue to push technology toward more fuel efficiency, the single biggest improvement to the City's vehicle fleet fuel efficiency and O&M costs will be wise purchases of new vehicles. Of course, initial purchase price also needs to be considered, but if fuel prices continue to rise, operation costs will also rise as a portion of the total lifecycle costs

## Methods

To learn how the City currently manages and fuels its vehicle fleet, a meeting was scheduled with the Public Works superintendent and the Motor Pool head mechanic in September 2008. This meeting provided guidance for data collection and analysis on the fleet.

Vehicle data was first compiled by the Public Works Department using the MP2 preventative maintenance program. Fuel and mileage/hours data is captured when a vehicle fuels up at the bulk fuel system and the mileage/hours are entered. A report is run daily and then the data is entered into the MP2 system. Fire Department vehicles and small machines are tracked via mechanic work orders for odometer readings.

An "equipment" report from MP2 for each year (2006-2008) was saved in an Excel format and provided for analysis. These reports provided the following for each vehicle: equipment number, vehicle description, serial number, department, odometer start read date, odometer start reading, odometer end read date, odometer end reading, odometer units, miles/hours, diesel gallons, unleaded gallons. For some vehicles data was not complete for all fields. The 2006 report provided only diesel fuel data for heavy equipment.

Fuel purchased elsewhere or when the fuel island is down is not tracked through MP2. During 2007 there were times when the fuel island was out of commission. Information on fuel purchased elsewhere or when the fuel island was down was not provided.

Fuel island deliveries and costs data was provided by the Finance Department.

Data from these reports were compiled in Excel to allow for year-to-year comparison of fuel cost and quantity and mileage/hours data by model year, vehicle, vehicle type, vehicle description, GL account fund, and GL account department, department division. Vehicle types were classified by vehicle weight using the Clean Air Climate Protection software user guide.

Average miles/hours per gallon were calculated for each vehicle using data provided from the MP2 reports. Some vehicles do not have complete fuel data due to lack of records for fuel purchases elsewhere or when the fuel island is down

Cost per gallon for each fuel used by each vehicle for 2007 and 2008 was calculated (total costs/total gallon) using fuel island delivery data.

Some vehicles will show data for both diesel and gasoline. This is because some equipment with a motor is attached to a vehicle, such as a sander on a dump truck—the truck is diesel and the sander motor runs on gas. Also there are fuel tanks on vehicles used to fill heavy equipment out at job locations. In order to get any fuel from the fuel island, either for a lawn mower or generator or miscellaneous barrels of fuel, a vehicle number must be associated with it.

A vehicle is generally "put away" for the season with a full tank of fuel. Consequently when it starts up again it may go 50 to 250 or more miles before it takes on fuel and mileage reported. To capture these miles the end odometer reading was entered for the following year's start odometer reading.

## Data Findings

Table 47 and Figures 45 and 46 below display annual and monthly gasoline and diesel fuel island deliveries and costs for the City of Homer vehicle fleet for 2006 - August 2009.

**Table 47 Summary of Diesel and Gasoline Fuel Island Deliveries, 2006-2007**

| Space Name | Year | Sum of Gallons Delivered | % Difference of Gallons Delivered from Previous Year | % Difference of Gallons Delivered from 2006 | Sum of Delivery Cost | % Difference of Delivery Cost from Previous Year | % Difference of Delivery Cost from 2006 |
|---|---|---|---|---|---|---|---|
| DIESEL FUEL ISLAND | 2006 | 16,544 | | | $41,047 | | |
| | 2007 | 13,689 | -17.25% | -17.25% | $34,771 | -15.29% | -15.29% |
| | 2008 | 16,126 | 17.80% | -2.52% | $60,257 | 73.29% | 46.80% |
| GASOLINE FUEL ISLAND | 2006 | 30,581 | | | $84,341 | | |
| | 2007 | 32,705 | 6.94% | 6.94% | $93,435 | 10.78% | 10.78% |
| | 2008 | 36,702 | 12.22% | 20.02% | $134,031 | 43.45% | 58.92% |

**Figure 45 Annual and Monthly Diesel and Gasoline Fuel Island Deliveries in Gallons from 2006 through August 2009**

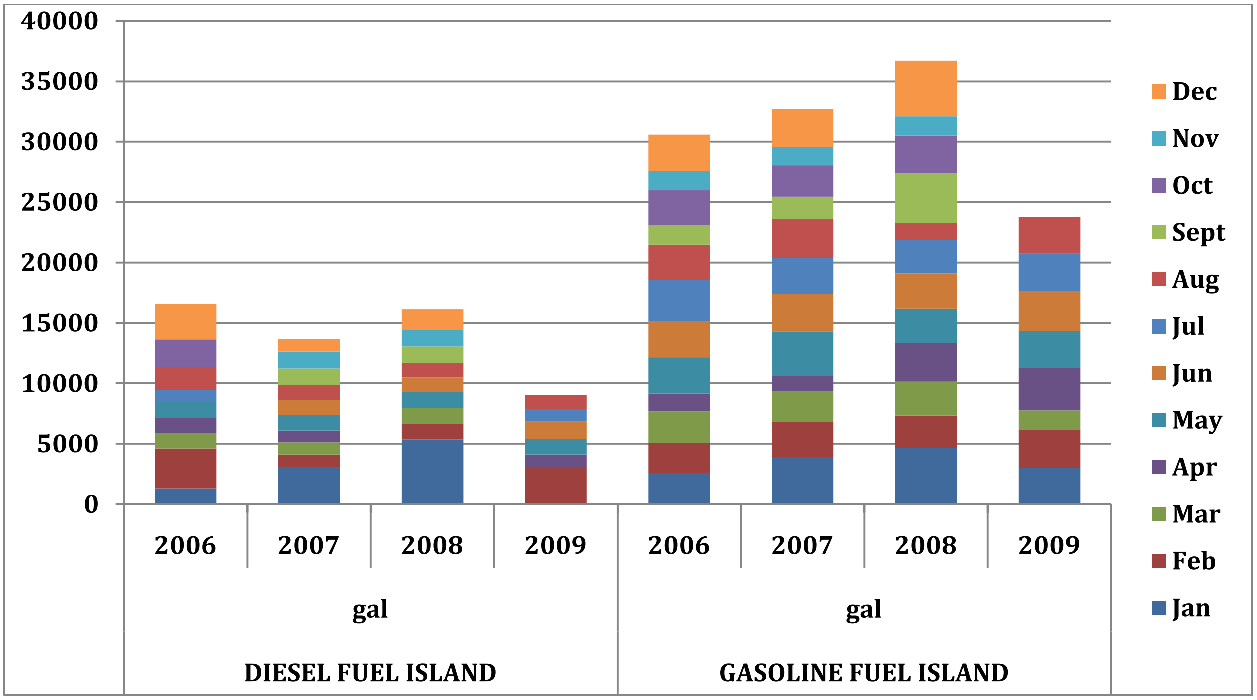



**Figure 46 Annual and Monthly Diesel and Gasoline Fuel Island Deliveries Costs from 2006 through August 2009**

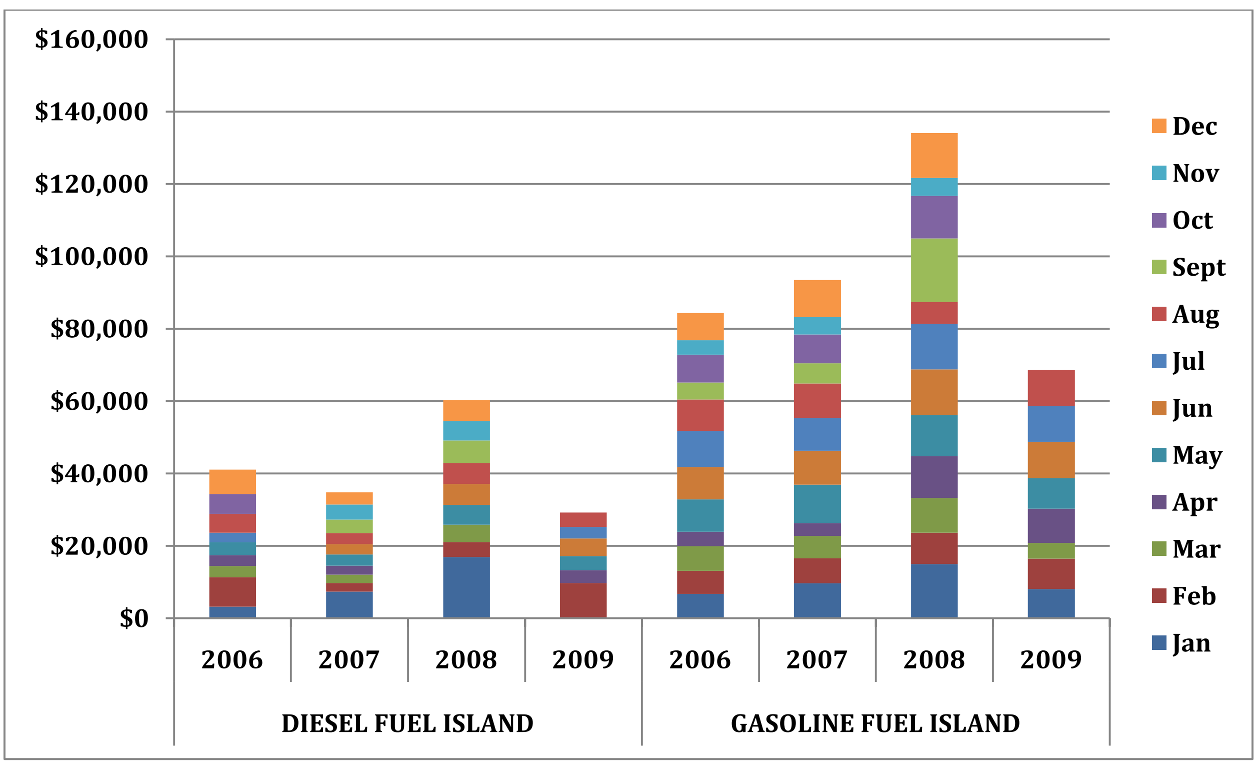


Table 48 and Figures 47–48 below display City of Homer fuel and vehicle use for both gasoline and diesel fuel, in hours and miles as appropriate, for 2006–2008. Hours of use are typically measured for heavy equipment, usually diesel powered, while miles are typically measured for more conventional vehicles, usually gasoline powered.

The only data for 2006 that was provided and is displayed here is diesel fuel gallons for heavy equipment, vehicle hours, and vehicle miles.

Some important trends and highlights from this data include the following:

- Diesel fuel use declined from 2007 to 2008 by 21%, but because of significantly higher fuel costs, City expenditures on diesel fuel increased by 17%, from $34,803 in 2007 to $40,898 in 2008.
- Gasoline consumption increased by 20% from 2007 to 2008, which, combined with higher fuel costs, resulted in an almost 54% increase in City expenditures on gasoline, from $84,160 in 2007 to $129,551 in 2008.
- Figure 49 provides the most comprehensive image of City of Homer vehicle fleet fuel use for both diesel and gasoline, in both hours and miles, for 2007 and 2008.

It is not clear from this research why usage hours for diesel fueled vehicles were greater by about 5% in 2007 than in 2008, but it is speculated that this was in large part a result of heavier snowfall and need for road plowing in 2007 compared to 2008. Similarly, it is not clear from this research why vehicle miles increased about 7% in 2008 compared to 2007 or 2006. But regardless of usage, the dramatic increase in per unit fuel costs caused an increase in City fuel expenditures even in situations where usage hours declined. This underscores the value of fuel efficiency and its increasing importance when considering vehicle replacement in the midst of rising fuel prices. Also note that detailed vehicle-by-vehicle fuel and usage data is included as an appendix to this report.

**Table 48 Fleet and Vehicle Use Summary, 2006 -2008**

| | 2006 | | 2007 | | 2008 | |
|---|---|---|---|---|---|---|
| **Data** | **hours** | **miles** | **hours** | **miles** | **hours** | **miles** |
| **Total Vehicle Use** | 4,587 | 34,1172 | 4,805 | 340,190 | 4,564 | 364,647 |
| **Gasoline Used (gallons)** | | | 315 | 28,907 | 456 | 34,653 |
| **Gasoline Costs** | $0 | $0 | $907 | $83,253 | $1,681 | $127,870 |
| **Diesel Used (gallons)** | 11,779 | | 10,200 | 3,666 | 8,214 | 2,692 |
| **Sum of Diesel Costs** | $0 | $0 | $25,601 | $9,202 | $30,803 | $10,095 |

**Figure 47 Miles Driven by City of Homer Fleet, 2006 -2008**


**Figure 48 Hours of Usage, City of Homer Vehicle Fleet, 2006 - 2008**

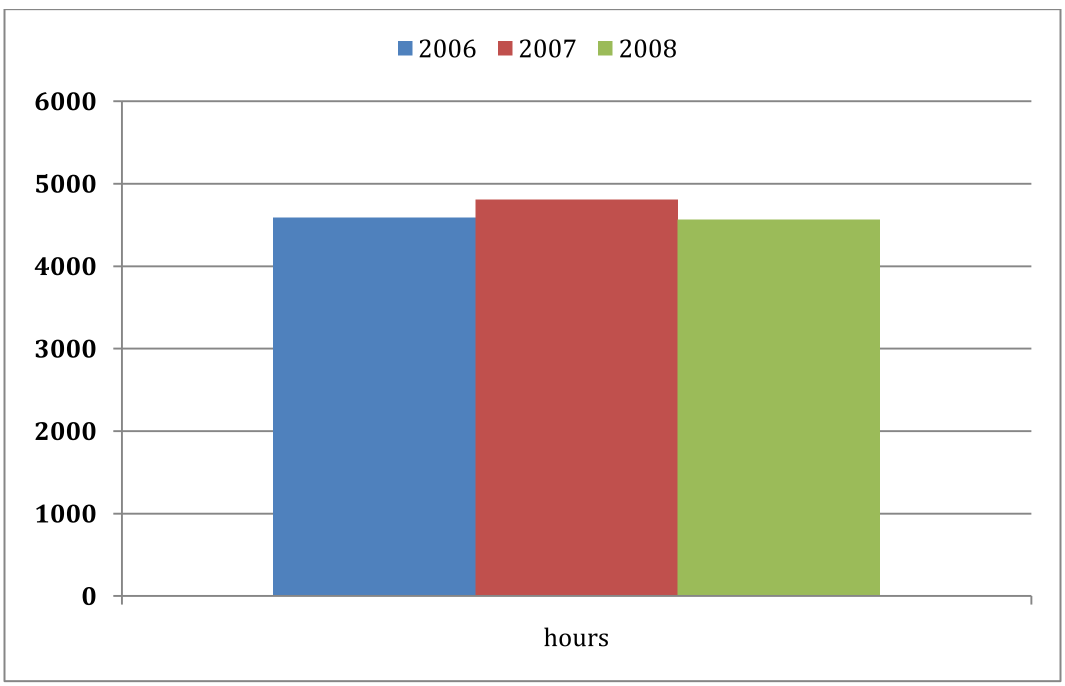
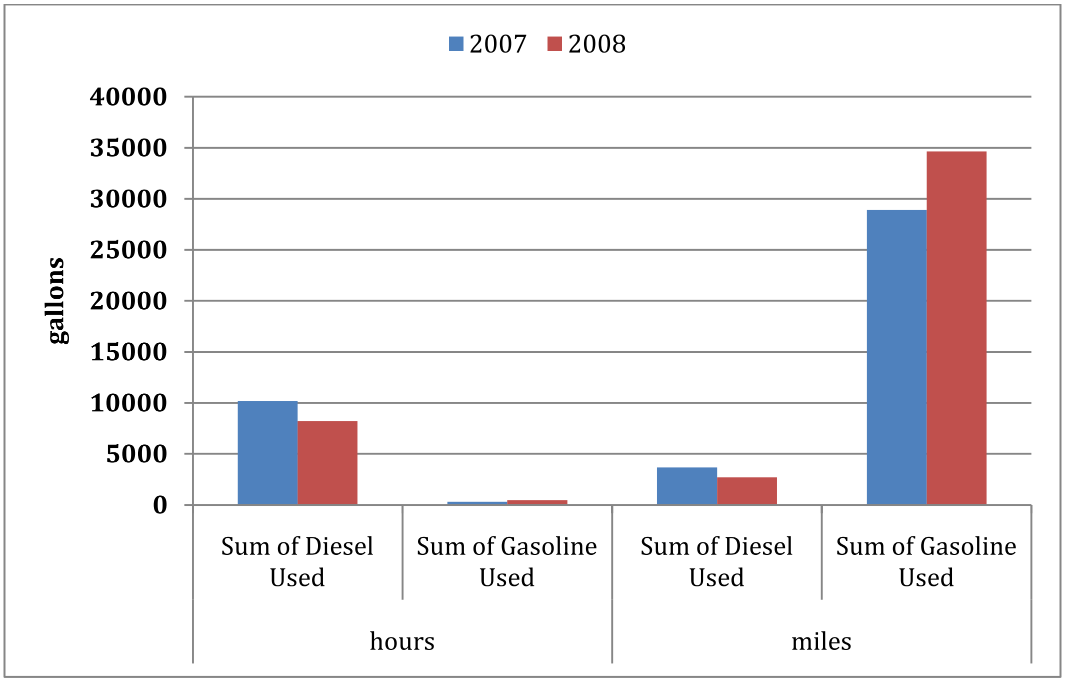


**Figure 49 Summary of Diesel and Gasoline Used by City of Homer Vehicle Fleet**




Historically, the most common replacement logic and schedule has revolved around time/mileage combinations of 36 months and 65,000 miles for autos and approximately 48 months and 75,000-100,000 miles for light trucks. While this cycle reflects a certain logic and may have been well suited to past economic times and technologies, the numerous changes in vehicles, warranties, and financial considerations have led many fleets nationally to consider lengthening replacement policy.

Over time variable expenses tend to ratchet upward. For the first 35,000-45,000 miles, variable expense is generally limited to preventative maintenance such as oil changes, wheel alignments, tire rotation, etc. The two largest (nonfuel) predictable variable expense events are tire and brake replacement, which generally occur sometime after 30,000 miles. At this point, variable expense, measured in cents per mile (CPM) spikes upward as tires and/or brakes are replaced.

High mileage vehicles can still be used effectively in appropriate applications, such as by transferring high mileage vehicles to maintenance and other departments where they will not be driven as far. This will increase useful vehicle life by several years.

Table 49 below displays the status of the existing City of Homer vehicle fleet in terms of year purchased, original cost, estimated life of the vehicle in years, replacement year based on the estimated life, and estimated replacement cost. This table was generated by the City's Department of Public Works. Highlighted items indicate vehicles that have already passed their estimated life span, thus becoming prime candidates for replacement.

**Table 49 Fleet Status: Age, Replacement Schedule, and Estimated Replacement Cost**

| Description | Purchase Year | Original Cost | Estimate Life (Years) | Replacement Year | Estimated Replacement Cost |
|---|---|---|---|---|---|
| 1987 CHEV FLAT BED | 1987 | used | 10 | 1997 | $30,000.00 |
| 1988 CHEV K2500 | 1988 | | 10 | 1998 | $22,000.00 |
| 1989 GMC 3/4 TON (Shop Truck) | 1989 | $16,630.23 | 10 | 1999 | $22,000.00 |
| 1989 GMC 1-TON – PKS | 1989 | $16,564.03 | 10 | 1999 | $22,000.00 |
| 1989 FORD SDN - FORMERLY E509 | 1989 | $15,900.00 | 10 | 1999 | $20,000.00 |
| 1991 CHEV S-10 | 1991 | $13,557.00 | 10 | 2001 | $18,000.00 |
| 1992 FORD RANGER | 1992 | $14,641.00 | 10 | 2002 | $20,000.00 |
| 1993 CHEVY S-10 | 1993 | $15,367.92 | 10 | 2003 | $20,000.00 |
| 1993 CHEVY MID SIZE EXT CAB P/U | 1993 | $15,367.92 | 10 | 2003 | $20,000.00 |
| 1994 FORD PU | 1994 | $14,970.00 | 10 | 2004 | $20,000.00 |
| 1994 CHEV SVC TRK | 1994 | $25,785.00 | 10 | 2004 | $40,000.00 |
| 1994 FORD 4X4 F-150 P/U | 1994 | $14,983.00 | 10 | 2004 | $20,000.00 |
| 1995 CHEV ASTRO VAN – BLDGS | 2001 | $3,500.00 | 10 | 2005 | $25,000.00 |
| 1997 FORD RANGER XLT 4X4 | 1997 | $19,120.00 | 10 | 2007 | $25,000.00 |
| 1997 FORD F-350 4x4 UTILITY TRUCK | 1997 | $22,950.00 | 10 | 2007 | $30,000.00 |
| 1999 RANGER | 1999 | $19,427.00 | 10 | 2009 | $25,000.00 |
| 1999 RANGER TRUCK | 1999 | $19,427.00 | 10 | 2009 | $20,000.00 |
| 1999 FORD E250 VAN | 1999 | $18,780.00 | 10 | 2009 | $25,000.00 |
| 1999 FORD F-550 2 TON 4X4 / SMALL SANDER | 1999 | $29,816.00 | 10 | 2009 | $40,000.00 |
| 2000 K2500 4X4 W/SERVICE BODY | 2000 | $23,300.00 | 10 | 2010 | $35,000.00 |
| 2000 K2500 4X4 W/SERVICE BODY | 2000 | $23,300.00 | 10 | 2010 | $35,000.00 |
| 2001 CHEV S-10 EXTEND CAB | 2001 | $19,180.00 | 10 | 2011 | $25,000.00 |
| 2003 FORD F-550 2-TON 4X4/SM SANDER | 2003 | $29,870.00 | 10 | 2013 | $35,000.00 |
| 2006 FORD F-150 - WTP/STP | 2006 | $19,997.00 | 10 | 2016 | $25,000.00 |
| 2006 FORD F-150 – DIRECTOR | 2006 | $19,997.00 | 10 | 2016 | $25,000.00 |
| 2006 FORD F-150 - Meter Tech | 2006 | $19,997.00 | 10 | 2016 | $25,000.00 |
| 2006 FORD F-350 - APT PLOW/SAND TRUCK | 2006 | $20,284.00 | 10 | 2016 | $27,500.00 |
| 2007 FORD F-150 - WTP/STP SUPT. | 2007 | $20,542.00 | 10 | 2016 | $25,000.00 |
| 2008 FORD F-250 FLAT BED | 2007 | $25,750.00 | 10 | 2016 | $30,000.00 |
| 2008 FORD F-350 - SHOP TRUCK | 2007 | $26,524.00 | 10 | 2016 | $35,000.00 |
| 1966 CHEV FLT BD 2-TON | 1966 | $1,100.00 | 20 | 1986 | $35,000.00 |
| 1968 GMC TANKER TK | 1968 | $3,500.00 | 20 | 1988 | $60,000.00 |
| 1980 CAT 12G GRADER | 1980 | $35,000.00 | 20 | 2000 | $250,000.00 |
| 1982 FORD 10 YARD END DUMP | 1982 | $52,810.53 | 20 | 2002 | $90,000.00 |
| 1984 FORD 4X6 2-TON VAN - STEAM TRK | 1984 | $48,786.85 | 20 | 2004 | $79,500.00 |
| 1984 INTERNATIONAL WHEELED EXCAVATOR | 1984 | $19,500.00 | 20 | 2004 | $200,000.00 |
| 1986 140 G CAT GRADER | 1986 | $114,700.00 | 20 | 2006 | $200,000.00 |
| 1987 950 CAT LOADER | 1987 | $129,039.00 | 20 | 2007 | $210,000.00 |
| 1990 ELGIN PELICAN -STREET SWEEPER | 1990 | $30,000.00 | 15 | 2005 | $80,000.00 |
| 1995 410D JOHN DEERE BACKHOE | 1995 | $64,083.00 | 20 | 2015 | $75,000.00 |
| CASE LOADER - SKID STEER | 1991 | $30,000.00 | 20 | 2011 | $49,000.00 |

| Description | Purchase Year | Original Cost | Estimate Life (Years) | Replacement Year | Estimated Replacement Cost |
|---|---|---|---|---|---|
| 1992 INTERNATIONAL SEWER/VACTOR TRUCK | 1992 | $144,773.78 | 20 | 2012 | $244,000.00 |
| HYSTER 50F FORK LIFT - WTP (used 5,000lb) | 1998 | used | 15 | 2013 | $25,000.00 |
| 1994 720A CHAMPION GRADER | 1994 | $161,000.00 | 20 | 2014 | $240,000.00 |
| 2000 FREIGHTLINER END DUMP | 2000 | $80,516.00 | 15 | 2015 | $90,000.00 |
| 2002 163H AWD CAT GRADER | 2002 | $199,193.00 | 15 | 2017 | $225,000.00 |
| RYLIND 6-WAY V-PLOW | 2002 | $24,069.00 | 15 | 2017 | $30,000.00 |
| RYLIND 14' SNOW WING | 2002 | $17,258.00 | 15 | 2017 | $18,500.00 |
| WLEDCO BEALES SNOW GATE | 2002 | $7,733.00 | 15 | 2017 | $8,500.00 |
| 2003 TOOLCAT 5600 | 2003 | $49,695.00 | 15 | 2018 | $55,000.00 |
| 2003 644H JD FRONT END LOADER | 2003 | $156,132.00 | 15 | 2018 | $200,000.00 |
| 1989 FORD F800 BUCKET TRUCK | 1989 | $37,238.00 | 30 | 2019 | $50,000.00 |
| 2006 KOMATSU TRACK EXCAVATOR | 2006 | $137,063.00 | 15 | 2021 | $155,000.00 |
| 2006 KOMATSU LOADER - W/S | 2006 | $67,025.00 | 15 | 2021 | $80,000.00 |
| 2007 KOMATSU DOZER | 2007 | $83,871.00 | 15 | 2022 | $95,000.00 |
| HRL-50 ROADWAY STRIPER | 2007 | $62,615.00 | 15 | 2022 | $80,000.00 |
| CHIEF TRUCK SANDER – LARGE | 1986 | $13,159.66 | 10 | 1996 | $20,000.00 |
| FAIR SNOW BLOWER | 1987 | $54,277.00 | 10 | 1997 | $80,000.00 |
| 9541C FAIRE SNOW BLOWER | used | $9,561.00 | 10 | 1997 | $80,000.00 |
| STAINLESS P/U SANDER – OLD | 1988 | $3,500.00 | 10 | 1998 | $5,000.00 |
| EQUIPMENT TRAILER - LARGE TILT TOP | 1974 | $2,000.00 | 25 | 1999 | $10,000.00 |
| OLATHE BRUSH CHIPPER | used | $5,631.00 | 10 | 2006 | $9,500.00 |
| STAINLESS STEEL SMALL SANDER UNIT – 1997 | 1997 | $8,082.00 | 10 | 2007 | $10,000.00 |
| 9' HINIKER V-PLOW | 1999 | $5,100.00 | 10 | 2009 | $6,000.00 |
| ONAN MOBILE GENERATOR - 80 KW | 1990 | $40,000.00 | 20 | 2010 | $45,000.00 |
| 1995 PATCHMAN AC PATCHER | 1995 | $27,183.00 | 15 | 2010 | $40,000.00 |
| BOMAG COMPACTOR | 1996 | $10,598.00 | 15 | 2011 | $15,000.00 |
| 1997 GORMAN RUPP WATER MAIN BOOSTER PUMP | 1997 | $4,693.34 | 15 | 2012 | $6,500.00 |
| SUPER CUT II - BRUSH CUTTER FOR LOADER | 1997 | $8,444.00 | 15 | 2012 | $10,000.00 |
| CASE POWER UNIT FOR BRUSH CUTTER ATTACH. | 1997 | $7,131.00 | 15 | 2012 | $10,000.00 |
| 2002 HENDERSON 1.5 CY - 7' SS APT SANDER | 2002 | $6,270.00 | 10 | 2012 | $8,000.00 |
| 9' 2" BOSS V-PLOW | 2002 | $5,083.00 | 10 | 2012 | $6,500.00 |
| 10 CY HENDERSON SANDER - 2002 | 2002 | $17,488.00 | 10 | 2012 | $20,000.00 |
| 2002 SWENSON SS SANDER - 1.5 CY | 2002 | $9,891.60 | 10 | 2012 | $10,500.00 |
| 2003 JOHN DEERE LAWN TRACTOR | 2003 | $4,995.00 | 10 | 2013 | $5,500.00 |
| 1995 INGERSOLL RAND AIR COMPRESSOR - P/H | 1995 | $4,000.00 | 20 | 2015 | $5,200.00 |
| RIGID SEWER CAMERA SYSTEM | 2000 | $9,759.00 | 15 | 2015 | $12,000.00 |
| OJK125 MELETER - CRACK SEALER | 2002 | $28,642.00 | 15 | 2017 | $35,000.00 |
| PERKINS MOBILE GENERATOR - 80KW | 1998 | $23,650.00 | 20 | 2018 | $45,000.00 |
| SULLAIR 185 MOBILE AIR COMPRESSOR | 2003 | $11,996.00 | 15 | 2018 | $15,000.00 |
| 8' BLIZZARD SNOW PLOW – APT | 2006 | $5,605.00 | 15 | 2021 | $7,000.00 |

| Description | Purchase Year | Original Cost | Estimate Life (Years) | Replacement Year | Estimated Replacement Cost |
|---|---|---|---|---|---|
| 8' BLIZZARD SNOW PLOW - P/H | 2007 | $6,287.00 | 15 | 2022 | $7,000.00 |
| 2003 TRAILMAX HEAVY EQUIPMENT TRAILER | 2003 | $20,436.00 | 20 | 2023 | $30,000.00 |
| 17½' HARBOR MAINT. SKIFF W/50HP HONDA | | $- | 15 | | $- |
| 1990 CHEV K2500 4X4 PU | 1990 | used | 10 | 2000 | $22,000.00 |
| 1985 CHEV C10 4X4 - FLAT BED w/ SANDER | 1985 | used | 15 | 2000 | $35,000.00 |
| WIGGINS 4X4 FORK LIFT | 1982 | $- | 20 | 2002 | $50,000.00 |
| 1993 CHEV K3500 CREW CAB | 1993 | $19,600.00 | 10 | 2003 | $35,000.00 |
| 1990 FORD F-250 2WD | 1990 | used | 15 | 2005 | $22,000.00 |
| 2001 VIKING WAST OIL TRANSFER PUMP | 2001 | $8,255.00 | 10 | 2011 | $9,500.00 |
| 2001 F550 WASTE OIL VAC TRUCK | 2001 | $53,731.00 | 15 | 2016 | $60,000.00 |
| 2008 FORD F-350 | 2007 | $21,144.00 | 10 | 2017 | $23,000.00 |
| 1993 CHEV STEP SIDE VAN | 2008 | used | 10 | 2018 | $23,000.00 |
| 2006 KOMATSU LOADER - P/H | 2006 | $67,025.00 | 15 | 2021 | $80,000.00 |
| Steel Grid Crane Replacement (1½ ton) | 2005 | $30,000.00 | 15 | old crane removed & disposed several years ago | |
| Used Water Truck | 2005 | $35,000.00 | 15 | assist with street clean up, dust control program & water shut downs | |

## Operation and Maintenance Considerations

While routine maintenance is generally standardized with newer vehicles, proper use of synthetic oils and lubricants along with advanced filters can help to substantially reduce oil changes and possibly improve mileage, thus reducing carbon emissions. Less frequent oil changes will reduce maintenance hours and allow more productive use of time for City staff.

Synthetic oils are made to protect and perform better than petroleum oils at both high and low temperature extremes. Every jet engine in the world is lubricated with synthetic oil because of its superior qualities.

Synthetic oils have extremely low pour points and flow readily at extremely low temperatures for easier winter starting and significantly reduced engine wear. Different products recommend different maintenance regimens, but in general, synthetic oils allow for engine oil changes from between 10,000 and 20,000 miles or annually. This compares to 3,000 – 5,000 miles or every three months for conventional engine oils.

The two possible down sides of converting older vehicles to synthetic oils are that they are more expensive to purchase initially and in some cases, once a vehicle is switched to synthetic, it will need to remain using synthetic oil for the remainder of its lifecycle.

The higher up-front costs are easily recovered with improved mileage, longer engine life, reduced oil changes and staff time. The need to continue using synthetic oil once a vehicle is switched results from the seal swelling compounds in synthetic oils that help reduce or eliminate leakage. This is generally a positive attribute but because of the “one way” nature of the switch, perhaps not all vehicles should be converted at once, but rather, a few test vehicles should start the conversion process and if successful, then all the vehicles can be converted to synthetic oils as appropriate.

Synthetic oils can be recycled in the same manner as conventional motor oils, and synthetics can also be used in furnaces designed to burn waste oils.

Another performance and maintenance improvement perhaps worth considering is using what is called the microGreen extended performance filter (www.microgreenfilter.com). This filter, which entered the market in 2008, can replace conventional cylinder spin-on filters for gasoline vehicles and allows for engine oil replacement on a 30,000 mile basis. The company also provides free oil analysis to monitor filter performance for some vehicle fleets. Some institutional vehicle fleets, including Pace University, have recently converted to these filters.

On another note, idling is probably the easiest way, from an operational perspective, to reduce the carbon foot print and increase the efficiency of the vehicle fleet.

The heavy equipment manufacturer Komatsu estimates that idling consumes nearly 20 percent of a typical construction machine's lifetime fuel burn. This has an impact on main engine life and carbon emissions. Determining when best to shut off an engine is often difficult, with many variables that have a large influence on vehicle performance.

New technologies like auxiliary power units and hybrid vehicles can assist in reducing idling automatically; this will eventually take the guess work out of when to turn off a vehicle.

Main engine idling can be reduced with on-board auxiliary power units. These auxiliary power units are becoming standard in the long haul trucking business. The units are diesel power units, usually 1 to 3 cylinders that produce AC and DC power for battery charging and AC powered appliances. The cooling system is tied into the truck’s heating and cooling system and preheats the main engine and keeps the cabin warm. Auxiliary power units are automatic and start when battery voltage drops or the main engine gets too cold. This type of system can be retrofitted to existing equipment adding capability and reducing wear on the main engine and other systems. Until such systems are used in City vehicles, understanding how wasteful idling can be may help operators to reduce idling to the minimum amount that is practical.

## Electric and Hybrid Vehicles

While electric vehicles are still uncommon on the road, hybrid models are commercially available and becoming almost the industry standard. The number of new hybrid models has notably increased from only 2 in 2003 to 16 in 2007, including trucks and SUVs. When comparing hybrids to non-hybrids, mileage improvements range widely but can be as much as 60% depending on the vehicle.

One advantage with hybrids that the City would readily realize is that hybrids’ mileage are often better in city type driving than in highway conditions, and the City’s vehicle fleet would be reasonably expected to be used in more typical city driving circumstances. Hybrid vehicles are more expensive up-front, however, and new electric plug-in hybrids are just now emerging in the marketplace. It would probably be prudent to wait at least one year before any plug-ins are purchased to allow for improvements in this new component of the technology.

Most electric vehicles are still in the development phase, though significant advances are rapidly improving the technologies. Two future options that could offer energy savings and increase the capabilities of the City vehicle fleet would be the fully electric car for short range personal transportation and the heavy truck that could be used for a maintenance truck.

Currently available heavy-duty electric trucks could allow for large amounts of conventional electric power for hand tools and equipment with an auxiliary power unit to give extended field service times and always-warm plug in capabilities.

To fill the need for a short range personal transportation vehicle, an all-electric 4 door Hatch back could greatly reduce fuel use and minimize maintenance. These should be available around early 2010; waiting to purchase until after the first generation gets the bugs worked out would be prudent planning.

The all-electric vehicle can greatly reduce maintenance. There is no oil to change, no oil or fuel filters to change, and moving parts are minimized, with traction motors lasting over 10 years with very little servicing and very robust power electronics.

The power electronics have become standardized and rugged for factory applications, locomotive, ship propulsion and power systems.

The electric propulsion equipment is mature and dependable. The battery is still the limiting factor, but current battery technology is sufficient to power vehicles effectively and efficiently for local transportation within the City. One additional capability that an electric vehicle can supply is AC power for small power tools and lights.

## Conclusion

The City of Homer's vehicle fleet operation, in terms of fuel consumption, miles driven and/or hours of operation, was assessed for 2006 – 2008. Ongoing tracking of the fleet's operation and performance will provide useful data in the future to determine the impact of various activities such as switching to synthetic oils. As well, this data is important for tracking the City's GHG emissions and evaluating overall fleet efficiency.

As energy prices continue to rise, variable costs such as fuel will comprise an ever larger portion of vehicle fleet expenditures. Increased fuel efficiency through operation and maintenance modifications, such as use of synthetic oils and high performance oil filters, and reduced idling and other driving habit adjustments, can save substantial amounts of fuel, GHG emissions, and maintenance time and costs. It is certainly possible to save as much as 5% of overall fuel consumption with these types of modifications.

Prudent and timely replacement of older vehicles when they exceed their useful life can have an even larger impact on fuel consumption and GHG emissions over the life of a new vehicle. The City of Homer's vehicle fleet has several recent acquisitions but also over 40 vehicles/motors that have already exceeded their expected lifetime. The logic and timing of "standard" fleet replacement schedules have been changing in the recent past for various reasons, with a trend toward better maintenance and longer lifecycles between replacements.  New technologies, especially electric and hybrid vehicles for individual passenger to large scale trucks and heavy equipment, are "in the pipeline" and will likely result in significant fuel savings in the near future. Because of the rapid development of these technologies, each individual purchase should be evaluated to fully consider both up-front costs and lifecycle O&M expenditures to determine the least-cost option.

# Chapter Six
# Public Education and Outreach Plan

## Introduction

In December 2008, Deerstone consultants convened a committee of representatives from the City of Homer, Sustainable Homer, Alaska Marine Conservation Council, and Center for Alaskan Coastal Studies to draft a public education and outreach plan for the City of Homer's Climate Action Plan. The committee comprised of Brian Hirsch, Kyra Wagner, Neil Wagner, Anne Marie Holen, Marilyn Sigman, John Lemons, Joel Cooper, Marla McPherson, and Alan Parks helped finalize the following plan.

## City of Homer Outreach Plan

**Goal:** The City of Homer will work with other organizations to educate the broader community about global warming and encourage changes that will help meet greenhouse gas emissions reduction targets.

**Strategy**

1. Community Involvement: Use an effective education and outreach strategy to empower the City Council, employees & commissions, & the broader community to be a part of the Climate Action Program.
2. Publicity: Message outreach so that it clearly communicates benefits of the Climate Action Plan. Explain economic benefits of reducing greenhouse gas emissions, and how this supports green businesses and acts as an economic engine in communities. Use a variety of outreach techniques with a high frequency so the message is reoccurring.
3. Education: Use education as an important tool to emphasize climate change and why it is important to our community.
4. Target Audience: Identify audience/targets such as businesses, homeowners, educators, etc. & development specific outreach strategies for each.
5. Collaboration: Look at the work that is already being done on the local level and beyond, identify the best niche that the City could fill, and collaborate and form alliances where appropriate.

**Plan**

Community Event/Presentations

The City of Homer should frequently look for opportunities to collaborate with other groups, agencies, and others to co-host community events, presentations and workshops related to climate change, energy conservation, and alternative energy solutions. This year, the City will:

1. Collaborate with community organizations, agencies, businesses and youth to hold a community event in the Spring 2009 with facilitated sessions on key topics including energy, businesses, local food, transportation, green building, waste management, and education/outreach (build on the ideas generated at the 9/15/07 poster sessions). Use a facilitation system that focuses on tangible working groups and action steps, with the ultimate goal to: identify and prioritize potential community-wide projects that will help the broader community meet greenhouse gas reduction

targets; and create action agendas/next steps and a pool of community members dedicated to implementing such projects.

2. Hold a community presentation in which Deerstone Consultants will present the CAP project's findings and answer questions (spring 2009, once the project findings are finalized).
3. Hold a community workshop in which Deerstone Consultants Brian Hirsch and Dave Mogar will present energy efficiency and alternative energy solutions for homeowners in the Homer area (spring 2009).

**Publications**

1. Promote & use the City of Homer's employee sustainability handbook as a template that businesses and other major employers in Homer, such as South Peninsula Hospital, public schools, South Peninsula Behavioral Health Services (the Center), etc. may want to implement.
2. Create an annual report modeled after the City of Boulder (see City of Boulder 2007 Climate Progress Report) on the CAP about the progress the City has done to reduce greenhouse gas emissions and how much money it has saved, and how businesses and households can do the same. The length and detail of the report will be limited based on the resources available to the City for this project. Make the report available on the City web site.

**Advertising**

1. Run weekly newspaper ads and periodically run public service announcements with tips on ways to save energy and with a reference to resources where people can go to get more information on such topics.
2. Look for other ways to get the message into the community through the use of various types of media.

**Email & Web Site**

1. Have the City enter into a formal MOU to promote and reference the Sustainable Homer web site and email list.
2. When the City holds meetings or wants to involve the public, provide a place for input and interaction on its web sites for those who do not attend the meetings.
3. Compile an email/mail list of top employers and largest facilities in Homer. Create a newsletter to send as an educational and networking tool to let the community know the steps the City has taken to reduce its carbon emissions and what resources are available to businesses and homeowners to do the same. The City can use this list in the future for networking/exchanging info such as links on web site, letting these people know what a resource the City can be to the community. The City could collaborate with Sustainable Homer web site and email list for this outreach.
4. From the City web site, provide Internet links to resources that could help community members reduce greenhouse gas emissions.
5. As often as possible, integrate ways the City has reduced greenhouse gas emissions and how individuals can do the same in their home or business in the weekly City Clerk announcements and other existing City outreach materials.
6. Research and electronically link to recent studies and high profile calls for greening the economy (Clinton Global Initiative, World Changing, etc.).

**Collaboration**

1. The City's Port and Harbor will collaborate with the Alaska Marine Conservation Council to distribute the Mariners Guide to Climate Change to Homer boaters.
2. Collaborate and network with other ICLEI cities in Alaska and other Alaska communities taking action on climate change.

3. Look for as many opportunities where the City of Homer can partner with others on community projects and groups that contribute to the City's outreach/education goal. Potential partners could include but aren't limited to: Homer Chamber of Commerce, Sustainable Homer, business community, nonprofit community (Cook Inletkeeper, Kachemak Heritage Land Trust, Center for Alaskan Coastal Studies, Pratt Museum, Alaska Marine Conservation Council, Homer Farmers Market), U.S. Fish and Wildlife Service, Alaska Department of Fish and Game & Kachemak Bay Research Reserve, Kenai Peninsula Borough, local realtors and Realtors Association, Homer Youth for Environmental Action, Kenai Peninsula Borough School District, fishing groups, recreation groups, boat owners, Homer Electric Association, contractors, ICLEI, Kachemak Bay Campus, U.S. Department of Agriculture, Homer Soil & Water Conservation District, etc.

**POSSIBLE FUTURE PROJECTS**
**Based on resources and personnel**

1. Collaborate with the Chamber of Commerce on a local version of the Green Star Program that rewards and promotes businesses that make a commitment to reduce their greenhouse gas emissions and operate more sustainably.
2. Have a community-wide goal for greenhouse gas reduction targets and a way to track this community target.
3. Once feasible, use the sustainability fund to provide donations/grants to community initiatives that help achieve the goals of the City's CAP.
4. When appropriate, the City can create and support task forces, modeled after the Global Warming Task Force, to help with specific community projects that are working toward achieving goals related to the City's CAP.

**OTHER IDEAS FOR FUTURE PROJECTS**

The City of Homer could collaborate with various partners to adapt and launch any one of these programs. Look at City of Boulder 2007 Climate Progress Report (http://www.beclimatesmart.com/content/documents/07_ClimateProgressReport.pdf).

**Business Energy Audits:** Provide energy audits to help local businesses and contractors identify energy saving opportunities. Work with the local utility to create a program that provides utility rebates for efficiency projects. The City could offer X number of free or discounted/subsidized audits per year, based on some commitment from the local business.

**Trade Ally Network:** Provide a list of all contractors that can help businesses retrofit to reduce greenhouse gases and operate more sustainably. In turn, the contractors promote City's programs to reduce greenhouse gases in the community.

**Residential Energy Audit Program:** Provide free or low-cost energy audits for all homeowners, with cost based on square footage with $100 subsidies from the City. The City could offer X number of subsidies each year based on the budget.

**Neighborhood Sweep & Affordable Housing Partnership**: Support a door-to-door program that distributes energy efficiency kits to households. The City could also provided these kits free to tenants that move into affordable housing as a gift and people who participate in home ownership classes.

**Weatherization Program**: Offer free weatherization services to income-qualifying homes or homes not already served by other programs.

**Neighborhood Organizations:** Provide support and resources for community members to start neighborhood organizations.

**ClimateSmart Web Site:** Provide a place on the City's web site where people can share their success stories, calculate their carbon footprint, make a pledge to reduce their footprint, provide resources on how to work toward the pledge, and a map and list that recognizes those who wish to be recognized for their pledge.

**Green Points Program:** Establish a criteria of green points that builders must meet before they can acquire a building permit from the City.

**Renewable Energy Fund**: Boulder City Council adopted the solar sales and use tax rebate ordinance, creating a renewable energy fund. A portion of the renewable energy fund (65%) was dedicated for the purpose of providing financial assistance through grants toward installation of photovoltaic (PV) or solar thermal systems on housing for low to moderate income persons and on the facilities of site-based non-profit entities operating in Boulder. The remaining 35% is dedicated to sales and use tax rebates for residents or businesses installing solar systems in the city. Eventually the City of Homer could look into creative options for helping local consumers/businesses/nonprofits offset the cost of installing alternative energy in Homer.

## Energy Wise Forum

In April, in an effort to begin implementation of the education and outreach plan, Deerstone consultants worked with the City of Homer in collaboration with Homer Chamber of Commerce, Sustainable Homer, Alaska Marine Conservation Council, and U.S. Department of Energy, with additional support from Homer Electric Association, local businesses, and the Homer Foundation to hold an Energy Wise Forum on April 25 at the Islands and Oceans Visitor Center.

Energy Wise included concurrent workshops on the following 4 topics: Energy Efficiency for Home & Business; Energy Efficiency for Boats; Alternative Energy Options, and Transportation Options. Several presenters from the local area along with a few visiting presenters shared their knowledge and experiences with more than 120 participants at the forum. All participants in the event received a "tool kit" which included: a reusable canvass grocery bag donated by Ulmers, a compact florescent light bulb donated by HEA, the Alaska Renewable Energy Atlas, a Department of Energy Handbook on Energy Efficiency, switch plate insulators, and the City of Homer's Sustainability Handbook. The event closed with a potluck focused on eating locally, and included a huge spread made of locally baked breads, local eggs, salmon, halibut, crab, potatoes, carrots, and blueberries. The event received good press coverage with stories and highlights in both the Homer News and Tribune (see below).

## Building a better house, one straw bale at a time

*• Transportation, other energy tips abound at conference*

By Naomi Klouda
Homer Tribune
April 29, 2009

HOMER TRIBUNE/Ryan Ridge

Sustainable Homer director Kyra Wagner kicks off the "Building Energy Efficiency" discussion.

Back when the Three Little Pigs set to work choosing building materials for their homes, straw wasn't considered a very prudent option. Wind blows, water soaks through, and then, there's that fire issue.
But introduce an energy crisis, and innovative builders find themselves returning to ancient mediums for keeping homes warm; much like the homesteaders on the Midwestern prairie did 150 years ago.

But does it work in Alaska, too?
Homebuilder Dale Banks thinks so.
The owner of Loopy Lupine Recycled Products explained the steps for building a better house using an ancient method involving straw bale insulation inside an earthen plaster of clay, sand and manure.
He spoke before a packed crowd Saturday at the Energy Wise Conference at Islands and Oceans Visitors Center.

The Energy Wise Conference yielded up diverse information that was shared almost entirely by some 20 local people involved in direct energy-efficiency experience. Discussions explored developing more energy efficient transportation, renewable energy pursuits, a better bang for boaters and building a better house.
Sustainable Homer Director Kyra Wagner, who organized the event along with the City of Homer Special Project Coordinator Anne Marie Holen and several others, estimated attendance around 150 people.
Attendees were given "energy kits" in recycled shopping bags.

As part of the "building a better house" segment, Banks discussed the 16-by-24-foot addition to his home, as well as a 40-by-64-foot warehouse for his business.

"I had read a lot of books on the topic and did some experimentation on my own," Banks explained. "Then I went to a workshop in Arizona with Bill and Athena Steen." The Steens are nationally known for their homes of mud and straw.

And with six years of testing out his home addition, and longer than that to test the walls of a shed, Banks has found the method to be highly effective.

"I don't have any heat in the addition," he said.
According to Banks, the addition is so well-insulated, it doesn't experience the daily temperature fluctuations of an average home. The rest of his home is heated by a wood-burning stove and a Toyo.
Banks said two other homes in Homer are built with straw insulation as well, but he concedes that it is a new idea for the area.

And despite the Three Little Pigs' shortcomings with a variety of different building materials, Banks said straw homes are actually more fireproof.

"Once the plaster goes on, it's fire resistant and it's sound structurally," he explained.

Transportation talk at the conference indicated that the many alternative fuel options for the average consumer are still a ways away. And while a public transportation system for Homer appears also fairly out-of-reach, if local residents want to get the idea off the ground, the American Recovery and Reinvestment Act stimulus funds are available for communities to start, said Central Area Rural Transit System director Jennifer Beckman, another featured speaker.

Beckman was recently appointed to the Governor's Task Force on Public Transportation, which was formed as a way to brainstorm ideas for the state. Alaska is one of only two states in the nation that doesn't fund public transportation projects.

Pedestrian-friendly cities advocate Debi Poore mentioned that Homer's crosswalks are not kept painted and maintained, leaving visitors confused about where to cross and making the town unfriendly for pedestrians. She said the problem can be solved if citizens advocate to the City of Homer.

Another idea presented at the conference involved making golf carts available to tourists for easy, fuel-efficient modes of travel. This could cut down on Homer Spit congestion in the summer, as well as gas emissions. Taxicab owners, who usually object when public transportation ideas surface, could be encouraged to try the carts out to help diversify their business and make it more energy-efficient.

Wagner introduced the concept of "Green Thumb" travel, setting up points along Homer's roads to connect people who need rides with those willing to offer them, as another possibility for Homer that doesn't involve buying vehicles or engaging government.

Setting up ride-share programs helps cut emissions and fuel consumption, and a new movement online called E-Ride Share offers Google maps for local areas. People in Homer can register online to network with others willing to carpool.

"We'll see what kind of support they (these ideas) generate," Wagner said. "I don't push anything unless there are people out there to help me. There are so many good ideas and that's my job; to get them out there."

As part of Earth Week celebrations, events started with a movie sponsored by the Farmer's Market at the Homer Theatre on Wednesday night.

"This town is amazing," Wagner said of the turnout for the film. "Wednesday, there was a line outside the door of the Theatre for 'Eating Alaska' … Only in Homer."

Resources for those looking to embrace a sustainable lifestyle are available at: www.sustainablehomer.org.
Alternative construction information: http://www.acat.org and http://www.solarhouse.com.
Alternative vehicle fuel: www.goldenfuelsytems.com
Electric vehicle info: www.evconvert.com

# Chapter Seven
# Renewable Energy Opportunities and Challenges

## Introduction

This overall report aims to provide guidance on how the City of Homer can reduce its carbon footprint and energy expenditures through increased energy efficiency (EE) and renewable energy (RE) initiatives. This specific chapter focuses on the RE side of the equation. Additional information is provided here to assist residents in and around the Homer area to similarly reduce their carbon footprint and energy expenditures through individual household and business RE initiatives.

RE opportunities are often evaluated through the lens of locally available resources. Broadly, the primary renewable energy resources are the following:

- Wind power
- Solar electric
- Solar thermal
- Hydropower (conventional and/or in-stream hydrokinetic)
- Ocean energy (wave and/or tidal)
- Biomass
- Geothermal

Two important features of RE projects are that all RE resources are site-specific and that most RE resources (except geothermal and to some degree conventional hydropower) are intermittent. Regarding site-specificity, the point is that "one size does NOT fit all" and typically, a detailed feasibility study is necessary to determine the quality and quantity of the resource in a particular location. Wind energy, for example, is notorious for being highly variable even within short distances from other sites because of ground interference that can cause turbulence and other factors. Even at a single site, wind energy can vary significantly at different elevations.

Regarding intermittency, wind or solar power for example are not always available, even at a good site. Thus, energy storage and/or other resources are necessary to combine to provide constant power. The *type* of resource intermittency is also important. For example, though tidal energy is not always available because of the ebb and flow of tides, it is highly predictable, thus making it easier to plan for when the tidal energy is not available. Wind, solar, or wave energy, on the other hand, are all intermittent and somewhat unpredictable, thus making it more difficult (and costly) to plan for gaps in availability.

Both site-specificity and intermittency add to the challenges and costs of developing renewable energy compared to fossil fuels. However, the advantages of renewable energy—inherently local, little or no carbon or other toxic emissions, little or no variable fuel costs, significant abundance at certain times and places—are also very important and valuable. Further, RE development is growing significantly and despite it currently being a small portion of the overall energy mix, it is widely expected to play an ever greater role in meeting the world's seemingly insatiable appetite for energy.[1]

## RE Options in Homer

### Tidal Power

Perhaps the most promising opportunity over time for large-scale RE development in the Homer area isocean energy in the form of tidal power in nearby Kachemak Bay. A proposal was submitted by the City of Homer to the Alaska Renewable Energy Fund (AREF) to conduct a feasibility study for tidal power throughout Kachemak Bay. Seldovia and Port Graham Tribal Councils supported the proposal and committed to participate in the feasibility study if funded. The intent was to determine the tidal energy resource of the entire Bay through site-specific resource assessment with Acoustic Doppler Current Profilers (ADCPs) and spatial modeling, and then select the optimum location(s) for further detailed study and potential development. (See Project Development section below).

Though the proposal received favorable reviews and was selected for advancement, there was insufficient funding in the AREF last year—half of what was called for in the original legislation, and 25% of what was provided the year before—and the feasibility study was not funded. With updating to be responsive to future solicitations, the proposal should be a basis for future submissions as funding opportunities emerge. AREF solicitations are on an annual basis and would likely be a good target for re-submission of the Kachemak Bay tidal energy feasibility study.[2]

Some important considerations around the tidal energy feasibility study and potential development include permitting, coordinating with Homer Electric Association, and "in-kind" contributions offered by the National Oceanic and Atmospheric Association (NOAA) and other possible partners. Several permits would be required to fully develop the tidal energy resource, but among the first necessary permits is a Preliminary Permit from the Federal Energy Regulatory Commission (FERC). An overview of the entire FERC Preliminary Permit and subsequent permitting and licensing processes is provided on FERC's website at:

http://www.ferc.gov/industries/hydropower/indus-act/hydrokinetics.asp

The FERC's Preliminary Permit provides exclusive right to conduct studies on ocean energy development in that area to whoever has the permit. However, it also requires the permit holder to comply with specific rules and regulations to demonstrate good faith effort and progress toward development and license applications so that the permits are not simply held ransom or for speculation. The Preliminary Permit applies for three years, at which time one has to demonstrate adequate progress by applying for the next permit and eventually a license, or relinquish the exclusive rights granted by the Preliminary Permit.

[1] RE currently provides less than 10% of the nation's and about 25% of Alaska's electricity supply (if one considers large-scale hydropower renewable, which Alaska does and the rest of the US doesn't). The Obama administration's goal is for 25% of US electricity to come from RE sources by 2025; former Alaska Governor Palin and the Alaska Energy Authority have set their target at 50% of the state's electricity to come from RE sources by 2025.

[2] The next AREF grant solicitation had a deadline of November 10, 2009. The 90 day legislative session that begins in January 2010 will determine the amount of money, if any, available for funding these projects.

Municipalities such as the City of Homer have first right of refusal in filing for FERC Preliminary Permits, meaning that if another entity files for this permit in an area adjacent to a municipality (or Tribal government), the municipality can file for the same permit within 60 days and "trump" the other, earlier application. Because of this allowance as a municipality, and the obligations that receiving a FERC Preliminary Permit entail, it is probably worth ***not*** filing for this permit until the City is ready and able to pursue the project, but the City should monitor if anyone else has filed for the Preliminary Permit and be ready to respond if necessary. Monitoring can be accomplished by going to FERC's website and subscribing to receive any information related to permitting applications in your area.

Other permits and studies, especially related to potential environmental impacts, will clearly be necessary as well. Some projects, such as the tidal development effort in Cook Inlet (further discussed below), may begin to address some concerns such as turbine impacts to fisheries connected to Kachemak Bay, but all projects are site-specific and no streamlining of permits has yet been established. However, the Alaska Energy Authority is now convening a "hydrokinetic developer's group" to try to determine what, if anything, is generic to similar projects and work closely with permitting agencies to avoid multiple and possibly conflicting requirements and eventually streamline the process.

Coordinating with Homer Electric Association (HEA) is both specific to this potential tidal development and generic to any large-scale development considered by the City of Homer. There are varying levels of possible cooperation, but if the City is considering producing enough electricity that there would be need for transmission or even simple distribution beyond the site of production, then the City will likely have to work with HEA to efficiently and cost effectively move the power.

HEA is also in the process of investigating tidal power on their own, and considering that energy production is part of their business, it makes sense to discuss possible synergies and areas of mutual benefit. If there is a situation where the power generated only meets the demand of a dedicated City load that does not require additional transmission or distribution, however, then HEA becomes less crucial and the City could develop this resource by itself, but that approach would likely not result in large-scale generation of tidal power.

Further, the original tidal energy feasibility study proposal submitted to the AREF contained a large in-kind commitment from NOAA. It is not certain that NOAA will again be able to dedicate such a significant amount of in-kind resource to the effort, so this will need confirmation and updating for any future proposal, but this is part of the standard grant development process. If NOAA will not be able to donate as much to any future project, the budget will have to be modified substantially to cover other entities' contributions in lieu of NOAA. The resource assessment component that was covered by NOAA's in-kind contribution is a skill set that is also provided by Terrasond, Inc., a Palmer, Alaska-based private company that contracts to NOAA, the oil industry, and others.

Another possible tidal option that has been discussed and is worthy of some investigation is the possibility of placing turbines in a break wall at the harbor if, at some point in the future, the Homer Harbor undergoes a significant retrofit or new construction effort. The concept is that during each ebb and flood cycle the water would course through the wall, either going into or exiting the Harbor, thus spinning embedded turbines and producing power.

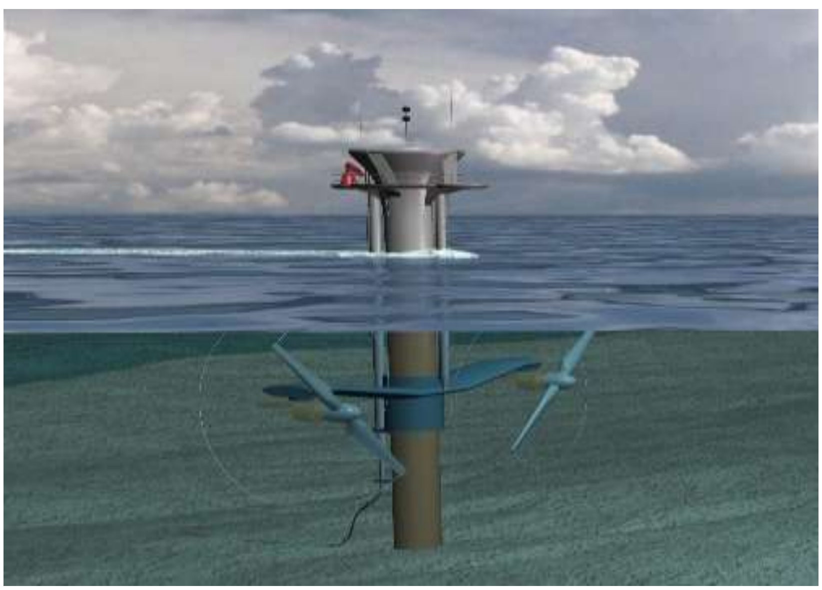
Finally, there is also clearly an amount of energy that could be harnessed from the regular rise and fall of the Homer docks and associated infrastructure as the tide continually ebbs or floods. The exact quantity, and economic feasibility, of this energy source is likely low but is certainly calculable and worthy of a first order assessment.

**Tidal Conversion Devices**

There are several technologies now in development to capture a portion of the moving water from tidal energy and convert it to electricity. These technologies are fundamentally similar to the types of conversion devices used to capture wind energy and convert it to electricity. In fact, the evolution and success of the wind industry is the model that many analysts and developers are applying to establish the tidal energy industry with an aim to decrease the amount of time required for wide-scale deployment.

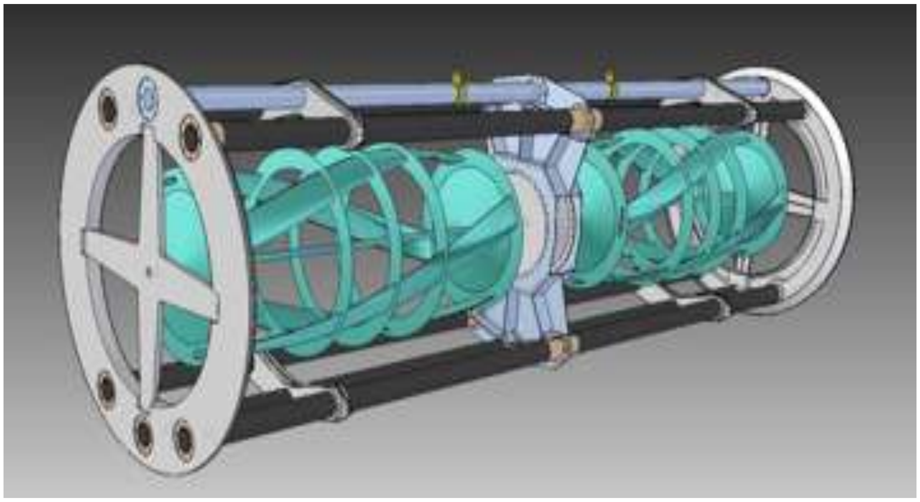
Two of the primary types of energy conversion devices that could be appropriate for Kachemak Bay are horizontal axis turbines and cross-flow turbines. Figure 1 below is an image of a typical horizontal axis turbine, similar to conventional two-blade wind turbines. Though this is only an artist's rendering, in fact, an actual 1.2 MW turbine of this type was installed in 2008 in Ireland by Marine Current Turbines <http://www.seageneration.co.uk/default.asp>.

**Figure 50Marine Current Turbines' 1.2 MW Horizontal Axis Turbine**



Cross-flow turbines are not as common, especially as wind turbine versions, but they do have a familiar shape that is often described as a helix or as a reel push lawn mower. Figure 2 below is an image of Ocean Renewable Power Company's (ORPC) cross-flow turbine that has been designed for both ocean tidal and in-stream river applications. Similarly to the horizontal axis turbine shown above, while this is merely an artist's rendering, in fact, ORPC <oceanrenewablepower.com> has constructed prototypes that have generated electricity and they are now producing turbines for actual deployment. ORPC's most developed projects are in Maine and Alaska, including Cook Inlet for tidal and the Alaska interior village of Nenana for in-stream hydrokinetic. It is expected that for full production in tidal environments, the single unit like the image below will be arranged in groups of two or four turbines and produce up to 1 MW per group. Multiple groups of turbines could be arrayed for additional production.

**Figure 51 Ocean Renewable Power Company's cross-flow turbine**



There are numerous variations on both of these turbine types, along with completely different approaches and technologies to capture and convert energy from moving water (or wind) into electricity, but these two types are probably the closest to full-scale commercial availability.

**Hydropower**

Prior to the tidal energy feasibility study proposal submitted to the AREF, the City of Homer had already submitted a proposal and been awarded approximately $51,000 in grant funds to study the potential for hydropower generated by the 1,000+ foot drop in elevation in the City's water lines coming from the Bridge Creek Reservoir into downtown Homer.

It is our understanding that the City has retained Bristol Environmental to examine the use of pressure reducing valves to power turbines and generate electricity. The City's Department of Public Works is overseeing and managing this project, so this report will not discuss this effort in detail, except for a few points that may not be immediately apparent.

While most hydropower projects of any substantial size require FERC permits and licenses (the "traditional" FERC hydro license is for 50 years and mandates a costly and cumbersome process), there is an exception for hydropower that is generated from municipal water lines. Specifically, "FERC issues exemptions for two types of projects: (1) small hydropower projects (five megawatts or less) that will be built at an existing dam; and (2) hydropower projects that will be constructed on an existing conduit, such as an irrigation canal. FERC, *Water Power: Use and Regulation of a Renewable Resource*, obtained from www.ferc.fed.us/hydro/docs/waterpwr.htm" on 2/13/98."

(excerpted from [http://www.fws.gov/policy/hydrochap1.pdf](http://www.fws.gov/policy/hydrochap1.pdf) on 10/6/09)

This exemption makes the potential project even more attractive because of the avoidance of long and costly permitting procedures with uncertain outcomes.

Another consideration is if the project proves feasible on a rough order of magnitude estimate, what is the best use of the power? Perhaps the most obvious response is to sell the electricity back to HEA, which is certainly an option. However, depending on the amount of electricity available and the terms of sale, this may be an expensive and time-consuming process that could diminish the value of the power from the City's perspective. Another option may be to identify possible on-site or near-site uses that do not require power conditioning and integration into HEA's grid. A likely use of on-site power could be space and water heating that can manage variable loads[1] and store the energy in the form of heat. Since the on-site heat and electric demand is so high in the area of the pressure reducing valves, and since the expected quantity of power is not very large, local heating may provide a more cost-effective use of the power instead of selling it to HEA. This is something that should be further investigated in the current AEA-funded feasibility study.

**Wind Power**

Wind energy is also commonly cited as a high potential opportunity in Homer, especially on the Spit and in some upland areas. Federal tax credits enacted in February 2009 under the American Recovery and Reinvestment Act (ARRA), also commonly known as the "Stimulus Bill," provide for a tax credit of 30% of the installation cost of selected renewable energy systems, including residential wind turbines[2]. Combined with the recent passage of Homer City Ordinance 09-34(A) to facilitate small wind energy systems within City limits, it appears there is increased interest and activity regarding small wind turbine installations. The City's passage of Ordinance 09-34(A), while creating some restrictions, clarifies and streamlines the development path for wind turbine installations.

This recent increase in interest and activity in Homer and the Kenai Peninsula can also be traced to some degree to Alaskan Wind Industries http://www.akwindindustries.com/index.html, based in Nikiski. Among other equipment, this company has been installing the SkyStream 3.7, which is almost a 2 kW rated turbine, shown below. Alaska High Mountain Energy http://alaskahighmountainenergy.com/energy/index.htm based in Homer has also been installing the SkyStream and other wind generators.

[1] Because the water lines are managed primarily for water supply, not hydropower generation, there will be variable amounts of energy produced based on water demand, not on power demand.

[2] Discussion of tax credits and other policy incentives is included in the solar energy section below and near the end of this report. A more complete listing and description of renewable energy and energy efficiency incentives can be found at http://www.borough.kenai.ak.us/mayorsoffice/Mayor/Articles/Alternative%20Energy%20Agenda%208-6-09.pdf.

**Figure 52 SkyStream 3.7 turbine (horizontal axis with curved blades)**

As discussed briefly above, because of wind energy's intermittent nature, it is generally necessary to provide supplemental or back-up power that is integrated with the wind energy to have full-time availability. The SkyStream turbine shown above comes with a fully integrated electronics package that easily interconnects with a local grid. In this case, this would mean interconnection with the HEA grid. HEA has fairly recently developed a program that supports this interconnection and distributed generation process known as the SNAP program (Sustainable Alternative Natural Power).

It is likely that the City itself will not become involved in any large-scale wind developments, but there may be some niche opportunities, such as powering City owned and maintained public restrooms on the Spit with wind and/or solar electric panels. Full "energy independence," i.e., no HEA grid-supplied power, for these or other facilities would require a battery or some other storage device. While this may be conceptually attractive, small-scale wind or solar power is not cost-competitive with grid-supplied power such as that provided by HEA. The Spit in particular seems to have good wind resource availability, but there are concerns with avian mortality, especially with predators such as eagles in such a high profile location.

For larger scale wind energy projects, a detailed feasibility study with at least one year worth of wind data is necessary. To collect wind data, usually a tower is erected with at least two wind speed measuring devices called anemometers at different heights and a data logger. Ideally, the tower is as tall as the expected turbine height, generally between 100-250 feet depending on the size of the project, but it is also possible to have a shorter tower and extrapolate based on the anemometers at different heights and the wind shear, which is a measurement of how wind speed varies with height. Typically the higher above the ground, the faster and more energetic the wind speed. The amount of energy available from the wind is proportional to the third power of velocity, i.e., the wind speed multiplied by itself three times, so a very slight change in wind speed translates into a significant change in amount of energy produced. This highlights the need for good data collection to determine the annual and seasonal average wind speeds.

**Biomass**

For the Homer area, biomass energy would primarily be burning of wood to produce heat and possibly electricity. For the City, this would most likely be for a large commercial building or a cluster of buildings, such as the Public Works complex or at the Harbor, where there is a substantial heating demand and outdoor space to handle wood storage of some sort, either chips, pellets, or logs/sticks that may be converted into chips. As compared to diesel-based heating fuel, biomass can provide significant cost savings depending on the source of fuel, delivery and storage methods. However, biomass facilities are generally capital and labor intensive, at least compared to a boiler and a fuel tank, but do achieve savings over the life of the project if a biomass fuel source is nearby.[1]

In other parts of the country and in rural Alaska, there is growing interest and activity in, for example, converting schools, health facilities, public pools, and other large buildings to biomass heat. Approximately two years ago (2007) there was an industrial effort to build a pellet facility near Homer and sell residential and/or commercial pellet stoves to the surrounding area. This effort was funded by a large international company involved in this industry primarily in Europe. The project was halted primarily because it was determined that they could not guarantee an adequate supply of fuel, i.e., wood, for the expected life of the project. This is a very common concern and while not as large a scale, the City would be confronted with this challenge as well if it chose to convert or supplement buildings with industrialized wood heat.

It should be noted that the technology for clean, efficient[2] biomass heating systems on almost any scale is well developed and available. Europe is far ahead of the US but with recent fuel price rises there has been an increased interest in the US and an expansion of European technology providers' interest in the US market. The biggest challenges that remain are cost, reliable fuel supply, and logistics around delivery, storage, and automation. Again, every situation is unique—which will result in variable overall costs—but generally biomass is competitive with fossil fuel heating, especially in a situation like in Homer where there is a lot of wood and paper waste generated. A detailed feasibility study that includes not just cost information but operational details such as where a storage facility would be located, how ash would be handled, who would operate the system, and fuel delivery options, should be conducted before any significant investment were made.

One type of biomass heating unit that has become fairly common in Alaska is a GARN boiler, manufactured by the Dectra Corporation in St. Anthony, MN. http://garn.com

Figure 4 below shows a GARN boiler prior to installation. This stick-fired technology (as compared to wood chips) provides both heat and hot water for a fairly large (~ 5,000 -8,000 sq ft) facility. Some installations for larger buildings use side-by-side GARNs. The largest GARN units can handle four foot long "sticks." The heat delivery method, and costs, will also vary based on the type of equipment. In general, the bigger the demand and the bigger the space being heated, wood chipping systems with automated fuel feeding

[1] The "rule of thumb" with biomass fuel availability is that a 50 mile radius defines the economic area for fuel collection and delivery.

[2] While some wood burning stoves or boilers produce significant emissions and pollutants, even compared to fuel oil stoves, a process known as gasification can be used to provide extremely clean burning and highly efficient thermal energy from biomass. This is a well understood and widely deployed technology.

systems become more economically and logistically advantageous as compared to stick-fired systems with the associated labor and fuel management.

**Figure 53 GARN Wood Fired Hydronic Heater**

Use of biomass for both heat and electricity, known as Combined Heat and Power or CHP, is not as developed a technology as that for just heat, especially on the scale that would likely be appropriate for City of Homer facilities. Again, this technology is more developed in Europe, though there is increasing interest and demand in the US and Canada. Most of the systems are for larger facilities that have significant heat and electrical demand, such as hospitals, universities, and research facilities such as in the lower 48 or southern Canada. Within Alaska, however, the Alaska Power & Telephone Company is attempting to develop a $20 million biomass CHP project to provide heat and power for the community of Tok. This would be a 2 MW effort using proprietary technology from Nexterra Systems http://www.nexterra.ca/ , based in Vancouver, BC, Canada, and GE Energy http://www.gepower.com/home/index.htm.

Though the AP&T Tok project is clearly a substantial undertaking probably beyond the scope of what the City of Homer would want to do, this is the direction of dedicated CHP units that could have widespread applicability in Alaska, and could, for example, provide district heat and power to a concentrated part of the City, such as Old Town or the Spit. One development scenario for an initiative such as this could be an independent power producer, perhaps a large industrial user at the Harbor that wanted to secure its own heat and power at reduced price relative to HEA and Petro Marine, who could afford a significant capital investment that would pay back in 5-10 years. This industrial user could make the investment and possibly sell heat and power to neighboring buildings, including the City, which could help buy down the cost of capital if a long-term heat and power contract was secured.

Fish oil is also considered a form of biomass that can be used as liquid fuel in diesel engines. This is being done in other parts of Alaska, including Unalaska and Denali National Park. In Homer, there is a fairly significant amount of fish waste, primarily from sport and charter fishing, that the City is already processing, and theoretically this could be rendered into fish oil for heating and/or other diesel fuel use within City operations. State level feasibility studies that have examined fish oil for various purposes have generally found that the amount of fish oil available, even in large commercial fishing locations, is small compared to the amount needed to justify the cost of a fish oil rendering plant. However, there are niche applications—such as in Unalaska where fuel costs are extremely high and there is a tremendous amount of fish waste from commercial fishing relative to the local demand, or in Denali, where there are federal mandates for clean fuels in National Parks—in which the project economics make sense.

If the City wanted to pursue this possibility, a feasibility study should be conducted to more precisely assess the available fish waste and determine how much fuel could be derived; identify the possible costs for producing the fish oil and some possible uses for the oil; and calculate how much the City is now spending on managing the waste. Finally, an environmental assessment should be performed to examine the value of the fish waste as food/biomass to the marine ecosystem and determine if this is necessary for maintaining sustainable fish stocks and a healthy marine environment and food web. This could be a candidate for a future Alaska Renewable Energy Fund feasibility study application or a partnership opportunity with an entrepreneur who would be interested in receiving the City's fish waste.

**Solar Energy (Electric and Thermal)**

Solar power—energy from the sun—is one of the most common sources of renewable energy, but of course here in Alaska there are long stretches of time when direct solar energy conversion is not practical[1]. Solar energy from the sun can be converted directly into electricity through photovoltaic (PV) panels[2] or it can be captured as heat in solar thermal panels or evacuated (vacuum) tubes and used for space and/or water heating. Both of these technologies are covered under the 2009 ARRA stimulus funding discussed above that provides 30% tax credits for residential and business system installations.

While neither solar thermal nor electric can meet all of Homer's needs for the entire year, there is a substantial solar resource that is often dismissed because of our dark winters. For example, it is not commonly known that PV panels work better in cold weather because there is less resistance in the panels and wiring in colder ambient temperatures[3]. As well, snow provides significant reflectance, which increases the solar intensity and hence, output of PV panels. Combining these two facts results in PV output in the Alaska spring time—when it is still cold, with snow on the ground, and typically sunny weather—that often exceeds maximum output ratings of panels. Nonetheless, in the dead of winter when there is little or no sun, there is essentially no solar output, and PV systems will generally require additional electric back-up—typically HEA's grid but batteries or other means are also possible though expensive—and solar thermal will also need a heat back-up for cloudy days with limited sunlight.

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[1] Wind and biomass energy are also essentially solar energy converted in various ways, as well as ocean thermal, which will be discussed briefly in this section.

[2] Concentrating Solar Power (CSP), a technology that produces electricity by using mirrors to focus solar rays into a concentrated heat source to boil a liquid that generates steam to turn a turbine, is developing quickly and is now cost competitive with large, centralized generating plants where there is a good solar resource. However, this technology is unlikely to advance in Alaska because of our generally poor solar resource.

[3] Compare this to Arizona or California where PV systems reduce their output in hot weather, precisely the time it is needed most for air conditioning.

Focusing on the electrical aspects of solar energy, there is no escaping the fact that PV systems only provide intermittent power and are generally more costly to individuals than centralized, grid-supplied power given current market conditions. Yet there are clear benefits and good reasons to diversify the overall generation mix where possible, and storage with batteries[1], at least on residential systems, can provide a valuable back-up if and when the grid goes down especially during unplanned outages such as during storms. To address the cost challenges posed by PV systems, various subsidies, including the 2009 ARRA legislation discussed above, HEA's SNAP program, a new "net metering" rule imposed by the Regulatory Commission of Alaska, and proposed statewide legislation for production tax credits have emerged.

It should be noted that these subsidies and policies are not unique to residential PV but would also apply to small-scale wind and perhaps other technologies.

Addressing the thermal aspects of solar energy, recently there has been a rise in solar thermal installations in the Homer area as heating fuel prices continue to escalate and solar thermal technology continues to improve and drop in cost per unit energy produced. While solar thermal is less well known compared to solar PV, it is generally estimated that it has the potential to displace significantly more diesel fuel in the form of heating oil within Alaska than PV does for displacing diesel and natural gas used for electricity generation, especially in remote areas. Nonetheless, solar thermal must generally be integrated into and is primarily a supplement to some other heating system, be it electric, propane, fuel oil, gas, or wood.

There are several variables related to solar thermal systems. These include:

- the type of collector (flat plate panels or evacuated tubes)
- heat transfer mechanisms and fluids from the collectors to the interior space
- amount of passive (gravity and convection) versus active (pumping and/or fans) distribution, and
- what is being heated (domestic hot water, space, or both)

Addressing site-specific needs and issues will result in unique system designs and selections among the variables listed above, and often expert assistance is required. Similar to the situation described above with a growth in wind energy installations and businesses locally, solar thermal systems have begun to spring up throughout the Homer area. Two local businesses**,** Eayrs Plumbing and Heating http://www.eayrsplumbingandheating.com/ and Alaska High Mountain Energy(see wind power section) , are providing expertise and equipment to Homer area businesses and residences and have been able to help their customers take advantage of the policy incentives already described such as federal tax credits. Based on this recent growth in local renewable energy projects and businesses, it would appear that the policy vehicles enacted to encourage such activity is working to some extent, though conventional fuel price increases have also clearly played a role in alternative energy growth.

Another solar thermal related initiative that is possibly applicable in the Homer area is something that is now being tested in Seward and Juneau: "lifting" solar heat energy stored in the ocean through heat pumps. The Alaska SeaLife Center in Seward, for example, already has significant infrastructure in place for

[1] "Grid-tied" PV or wind energy systems do not use batteries, but rather electrically connect directly into the grid, and are much less costly than a system with batteries. While battery storage is generally not necessary for residential PV systems in the Homer area because of the HEA distribution grid, some people choose to have battery storage for a back-up and/or to not connect to the HEA. Of course, battery back-up/storage is not unique to PV systems, but can also be used in residential wind energy and other renewable and/or fossil fuel systems as well.

drawing sea water into its aquarium facilities for marine animals. Depending on the time of year, the sea water enters the facility at approximately 38°F. A heat pump can be used to remove some of the heat from the sea water and essentially concentrate it, thus delivering relatively warm water—typically in excess of 90°F—to the facility. Like with other solar thermal systems described above, this is a supplemental process that integrates multiple heating systems, but has significant potential to reduce use of diesel fuel in specific applications, namely large buildings near the coast with large heating loads.

While speculating, perhaps one of the better candidates for such a system in Homer would be the Islands and Oceans Visitor Center, or possibly some of the Harbor facilities. Like with biomass discussed above, this technology is widespread and considered "mature" in Europe, though it has never been applied in Alaska until now at the SeaLife Center in Seward and at the National Oceanic and Atmospheric Association (NOAA) Ted Stevens Marine Research Institute in Auke Bay/Juneau. Both of these Alaska projects are in the early deployment phases, so the primary recommendation here is to stay abreast of the progress of these two projects to see if they are successful and if there may be any application for diesel fuel reduction for heating in large Homer facilities.

**Geothermal**

Geothermal Energy, or "earth heat," is typically associated with hot springs and/or volcanoes. Chena Hot Springs near Fairbanks is well known for its recent success in developing the lowest temperature electricity producing geothermal system in the world using an Organic Rankine Cycle device that was designed and now patented to use the 165°F water from Chena. In this case, Chena was able to use Combined Heat and Power technology to provide both electricity and heat to the Chena Hot Springs resort facility, including a year round ice museum.

Large scale geothermal is now being explored across Cook Inlet from Homer at Mt. Spurr. Developers hope to produce 50-100MW of electricity from this volcanic source of geothermal energy and perhaps heat as well, though this is a secondary focus of the project[1]. It is expected that if this project moves forward and actually produces power, several of the Railbelt utilities, including HEA, would purchase some of this electricity. Thus, the City of Homer would receive a portion of this. However, it is also expected that Mt. Spurr will not be producing commercial power until at least 2014.

A possibly "closer to home" and shorter term option may be a version of geothermal energy that uses a technology called ground source heat pumps. This is essentially the same technology described above with ocean thermal energy that is being explored at the Alaska SeaLife Center and the Auke Bay Laboratory, but using heat in the ground instead of heat in sea water. This technology was proposed for consideration in the new Homer City Hall that was not built.

Perhaps the largest Alaska project using this technology is the Juneau airport, which recently (October 2008) received a grant by the Alaska Energy Authority and matching funds from the City of Juneau. This will be a $6 million project when complete and is designed to offset use of diesel heating fuel. In general, all

[1] In Iceland, for example, they have been able to use geothermal energy for both their electric and heating needs, though this is a unique situation in which geothermal resources are close to population centers and the country has made a political and financial decision to invest in this technology. Iceland now leads the world in the percentage of clean energy used to meet national needs and is a technology and commodity exporter because of their global expertise in and abundance of geothermal energy.

of these heat pump projects, whether they are ground source or sea water, are dependent on fairly inexpensive electricity as compared to diesel fuel and a sufficient source of heat for the heat pumps to concentrate and move. Like with many other technologies described here, this is a site-specific endeavor and each unique situation, especially for large investments in large commercial facilities, requires a detailed feasibility study.

It is also possible that this ground source heat pump technology can be adopted for residential scale use. Several systems have recently been installed in the Fairbanks area and the Cold Climate Housing Research Center www.cchrc.org is conducting research on these systems, similar to their research on solar thermal collectors. There has been some interest expressed among residential home owners in Homer to experiment with this technology using black coils of poly pipe buried in the ground to collect heat from the earth, but it is not known at this time if any local projects have been installed.

**Project Development Process**

The following outline is offered to provide a basic framework for developing projects. The main point here is to show that while each project, technology, and resource is site-specific and unique, there are also some general steps that must be taken in any renewable energy development process, such as conducting a resource assessment to determine how much energy is available. However, different amounts of time and money will be required to conduct the resource assessments. For example, while wind energy requires at least a year of data collection at the exact site proposed, solar energy data collection can be much simpler and cheaper based on existing known solar insolation figures and equipment and software that can be used to determine annual solar energy production at virtually any site.

Project Development Outline:

1. Community Need
2. Project Champion
3. Resource Assessment → **Feasibility Study**
    a. Go/No Go
4. System Design → **Technical Assistance**
    a. Load Profile
    b. Performance goals/criteria
    c. Environmental constraints
    d. Electric/thermal/storage integration
    e. Available Technology
    f. Economics
5. Permitting → **Lead Time**
6. Procurement (Buy Equipment) → **$$$**
7. Construction
8. Operation & Maintenance (O&M) → **Ongoing**
    a. Performance Monitoring
    b. Equipment maintenance regime
    c. Operator training
    d. Support network
    e. Performance evaluation/verification and improvements
    f. Financial maintenance

# Summary and Conclusion

## Summary

### Energy Use and Costs

Relational databases were developed in Excel to provide a system for energy, facility, and vehicle tracking. A summary of results using these databases follows.

***Total City and Individual Facilities Energy Use and Costs***

- The City's total energy use in 2008 was 37,615 MMBtus.
- The City's total energy costs in 2008 were $1,307,590.
- Total energy use increased by 3.4% in 2007 and by 2.28 % in 2008, up 5.76% from 2006 numbers.
- Total energy costs increased by 5.11 % in 2007 and 2008 costs increased dramatically by 18.99%, up 25.07 % from 2006 costs. High fuel prices in 2008 were the cause for the increase in costs.
- Total energy use through September 2009 is showing a 2.91% decrease (Figure 1), but costs are showing an 11.37% increase.
- The City's total electricity consumption in kWh for 2008 was 5,957,577.
- The City's total electricity cost in 2008 was $849,369.
- Electricity accounts for 54% of the City's total annual energy use and 65-70% of its total annual energy costs.
- Electricity use increased by 5.19% in 2007 and by 0.87% in 2008, up 6.11% from 2006.
- Electricity use through October 2009 is showing a 2.54% decrease.
- The City's total heating fuel deliveries for 2008 was 72,602 gallons.
- The City's total heating fuel costs for 2008 was $246,505.
- Heating fuel deliveries were down 1.55% in 2008 after a 4.41% increase in 2007.
- Heating fuel deliveries through September 2009 is showing 7.22% an increase.
- Propane fuel accounts for just over 1% of the City's total energy use and deliveries have been decreasing.
- 2008 numbers show that the Sewer Treatment Plant is the City's largest energy consumer accounting for just over 14% of the City's total energy use.
- The Port and Harbor facilities including the Fish Dock account for 22.5% of the City's total energy use in 2008.
- Gasoline deliveries to the Fuel Island accounted for 12.1% of the City's total energy use.
- The City's largest electricity user is the Sewer Treatment Plant which uses 20% of the City's electricity.
- The Port and Harbor facilities including the Fish Dock account for just over 41% of the City's total electricity use in 2008. This total does not include the restrooms in the harbor area.
- The Kenai Peninsula College and Boys & Girls Club facility accounted for nearly 25% of the total heating fuel deliveries to the City and the new Public Library accounted for 15% in 2008.
- 40 facilities and equipment are showing decreasing electricity usage in 2009.
- 26 facilities and equipment are showing increasing electricity usage in 2009.

- 12 facilities are showing an increase in heating fuel deliveries in 2009.
- 4 facilities are showing a decrease in heating fuel deliveries in 2009.

***Vehicle Fleet***

- In 2008 the City spent $60,257 on deliveries to the Diesel Fuel Island.
- In 2008 the City spent $134,031 on deliveries to the Gasoline Fuel Island.
- Diesel Fuel Island deliveries increased by 17.8% in 2008, but were down 2.52% from 2006. Deliveries are showing a 22.6% decrease through August 2009.
- Gasoline Fuel Island deliveries increased by 12.22% and are up 20.02% from 2006. Deliveries are showing a 1.98% increase through August 2009.
- The vehicle fleet logged 364,647 miles in 2008, a 7% increase from 2007.
- The vehicle fleet logged 4,564 hours in 2008, a 5% decrease from 2007.
- Diesel fuel use declined from 2007 to 2008 by 21%.
- Gasoline consumption increased by 20% from 2007 to 2008.
- City expenditures on diesel fuel consumption increased by 17%, from $34,803 in 2007 to $40,898 in 2008.
- There was 54% increase in City expenditures on gasoline consumption, from $84,160 in 2007 to $129,551 in 2008.
- As much as 5% of overall fuel consumption can be saved through operation and maintenance modifications, such as use of synthetic oils and high performance oil filters, and reduced idling and other driving habit adjustments.

***Greenhouse Gas Emissions***

Greenhouse gas emissions were calculated using ICLEI's Clean Air and Climate Protection 2009 Software. A summary of results follows:

- Total equivalent CO2 (tonnes) increased by 5.32% in 2007 compared to 2006.
- In 2008 total equivalent CO2 (tonnes) increased by 0.82%.
- Total equivalent CO2 (tonnes) emissions for 2008 are up 6.19% from the 2006 base year.
- The City of Homer emitted 4530 total equivalent CO2 (tonnes) in 2008.
- Port and Harbor facilities accounted for 31.6% of the total equivalent CO2 (tonnes) in 2008. This includes the restrooms in the harbor area.
- The Sewer Treatment Plant accounted for 16.6% of the total equivalent CO2 (tonnes) in 2008.
- The City Vehicle Fleet accounted for 402 total equivalent CO2 (tonnes), 8.9%, in 2008

***Energy Savings***

- From January to October 2009 an estimated $8,241 was saved by adjusting the photo cells on the High Mast Harbor Lights and has can result in an estimated $10,171 worth of savings annually.
- $3600 dollars worth of annual savings was realized by closing the electricity accounts for the East and West Shore ties for the Pioneer Dock.
- $1243 dollars worth of annual savings was realized by closing the Ramp # 4 street light account
- $279 dollars was recovered from a billing error on the Old Public Library.
- $528 dollars worth of annual saving s can be realized by closing two accounts that are not using electricity.

- Over $50,000 worth of savings can be realized by investing an estimated $132,636 (based on current utility costs) on energy saving projects identified in the report. Payback would take 2.6 years.

**Recommendations**

The following is a summary of recommendations made in this report:

***Energy and Greenhouse Gas Emissions Tracking***

- Use EPA's Portfolio Manager to help better track energy use.
- Track water use in the future to save on water and energy costs associated with water use.
- Designate an employee or hire an Energy Director who can spend at least 25 hours a week to manage the Revolving Energy Fund and keep energy-tracking and reporting systems up to date.
- Maintain consistent account, facility and equipment names, and facility addresses throughout all City Departments.
- Create a policy for all departments that assures the following Quality Assurance and Quality Control measures are implemented when handling energy and vehicle data and financial information.
    1. Staff has been appropriately trained in the use of computer programs,
    2. Data have been accurately transcribed and recorded,
    3. Appropriate procedures have been followed,
    4. Electronic and hard-copy data show one-to-one correspondence, and
    5. Data are consistent with expected trends.
- Communicate to the Energy Director prior to when a facility or piece of equipment is coming on or off line.
- Involve Energy Director in planning and maintenance decisions.
- Install electric sub meters and fuel meters at the following locations (see Page 61 for table of locations).
- Track how much waste oil is burned in the Motor Pool Shop heater.
- Track all vehicle fueling events that to do not tack place at the City Fuel Island.
- Identify equipment on larger vehicles and track fuel usage for this equipment.
- Complete a new GHG emissions extrapolation to estimate 2000 baseline emissions and then a determination can be made as to where the City is at in regards to meeting its target reductions of 12% by 2012 and 20% by 2020.

***Funding***

- Utilize websites and resources for funding opportunities identified in Chapter 3.
- Establish a Revolving Energy Fund (REF) that is neither very narrow nor very broad such that the benefits are widely distributed and the program becomes widely supported throughout the community.
- Place $200,000 or more into the REF immediately and then set a goal of raising an additional $100,000 - $200,000 by the end of 2010.
- Consider a "sustainability fee" to further grow and add flexibility to the REF.

- Consider establishing a local carbon offset program after the REF is well-established and it's clear that the Energy Manager has time to develop and administer the program in concert with other community outreach activitie**s.**
- Evaluate the Alaska Housing Finance Corporation's "turn-key energy savings program" utilizing performance contracting when it is announced (spring 2010) and, if eligibility criteria are met, seriously consider applying.
- Designate an employee who can spend at least 25 hours a week to manage the REF and keep energy-tracking and reporting systems up to date. (See recommendation above).

***Potential Energy and Cost Savings for City Buildings and Facilities***

- It is recommended that the City implement the prioritized projects list of recommendations for achieving energy and costs savings from facilities' conservation measures starting with the quickest payback projects.
- Increase building maintenance staff by one full time position.
- Move Port and Harbor Maintenance division from Public Works Department to Port and Harbor Department to increase efficiency.
- Increase Ice Plant staff by one half-time position for winter maintenance.
- Increase water and sewer maintenance staff by one full time position.
- Develop and implement a long term plan for maintenance staff to be further trained for the facilities and equipment they are maintaining.
- Consider an energy service company (ESCO) to conduct additional and detailed energy audits would likely yield further energy saving measures with more accurate costs and payback times

***Vehicle Fleet***

- Develop and implement a plan to provide adequate space and equipment for the motor pool shop to maintain the City Fleet.
- Increase motor pool staff by one full time position.
- Develop and implement a long term plan for maintenance staff to be further trained for the facilities and equipment they are maintaining.
- Consider use of synthetic oils and lubricants along with advanced filters can help to substantially reduce oil changes, improve mileage, and reduce maintenance hours.
- Reduce idling to save on fuel consumption, reduce carbon emissions, reduce wear on the engine, and improve efficiency of the vehicle fleet.
- Evaluate each individual fleet replacement to fully consider both up-front costs and lifecycle O&M expenditures to determine the least-cost option.
- Consider electric and hybrid vehicle replacement. Wait at least one year before any plug-ins are purchased to allow for improvements in this new component of the technology.

***Public Outreach***

It is recommended that the City of Homer implement the Public Education and Outreach Plan outlined in Chapter Six.

***Renewable Energy Opportunities***

It is recommended that the City of Homer consider the renewable energy options discussed in Chapter Seven and utilize the project development process outlined.

## Conclusion

With this report in hand, the City of Homer is in an excellent position to join the thousands of other local governments and other organizations around the country that have reduced their energy use dramatically, saving money at the same time as they reduce greenhouse gas emissions.

Discussions with state and federal funding agencies about programs to assist local governments in reducing energy use illustrate the importance of documenting energy use and establishing benchmarks. This project has accomplished that critical first step and leaves the City with software tools and protocols to continue monitoring and reporting energy use.

With detailed information about electricity and fuel use in City facilities and vehicles and a list of specific measures that can be implemented to reduce energy use, the City can now take the next step in Climate Action Plan implementation and move ahead with these measures while continuing to investigate other opportunities.

Similarly, the City now has more detailed information about how to achieve the greatest benefit from its Sustainability Fund, growing and utilizing the fund to accomplish many of the recommendations in this report. Other options for funding energy-saving measures have also been identified.

The City will further serve the community through public outreach and education as described in this report. Those efforts do not need to be expensive and could be funded through the Sustainability Fund.

Renewable energy development will be a much more ambitious enterprise but has the potential to greatly reduce fossil fuel consumption and help Homer transition to a cleaner, more sustainable energy future.

Beginning with the Global Warming Task Force and Climate Action Plan, the City of Homer has shown leadership in responding to energy and climate protection challenges. Commissioning this report demonstrated continued commitment to these goals. The next step will be the most important one to directly reduce fossil fuel use and associated costs. When the City Council, City employees, and the citizens of this community look back on 2010, they should see that tremendous progress has been made by the City of Homer in this regard, with more to come as the City adopts a new “business as usual” ethos reflecting best practices for sustainability.

## Appendix 1 City of Homer Personnel Data for 2006 - 2010

| Department | Actual FY 2006 | Actual FY 2007 | Actual FY 2008 | Adopted FY 2009 | Preliminary FY 2010 |
|---|---|---|---|---|---|
| **City Clerk** | 3.00 | 3.50 | 3.60 | 3.60 | 3.00 |
| **City Clerk Elections** | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| **Total** | 3.12 | 3.62 | 3.72 | 3.72 | 3.12 |
| **City Manager** | 3.00 | 3.00 | 2.20 | 2.20 | 2.20 |
| **Personnel** | 1.04 | 1.04 | 1.04 | 1.04 | 0.80 |
| **Economic Development** | 0.00 | 0.00 | 0.80 | 0.80 | 0.80 |
| **Information Systems** | 1.00 | 1.00 | 1.00 | 1.50 | 1.50 |
| **Community Schools** | 1.00 | 1.00 | 1.00 | 1.00 | 0.15 |
| **Total** | 6.04 | 6.04 | 6.04 | 6.54 | 5.45 |
| **Finance** | 7.22 | 7.52 | 7.72 | 7.72 | 7.02 |
| **Planning and Zoning** | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| **Library** | 5.68 | 6.90 | 7.40 | 7.40 | 7.10 |
| **Fire Administration** | 1.60 | 1.60 | 1.60 | 1.60 | 1.60 |
| **Emergency Medical Services** | 2.20 | 2.20 | 2.20 | 2.20 | 1.70 |
| **Fire Services** | 2.20 | 2.20 | 2.20 | 2.20 | 1.70 |
| **Total** | 6.00 | 6.00 | 6.00 | 6.00 | 5.00 |
| **Police Administration** | 1.05 | 1.05 | 1.05 | 1.15 | 1.15 |
| **Police Dispatch** | 5.95 | 5.95 | 7.70 | 6.80 | 5.95 |
| **Police Investigation** | 1.70 | 1.70 | 1.70 | 1.70 | 1.70 |
| **Police Patrol** | 8.80 | 8.80 | 9.20 | 9.20 | 7.80 |
| **Jail** | 6.80 | 6.80 | 6.80 | 6.95 | 6.10 |
| **Total** | 24.30 | 24.30 | 26.45 | 25.80 | 22.70 |
| **Airport Terminal** | 0.52 | 0.70 | 0.70 | 0.70 | 0.85 |
| **Public Works Administration** | 1.80 | 1.90 | 2.05 | 2.05 | 1.45 |
| **Public Works General Maintenance** | 1.89 | 2.51 | 2.53 | 2.53 | 2.30 |
| **Public Works Gravel Roads** | 0.47 | 0.37 | 0.30 | 0.30 | 0.25 |
| **Public Works Paved Roads** | 0.00 | 1.01 | 0.90 | 0.90 | 0.75 |
| **Public Works Snow Removal** | 0.95 | 0.75 | 0.90 | 0.75 | 0.80 |
| **Parks/Recreation/Cemetery** | 4.34 | 4.44 | 5.60 | 4.60 | 3.70 |
| **Public Works Motor Pool** | 2.00 | 2.20 | 2.05 | 2.05 | 2.05 |
| **Public Works Engineering /Inspection** | 1.50 | 1.50 | 2.30 | 2.30 | 1.50 |
| **Janitorial** | 1.88 | 1.88 | 2.15 | 1.75 | 1.75 |
| **Total** | 14.83 | 17.26 | 18.78 | 17.23 | 14.55 |
| **Water Fund Administration** | 1.83 | 2.25 | 2.86 | 2.15 | 1.85 |
| **Water Treatment Plant** | 1.52 | 1.52 | 2.05 | 2.00 | 1.94 |
| **Water Treatment Plant Testing** | 0.28 | 0.33 | 0.30 | 0.30 | 0.30 |
| **Water Pump Station** | 0.19 | 0.20 | 0.40 | 0.40 | 0.37 |

| Department | Actual FY 2006 | Actual FY 2007 | Actual FY 2008 | Adopted FY 2009 | Preliminary FY 2010 |
|---|---|---|---|---|---|
| **Water Distribution Stations** | 1.49 | 1.99 | 1.90 | 2.25 | 2.15 |
| **Water Reservoir** | 0.26 | 0.26 | 0.60 | 0.50 | 0.50 |
| **Water Meters** | 1.00 | 1.10 | 0.95 | 0.95 | 1.00 |
| **Water Hydrants** | 0.69 | 0.89 | 0.95 | 0.95 | 0.80 |
| **Total** | 7.26 | 8.54 | 10.01 | 9.50 | 8.91 |
| **Sewer Administration** | 1.80 | 2.55 | 3.19 | 2.05 | 1.75 |
| **Sewer Plant Operations** | 2.06 | 2.06 | 2.55 | 2.50 | 2.69 |
| **Sewer Testing** | 0.58 | 0.58 | 0.35 | 0.60 | 0.60 |
| **Sewer Pump/Lift Station** | 1.09 | 1.39 | 0.95 | 1.60 | 1.35 |
| **Sewer Collection System** | 1.62 | 1.81 | 1.40 | 1.55 | 1.25 |
| **Total** | 7.15 | 8.39 | 8.44 | 8.30 | 7.64 |
| **Public Works Total** | 29.24 | 34.19 | 37.23 | 35.03 | 31.10 |
| **Port and Harbor Administration** | 4.00 | 4.00 | 4.24 | 4.40 | 4.00 |
| **Port and Harbor - Harbor** | 7.20 | 7.05 | 10.32 | 6.55 | 7.29 |
| **Port and Harbor Pioneer Dock** | 0.25 | 0.30 | 0.30 | 0.50 | 0.48 |
| **Port and Harbor Fish Dock** | 3.85 | 3.90 | 4.60 | 4.10 | 3.98 |
| **Port and Harbor Deep Water Dock** | 0.30 | 0.35 | 1.07 | 0.50 | 0.50 |
| **Port and Harbor - Administration Maintenance** | 0.50 | 0.50 | 0.40 | 0.40 | 0.35 |
| **Port and Harbor - Harbor Maintenance** | 2.25 | 2.26 | 2.15 | 2.15 | 2.80 |
| **Port and Harbor Pioneer Dock Maintenance** | 0.22 | 0.22 | 0.30 | 0.40 | 0.30 |
| **Port and Harbor Deep Water Dock Maintenance** | 0.20 | 0.20 | 0.30 | 0.40 | 0.30 |
| **Total** | 18.77 | 18.78 | 23.68 | 19.40 | 20.00 |
| **Grand Total** | 104.89 | 112.05 | 122.94 | 116.31 | 106.34 |

## Appendix 2 City of Homer Infrastructure

| Department | Division | Facility Name | Space Name | Year Built | Gross Floor Area (Sq Ft) | Number Of PCs |
|---|---|---|---|---|---|---|
| **City Hall** | City Hall | CITY HALL | CITY HALL | 1980 | 10531 | 22 PCs & 6 servers |
| | | | CITY HALL-EG | | | |
| **Fire** | Fire | FIRE HALL | FIRE HALL | 1980 | 8500 | 6 PCs & 5 servers |
| **Library** | Library | OLD LIBRARY | OLD LIBRARY | | | |
| | | PUBLIC LIBRARY | PUBLIC LIBRARY | 2005 | 17115 | 37 PCs & 3 servers |
| **Police** | Jail | POLICE STA/JAIL/FIRE HALL | JAIL | | | 1 PC |
| | Police | HPD COM ON HOMER SPIT RD | HPD COM ON HOMER SPIT RD | | | |
| | | POLICE STA/JAIL/FIRE HALL | POLICE STA/JAIL | 1979 | 5756 | 18 PCs & 7 servers |
| | | | POLICE STA/JAIL-EG | | | |
| **Port & Harbor** | Fish Dock | FISH DOCK | ICE PLANT | 1983 | 8863 | 1 PC |
| | | | FISH GRINDER | 2001 | 800 | |
| | Maintenance | PORT & HARBOR MAIN SHOP | PORT & HARBOR MAIN SHOP | 1993 | 4000 | |
| | | PORT & HARBOR USED OIL BLDG | PORT & HARBOR USED OIL BLDG | | | |
| | Parks & Recreation | RR @ RAMP #6 AND SYS #4 | RR @ RAMP #6 AND SYS #4 | 2005 | 588 | |
| | | RR AT FISHING LAGOON | RR AT FISHING LAGOON | 1996 | 576 | |
| | | RR AT LAUNCH RAMP | RR AT LAUNCH RAMP | 2005 | 252 | |
| | | RR AT RAMP # 4 | RR AT RAMP # 4 | 2005 | 588 | |
| | | RR BY HARBORMASTER OFFICE | RR BY HARBORMASTER OFFICE | 1983 | 1111 | |
| | Port & Harbor | DEEP WATER DOCK | DEEP WATER DOCK | | | |
| | | HIGH MAST LGT #7 AT RAMP #6 | HIGH MAST LGT #7 AT RAMP #6 | | | |
| | | HIGH MAST LGTS #2,3, & 4 | HIGH MAST LGTS #2,3, & 4 | | | |
| | | MAIN DK (INSIDE PIONEER DK) | MAIN DK (INSIDE PIONEER DK) | | | |
| | | PH HARBORMASTER OFFICE | PH HARBORMASTER OFFICE | 1983 | 1917 | 9 PCs & 2 servers |
| | | PIONEER DOCK EAST | EAST - SHORE TIE | | | |
| | | | PIONEER DOCK EAST | | | |
| | | PIONEER DOCK WEST | PIONEER DOCK WEST | | | |
| | | | WEST - SHORE TIE | | | |
| | | RAMP #4 SPIT STREET LIGHTS | RAMP #4 SPIT STREET LIGHTS | | | |
| | | RAMP #6 & FISH TABLES | RAMP #6 & FISH TABLES | | | |
| | | STEEL GRID | STEEL GRID | | | |
| | | SYS # 4 FLT | SYS # 4 FLT | | | |
| | | SYS #1 FLT & H MAST LGT #1 | SYS #1 FLT & H MAST LGT #1 | | | |

| Department | Division | Facility Name | Space Name | Year Built | Gross Floor Area (Sq Ft) | Number Of PCs |
|---|---|---|---|---|---|---|
| | | SYSTEM #5 (LIGHT/FLOAT) | SYSTEM #5 (LIGHT/FLOAT) | | | |
| | | WOOD GRID | WOOD GRID | | | |
| **Public Works** | Airport | AIRPORT TERMINAL | AIRPORT TERMINAL | 1993 | 8588 | 6 PCs |
| | Animal Shelter | ANIMAL SHELTER | ANIMAL SHELTER | 2004 | 4100 | 1 PC |
| | Maintenance | HERC-02 PW MAIN SHOP | HERC-02 PW MAIN SHOP | 1952 | 7424 | 3 PCs |
| | Motor Pool | PUBLIC WORKS OFFICE AND SHOP | MOTOR POOL SHOP | 1986 | 2440 | 2 PCs |
| | Parks & Recreation | BEN WALTERS PARK | RR AT BEN WALTERS PARK | | | |
| | | HICKERSON MEMORIAL CEMETERY | HICKERSON MEMORIAL CEMETERY | | | |
| | | HSC FEE COLLECTION BLDG | HSC FEE COLLECTION BLDG | 1999 | 600 | |
| | | KAREN HORNADAY PK\CG\BF | KAREN HORNADAY PK\CG\BF | | | |
| | | | RR AT KAREN HORNADAY PK | | | |
| | | RR AT BISHOP'S BEACH | RR AT BISHOP'S BEACH | | | |
| | | WKFL PARK GAZEBO | WKFL PARK GAZEBO | | | |
| | Public Works | BAY AVE WARNING SIREN | BAY AVE WARNING SIREN | | | |
| | | DIESEL FUEL ISLAND | DIESEL FUEL ISLAND | | | |
| | | GASOLINE FUEL ISLAND | GASOLINE FUEL ISLAND | | | |
| | | HERC-01 KPC AND BGC | HERC-01 KPC AND BGC | 1956 | 24006 | |
| | | LGT BAY AVE THAW CABLE | LGT BAY AVE THAW CABLE | | | |
| | | LGT@RANGEVIEW AVE&WRIGHT ST | LGT@RANGEVIEW AVE&WRIGHT ST | | | |
| | | LGTS ON HEATH ST | LGTS ON HEATH ST | | | |
| | | PUBLIC WORKS OFFICE AND SHOP | EQUIPMENT STORAGE POLE BARN | 2005 | 6336 | |
| | | | PUBLIC WORKS OFFICE AND SHOP | 1970 | 8381 | 10 PCs & 2 servers |
| | | RV DUMP STA AT PUBLIC WORKS | RV DUMP STA AT PUBLIC WORKS | | | |
| | | VARIOUS LOCATIONS (LIGHTS) | VARIOUS LOCATIONS (LIGHTS) | | | |
| | | WARNING SIREN HOMER SPIT RD | WARNING SIREN HOMER SPIT RD | | | |
| | Wastewater | KACHEMAK DR-FLUSHING STATION | KACHEMAK DR-FLUSHING STATION | | | |
| | | SEWER TREATMENT PLANT | SEWER TREATMENT PLANT | 1989 | 22696 | 1 PC |
| | | | SEWER TREATMENT PLANT-EG | | | |
| | | | STP LAB & OFFICE | 1989 | 1536 | 4 PCs |
| | | | WATER & SEWER MS | 1975 | 800 | |
| | | SL @ BAY AVE | SL @ BAY AVE | 1979 | 96" diameter | |
| | | SL @ BELUGA LAKE | SL @ BELUGA LAKE | 2000 | 120" diameter | |
| | | SL @ LAUNCH RAMP | SL @ LAUNCH RAMP | 1990 | 120" diameter | |

## Appendix 2 City of Homer Infrastructure

| Department | Division | Facility Name | Space Name | Year Built | Gross Floor Area (Sq Ft) | Number Of PCs |
|---|---|---|---|---|---|---|
| | | SL @ PORT 30 HOMER SPIT | SL @ PORT 30 HOMER SPIT | 1993 | 72" diameter | |
| | | SL AT BEAR CREEK DR | SL AT BEAR CREEK DR | 1990 | 96" diameter | |
| | | SL@CHLOR STA-GOV LOT 8 | SL@CHLOR STA-GOV LOT 8 | 1990 | 120 | |
| | | SL@HOMER SPIT CAMPGROUND | SL@HOMER SPIT CAMPGROUND | 1990 | 96" diameter | |
| | Water | BSTER STA@ FIREWEED AVE 250 | BSTER STA@ FIREWEED AVE 250 | 2007 | 160 | |
| | | MTRVAULT@ EAST END/EAST HILL | MTRVAULT@ EAST END/EAST HILL | 2000 | 96" diameter | |
| | | NEW WATER TREATMENT PLANT | NEW WATER TREATMENT PLANT | | | |
| | | OLD WATER TREATMENT PLANT | OLD WATER TREATMENT PLANT | 1973 | 4746 | 2 PCs |
| | | | OLD WATER TREATMENT PLANT-EG | | | |
| | | PR STA @ A-FRAME | PR STA @ A-FRAME | 1966 | 231 | |
| | | PR STA @ BARNETT | PR STA @ BARNETT | 1976 | 117 | |
| | | PR STA @ BARTLETT-SOUNDVIEW | PR STA @ BARTLETT-SOUNDVIEW | 2002 | 160 | |
| | | PR STA @ BEAR CREEK | PR STA @ BEAR CREEK | 1979 | 96 | |
| | | PR STA @ EAST HILL-HOEDL | PR STA @ EAST HILL-HOEDL | 1975 | 96 | |
| | | PR STA @ EFFLER | PR STA @ EFFLER | 1976 | 96 | |
| | | PR STA @ HEA | PR STA @ HEA | 1975 | 80 | |
| | | PR STA @ HILLTOP | PR STA @ HILLTOP | 2005 | 160 | |
| | | PR STA @ JEEP SALES | PR STA @ JEEP SALES | 1975 | 80 | |
| | | PR STA @ KACHEMAK WAY | PR STA @ KACHEMAK WAY | 1975 | 80 | |
| | | PR STA @ LAKESIDE | PR STA @ LAKESIDE | 1978 | 96 | |
| | | PR STA @ LUCKY SHOT | PR STA @ LUCKY SHOT | 1975 | 80 | |
| | | PR STA @ MAIN & DANVIEW | PR STA @ MAIN & DANVIEW | 1983 | 80 | |
| | | PR STA @ MID-HILL | PR STA @ MID-HILL | 2005 | 80 | |
| | | PR STA @ RIDGELINE STATION | PR STA @ RIDGELINE STATION | 1997 | 96 | |
| | | PR STA @ STERLING | PR STA @ STERLING | 2006 | 160 | |
| | | PR STA @ SWITCHBACK | PR STA @ SWITCHBACK | 1976 | 80 | |
| | | PR STA @ TESORO METER VAULT | PR STA @ TESORO METER VAULT | 1967 | 80 | |
| | | PR STA @ WEST HILL | PR STA @ WEST HILL | 2006 | 160 | |
| | | PR STA@OHLSON LN/FAT OLIVE'S | PR STA@OHLSON LN/FAT OLIVE'S | 1975 | 80 | |
| | | STREAM HILL BOOSTER STATION | STREAM HILL BOOSTER STATION | | | |
| | | WATER PUMP STA @ CROSSMAN | WATER PUMP STA @ CROSSMAN | 1974 | 831 | |
| | | WATER PUMP STA @ HOMER SPIT | WATER PUMP STA @ HOMER SPIT | 1983 | 2471 | |

| Facility Name | Space Name | HEA Account # | HEA Status | HEA Rate | HEA Class | HEA Meter # | HEA Meter Multiplier | HEA Security Light Type | HEA Security Light Count |
|---|---|---|---|---|---|---|---|---|---|
| AIRPORT TERMINAL | AIRPORT TERMINAL | 277854 | A D | 4 | 4 | 2001661 | 40 | 0 | 0 |
| ANIMAL SHELTER | ANIMAL SHELTER | 277885 | A D | 3 | 4 | 2002381 | 1 | 0 | 0 |
| BEN WALTERS PARK | RR AT BEN WALTERS PARK | 277855 | A | 3 | 4 | 52073 | 1 | 0 | 0 |
| BSTER STA@ FIREWEED AVE 250 | BSTER STA@ FIREWEED AVE 250 | 277899 | A | 3 | 4 | 53179 | 1 | 0 | 0 |
| CITY HALL | CITY HALL | 277871 | A D | 4 | 4 | 2003082 | 40 | 0 | 0 |
| DEEP WATER DOCK | DEEP WATER DOCK | 277806 | A D | 4 | 4 | 2001292 | 40 | 0 | 0 |
| FISH DOCK | FISH DOCK | 277838 | A D | 4 | 4 | 6001973 | 100 | 0 | 0 |
| | FISH DOCK KVAR | 277839 | A D | 18 | 19 | 6021973 | 100 | 0 | 0 |
| HERC-01 KPC AND BGC | HERC-01 KPC AND BGC | 277843 | A D | 4 | 4 | 2001114 | 80 | 0 | 0 |
| HERC-02 PW MAIN SHOP | HERC-02 PW MAIN SHOP | 277833 | A | 3 | 4 | 62725 | 1 | 1 | 2 |
| HICKERSON MEMORIAL CEMETARY | HICKERSON MEMORIAL CEMETARY | 277861 | A | 3 | 4 | 54229 | 1 | 0 | 0 |
| HIGH MAST LGT #7 @ RAMP #6 | HIGH MAST LGT #7 @ RAMP #6 | 277898 | A D | 3 | 4 | 2002394 | 1 | 0 | 0 |
| HIGH MAST LGTS #2,3, & 4 | HIGH MAST LGTS #2,3, & 4 | 277891 | A D | 4 | 4 | 2001118 | 60 | 0 | 0 |
| HPD COM ON HOMER SPIT RD | HPD COM ON HOMER SPIT RD | 277812 | A | 3 | 4 | 60001 | 1 | 0 | 0 |
| HSC FEE COLLECTION BLDG | HSC FEE COLLECTION BLDG | 277830 | A | 3 | 4 | 51881 | 1 | 0 | 0 |
| KACHEMAK DR-FLUSHING STATION | KACHEMAK DR-FLUSHING STATION | 9100277805 | A | 3 | 4 | 60119 | 1 | 0 | 0 |
| KAREN HORNADAY PK/CG/BF | KAREN HORNADAY PK/CG/BF | 277816 | A | 3 | 4 | 56160 | 1 | 0 | 0 |
| LGT BAY AVE THAW CABLE | LGT BAY AVE THAW CABLE | 277840 | A | 3 | 4 | 62649 | 1 | 0 | 0 |
| LGT@ RANGEVIEW & WRIGHT ST | LGT@ RANGEVIEW & WRIGHT ST | 277872 | A | 3 | 4 | 62776 | 1 | 0 | 0 |
| LGTS ON HEATH ST | LGTS ON HEATH ST | 277803 | A | 3 | 4 | 45762 | 1 | 0 | 0 |
| MAIN DK INSIDE PIONEER DK | MAIN DK INSIDE PIONEER DK | 277834 | A D | 3 | 4 | 2001630 | 40 | 0 | 0 |
| MANLEY APT#1 | MANLEY APT#1 | 277875 | I | 1 | 1 | 522 | 1 | 0 | 0 |
| MANLEY APT#2 | MANLEY APT#2 | 277868 | I | 1 | 1 | 748 | 1 | 0 | 0 |
| MTRVAULT@ EAST END/EAST HILL | MTRVAULT@ EAST END/EAST HILL | 277887 | A | 3 | 4 | 34355 | 1 | 0 | 0 |
| NEW WATER TREATMENT PLANT | NEW WATER TREATMENT PLANT | 9100277806 | A D | 4 | 4 | 2002618 | 40 | 0 | 0 |
| OLD LIBRARY | OLD LIBRARY | 277829 | I | 3 | 4 | 54158 | 1 | 5 | 1 |
| OLD WATER TREATMENT PLANT | OLD WATER TREATMENT PLANT | 277870 | A D | 4 | 4 | 2002371 | 40 | 0 | 0 |
| PH HARBORMASTER OFFICE | PH HARBORMASTER OFFICE | 277864 | A | 3 | 4 | 62972 | 1 | 0 | 0 |
| PIONEER DOCK EAST | EAST - SHORE TIE | 277879 | I D | 4 | 4 | 2002148 | 40 | 0 | 0 |
| | PIONEER DOCK EAST | 277877 | A D | 4 | 4 | 2002088 | 40 | 0 | 0 |
| PIONEER DOCK WEST | WEST - SHORE TIE | 277878 | I D | 4 | 4 | 2002149 | 40 | 0 | 0 |

## Appendix 3 Homer Electric Association Account Information for City of Homer Facilities from 2006 to Present

| Facility Name | Space Name | HEA Account # | HEA Status | HEA Rate | HEA Class | HEA Meter # | HEA Meter Multiplier | HEA Security Light Type | HEA Security Light Count |
|---|---|---|---|---|---|---|---|---|---|
| **POLICE STA/JAIL/FIRE HALL** | **FIRE HALL** | 277813 | **I D** | 4 | **4** | 200156 | **60** | 0 | 0 |
| | **FIRE HALL** | 277869 | **A D** | 4 | **5** | 2002791 | **40** | 0 | 0 |
| | **JAIL** | 277869 | **A D** | 4 | **5** | 2002791 | **40** | 0 | 0 |
| | **POLICE STATION** | 277869 | **A D** | 4 | **5** | 2002791 | **40** | 0 | 0 |
| **PORT & HARBOR MAIN SHOP** | **PORT & HARBOR MAIN SHOP** | 277857 | **A D** | 3 | **4** | 2001663 | **40** | 0 | 0 |
| **PORT & HARBOR USED OIL BLDG** | **PORT & HARBOR USED OIL BLDG** | 277844 | **A D** | 3 | **4** | 2001861 | **1** | 0 | 0 |
| **PR STA @ A-FRAME** | **PR STA @ A-FRAME** | 277801 | **A** | 3 | **4** | 55628 | **1** | 0 | 0 |
| **PR STA @ BARNETT** | **PR STA @ BARNETT** | 277820 | **A** | 3 | **4** | 64199 | **1** | 0 | 0 |
| **PR STA @ BARTLETTT-SOUNDVIEW** | **PR STA @ BARTLETTT-SOUNDVIEW** | 277896 | **A** | 3 | **4** | 56972 | **1** | 0 | 0 |
| **PR STA @ BEAR CREEK** | **PR STA @ BEAR CREEK** | 277826 | **A** | 3 | **4** | 62290 | **1** | 0 | 0 |
| **PR STA @ EAST HILL-HOEDL** | **PR STA @ EAST HILL-HOEDL** | 277814 | **A** | 3 | **4** | 64158 | **1** | 0 | 0 |
| **PR STA @ EFFLER** | **PR STA @ EFFLER** | 277822 | **A** | 3 | **4** | 59761 | **1** | 0 | 0 |
| **PR STA @ HEA** | **PR STA @ HEA** | 277818 | **A** | 3 | **4** | 30211 | **1** | 0 | 0 |
| **PR STA @ HILLTOP** | **PR STA @ HILLTOP** | 277836 | **A** | 3 | **4** | 44760 | **1** | 0 | 0 |
| **PR STA @ JEEP SALES** | **PR STA @ JEEP SALES** | 277817 | **A** | 3 | **4** | 54142 | **1** | 0 | 0 |
| **PR STA @ KACHEMAK WAY** | **PR STA @ KACHEMAK WAY** | 277807 | **A** | 3 | **4** | 55594 | **1** | 0 | 0 |
| **PR STA @ LAKESIDE** | **PR STA @ LAKESIDE** | 277825 | **A** | 3 | **4** | 52323 | **1** | 0 | 0 |
| **PR STA @ LUCKY SHOT** | **PR STA @ LUCKY SHOT** | 277866 | **A** | 3 | **4** | 55112 | **1** | 0 | 0 |
| **PR STA @ MAIN & DANVIEW** | **PR STA @ MAIN & DANVIEW** | 277835 | **A** | 3 | **4** | 57789 | **1** | 0 | 0 |
| **PR STA @ MID-HILL** | **PR STA @ MID-HILL** | 277897 | **A** | 3 | **4** | 43049 | **1** | 0 | 0 |
| **PR STA @ RIDGELINE STATION** | **PR STA @ RIDGELINE STATION** | 277849 | **A** | 3 | **4** | 62438 | **1** | 0 | 0 |
| **PR STA @ STERLING** | **PR STA @ STERLING** | 277888 | **A** | 3 | **4** | 57614 | **1** | 0 | 0 |
| **PR STA @ SWITCHBACK** | **PR STA @ SWITCHBACK** | 277819 | **A** | 3 | **4** | 63164 | **1** | 0 | 0 |
| **PR STA @ TESORO METER VAULT** | **PR STA @ TESORO METER VAULT** | 277863 | **A** | 3 | **4** | 64237 | **1** | 0 | 0 |
| **PR STA @ WEST HILL** | **PR STA @ WEST HILL** | 277889 | **A** | 3 | **4** | 62167 | **1** | 0 | 0 |
| **PR STA@OHLSON LN/FAT OLIVES** | **PR STA@OHLSON LN/FAT OLIVES** | 277815 | **A** | 3 | **4** | 55705 | **1** | 0 | 0 |
| **PUBLIC LIBRARY** | **PUBLIC LIBRARY-Construction** | 277894 | **I D** | 4 | **4** | 2002418 | **40** | 0 | 0 |
| | **PUBLIC LIBRARY** | 9100277801 | **A D** | 4 | **4** | 2002418 | **40** | 0 | 0 |
| **PUBLIC WORKS OFFICE & SHOP** | **PUBLIC WORKS OFFICE & SHOP** | 277867 | **A D** | 4 | **5** | 2001884 | **40** | 0 | 0 |
| **RAMP #4 SPIT STREET LIGHTS** | **RAMP #4 SPIT STREET LIGHTS** | 277805 | **I** | 8 | **81** | | | 5 | 6 |
| **RR @ RAMP #6 AND SYS #4** | **RR @ RAMP #6 AND SYS #4** | 277876 | **A D** | 4 | **4** | 2001787 | **40** | 0 | 0 |

| Facility Name | Space Name | HEA Account # | HEA Status | HEA Rate | HEA Class | HEA Meter # | HEA Meter Multiplier | HEA Security Light Type | HEA Security Light Count |
|---|---|---|---|---|---|---|---|---|---|
| RR AT BISHOPS BEACH | RR AT BISHOPS BEACH | 277860 | A | 3 | 4 | 54648 | 1 | 0 | 0 |
| RR AT FISHING LAGOON | RR AT FISHING LAGOON | 277858 | A | 3 | 4 | 62745 | 1 | 0 | 0 |
| RR AT LAUNCH RAMP | RR AT LAUNCH RAMP | 277884 | A | 3 | 4 | 62216 | 1 | 0 | 0 |
| RR AT RAMP # 4 | RR AT RAMP # 4 | 277893 | A | 3 | 4 | 60146 | 1 | 0 | 0 |
| RR BY HARBORMASTER OFFICE | RR BY HARBORMASTER OFFICE | 277837 | A | 3 | 4 | 60150 | 1 | 0 | 0 |
| SEWER TREATMENT PLANT | SEWER TREATMENT PLANT | 277873 | A D | 4 | 4 | 2002744 | 80 | 0 | 0 |
| | SEWER TREATMENT PLANT KVAR | 277874 | I D | 18 | 19 | 6021974 | 80 | 0 | 0 |
| SL @ BAY AVE | SL @ BAY AVE | 277862 | A D | 3 | 4 | 2001996 | 1 | 0 | 0 |
| SL @ BELUGA LAKE | SL @ BELUGA LAKE | 277841 | A | 3 | 4 | 100224 | 1 | 0 | 0 |
| SL @ LAUNCH RAMP | SL @ LAUNCH RAMP | 277831 | A D | 3 | 4 | 200862 | 18 | 0 | 0 |
| SL @ PORT 30 HOMER SPIT | SL @ PORT 30 HOMER SPIT | 277809 | A | 3 | 4 | 58743 | 1 | 0 | 0 |
| SL AT BEAR CREEK DR | SL AT BEAR CREEK DR | 9100277889 | A | 3 | 4 | 1001232 | 1 | 0 | 0 |
| SL@CHLOR STA-GOV LOT 8 | SL@CHLOR STA-GOV LOT 8 | 277828 | A | 3 | 4 | 53141 | 1 | 0 | 0 |
| SL@HOMER SPIT CAMPGROUND | SL@HOMER SPIT CAMPGROUND | 277832 | A | 3 | 4 | 1001230 | 1 | 0 | 0 |
| STEEL GRID | STEEL GRID | 277850 | A D | 3 | 4 | 2001891 | 1 | 0 | 0 |
| STREAM HILL BOOSTER STATION | STREAM HILL BOOSTER STATION | 9100277808 | A | 3 | 4 | 63403 | 1 | 0 | 0 |
| SYS #1 FLT & H MAST LGT#1 | SYS #1 FLT & H MAST LGT#1 | 277811 | A D | 4 | 4 | 2002741 | 40 | 0 | 0 |
| SYSTEM #5 (LIGHT/FLOAT) | SYSTEM #5 (LIGHT/FLOAT) | 277892 | A D | 4 | 4 | 2002752 | 80 | 0 | 0 |
| VARIOUS LOCATIONS (LIGHTS) | VARIOUS LOCATIONS (LIGHTS) | 277852 | A | 8 | 81 | 0 | NA | Various Types | 50 |
| WARNING SIREN HOMER SPIT RD | WARNING SIREN HOMER SPIT RD | 9100277802 | A | 3 | 4 | 53097 | 1 | 0 | 0 |
| WATER PUMP STA @ CROSSMAN | WATER PUMP STA @ CROSSMAN | 277846 | A D | 4 | 4 | 200316 | 120 | 0 | 0 |
| WATER PUMP STA @ HOMER SPIT | WATER PUMP STA @ HOMER SPIT | 277853 | A D | 4 | 4 | 200565 | 1 | 0 | 0 |
| WKFL PARK GAZEBO | WKFL PARK GAZEBO | 277808 | A | 3 | 4 | 62700 | 1 | 0 | 0 |
| WOOD GRID | WOOD GRID | 277802 | A | 3 | 4 | 60003 | 1 | 0 | 0 |

## Appendix 4 City of Homer Fuel Tank Information

| Facility Name | Space Name | Fuel Tank ID # | Fuel Tank Capacity | Fuel Tank Capacity Unit | Fuel Tank Type | Fuel Type | Fuel Tank Status |
|---|---|---|---|---|---|---|---|
| AIRPORT TERMINAL | AIRPORT TERMINAL | A-1 | 1100 | gal | UST | Heating Fuel Oil #1 or #2 | A |
| ANIMAL SHELTER | ANIMAL SHELTER | AS-1 | 1000 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| CITY HALL | CITY HALL-EG | CH-1 | ? | gal | ? | Heating Fuel Oil #1 or #2 | A |
| DIESEL FUEL ISLAND | DIESEL FUEL ISLAND | PW-7 | 4000 | gal | UST | Diesel | A |
| GASOLINE FUEL ISLAND | GASOLINE FUEL ISLAND | PW-6 | 4000 | gal | UST | Gasoline | A |
| HERC-01 KPC AND BGC | HERC-01 KPC AND BGC | HERC-1 | 2000 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| HERC-02 PW MAIN SHOP | HERC-02 PW MAIN SHOP | HERC-2 | 2000 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| HSC FEE COLLECTION BLDG | HSC FEE COLLECTION BLDG | PK-5 | 120 | gal | Rental AST | Propane | Seasonal |
| OLD WATER TREATMENT PLANT | OLD WATER TREATMENT PLANT | WTP-02 | 250 | gal | AST | Propane | A |
| | OLD WATER TREATMENT PLANT-EG | WTP-01 | 500 | gal | Rental | Heating Fuel Oil #1 or #2 | A |
| PH HARBORMASTER OFFICE | PH HARBORMASTER OFFICE | PHM-2 | 300 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| POLICE STA/JAIL/FIRE HALL | POLICE STA/JAIL | PD-1 | 550 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| | POLICE STA/JAIL-EG | PD-2 | 550 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| PORT & HARBOR MAIN SHOP | PORT & HARBOR MAIN SHOP | PHM-1 | 2000 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| PUBLIC LIBRARY | PUBLIC LIBRARY | LIB-1 | 1000 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| PUBLIC WORKS OFFICE AND SHOP | EQUIPMENT STORAGE POLE BARN | PW-8 | 500 | gal | AST | Diesel | A |
| | MOTOR POOL SHOP | PW-MP | 300 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| | PUBLIC WORKS OFFICE AND SHOP | PW-1 | 550 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| RR @ RAMP #6 AND SYS #4 | RR @ RAMP #6 AND SYS #4 | PK-3 | 300 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| RR AT LAUNCH RAMP | RR AT LAUNCH RAMP | PK-4 | 300 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| RR AT RAMP # 4 | RR AT RAMP # 4 | PK-2 | 300 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| RR BY HARBORMASTER OFFICE | RR BY HARBORMASTER OFFICE | PK-1 | 500 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| SEWER TREATMENT PLANT | SEWER TREATMENT PLANT | PW-10 | 3000 | gal | UST | Heating Fuel Oil #1 or #2 | A |
| | SEWER TREATMENT PLANT-EG | PW-9 | 1100 | gal | UST | Heating Fuel Oil #1 or #2 | A |
| | STP LAB & OFFICE | PW-11 | 250 | gal | Rental | Propane | A |
| WATER PUMP STA @ CROSSMAN | WATER PUMP STA @ CROSSMAN | RWPS-1 | 500 | gal | AST | Heating Fuel Oil #1 or #2 | A |
| WATER PUMP STA @ HOMER SPIT | WATER PUMP STA @ HOMER SPIT | SPS-1 | 500 | gal | AST | Heating Fuel Oil #1 or #2 | A |

# Appendix 5

**Homer Electric Association Maps of Load Centers and Street Lights for City of Homer Electricity Accounts**

## Appendix 6 City of Homer Street Light on HEA Account 277852

| LOCATION # | TYPE | ADDRESS | LOCATION # | TYPE | ADDRESS |
|---|---|---|---|---|---|
| 0029031701760901 | 02 | MAIN ST & DANVIEW ST | 0029032001010901 | 05 | MAIN ST & FAIRVIEW AVE |
| 0029031702630901 | 02 | MAIN ST & BAYVIEW AVE | 0029032001120901 | 05 | MAIN ST & LEE DR |
| 0029031710630901 | 02 | BAYVIEW AVE & CALHOUN COURT | 0029032017060901 | 02 | SVEDLUND ST & LEE ST |
| 0029031718630901 | 05 | BAYVIEW AVE & BAYVIEW COURT | 0029032017110901 | 02 | SVEDLUND ST & HERNDON ST |
| 0029031718710901 | 05 | CORNER SVEDLUND & DANVIEW | 0029032030090901 | 02 | KACHEMAK WAY @ GREGOIRES |
| 0029031725630901 | 05 | KACHEMAK WAY & BAYVIEW AVE | 0029032031010901 | 02 | KACHMAK WAY & FAIRVIEW AVE |
| 0029031861800901 | 02 | FAIRVIEW @ HORNADY PK | 0029032031280901 | 05 | LUCKY SHOT & GRUBSTAKE |
| 0029031865710901 | 05 | BARTLETT BTWN CITYVIEW/DANVI | 0029032036200901 | 02 | KLONDIKE & KACHEMAK WAY |
| 0029031871650901 | 05 | HOHE & HOSPITAL ENTRANCE | 0029032051240901 | 04 | LAKE ST @ OLD ELKS BLDG |
| 0029031871690901 | 02 | HOHE & CITYVIEW AVE | 0029032054300901 | 04 | LAKE ST @ BAY SUPPLY |
| 0029031871740901 | 02 | HOHE & DANVIEW AVE | 0029032055210901 | 04 | LAKE ST & SMOKEY BAY WAY |
| 0029031938030901 | 02 | FAIRVIEW AVE & MILLIKEN ST | 0029032065120901 | 02 | BEN WALTERS & LAKESIDE DR |
| 0029031938030902 | 05 | RANGEVIEW & MULLIKEN | 0029032068060901 | 02 | BEN WALTERS & LUPINE CT |
| 0029031941080901 | 02 | SOUNDVIEW AVE & MULLIKEN ST | 0029032073120901 | 02 | HILLFAIR CT |
| 0029031948030901 | 02 | FAIRVIEW AVE & WRIGHT ST | 0029032103640901 | 05 | OCEAN DR |
| 0029031949100901 | 02 | SOUNDVIEW AVE & WRIGHT ST | 0029032111620901 | 05 | OCEAN DR & E ST |
| 0029031964030901 | 05 | BARTLETT ST S OF FAIRVIEW | 0029032119590901 | 05 | OCEAN DR @ SOURDOUGH BAKERY |
| 0029031964030902 | 02 | CORNER BARTLETT & FAIRVIEW | 0029032124570901 | 05 | OCEAN DR @ SKI-DOO SHOP |
| 0029031965090901 | 05 | BARLETT ST N OF SOUNDVIEW | 0029033561700901 | 01 | PIER ONE THEATER |
| 0029031965120901 | 02 | BARTLETT ST BY BLUE GARTER | 0030030105100901 | 02 | CHAMBER HALIBUT DERBY OFFICE |
| 0029031965210901 | 02 | BARTLETT ST 3838 | 0030030115180901 | 05 | SPIT RD BY RAMP 3 |
| 0029031966150901 | 05 | BARTLETT ST | 0030030117160901 | 02 | A FLOAT RAMP |
| 0029031967240901 | 02 | BARTLETT ST X FRM MUSEUM | 0030030126220902 | 05 | SPIT RD BY RAMP 2 |
| 0029031970010901 | 02 | FAIRVIEW AVE & HOHE ST | 0030030126220903 | 01 | RAMP 1 |
| 0029031970530901 | 01 | BUNNELL & OHLSON DR | 0030030134290901 | 02 | SPIT RD/FISH DOCK INTERSECT |

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Buildings and Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *ANIMAL SHELTER-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 82 | 1 | 12 | 82 | 1.9 | 1,118 | 20,320 |
| *Subtotal ANIMAL SHELTER-Scope 1* | 82 | 1 | 12 | 82 | 1.9 | 1,118 | 20,320 |
| *ANIMAL SHELTER-Scope 2* | | | | | | | |
| Electricity | 21 | 0 | 0 | 22 | 0.5 | 131 | 4,994 |
| *Subtotal ANIMAL SHELTER-Scope 2* | 21 | 0 | 0 | 22 | 0.5 | 131 | 4,994 |
| *CITY HALL-Scope 2* | | | | | | | |
| Electricity | 118 | 1 | 2 | 118 | 2.8 | 718 | 27,590 |
| *Subtotal CITY HALL-Scope 2* | 118 | 1 | 2 | 118 | 2.8 | 718 | 27,590 |
| *FIRE HALL-Scope 2* | | | | | | | |
| Electricity | 75 | 0 | 2 | 75 | 1.8 | 460 | 18,969 |
| *Subtotal FIRE HALL-Scope 2* | 75 | 0 | 2 | 75 | 1.8 | 460 | 18,969 |
| *HERC-01 KPC AND BGC-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 169 | 1 | 25 | 170 | 4.0 | 2,314 | 43,302 |
| *Subtotal HERC-01 KPC AND BGC-Scope 1* | 169 | 1 | 25 | 170 | 4.0 | 2,314 | 43,302 |
| *HERC-01 KPC AND BGC-Scope 2* | | | | | | | |
| Electricity | 76 | 0 | 2 | 76 | 1.8 | 464 | 18,764 |
| *Subtotal HERC-01 KPC AND BGC-Scope 2* | 76 | 0 | 2 | 76 | 1.8 | 464 | 18,764 |
| *HERC-02 PW MAIN SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 38 | 0 | 6 | 38 | 0.9 | 521 | 9,603 |
| *Subtotal HERC-02 PW MAIN SHOP-Scope 1* | 38 | 0 | 6 | 38 | 0.9 | 521 | 9,603 |
| *HERC-02 PW MAIN SHOP-Scope 2* | | | | | | | |
| Electricity | 21 | 0 | 0 | 21 | 0.5 | 126 | 4,987 |
| *Subtotal HERC-02 PW MAIN SHOP-Scope 2* | 21 | 0 | 0 | 21 | 0.5 | 126 | 4,987 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *HPD COM ON HOMER SPIT RD-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 431 |
| *Subtotal HPD COM ON HOMER SPIT RD-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 431 |
| *HSC FEE COLLECTION BLDG-Scope 1* | | | | | | | |
| Propane | 1 | 0 | 0 | 1 | 0.0 | 17 | 467 |
| *Subtotal HSC FEE COLLECTION BLDG-Scope 1* | 1 | 0 | 0 | 1 | 0.0 | 17 | 467 |
| *HSC FEE COLLECTION BLDG-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 3 | 300 |
| *Subtotal HSC FEE COLLECTION BLDG-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 3 | 300 |
| *Jail-Scope 2* | | | | | | | |
| Electricity | 23 | 0 | 0 | 23 | 0.5 | 140 | 5,361 |
| *Subtotal Jail-Scope 2* | 23 | 0 | 0 | 23 | 0.5 | 140 | 5,361 |
| *KAREN HORNADAY PK/CG/BF-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 22 | 1,041 |
| *Subtotal KAREN HORNADAY PK/CG/BF-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 22 | 1,041 |
| *MANLEY APT#1-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 21 | 905 |
| *Subtotal MANLEY APT#1-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 21 | 905 |
| *MANLEY APT#2-Scope 2* | | | | | | | |
| Electricity | 5 | 0 | 0 | 5 | 0.1 | 32 | 1,272 |
| *Subtotal MANLEY APT#2-Scope 2* | 5 | 0 | 0 | 5 | 0.1 | 32 | 1,272 |
| *MOTOR POOL SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 7 | 0 | 1 | 7 | 0.2 | 99 | 1,673 |
| *Subtotal MOTOR POOL SHOP-Scope 1* | 7 | 0 | 1 | 7 | 0.2 | 99 | 1,673 |
| *OLD LIBRARY-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 14 | 0 | 2 | 14 | 0.3 | 186 | 3,330 |
| *Subtotal OLD LIBRARY-Scope 1* | 14 | 0 | 2 | 14 | 0.3 | 186 | 3,330 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *OLD LIBRARY-Scope 2* | | | | | | | |
| Electricity | 19 | 0 | 0 | 19 | 0.4 | 117 | 4,288 |
| *Subtotal OLD LIBRARY-Scope 2* | 19 | 0 | 0 | 19 | 0.4 | 117 | 4,288 |
| *POLICE STA/JAIL-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 14 | 0 | 2 | 14 | 0.3 | 195 | 3,501 |
| *Subtotal POLICE STA/JAIL-Scope 1* | 14 | 0 | 2 | 14 | 0.3 | 195 | 3,501 |
| *POLICE STATION-Scope 2* | | | | | | | |
| Electricity | 71 | 0 | 1 | 71 | 1.7 | 433 | 16,241 |
| *Subtotal POLICE STATION-Scope 2* | 71 | 0 | 1 | 71 | 1.7 | 433 | 16,241 |
| *PUBLIC LIBRARY-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 54 | 0 | 8 | 54 | 1.3 | 734 | 13,322 |
| *Subtotal PUBLIC LIBRARY-Scope 1* | 54 | 0 | 8 | 54 | 1.3 | 734 | 13,322 |
| *PUBLIC LIBRARY-Scope 2* | | | | | | | |
| Electricity | 32 | 0 | 1 | 32 | 0.8 | 195 | 8,760 |
| *Subtotal PUBLIC LIBRARY-Scope 2* | 32 | 0 | 1 | 32 | 0.8 | 195 | 8,760 |
| *PUBLIC WORKS OFFICE & SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 34 | 0 | 5 | 34 | 0.8 | 467 | 8,740 |
| *Subtotal PUBLIC WORKS OFFICE & SHOP-Scope 1* | 34 | 0 | 5 | 34 | 0.8 | 467 | 8,740 |
| *PUBLIC WORKS OFFICE & SHOP-Scope 2* | | | | | | | |
| Electricity | 75 | 0 | 2 | 76 | 1.8 | 461 | 18,349 |
| *Subtotal PUBLIC WORKS OFFICE & SHOP-Scope 2* | 75 | 0 | 2 | 76 | 1.8 | 461 | 18,349 |
| *RR AT BEN WALTERS PARK-Scope 2* | | | | | | | |
| Electricity | 10 | 0 | 0 | 10 | 0.2 | 58 | 2,344 |
| *Subtotal RR AT BEN WALTERS PARK-Scope 2* | 10 | 0 | 0 | 10 | 0.2 | 58 | 2,344 |
| *RR AT BISHOPS BEACH-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 487 |
| *Subtotal RR AT BISHOPS BEACH-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 487 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

# Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *WKFL PARK GAZEBO-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 6 | 502 |
| *Subtotal WKFL PARK GAZEBO-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 6 | 502 |
| **Subtotal Buildings and Facilities** | 969 | 6 | 74 | 973 | 22.8 | 9,048 | 239,843 |
| **Streetlights & Traffic Signals** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *HIGH MAST LGTS #2,3, & 4-Scope 2* | | | | | | | |
| Electricity | 69 | 0 | 1 | 69 | 1.6 | 423 | 17,287 |
| *Subtotal HIGH MAST LGTS #2,3, & 4-Scope 2* | 69 | 0 | 1 | 69 | 1.6 | 423 | 17,287 |
| *LGT BAY AVE THAW CABLE-Scope 2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 8 | 0.2 | 51 | 2,175 |
| *Subtotal LGT BAY AVE THAW CABLE-Scope 2* | 8 | 0 | 0 | 8 | 0.2 | 51 | 2,175 |
| *LGT@ RANGEVIEW & WRIGHT ST-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 431 |
| *Subtotal LGT@ RANGEVIEW & WRIGHT ST-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 431 |
| *LGTS ON HEATH ST-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.1 | 13 | 778 |
| *Subtotal LGTS ON HEATH ST-Scope 2* | 2 | 0 | 0 | 2 | 0.1 | 13 | 778 |
| *RAMP #4 SPIT STREET LIGHTS-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 9 | 300 |
| *Subtotal RAMP #4 SPIT STREET LIGHTS-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 9 | 300 |
| *VARIOUS LOCATIONS (LIGHTS)-Scope 2* | | | | | | | |
| Electricity | 41 | 0 | 1 | 42 | 1.0 | 253 | 10,657 |
| *Subtotal VARIOUS LOCATIONS (LIGHTS)-Scope 2* | 41 | 0 | 1 | 42 | 1.0 | 253 | 10,657 |
| **Subtotal Streetlights & Traffic Signals** | 124 | 1 | 3 | 124 | 2.9 | 754 | 31,628 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Port Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *DEEP WATER DOCK-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.2 | 39 | 3,342 |
| *Subtotal DEEP WATER DOCK-Scope 2* | 6 | 0 | 0 | 6 | 0.2 | 39 | 3,342 |
| *FISH DOCK-Scope 2* | | | | | | | |
| Electricity | 488 | 3 | 10 | 489 | 11.5 | 2,977 | 110,309 |
| *Subtotal FISH DOCK-Scope 2* | 488 | 3 | 10 | 489 | 11.5 | 2,977 | 110,309 |
| *MAIN DK INSIDE PIONEER DK-Scope 2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 8 | 0.2 | 48 | 2,054 |
| *Subtotal MAIN DK INSIDE PIONEER DK-Scope 2* | 8 | 0 | 0 | 8 | 0.2 | 48 | 2,054 |
| *PH HARBORMASTER OFFICE-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 1 | 0 | 0 | 1 | 0.0 | 12 | 224 |
| *Subtotal PH HARBORMASTER OFFICE-Scope 1* | 1 | 0 | 0 | 1 | 0.0 | 12 | 224 |
| *PH HARBORMASTER OFFICE-Scope 2* | | | | | | | |
| Electricity | 31 | 0 | 1 | 31 | 0.7 | 187 | 7,087 |
| *Subtotal PH HARBORMASTER OFFICE-Scope 2* | 31 | 0 | 1 | 31 | 0.7 | 187 | 7,087 |
| *PIONEER DOCK EAST-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 1 | 1,853 |
| *Subtotal PIONEER DOCK EAST-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 1 | 1,853 |
| *PORT & HARBOR MAIN SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 48 | 0 | 7 | 49 | 1.1 | 661 | 11,723 |
| *Subtotal PORT & HARBOR MAIN SHOP-Scope 1* | 48 | 0 | 7 | 49 | 1.1 | 661 | 11,723 |
| *PORT & HARBOR MAIN SHOP-Scope 2* | | | | | | | |
| Electricity | 23 | 0 | 0 | 23 | 0.5 | 140 | 5,371 |
| *Subtotal PORT & HARBOR MAIN SHOP-Scope 2* | 23 | 0 | 0 | 23 | 0.5 | 140 | 5,371 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PORT & HARBOR USED OIL BLDG-Scope 2* | | | | | | | |
| Electricity | 5 | 0 | 0 | 5 | 0.1 | 31 | 1,416 |
| *Subtotal PORT & HARBOR USED OIL BLDG-Scope 2* | 5 | 0 | 0 | 5 | 0.1 | 31 | 1,416 |
| *RR @ RAMP #6 AND SYS #4-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 7 | 0 | 1 | 7 | 0.2 | 97 | 1,655 |
| *Subtotal RR @ RAMP #6 AND SYS #4-Scope 1* | 7 | 0 | 1 | 7 | 0.2 | 97 | 1,655 |
| *RR @ RAMP #6 AND SYS #4-Scope 2* | | | | | | | |
| Electricity | 17 | 0 | 0 | 17 | 0.4 | 101 | 5,446 |
| *Subtotal RR @ RAMP #6 AND SYS #4-Scope 2* | 17 | 0 | 0 | 17 | 0.4 | 101 | 5,446 |
| *RR AT FISHING LAGOON-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.1 | 15 | 774 |
| *Subtotal RR AT FISHING LAGOON-Scope 2* | 2 | 0 | 0 | 2 | 0.1 | 15 | 774 |
| *RR AT LAUNCH RAMP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 5 | 0 | 1 | 5 | 0.1 | 65 | 1,119 |
| *Subtotal RR AT LAUNCH RAMP-Scope 1* | 5 | 0 | 1 | 5 | 0.1 | 65 | 1,119 |
| *RR AT LAUNCH RAMP-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 440 |
| *Subtotal RR AT LAUNCH RAMP-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 440 |
| *RR AT RAMP # 4-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 7 | 0 | 1 | 7 | 0.2 | 98 | 1,671 |
| *Subtotal RR AT RAMP # 4-Scope 1* | 7 | 0 | 1 | 7 | 0.2 | 98 | 1,671 |
| *RR AT RAMP #4-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 9 | 591 |
| *Subtotal RR AT RAMP #4-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 9 | 591 |
| *RR BY HARBORMASTER OFFICE-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 6 | 0 | 1 | 6 | 0.1 | 85 | 1,537 |
| *Subtotal RR BY HARBORMASTER OFFICE-Scope 1* | 6 | 0 | 1 | 6 | 0.1 | 85 | 1,537 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *RR BY HARBORMASTER OFFICE-Scope 2* | | | | | | | |
| Electricity | 13 | 0 | 0 | 13 | 0.3 | 79 | 3,100 |
| *Subtotal RR BY HARBORMASTER OFFICE-Scope 2* | 13 | 0 | 0 | 13 | 0.3 | 79 | 3,100 |
| *SYS #1 FLT & H MAST LGT#1-Scope 2* | | | | | | | |
| Electricity | 325 | 2 | 7 | 326 | 7.6 | 1,987 | 71,797 |
| *Subtotal SYS #1 FLT & H MAST LGT#1-Scope 2* | 325 | 2 | 7 | 326 | 7.6 | 1,987 | 71,797 |
| *SYSTEM #5 (LIGHT/FLOAT)-Scope 2* | | | | | | | |
| Electricity | 363 | 2 | 8 | 364 | 8.5 | 2,218 | 81,036 |
| *Subtotal SYSTEM #5 (LIGHT/FLOAT)-Scope 2* | 363 | 2 | 8 | 364 | 8.5 | 2,218 | 81,036 |
| *WOOD GRID-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 425 |
| *Subtotal WOOD GRID-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 425 |
| **Subtotal Port Facilities** | 1,359 | 7 | 38 | 1,362 | 31.9 | 8,859 | 312,969 |
| **Airport Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *AIRPORT TERMINAL-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 88 | 1 | 13 | 89 | 2.1 | 1,210 | 20,991 |
| *Subtotal AIRPORT TERMINAL-Scope 1* | 88 | 1 | 13 | 89 | 2.1 | 1,210 | 20,991 |
| *AIRPORT TERMINAL-Scope 2* | | | | | | | |
| Electricity | 153 | 1 | 3 | 153 | 3.6 | 934 | 33,231 |
| *Subtotal AIRPORT TERMINAL-Scope 2* | 153 | 1 | 3 | 153 | 3.6 | 934 | 33,231 |
| **Subtotal Airport Facilities** | 242 | 2 | 16 | 242 | 5.7 | 2,144 | 54,222 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Water Delivery Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *MTRVAULT@ EAST END/EAST HILL-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 17 | 917 |
| *Subtotal MTRVAULT@ EAST END/EAST HILL-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 17 | 917 |
| *OLD WATER TREATMENT PLANT-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 1 | 0 | 0 | 1 | 0.0 | 16 | 283 |
| Propane | 32 | 0 | 6 | 32 | 0.8 | 505 | 13,763 |
| *Subtotal OLD WATER TREATMENT PLANT-Scope 1* | 33 | 0 | 6 | 33 | 0.8 | 521 | 14,046 |
| *OLD WATER TREATMENT PLANT-Scope 2* | | | | | | | |
| Electricity | 65 | 0 | 1 | 65 | 1.5 | 398 | 16,604 |
| *Subtotal OLD WATER TREATMENT PLANT-Scope 2* | 65 | 0 | 1 | 65 | 1.5 | 398 | 16,604 |
| *PR STA @ A-FRAME-Scope 2* | | | | | | | |
| Electricity | 9 | 0 | 0 | 9 | 0.2 | 53 | 2,205 |
| *Subtotal PR STA @ A-FRAME-Scope 2* | 9 | 0 | 0 | 9 | 0.2 | 53 | 2,205 |
| *PR STA @ BARNETT-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 41 | 1,777 |
| *Subtotal PR STA @ BARNETT-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 41 | 1,777 |
| *PR STA @ BARTLETTT-SOUNDVIEW-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 23 | 1,220 |
| *Subtotal PR STA @ BARTLETTT-SOUNDVIEW-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 23 | 1,220 |
| *PR STA @ BEAR CREEK-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 12 | 717 |
| *Subtotal PR STA @ BEAR CREEK-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 12 | 717 |
| *PR STA @ EAST HILL-HOEDL-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 43 | 1,839 |
| *Subtotal PR STA @ EAST HILL-HOEDL-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 43 | 1,839 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PR STA @ EFFLER-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 35 | 1,490 |
| *Subtotal PR STA @ EFFLER-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 35 | 1,490 |
| *PR STA @ HEA-Scope 2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 8 | 0.2 | 48 | 2,007 |
| *Subtotal PR STA @ HEA-Scope 2* | 8 | 0 | 0 | 8 | 0.2 | 48 | 2,007 |
| *PR STA @ HILLTOP-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 26 | 1,262 |
| *Subtotal PR STA @ HILLTOP-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 26 | 1,262 |
| *PR STA @ JEEP SALES-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 13 | 754 |
| *Subtotal PR STA @ JEEP SALES-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 13 | 754 |
| *PR STA @ KACHEMAK WAY-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 27 | 1,253 |
| *Subtotal PR STA @ KACHEMAK WAY-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 27 | 1,253 |
| *PR STA @ LAKESIDE-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 17 | 904 |
| *Subtotal PR STA @ LAKESIDE-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 17 | 904 |
| *PR STA @ LUCKY SHOT-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 1 | 339 |
| *Subtotal PR STA @ LUCKY SHOT-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 1 | 339 |
| *PR STA @ MAIN & DANVIEW-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 40 | 1,734 |
| *Subtotal PR STA @ MAIN & DANVIEW-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 40 | 1,734 |
| *PR STA @ MID-HILL-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 17 | 796 |
| *Subtotal PR STA @ MID-HILL-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 17 | 796 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PR STA @ RIDGELINE STATION-Scope 2* | | | | | | | |
| Electricity | 9 | 0 | 0 | 9 | 0.2 | 58 | 2,409 |
| *Subtotal PR STA @ RIDGELINE STATION-Scope 2* | 9 | 0 | 0 | 9 | 0.2 | 58 | 2,409 |
| *PR STA @ STERLING-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 39 | 1,638 |
| *Subtotal PR STA @ STERLING-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 39 | 1,638 |
| *PR STA @ SWITCHBACK-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 40 | 1,684 |
| *Subtotal PR STA @ SWITCHBACK-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 40 | 1,684 |
| *PR STA @ TESORO METER VAULT-Scope 2* | | | | | | | |
| Electricity | 5 | 0 | 0 | 5 | 0.1 | 32 | 1,463 |
| *Subtotal PR STA @ TESORO METER VAULT-Scope 2* | 5 | 0 | 0 | 5 | 0.1 | 32 | 1,463 |
| *PR STA @ WEST HILL-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 38 | 1,623 |
| *Subtotal PR STA @ WEST HILL-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 38 | 1,623 |
| *PR STA@OHLSON LN/FAT OLIVES-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 18 | 955 |
| *Subtotal PR STA@OHLSON LN/FAT OLIVES-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 18 | 955 |
| *WATER PUMP STA @ CROSSMAN-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 3 | 0 | 0 | 3 | 0.1 | 40 | 699 |
| *Subtotal WATER PUMP STA @ CROSSMAN-Scope 1* | 3 | 0 | 0 | 3 | 0.1 | 40 | 699 |
| *WATER PUMP STA @ CROSSMAN-Scope 2* | | | | | | | |
| Electricity | 142 | 1 | 3 | 142 | 3.3 | 866 | 32,386 |
| *Subtotal WATER PUMP STA @ CROSSMAN-Scope 2* | 142 | 1 | 3 | 142 | 3.3 | 866 | 32,386 |
| *WATER PUMP STA @ HOMER SPIT-Scope 2* | | | | | | | |
| Electricity | 23 | 0 | 0 | 23 | 0.5 | 142 | 7,461 |
| *Subtotal WATER PUMP STA @ HOMER SPIT-Scope 2* | 23 | 0 | 0 | 23 | 0.5 | 142 | 7,461 |
| **Subtotal Water Delivery Facilities** | 371 | 2 | 13 | 372 | 8.7 | 2,605 | 100,182 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Wastewater Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *SEWER TREATMENT PLANT-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 137 | 1 | 21 | 138 | 3.2 | 1,874 | 32,362 |
| Nitrous Oxide | 0 | 16 | 0 | 5 | 0.1 | 0 | 0 |
| *Subtotal SEWER TREATMENT PLANT-Scope 1* | 137 | 17 | 21 | 143 | 3.3 | 1,874 | 32,362 |
| *SEWER TREATMENT PLANT-Scope 2* | | | | | | | |
| Electricity | 632 | 3 | 13 | 633 | 14.9 | 3,859 | 130,645 |
| *Subtotal SEWER TREATMENT PLANT-Scope 2* | 632 | 3 | 13 | 633 | 14.9 | 3,859 | 130,645 |
| *SL @ BAY AVE-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 27 | 1,285 |
| *Subtotal SL @ BAY AVE-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 27 | 1,285 |
| *SL @ BELUGA LAKE-Scope 2* | | | | | | | |
| Electricity | 9 | 0 | 0 | 9 | 0.2 | 57 | 2,320 |
| *Subtotal SL @ BELUGA LAKE-Scope 2* | 9 | 0 | 0 | 9 | 0.2 | 57 | 2,320 |
| *SL @ LAUNCH RAMP-Scope 2* | | | | | | | |
| Electricity | 28 | 0 | 1 | 28 | 0.7 | 169 | 6,346 |
| *Subtotal SL @ LAUNCH RAMP-Scope 2* | 28 | 0 | 1 | 28 | 0.7 | 169 | 6,346 |
| *SL @ PORT 30 HOMER SPIT-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 2 | 350 |
| *Subtotal SL @ PORT 30 HOMER SPIT-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 2 | 350 |
| *SL AT BEAR CREEK DR-Scope 2* | | | | | | | |
| Electricity | 5 | 0 | 0 | 5 | 0.1 | 28 | 1,288 |
| *Subtotal SL AT BEAR CREEK DR-Scope 2* | 5 | 0 | 0 | 5 | 0.1 | 28 | 1,288 |
| *SL@HOMER SPIT CAMPGROUND-Scope 2* | | | | | | | |
| Electricity | 9 | 0 | 0 | 9 | 0.2 | 52 | 2,161 |
| *Subtotal SL@HOMER SPIT CAMPGROUND-Scope 2* | 9 | 0 | 0 | 9 | 0.2 | 52 | 2,161 |
| **Subtotal Wastewater Facilities** | 824 | 21 | 35 | 831 | 19.5 | 6,069 | 176,757 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

# Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2006**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Solid Waste Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *City of Homer-Scope 3* | | | | | | | |
| Carbon Dioxide | 16 | 0 | 0 | 16 | 0.4 | 0 | 0 |
| *Subtotal City of Homer-Scope 3* | 16 | 0 | 0 | 16 | 0.4 | 0 | 0 |
| **Subtotal Solid Waste Facilities** | 16 | 0 | 0 | 16 | 0.4 | 0 | 0 |
| **Vehicle Fleet** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *City Hall* | | | | | | | |
| Gasoline | 1 | 0 | 0 | 1 | 0.0 | 16 | 0 |
| *Subtotal City Hall* | 1 | 0 | 0 | 1 | 0.0 | 16 | 0 |
| *Fire Department* | | | | | | | |
| Diesel | 4 | 0 | 0 | 4 | 0.1 | 52 | 0 |
| *Subtotal Fire Department* | 4 | 0 | 0 | 4 | 0.1 | 52 | 0 |
| *Police Department* | | | | | | | |
| Gasoline | 92 | 8 | 6 | 95 | 2.2 | 1,301 | 0 |
| *Subtotal Police Department* | 92 | 8 | 6 | 95 | 2.2 | 1,301 | 0 |
| *Port and Harbor Department* | | | | | | | |
| Diesel | 3 | 0 | 0 | 3 | 0.1 | 35 | 0 |
| Gasoline | 33 | 3 | 3 | 34 | 0.8 | 461 | 0 |
| OFF ROAD Gasoline | 7 | 0 | 0 | 7 | 0.2 | 99 | 0 |
| *Subtotal Port and Harbor Department* | 42 | 3 | 3 | 43 | 1.0 | 595 | 0 |
| *Public Works Department* | | | | | | | |
| Gasoline | 79 | 8 | 6 | 82 | 1.9 | 1,117 | 0 |
| OFF ROAD Diesel | 120 | 3 | 7 | 121 | 2.8 | 1,634 | 0 |
| *Subtotal Public Works Department* | 199 | 11 | 12 | 202 | 4.7 | 2,750 | 0 |
| **Subtotal Vehicle Fleet** | 338 | 23 | 22 | 346 | 8.1 | 4,714 | 0 |
| **Total** | 4,242 | 61 | 201 | 4,265 | 100.0 | 34,192 | 915,601 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Buildings and Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *ANIMAL SHELTER-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 84 | 1 | 13 | 85 | 1.9 | 1,150 | 20,790 |
| *Subtotal ANIMAL SHELTER-Scope 1* | 84 | 1 | 13 | 85 | 1.9 | 1,150 | 20,790 |
| *ANIMAL SHELTER-Scope 2* | | | | | | | |
| Electricity | 20 | 0 | 0 | 20 | 0.4 | 122 | 4,746 |
| *Subtotal ANIMAL SHELTER-Scope 2* | 20 | 0 | 0 | 20 | 0.4 | 122 | 4,746 |
| *CITY HALL-Scope 2* | | | | | | | |
| Electricity | 119 | 1 | 2 | 119 | 2.7 | 728 | 28,029 |
| *Subtotal CITY HALL-Scope 2* | 119 | 1 | 2 | 119 | 2.7 | 728 | 28,029 |
| *EQUIPMENT STORAGE POLE BARN- Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 8 | 0 | 1 | 8 | 0.2 | 111 | 2,020 |
| *Subtotal EQUIPMENT STORAGE POLE BARN- Scope 1* | 8 | 0 | 1 | 8 | 0.2 | 111 | 2,020 |
| *FIRE HALL-Scope 2* | | | | | | | |
| Electricity | 69 | 0 | 1 | 69 | 1.5 | 420 | 17,040 |
| *Subtotal FIRE HALL-Scope 2* | 69 | 0 | 1 | 69 | 1.5 | 420 | 17,040 |
| *HERC-01 KPC AND BGC-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 164 | 1 | 25 | 165 | 3.7 | 2,239 | 41,178 |
| *Subtotal HERC-01 KPC AND BGC-Scope 1* | 164 | 1 | 25 | 165 | 3.7 | 2,239 | 41,178 |
| *HERC-01 KPC AND BGC-Scope 2* | | | | | | | |
| Electricity | 72 | 0 | 1 | 72 | 1.6 | 439 | 18,083 |
| *Subtotal HERC-01 KPC AND BGC-Scope 2* | 72 | 0 | 1 | 72 | 1.6 | 439 | 18,083 |
| *HERC-02 PW MAIN SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 40 | 0 | 6 | 40 | 0.9 | 546 | 9,707 |
| *Subtotal HERC-02 PW MAIN SHOP-Scope 1* | 40 | 0 | 6 | 40 | 0.9 | 546 | 9,707 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

## Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *HERC-02 PW MAIN SHOP-Scope 2* | | | | | | | |
| Electricity | 23 | 0 | 0 | 23 | 0.5 | 141 | 5,626 |
| *Subtotal HERC-02 PW MAIN SHOP-Scope 2* | 23 | 0 | 0 | 23 | 0.5 | 141 | 5,626 |
| *HPD COM ON HOMER SPIT RD-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 6 | 503 |
| *Subtotal HPD COM ON HOMER SPIT RD-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 6 | 503 |
| *HSC FEE COLLECTION BLDG-Scope 1* | | | | | | | |
| Propane | 2 | 0 | 0 | 2 | 0.1 | 37 | 1,134 |
| *Subtotal HSC FEE COLLECTION BLDG-Scope 1* | 2 | 0 | 0 | 2 | 0.1 | 37 | 1,134 |
| *HSC FEE COLLECTION BLDG-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 378 |
| *Subtotal HSC FEE COLLECTION BLDG-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 378 |
| *JAIL-Scope 2* | | | | | | | |
| Electricity | 34 | 0 | 1 | 34 | 0.8 | 210 | 7,746 |
| *Subtotal JAIL-Scope 2* | 34 | 0 | 1 | 34 | 0.8 | 210 | 7,746 |
| *KAREN HORNADAY PK/CG/BF-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 12 | 732 |
| *Subtotal KAREN HORNADAY PK/CG/BF-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 12 | 732 |
| *OLD LIBRARY-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 10 | 0 | 2 | 10 | 0.2 | 141 | 2,466 |
| *Subtotal OLD LIBRARY-Scope 1* | 10 | 0 | 2 | 10 | 0.2 | 141 | 2,466 |
| *OLD LIBRARY-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 13 | 749 |
| *Subtotal OLD LIBRARY-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 13 | 749 |
| *POLICE STA/JAIL-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 16 | 0 | 2 | 16 | 0.4 | 215 | 3,868 |
| *Subtotal POLICE STA/JAIL-Scope 1* | 16 | 0 | 2 | 16 | 0.4 | 215 | 3,868 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *POLICE STATION-Scope 2* | | | | | | | |
| Electricity | 69 | 0 | 1 | 69 | 1.5 | 420 | 15,491 |
| *Subtotal POLICE STATION-Scope 2* | 69 | 0 | 1 | 69 | 1.5 | 420 | 15,491 |
| *PUBLIC LIBRARY-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 116 | 1 | 17 | 116 | 2.6 | 1,581 | 28,942 |
| *Subtotal PUBLIC LIBRARY-Scope 1* | 116 | 1 | 17 | 116 | 2.6 | 1,581 | 28,942 |
| *PUBLIC LIBRARY-Scope 2* | | | | | | | |
| Electricity | 104 | 1 | 2 | 104 | 2.3 | 633 | 24,497 |
| *Subtotal PUBLIC LIBRARY-Scope 2* | 104 | 1 | 2 | 104 | 2.3 | 633 | 24,497 |
| *PUBLIC WORKS OFFICE & SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 27 | 0 | 4 | 28 | 0.6 | 376 | 6,889 |
| *Subtotal PUBLIC WORKS OFFICE & SHOP-Scope 1* | 27 | 0 | 4 | 28 | 0.6 | 376 | 6,889 |
| *PUBLIC WORKS OFFICE & SHOP-Scope 2* | | | | | | | |
| Electricity | 78 | 0 | 2 | 78 | 1.7 | 476 | 19,032 |
| *Subtotal PUBLIC WORKS OFFICE & SHOP-Scope 2* | 78 | 0 | 2 | 78 | 1.7 | 476 | 19,032 |
| *RR AT BEN WALTERS PARK-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 17 | 908 |
| *Subtotal RR AT BEN WALTERS PARK-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 17 | 908 |
| *RR AT BISHOPS BEACH-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 5 | 518 |
| *Subtotal RR AT BISHOPS BEACH-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 5 | 518 |
| *WKFL PARK GAZEBO-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 2 | 382 |
| *Subtotal WKFL PARK GAZEBO-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 2 | 382 |
| **Subtotal Buildings and Facilities** | 1,065 | 7 | 83 | 1,069 | 23.8 | 10,044 | 261,453 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Streetlights & Traffic Signals** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *HIGH MAST LGT #7 @ RAMP #6-Scope 2* | | | | | | | |
| Electricity | 17 | 0 | 0 | 17 | 0.4 | 102 | 3,979 |
| *Subtotal HIGH MAST LGT #7 @ RAMP #6-Scope 2* | 17 | 0 | 0 | 17 | 0.4 | 102 | 3,979 |
| *HIGH MAST LGTS #2,3, & 4-Scope 2* | | | | | | | |
| Electricity | 67 | 0 | 1 | 67 | 1.5 | 411 | 16,838 |
| *Subtotal HIGH MAST LGTS #2,3, & 4-Scope 2* | 67 | 0 | 1 | 67 | 1.5 | 411 | 16,838 |
| *LGT BAY AVE THAW CABLE-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 44 | 1,937 |
| *Subtotal LGT BAY AVE THAW CABLE-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 44 | 1,937 |
| *LGT@ RANGEVIEW & WRIGHT ST-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 440 |
| *Subtotal LGT@ RANGEVIEW & WRIGHT ST-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 440 |
| *LGTS ON HEATH ST-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 11 | 701 |
| *Subtotal LGTS ON HEATH ST-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 11 | 701 |
| *RAMP #4 SPIT STREET LIGHTS-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 38 | 1,243 |
| *Subtotal RAMP #4 SPIT STREET LIGHTS-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 38 | 1,243 |
| *VARIOUS LOCATIONS (LIGHTS)-Scope 2* | | | | | | | |
| Electricity | 41 | 0 | 1 | 42 | 0.9 | 253 | 11,093 |
| *Subtotal VARIOUS LOCATIONS (LIGHTS)-Scope 2* | 41 | 0 | 1 | 42 | 0.9 | 253 | 11,093 |
| **Subtotal Streetlights & Traffic Signals** | 141 | 1 | 3 | 142 | 3.2 | 863 | 36,231 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Port Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *DEEP WATER DOCK-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 38 | 3,357 |
| *Subtotal DEEP WATER DOCK-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 38 | 3,357 |
| *FISH DOCK-Scope 2* | | | | | | | |
| Electricity | 519 | 3 | 11 | 520 | 11.6 | 3,169 | 120,433 |
| *Subtotal FISH DOCK-Scope 2* | 519 | 3 | 11 | 520 | 11.6 | 3,169 | 120,433 |
| *MAIN DK INSIDE PIONEER DK-Scope 2* | | | | | | | |
| Electricity | 10 | 0 | 0 | 10 | 0.2 | 58 | 2,418 |
| *Subtotal MAIN DK INSIDE PIONEER DK-Scope 2* | 10 | 0 | 0 | 10 | 0.2 | 58 | 2,418 |
| *PH HARBORMASTER OFFICE-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 2 | 0 | 0 | 2 | 0.0 | 23 | 401 |
| *Subtotal PH HARBORMASTER OFFICE-Scope 1* | 2 | 0 | 0 | 2 | 0.0 | 23 | 401 |
| *PH HARBORMASTER OFFICE-Scope 2* | | | | | | | |
| Electricity | 27 | 0 | 1 | 27 | 0.6 | 165 | 6,363 |
| *Subtotal PH HARBORMASTER OFFICE-Scope 2* | 27 | 0 | 1 | 27 | 0.6 | 165 | 6,363 |
| *PIONEER DOCK EAST-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 1 | 3,713 |
| *Subtotal PIONEER DOCK EAST-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 1 | 3,713 |
| *PORT & HARBOR MAIN SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 32 | 0 | 5 | 32 | 0.7 | 438 | 7,375 |
| *Subtotal PORT & HARBOR MAIN SHOP-Scope 1* | 32 | 0 | 5 | 32 | 0.7 | 438 | 7,375 |
| *PORT & HARBOR MAIN SHOP-Scope 2* | | | | | | | |
| Electricity | 22 | 0 | 0 | 22 | 0.5 | 137 | 5,318 |
| *Subtotal PORT & HARBOR MAIN SHOP-Scope 2* | 22 | 0 | 0 | 22 | 0.5 | 137 | 5,318 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PORT & HARBOR USED OIL BLDG-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 26 | 1,221 |
| *Subtotal PORT & HARBOR USED OIL BLDG-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 26 | 1,221 |
| *RR @ RAMP #6 AND SYS #4-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 8 | 0 | 1 | 8 | 0.2 | 109 | 1,895 |
| *Subtotal RR @ RAMP #6 AND SYS #4-Scope 1* | 8 | 0 | 1 | 8 | 0.2 | 109 | 1,895 |
| *RR @ RAMP #6 AND SYS #4-Scope 2* | | | | | | | |
| Electricity | 12 | 0 | 0 | 12 | 0.3 | 74 | 4,518 |
| *Subtotal RR @ RAMP #6 AND SYS #4-Scope 2* | 12 | 0 | 0 | 12 | 0.3 | 74 | 4,518 |
| *RR AT FISHING LAGOON-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 13 | 783 |
| *Subtotal RR AT FISHING LAGOON-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 13 | 783 |
| *RR AT LAUNCH RAMP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 7 | 0 | 1 | 7 | 0.2 | 92 | 1,602 |
| *Subtotal RR AT LAUNCH RAMP-Scope 1* | 7 | 0 | 1 | 7 | 0.2 | 92 | 1,602 |
| *RR AT LAUNCH RAMP-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 5 | 462 |
| *Subtotal RR AT LAUNCH RAMP-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 5 | 462 |
| *RR AT RAMP # 4-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 9 | 0 | 1 | 9 | 0.2 | 117 | 2,049 |
| *Subtotal RR AT RAMP # 4-Scope 1* | 9 | 0 | 1 | 9 | 0.2 | 117 | 2,049 |
| *RR AT RAMP # 4-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 13 | 769 |
| *Subtotal RR AT RAMP # 4-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 13 | 769 |
| *RR BY HARBORMASTER OFFICE-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 2 | 0 | 0 | 2 | 0.0 | 28 | 476 |
| *Subtotal RR BY HARBORMASTER OFFICE-Scope 1* | 2 | 0 | 0 | 2 | 0.0 | 28 | 476 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *RR BY HARBORMASTER OFFICE-Scope 2* | | | | | | | |
| Electricity | 16 | 0 | 0 | 16 | 0.4 | 96 | 3,814 |
| *Subtotal RR BY HARBORMASTER OFFICE-Scope 2* | 16 | 0 | 0 | 16 | 0.4 | 96 | 3,814 |
| *SYS #1 FLT & H MAST LGT#1-Scope 2* | | | | | | | |
| Electricity | 341 | 2 | 7 | 341 | 7.6 | 2,079 | 75,062 |
| *Subtotal SYS #1 FLT & H MAST LGT#1-Scope 2* | 341 | 2 | 7 | 341 | 7.6 | 2,079 | 75,062 |
| *SYSTEM #5 (LIGHT/FLOAT)-Scope 2* | | | | | | | |
| Electricity | 371 | 2 | 8 | 372 | 8.3 | 2,264 | 81,592 |
| *Subtotal SYSTEM #5 (LIGHT/FLOAT)-Scope 2* | 371 | 2 | 8 | 372 | 8.3 | 2,264 | 81,592 |
| *WOOD GRID-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 425 |
| *Subtotal WOOD GRID-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 425 |
| **Subtotal Port Facilities** | 1,393 | 8 | 37 | 1,396 | 31.1 | 8,951 | 324,048 |
| **Airport Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *AIRPORT TERMINAL-Scope 2* | | | | | | | |
| Electricity | 153 | 1 | 3 | 154 | 3.4 | 935 | 33,750 |
| *Subtotal AIRPORT TERMINAL-Scope 2* | 153 | 1 | 3 | 154 | 3.4 | 935 | 33,750 |
| *AIRPORT TERMINAL-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 88 | 1 | 13 | 89 | 2.0 | 1,207 | 21,850 |
| *Subtotal AIRPORT TERMINAL-Scope 1* | 88 | 1 | 13 | 89 | 2.0 | 1,207 | 21,850 |
| **Subtotal Airport Facilities** | 241 | 2 | 16 | 242 | 5.4 | 2,142 | 55,600 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

# Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Water Delivery Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *BSTER STA@ FIREWEED AVE 250-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 172 |
| *Subtotal BSTER STA@ FIREWEED AVE 250-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 172 |
| *MTRVAULT@ EAST END/EAST HILL-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 18 | 960 |
| *Subtotal MTRVAULT@ EAST END/EAST HILL-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 18 | 960 |
| *OLD WATER TREATMENT PLANT-EG-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 1 | 0 | 0 | 1 | 0.0 | 12 | 288 |
| *Subtotal OLD WATER TREATMENT PLANT-EG-Scope 1* | 1 | 0 | 0 | 1 | 0.0 | 12 | 288 |
| *OLD WATER TREATMENT PLANT-Scope 1* | | | | | | | |
| Propane | 22 | 0 | 4 | 23 | 0.5 | 355 | 11,366 |
| *Subtotal OLD WATER TREATMENT PLANT-Scope 1* | 22 | 0 | 4 | 23 | 0.5 | 355 | 11,366 |
| *OLD WATER TREATMENT PLANT-Scope 2* | | | | | | | |
| Electricity | 70 | 0 | 1 | 70 | 1.6 | 426 | 17,604 |
| *Subtotal OLD WATER TREATMENT PLANT-Scope 2* | 70 | 0 | 1 | 70 | 1.6 | 426 | 17,604 |
| *PR STA @ A-FRAME-Scope2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 8 | 0.2 | 50 | 2,104 |
| *Subtotal PR STA @ A-FRAME-Scope2* | 8 | 0 | 0 | 8 | 0.2 | 50 | 2,104 |
| *PR STA @ BARNETT-Scope 2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 9 | 0.2 | 52 | 2,183 |
| *Subtotal PR STA @ BARNETT-Scope 2* | 8 | 0 | 0 | 9 | 0.2 | 52 | 2,183 |
| *PR STA @ BARTLETTT-SOUNDVIEW-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 22 | 1,095 |
| *Subtotal PR STA @ BARTLETTT-SOUNDVIEW-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 22 | 1,095 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PR STA @ BEAR CREEK-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 17 | 898 |
| *Subtotal PR STA @ BEAR CREEK-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 17 | 898 |
| *PR STA @ EAST HILL-HOEDL-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.1 | 41 | 1,768 |
| *Subtotal PR STA @ EAST HILL-HOEDL-Scope 2* | 7 | 0 | 0 | 7 | 0.1 | 41 | 1,768 |
| *PR STA @ EFFLER-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 27 | 1,280 |
| *Subtotal PR STA @ EFFLER-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 27 | 1,280 |
| *PR STA @ HEA-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 42 | 1,822 |
| *Subtotal PR STA @ HEA-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 42 | 1,822 |
| *PR STA @ HILLTOP-Scope 2* | | | | | | | |
| Electricity | 12 | 0 | 0 | 12 | 0.3 | 73 | 2,949 |
| *Subtotal PR STA @ HILLTOP-Scope 2* | 12 | 0 | 0 | 12 | 0.3 | 73 | 2,949 |
| *PR STA @ JEEP SALES-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 4 | 0.1 | 21 | 1,057 |
| *Subtotal PR STA @ JEEP SALES-Scope 2* | 3 | 0 | 0 | 4 | 0.1 | 21 | 1,057 |
| *PR STA @ KACHEMAK WAY-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 24 | 1,139 |
| *Subtotal PR STA @ KACHEMAK WAY-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 24 | 1,139 |
| *PR STA @ LAKESIDE-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 16 | 892 |
| *Subtotal PR STA @ LAKESIDE-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 16 | 892 |
| *PR STA @ LUCKY SHOT-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 17 | 900 |
| *Subtotal PR STA @ LUCKY SHOT-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 17 | 900 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PR STA @ MAIN & DANVIEW-Scope 2* | | | | | | | |
| Electricity | 5 | 0 | 0 | 5 | 0.1 | 32 | 1,445 |
| *Subtotal PR STA @ MAIN & DANVIEW-Scope 2* | 5 | 0 | 0 | 5 | 0.1 | 32 | 1,445 |
| *PR STA @ MID-HILL-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 44 | 1,883 |
| *Subtotal PR STA @ MID-HILL-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 44 | 1,883 |
| *PR STA @ RIDGELINE STATION-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 44 | 1,902 |
| *Subtotal PR STA @ RIDGELINE STATION-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 44 | 1,902 |
| *PR STA @ STERLING-Scope 2* | | | | | | | |
| Electricity | 11 | 0 | 0 | 11 | 0.2 | 68 | 2,818 |
| *Subtotal PR STA @ STERLING-Scope 2* | 11 | 0 | 0 | 11 | 0.2 | 68 | 2,818 |
| *PR STA @ SWITCHBACK-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 38 | 1,679 |
| *Subtotal PR STA @ SWITCHBACK-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 38 | 1,679 |
| *PR STA @ TESORO METER VAULT-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 39 | 1,704 |
| *Subtotal PR STA @ TESORO METER VAULT-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 39 | 1,704 |
| *PR STA @ WEST HILL-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 39 | 1,718 |
| *Subtotal PR STA @ WEST HILL-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 39 | 1,718 |
| *PR STA@OHLSON LN/FAT OLIVES-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 18 | 934 |
| *Subtotal PR STA@OHLSON LN/FAT OLIVES-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 18 | 934 |
| *WATER PUMP STA @ CROSSMAN-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 3 | 0 | 0 | 3 | 0.1 | 38 | 878 |
| *Subtotal WATER PUMP STA @ CROSSMAN-Scope 1* | 3 | 0 | 0 | 3 | 0.1 | 38 | 878 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *WATER PUMP STA @ CROSSMAN-Scope 2* | | | | | | | |
| Electricity | 157 | 1 | 3 | 158 | 3.5 | 961 | 36,380 |
| *Subtotal WATER PUMP STA @ CROSSMAN-Scope 2* | 157 | 1 | 3 | 158 | 3.5 | 961 | 36,380 |
| *WATER PUMP STA @ HOMER SPIT-Scope 2* | | | | | | | |
| Electricity | 20 | 0 | 0 | 20 | 0.4 | 122 | 6,537 |
| *Subtotal WATER PUMP STA @ HOMER SPIT-Scope 2* | 20 | 0 | 0 | 20 | 0.4 | 122 | 6,537 |
| **Subtotal Water Delivery Facilities** | 395 | 2 | 12 | 396 | 8.8 | 2,659 | 106,355 |
| **Wastewater Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *SEWER TREATMENT PLANT-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 126 | 1 | 19 | 127 | 2.8 | 1,723 | 31,389 |
| Nitrous Oxide | 0 | 16 | 0 | 5 | 0.1 | 0 | 0 |
| *Subtotal SEWER TREATMENT PLANT-Scope 1* | 126 | 17 | 19 | 132 | 2.9 | 1,723 | 31,389 |
| *SEWER TREATMENT PLANT-Scope 2* | | | | | | | |
| Electricity | 647 | 3 | 13 | 649 | 14.4 | 3,952 | 134,901 |
| *Subtotal SEWER TREATMENT PLANT-Scope 2* | 647 | 3 | 13 | 649 | 14.4 | 3,952 | 134,901 |
| *SL @ BAY AVE-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 24 | 1,178 |
| *Subtotal SL @ BAY AVE-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 24 | 1,178 |
| *SL @ BELUGA LAKE-Scope 2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 8 | 0.2 | 51 | 2,146 |
| *Subtotal SL @ BELUGA LAKE-Scope 2* | 8 | 0 | 0 | 8 | 0.2 | 51 | 2,146 |
| *SL @ LAUNCH RAMP-Scope 2* | | | | | | | |
| Electricity | 31 | 0 | 1 | 31 | 0.7 | 188 | 7,134 |
| *Subtotal SL @ LAUNCH RAMP-Scope 2* | 31 | 0 | 1 | 31 | 0.7 | 188 | 7,134 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *SL @ PORT 30 HOMER SPIT-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 2 | 352 |
| *Subtotal SL @ PORT 30 HOMER SPIT-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 2 | 352 |
| *SL AT BEAR CREEK DR-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 42 | 1,865 |
| *Subtotal SL AT BEAR CREEK DR-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 42 | 1,865 |
| *SL@HOMER SPIT CAMPGROUND-Scope 2* | | | | | | | |
| Electricity | 9 | 0 | 0 | 9 | 0.2 | 54 | 2,264 |
| *Subtotal SL@HOMER SPIT CAMPGROUND-Scope 2* | 9 | 0 | 0 | 9 | 0.2 | 54 | 2,264 |
| *STP LAB & OFFICE-Scope 1* | | | | | | | |
| Propane | 3 | 0 | 1 | 3 | 0.1 | 47 | 1,794 |
| *Subtotal STP LAB & OFFICE-Scope 1* | 3 | 0 | 1 | 3 | 0.1 | 47 | 1,794 |
| **Subtotal Wastewater Facilities** | 835 | 21 | 34 | 843 | 18.8 | 6,083 | 183,023 |
| **Solid Waste Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *City of Homer-Scope 3* | | | | | | | |
| Carbon Dioxide | 17 | 0 | 0 | 17 | 0.4 | 0 | 0 |
| *Subtotal City of Homer-Scope 3* | 17 | 0 | 0 | 17 | 0.4 | 0 | 0 |
| **Subtotal Solid Waste Facilities** | 17 | 0 | 0 | 17 | 0.4 | 0 | 0 |
| **Vehicle Fleet** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *City Hall* | | | | | | | |
| Gasoline | 1 | 0 | 0 | 1 | 0.0 | 16 | 381 |
| *Subtotal City Hall* | 1 | 0 | 0 | 1 | 0.0 | 16 | 381 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2007**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *Fire Department* | | | | | | | |
| Diesel | 0 | 0 | 0 | 0 | 0.0 | 6 | 1,885 |
| OFF ROAD Diesel | 18 | 0 | 1 | 18 | 0.4 | 248 | 4,481 |
| *Subtotal Fire Department* | 19 | 0 | 1 | 19 | 0.4 | 254 | 6,366 |
| *Police Department* | | | | | | | |
| Gasoline | 81 | 5 | 3 | 83 | 1.8 | 1,150 | 24,622 |
| *Subtotal Police Department* | 81 | 5 | 3 | 83 | 1.8 | 1,150 | 24,622 |
| *Port and Harbor Department* | | | | | | | |
| Diesel | 10 | 0 | 0 | 10 | 0.2 | 135 | 2,438 |
| Gasoline | 32 | 2 | 2 | 33 | 0.7 | 455 | 10,560 |
| OFF ROAD Gasoline | 2 | 0 | 0 | 2 | 0.0 | 30 | 691 |
| *Subtotal Port and Harbor Department* | 44 | 2 | 2 | 45 | 1.0 | 620 | 13,689 |
| *Public Works Department* | | | | | | | |
| Gasoline | 86 | 7 | 5 | 88 | 2.0 | 1,213 | 28,127 |
| OFF ROAD Diesel | 104 | 3 | 6 | 104 | 2.3 | 1,414 | 25,601 |
| OFF ROAD Gasoline | 47 | 1 | 3 | 47 | 1.1 | 664 | 15,386 |
| *Subtotal Public Works Department* | 237 | 11 | 13 | 240 | 5.3 | 3,291 | 69,114 |
| **Subtotal Vehicle Fleet** | 382 | 18 | 20 | 388 | 8.6 | 5,331 | 114,172 |
| **Total** | 4,470 | 58 | 205 | 4,493 | 100.0 | 36,073 | 1,080,881 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

# Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Buildings and Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *ANIMAL SHELTER-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 69 | 1 | 10 | 69 | 1.5 | 942 | 25,368 |
| *Subtotal ANIMAL SHELTER-Scope 1* | 69 | 1 | 10 | 69 | 1.5 | 942 | 25,368 |
| *ANIMAL SHELTER-Scope 2* | | | | | | | |
| Electricity | 20 | 0 | 0 | 20 | 0.4 | 120 | 5,115 |
| *Subtotal ANIMAL SHELTER-Scope 2* | 20 | 0 | 0 | 20 | 0.4 | 120 | 5,115 |
| *CITY HALL-Scope 2* | | | | | | | |
| Electricity | 122 | 1 | 3 | 123 | 2.7 | 747 | 31,331 |
| *Subtotal CITY HALL-Scope 2* | 122 | 1 | 3 | 123 | 2.7 | 747 | 31,331 |
| *EQUIPMENT STORAGE POLE BARN-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 3 | 0 | 0 | 3 | 0.1 | 42 | 1,008 |
| *Subtotal EQUIPMENT STORAGE POLE BARN-Scope 1* | 3 | 0 | 0 | 3 | 0.1 | 42 | 1,008 |
| *FIRE HALL-Scope 2* | | | | | | | |
| Electricity | 71 | 0 | 1 | 71 | 1.6 | 434 | 19,070 |
| *Subtotal FIRE HALL-Scope 2* | 71 | 0 | 1 | 71 | 1.6 | 434 | 19,070 |
| *HERC-01 KPC AND BGC-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 183 | 1 | 27 | 184 | 4.1 | 2,498 | 58,309 |
| *Subtotal HERC-01 KPC AND BGC-Scope 1* | 183 | 1 | 27 | 184 | 4.1 | 2,498 | 58,309 |
| *HERC-01 KPC AND BGC-Scope 2* | | | | | | | |
| Electricity | 67 | 0 | 1 | 67 | 1.5 | 408 | 18,740 |
| *Subtotal HERC-01 KPC AND BGC-Scope 2* | 67 | 0 | 1 | 67 | 1.5 | 408 | 18,740 |
| *HERC-02 PW MAIN SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 45 | 0 | 7 | 45 | 1.0 | 614 | 13,983 |
| *Subtotal HERC-02 PW MAIN SHOP-Scope 1* | 45 | 0 | 7 | 45 | 1.0 | 614 | 13,983 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *HERC-02 PW MAIN SHOP-Scope 2* | | | | | | | |
| Electricity | 25 | 0 | 1 | 25 | 0.6 | 155 | 6,663 |
| *Subtotal HERC-02 PW MAIN SHOP-Scope 2* | 25 | 0 | 1 | 25 | 0.6 | 155 | 6,663 |
| *HPD COM ON HOMER SPIT RD-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 5 | 478 |
| *Subtotal HPD COM ON HOMER SPIT RD-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 5 | 478 |
| *HSC FEE COLLECTION BLDG-Scope 1* | | | | | | | |
| Propane | 2 | 0 | 0 | 2 | 0.0 | 26 | 1,182 |
| *Subtotal HSC FEE COLLECTION BLDG-Scope 1* | 2 | 0 | 0 | 2 | 0.0 | 26 | 1,182 |
| *HSC FEE COLLECTION BLDG-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 3 | 308 |
| *Subtotal HSC FEE COLLECTION BLDG-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 3 | 308 |
| *JAIL-Scope 2* | | | | | | | |
| Electricity | 36 | 0 | 1 | 36 | 0.8 | 217 | 8,668 |
| *Subtotal JAIL-Scope 2* | 36 | 0 | 1 | 36 | 0.8 | 217 | 8,668 |
| *KAREN HORNADAY PK/CG/BF-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.1 | 15 | 917 |
| *Subtotal KAREN HORNADAY PK/CG/BF-Scope 2* | 2 | 0 | 0 | 2 | 0.1 | 15 | 917 |
| *MOTOR POOL SHOP- Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 7 | 0 | 1 | 7 | 0.2 | 101 | 2,557 |
| *Subtotal MOTOR POOL SHOP- Scope 1* | 7 | 0 | 1 | 7 | 0.2 | 101 | 2,557 |
| *OLD LIBRARY-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 9 | 0 | 1 | 9 | 0.2 | 119 | 2,821 |
| *Subtotal OLD LIBRARY-Scope 1* | 9 | 0 | 1 | 9 | 0.2 | 119 | 2,821 |
| *OLD LIBRARY-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 8 | 395 |
| *Subtotal OLD LIBRARY-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 8 | 395 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

# Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *POLICE STA/JAIL-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 33 | 0 | 5 | 33 | 0.7 | 446 | 10,478 |
| *Subtotal POLICE STA/JAIL-Scope 1* | 33 | 0 | 5 | 33 | 0.7 | 446 | 10,478 |
| *POLICE STATION-Scope 2* | | | | | | | |
| Electricity | 71 | 0 | 1 | 71 | 1.6 | 434 | 17,336 |
| *Subtotal POLICE STATION-Scope 2* | 71 | 0 | 1 | 71 | 1.6 | 434 | 17,336 |
| *PUBLIC LIBRARY-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 110 | 1 | 17 | 111 | 2.5 | 1,510 | 35,399 |
| *Subtotal PUBLIC LIBRARY-Scope 1* | 110 | 1 | 17 | 111 | 2.5 | 1,510 | 35,399 |
| *PUBLIC LIBRARY-Scope 2* | | | | | | | |
| Electricity | 94 | 0 | 2 | 94 | 2.1 | 573 | 24,564 |
| *Subtotal PUBLIC LIBRARY-Scope 2* | 94 | 0 | 2 | 94 | 2.1 | 573 | 24,564 |
| *PUBLIC WORKS OFFICE & SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 22 | 0 | 3 | 22 | 0.5 | 302 | 7,389 |
| *Subtotal PUBLIC WORKS OFFICE & SHOP-Scope 1* | 22 | 0 | 3 | 22 | 0.5 | 302 | 7,389 |
| *PUBLIC WORKS OFFICE & SHOP-Scope 2* | | | | | | | |
| Electricity | 82 | 0 | 2 | 82 | 1.8 | 498 | 21,296 |
| *Subtotal PUBLIC WORKS OFFICE & SHOP-Scope 2* | 82 | 0 | 2 | 82 | 1.8 | 498 | 21,296 |
| *RR AT BEN WALTERS PARK-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 452 |
| *Subtotal RR AT BEN WALTERS PARK-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 452 |
| *RR AT BISHOPS BEACH-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 454 |
| *Subtotal RR AT BISHOPS BEACH-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 454 |
| *WARNING SIREN HOMER SPIT RD-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 2 | 338 |
| *Subtotal WARNING SIREN HOMER SPIT RD-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 2 | 338 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *WKFL PARK GAZEBO-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 2 | 365 |
| *Subtotal WKFL PARK GAZEBO-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 2 | 365 |
| **Subtotal Buildings and Facilities** | 1,077 | 7 | 85 | 1,081 | 23.9 | 10,229 | 314,985 |
| **Streetlights & Traffic Signals** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *HIGH MAST LGT #7 @ RAMP #6-Scope 2* | | | | | | | |
| Electricity | 30 | 0 | 1 | 30 | 0.7 | 184 | 7,753 |
| *Subtotal HIGH MAST LGT #7 @ RAMP #6-Scope 2* | 30 | 0 | 1 | 30 | 0.7 | 184 | 7,753 |
| *HIGH MAST LGTS #2,3, & 4-Scope 2* | | | | | | | |
| Electricity | 71 | 0 | 1 | 71 | 1.6 | 435 | 19,284 |
| *Subtotal HIGH MAST LGTS #2,3, & 4-Scope 2* | 71 | 0 | 1 | 71 | 1.6 | 435 | 19,284 |
| *LGT BAY AVE THAW CABLE-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 45 | 2,019 |
| *Subtotal LGT BAY AVE THAW CABLE-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 45 | 2,019 |
| *LGT@ RANGEVIEW & WRIGHT ST-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 452 |
| *Subtotal LGT@ RANGEVIEW & WRIGHT ST-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 452 |
| *LGTS ON HEATH ST-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 13 | 799 |
| *Subtotal LGTS ON HEATH ST-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 13 | 799 |
| *RAMP #4 SPIT STREET LIGHTS-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 26 | 906 |
| *Subtotal RAMP #4 SPIT STREET LIGHTS-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 26 | 906 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

# Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *VARIOUS LOCATIONS (LIGHTS)-Scope 2* | | | | | | | |
| Electricity | 41 | 0 | 1 | 42 | 0.9 | 253 | 11,864 |
| *Subtotal VARIOUS LOCATIONS (LIGHTS)-Scope 2* | 41 | 0 | 1 | 42 | 0.9 | 253 | 11,864 |
| **Subtotal Streetlights & Traffic Signals** | 157 | 1 | 3 | 157 | 3.5 | 959 | 43,077 |
| **Port Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *DEEP WATER DOCK-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 37 | 3,444 |
| *Subtotal DEEP WATER DOCK-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 37 | 3,444 |
| *FISH DOCK-Scope 2* | | | | | | | |
| Electricity | 522 | 3 | 11 | 523 | 11.6 | 3,189 | 134,996 |
| *Subtotal FISH DOCK-Scope 2* | 522 | 3 | 11 | 523 | 11.6 | 3,189 | 134,996 |
| *MAIN DK INSIDE PIONEER DK-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 44 | 1,972 |
| *Subtotal MAIN DK INSIDE PIONEER DK-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 44 | 1,972 |
| *PH HARBORMASTER OFFICE-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 3 | 0 | 0 | 3 | 0.1 | 35 | 921 |
| *Subtotal PH HARBORMASTER OFFICE-Scope 1* | 3 | 0 | 0 | 3 | 0.1 | 35 | 921 |
| *PH HARBORMASTER OFFICE-Scope 2* | | | | | | | |
| Electricity | 22 | 0 | 0 | 22 | 0.5 | 134 | 5,660 |
| *Subtotal PH HARBORMASTER OFFICE-Scope 2* | 22 | 0 | 0 | 22 | 0.5 | 134 | 5,660 |
| *PIONEER DOCK EAST-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 2 | 1,972 |
| *Subtotal PIONEER DOCK EAST-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 2 | 1,972 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PORT & HARBOR MAIN SHOP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 46 | 0 | 7 | 46 | 1.0 | 627 | 15,900 |
| *Subtotal PORT & HARBOR MAIN SHOP-Scope 1* | 46 | 0 | 7 | 46 | 1.0 | 627 | 15,900 |
| *PORT & HARBOR MAIN SHOP-Scope 2* | | | | | | | |
| Electricity | 25 | 0 | 1 | 25 | 0.5 | 151 | 6,279 |
| *Subtotal PORT & HARBOR MAIN SHOP-Scope 2* | 25 | 0 | 1 | 25 | 0.5 | 151 | 6,279 |
| *PORT & HARBOR USED OIL BLDG-Scope 2* | | | | | | | |
| Electricity | 9 | 0 | 0 | 9 | 0.2 | 57 | 2,641 |
| *Subtotal PORT & HARBOR USED OIL BLDG-Scope 2* | 9 | 0 | 0 | 9 | 0.2 | 57 | 2,641 |
| *RR @ RAMP #6 AND SYS #4-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 12 | 0 | 2 | 12 | 0.3 | 160 | 4,193 |
| *Subtotal RR @ RAMP #6 AND SYS #4-Scope 1* | 12 | 0 | 2 | 12 | 0.3 | 160 | 4,193 |
| *RR @ RAMP #6 AND SYS #4-Scope 2* | | | | | | | |
| Electricity | 15 | 0 | 0 | 15 | 0.3 | 92 | 5,391 |
| *Subtotal RR @ RAMP #6 AND SYS #4-Scope 2* | 15 | 0 | 0 | 15 | 0.3 | 92 | 5,391 |
| *RR AT FISHING LAGOON-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 11 | 747 |
| *Subtotal RR AT FISHING LAGOON-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 11 | 747 |
| *RR AT LAUNCH RAMP-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 9 | 0 | 1 | 9 | 0.2 | 118 | 3,076 |
| *Subtotal RR AT LAUNCH RAMP-Scope 1* | 9 | 0 | 1 | 9 | 0.2 | 118 | 3,076 |
| *RR AT LAUNCH RAMP-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 7 | 553 |
| *Subtotal RR AT LAUNCH RAMP-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 7 | 553 |
| *RR AT RAMP # 4-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 12 | 0 | 2 | 12 | 0.3 | 170 | 4,327 |
| *Subtotal RR AT RAMP # 4-Scope 1* | 12 | 0 | 2 | 12 | 0.3 | 170 | 4,327 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

# Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *RR AT RAMP # 4-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 11 | 745 |
| *Subtotal RR AT RAMP # 4-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 11 | 745 |
| *RR BY HARBORMASTER OFFICE-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 3 | 0 | 1 | 3 | 0.1 | 46 | 856 |
| *Subtotal RR BY HARBORMASTER OFFICE-Scope 1* | 3 | 0 | 1 | 3 | 0.1 | 46 | 856 |
| *RR BY HARBORMASTER OFFICE-Scope 2* | | | | | | | |
| Electricity | 14 | 0 | 0 | 14 | 0.3 | 85 | 3,631 |
| *Subtotal RR BY HARBORMASTER OFFICE-Scope 2* | 14 | 0 | 0 | 14 | 0.3 | 85 | 3,631 |
| *SYS #1 FLT & H MAST LGT#1-Scope 2* | | | | | | | |
| Electricity | 367 | 2 | 8 | 368 | 8.1 | 2,242 | 86,690 |
| *Subtotal SYS #1 FLT & H MAST LGT#1-Scope 2* | 367 | 2 | 8 | 368 | 8.1 | 2,242 | 86,690 |
| *SYSTEM #5 (LIGHT/FLOAT)-Scope 2* | | | | | | | |
| Electricity | 352 | 2 | 7 | 353 | 7.8 | 2,149 | 85,073 |
| *Subtotal SYSTEM #5 (LIGHT/FLOAT)-Scope 2* | 352 | 2 | 7 | 353 | 7.8 | 2,149 | 85,073 |
| *WOOD GRID-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 4 | 462 |
| *Subtotal WOOD GRID-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 4 | 462 |
| **Subtotal Port Facilities** | 1,430 | 8 | 41 | 1,433 | 31.6 | 9,371 | 369,529 |
| **Airport Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *AIRPORT TERMINAL-Scope 2* | | | | | | | |
| Electricity | 154 | 1 | 3 | 154 | 3.4 | 941 | 37,287 |
| *Subtotal AIRPORT TERMINAL-Scope 2* | 154 | 1 | 3 | 154 | 3.4 | 941 | 37,287 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *AIRPORT TERMINAL-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 85 | 1 | 13 | 85 | 1.9 | 1,159 | 30,546 |
| *Subtotal AIRPORT TERMINAL-Scope 1* | 85 | 1 | 13 | 85 | 1.9 | 1,159 | 30,546 |
| **Subtotal Airport Facilities** | 239 | 2 | 16 | 240 | 5.3 | 2,100 | 67,833 |
| **Water Delivery Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *BSTER STA@ FIREWEED AVE 250-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 26 | 1,341 |
| *Subtotal BSTER STA@ FIREWEED AVE 250-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 26 | 1,341 |
| *MTRVAULT@ EAST END/EAST HILL-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 17 | 950 |
| *Subtotal MTRVAULT@ EAST END/EAST HILL-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 17 | 950 |
| *OLD WATER TREATMENT PLANT-EG-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 1 | 0 | 0 | 1 | 0.0 | 14 | 365 |
| *Subtotal OLD WATER TREATMENT PLANT-EG-Scope 1* | 1 | 0 | 0 | 1 | 0.0 | 14 | 365 |
| *OLD WATER TREATMENT PLANT-Scope 1* | | | | | | | |
| Propane | 16 | 0 | 3 | 16 | 0.4 | 253 | 10,331 |
| *Subtotal OLD WATER TREATMENT PLANT-Scope 1* | 16 | 0 | 3 | 16 | 0.4 | 253 | 10,331 |
| *OLD WATER TREATMENT PLANT-Scope 2* | | | | | | | |
| Electricity | 87 | 0 | 2 | 87 | 1.9 | 531 | 24,118 |
| *Subtotal OLD WATER TREATMENT PLANT-Scope 2* | 87 | 0 | 2 | 87 | 1.9 | 531 | 24,118 |
| *PR STA @ A-FRAME-Scope2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 8 | 0.2 | 46 | 2,095 |
| *Subtotal PR STA @ A-FRAME-Scope2* | 7 | 0 | 0 | 8 | 0.2 | 46 | 2,095 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PR STA @ BARNETT-Scope 2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 8 | 0.2 | 51 | 2,259 |
| *Subtotal PR STA @ BARNETT-Scope 2* | 8 | 0 | 0 | 8 | 0.2 | 51 | 2,259 |
| *PR STA @ BARTLETTT-SOUNDVIEW-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 24 | 1,241 |
| *Subtotal PR STA @ BARTLETTT-SOUNDVIEW-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 24 | 1,241 |
| *PR STA @ BEAR CREEK-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 11 | 699 |
| *Subtotal PR STA @ BEAR CREEK-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 11 | 699 |
| *PR STA @ EAST HILL-HOEDL-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 39 | 1,875 |
| *Subtotal PR STA @ EAST HILL-HOEDL-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 39 | 1,875 |
| *PR STA @ EFFLER-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 21 | 1,064 |
| *Subtotal PR STA @ EFFLER-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 21 | 1,064 |
| *PR STA @ HEA-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 34 | 1,627 |
| *Subtotal PR STA @ HEA-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 34 | 1,627 |
| *PR STA @ HILLTOP-Scope 2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 8 | 0.2 | 50 | 2,252 |
| *Subtotal PR STA @ HILLTOP-Scope 2* | 8 | 0 | 0 | 8 | 0.2 | 50 | 2,252 |
| *PR STA @ JEEP SALES-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 17 | 971 |
| *Subtotal PR STA @ JEEP SALES-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 17 | 971 |
| *PR STA @ KACHEMAK WAY-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 25 | 1,273 |
| *Subtotal PR STA @ KACHEMAK WAY-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 25 | 1,273 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PR STA @ LAKESIDE-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 23 | 1,176 |
| *Subtotal PR STA @ LAKESIDE-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 23 | 1,176 |
| *PR STA @ LUCKY SHOT-Scope 2* | | | | | | | |
| Electricity | 3 | 0 | 0 | 3 | 0.1 | 18 | 982 |
| *Subtotal PR STA @ LUCKY SHOT-Scope 2* | 3 | 0 | 0 | 3 | 0.1 | 18 | 982 |
| *PR STA @ MAIN & DANVIEW-Scope 2* | | | | | | | |
| Electricity | 5 | 0 | 0 | 5 | 0.1 | 30 | 1,481 |
| *Subtotal PR STA @ MAIN & DANVIEW-Scope 2* | 5 | 0 | 0 | 5 | 0.1 | 30 | 1,481 |
| *PR STA @ MID-HILL-Scope 2* | | | | | | | |
| Electricity | 5 | 0 | 0 | 5 | 0.1 | 32 | 1,575 |
| *Subtotal PR STA @ MID-HILL-Scope 2* | 5 | 0 | 0 | 5 | 0.1 | 32 | 1,575 |
| *PR STA @ RIDGELINE STATION-Scope 2* | | | | | | | |
| Electricity | 6 | 0 | 0 | 6 | 0.1 | 34 | 1,532 |
| *Subtotal PR STA @ RIDGELINE STATION-Scope 2* | 6 | 0 | 0 | 6 | 0.1 | 34 | 1,532 |
| *PR STA @ STERLING-Scope 2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 8 | 0.2 | 48 | 2,297 |
| *Subtotal PR STA @ STERLING-Scope 2* | 8 | 0 | 0 | 8 | 0.2 | 48 | 2,297 |
| *PR STA @ SWITCHBACK-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 43 | 1,942 |
| *Subtotal PR STA @ SWITCHBACK-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 43 | 1,942 |
| *PR STA @ TESORO METER VAULT-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 25 | 1,294 |
| *Subtotal PR STA @ TESORO METER VAULT-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 25 | 1,294 |
| *PR STA @ WEST HILL-Scope 2* | | | | | | | |
| Electricity | 7 | 0 | 0 | 7 | 0.2 | 46 | 2,211 |
| *Subtotal PR STA @ WEST HILL-Scope 2* | 7 | 0 | 0 | 7 | 0.2 | 46 | 2,211 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

# Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *PR STA@OHLSON LN/FAT OLIVES-Scope 2* | | | | | | | |
| Electricity | 2 | 0 | 0 | 2 | 0.0 | 12 | 770 |
| *Subtotal PR STA@OHLSON LN/FAT OLIVES-Scope 2* | 2 | 0 | 0 | 2 | 0.0 | 12 | 770 |
| *WATER PUMP STA @ CROSSMAN-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 3 | 0 | 0 | 3 | 0.1 | 38 | 1,008 |
| *Subtotal WATER PUMP STA @ CROSSMAN-Scope 1* | 3 | 0 | 0 | 3 | 0.1 | 38 | 1,008 |
| *WATER PUMP STA @ CROSSMAN-Scope 2* | | | | | | | |
| Electricity | 130 | 1 | 3 | 131 | 2.9 | 796 | 33,703 |
| *Subtotal WATER PUMP STA @ CROSSMAN-Scope 2* | 130 | 1 | 3 | 131 | 2.9 | 796 | 33,703 |
| *WATER PUMP STA @ HOMER SPIT-Scope 2* | | | | | | | |
| Electricity | 33 | 0 | 1 | 33 | 0.7 | 200 | 10,119 |
| *Subtotal WATER PUMP STA @ HOMER SPIT-Scope 2* | 33 | 0 | 1 | 33 | 0.7 | 200 | 10,119 |
| **Subtotal Water Delivery Facilities** | 380 | 2 | 11 | 381 | 8.4 | 2,503 | 112,551 |
| **Wastewater Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *KACHEMAK DR-FLUSHING STATION-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 0 | 13 |
| *Subtotal KACHEMAK DR-FLUSHING STATION-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 0 | 13 |
| *SEWER TREATMENT PLANT-Scope 1* | | | | | | | |
| Fuel Oil (#1 2 4) | 82 | 1 | 12 | 83 | 1.8 | 1,127 | 28,000 |
| Nitrous Oxide | 0 | 16 | 0 | 5 | 0.1 | 0 | 0 |
| *Subtotal SEWER TREATMENT PLANT-Scope 1* | 82 | 17 | 12 | 88 | 1.9 | 1,127 | 28,000 |
| *SEWER TREATMENT PLANT-Scope 2* | | | | | | | |
| Electricity | 667 | 4 | 14 | 668 | 14.7 | 4,070 | 153,316 |
| *Subtotal SEWER TREATMENT PLANT-Scope 2* | 667 | 4 | 14 | 668 | 14.7 | 4,070 | 153,316 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| *SL @ BAY AVE-Scope 2* | | | | | | | |
| Electricity | 4 | 0 | 0 | 4 | 0.1 | 22 | 1,136 |
| *Subtotal SL @ BAY AVE-Scope 2* | 4 | 0 | 0 | 4 | 0.1 | 22 | 1,136 |
| *SL @ BELUGA LAKE-Scope 2* | | | | | | | |
| Electricity | 8 | 0 | 0 | 8 | 0.2 | 50 | 2,307 |
| *Subtotal SL @ BELUGA LAKE-Scope 2* | 8 | 0 | 0 | 8 | 0.2 | 50 | 2,307 |
| *SL @ LAUNCH RAMP-Scope 2* | | | | | | | |
| Electricity | 26 | 0 | 1 | 26 | 0.6 | 160 | 6,718 |
| *Subtotal SL @ LAUNCH RAMP-Scope 2* | 26 | 0 | 1 | 26 | 0.6 | 160 | 6,718 |
| *SL @ PORT 30 HOMER SPIT-Scope 2* | | | | | | | |
| Electricity | 0 | 0 | 0 | 0 | 0.0 | 2 | 358 |
| *Subtotal SL @ PORT 30 HOMER SPIT-Scope 2* | 0 | 0 | 0 | 0 | 0.0 | 2 | 358 |
| *SL AT BEAR CREEK DR-Scope 2* | | | | | | | |
| Electricity | 5 | 0 | 0 | 5 | 0.1 | 29 | 1,434 |
| *Subtotal SL AT BEAR CREEK DR-Scope 2* | 5 | 0 | 0 | 5 | 0.1 | 29 | 1,434 |
| *SL@CHLOR STA-GOV LOT 8-Scope 2* | | | | | | | |
| Electricity | 1 | 0 | 0 | 1 | 0.0 | 5 | 457 |
| *Subtotal SL@CHLOR STA-GOV LOT 8-Scope 2* | 1 | 0 | 0 | 1 | 0.0 | 5 | 457 |
| *SL@HOMER SPIT CAMPGROUND-Scope 2* | | | | | | | |
| Electricity | 9 | 0 | 0 | 9 | 0.2 | 54 | 2,484 |
| *Subtotal SL@HOMER SPIT CAMPGROUND-Scope 2* | 9 | 0 | 0 | 9 | 0.2 | 54 | 2,484 |
| *STP LAB & OFFICE-Scope 1* | | | | | | | |
| Propane | 9 | 0 | 2 | 9 | 0.2 | 145 | 5,914 |
| *Subtotal STP LAB & OFFICE-Scope 1* | 9 | 0 | 2 | 9 | 0.2 | 145 | 5,914 |
| **Subtotal Wastewater Facilities** | 811 | 21 | 29 | 818 | 18.1 | 5,664 | 202,137 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

## Appendix 7 City of Homer Greenhouse Gas Emissions 2006-2008 Detailed Report for all Facilities and Vehicle Fleet



**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| **Solid Waste Facilities** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *City of Homer-Scope 3* | | | | | | | |
| Carbon Dioxide | 18 | 0 | 0 | 18 | 0.4 | 0 | 0 |
| *Subtotal City of Homer-Scope 3* | 18 | 0 | 0 | 18 | 0.4 | 0 | 0 |
| **Subtotal Solid Waste Facilities** | 18 | 0 | 0 | 18 | 0.4 | 0 | 0 |
| **Vehicle Fleet** | | | | | | | |
| **Homer, Alaska** | | | | | | | |
| *City Hall* | | | | | | | |
| Gasoline | 1 | 0 | 0 | 1 | 0.0 | 15 | 446 |
| *Subtotal City Hall* | 1 | 0 | 0 | 1 | 0.0 | 15 | 446 |
| *Fire Department* | | | | | | | |
| Diesel | 4 | 0 | 0 | 4 | 0.1 | 48 | 1,300 |
| OFF ROAD Diesel | 19 | 0 | 1 | 19 | 0.4 | 255 | 6,888 |
| *Subtotal Fire Department* | 22 | 0 | 1 | 22 | 0.5 | 303 | 8,188 |
| *Police Department* | | | | | | | |
| Gasoline | 97 | 5 | 4 | 99 | 2.2 | 1,373 | 40,774 |
| *Subtotal Police Department* | 97 | 5 | 4 | 99 | 2.2 | 1,373 | 40,774 |
| *Port and Harbor Department* | | | | | | | |
| Diesel | 3 | 0 | 0 | 3 | 0.1 | 42 | 1,143 |
| Gasoline | 29 | 3 | 2 | 29 | 0.6 | 403 | 11,967 |
| OFF ROAD Gasoline | 2 | 0 | 0 | 2 | 0.0 | 24 | 722 |
| *Subtotal Port and Harbor Department* | 33 | 3 | 3 | 34 | 0.8 | 469 | 13,832 |
| *Public Works Department* | | | | | | | |
| Gasoline | 106 | 7 | 5 | 109 | 2.4 | 1,499 | 44,533 |
| OFF ROAD Diesel | 83 | 2 | 5 | 84 | 1.9 | 1,139 | 30,804 |

This report has been generated for Homer, Alaska using ICLEI's Clean Air and Climate Protection 2009 Software.

**Government Greenhouse Gas Emissions in 2008**
**Detailed Report**

| | $CO_2$ (tonnes) | $N_2O$ (kg) | $CH_4$ (kg) | Equiv $CO_2$ (tonnes) | Equiv $CO_2$ (%) | Energy (MMBtu) | Cost ($) |
|---|---|---|---|---|---|---|---|
| OFF ROAD Gasoline | 52 | 1 | 3 | 53 | 1.2 | 737 | 21,881 |
| *Subtotal Public Works Department* | 242 | 11 | 13 | 246 | 5.4 | 3,375 | 97,218 |
| **Subtotal Vehicle Fleet** | 396 | 19 | 21 | 402 | 8.9 | 5,535 | 160,458 |
| **Total** | 4,507 | 59 | 205 | 4,530 | 100.0 | 36,360 | 1,270,571 |

## Appendix 8 Prioritized Projects List of Recommendations for Achieving Energy and Costs Savings from Facilities' Conservation Measures

| Facility Name | Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PUBLIC LIBRARY | Turn Off Snow Melt Sidewalk | Program BMS, Turn off pumps & Controls | Would require more snow removal effort, in addition to already manually maintained sidewalks | $85 | $0 | $3,154 | $3,154 | 0.0 | 0.0 | 0.0 | 0.0 |
| PUBLIC LIBRARY | Restroom Fan control | Install Occupancy sensors and signal to BMS | | $575 | $0 | $1,511 | $1,511 | 0.4 | 0.3 | 0.3 | 0.3 |
| FISH DOCK | Remove 8 transformers that power 8 dockside 15 amp 120 volt receptacles | The 8 transformers rated at 5 kw each consume 500 watts of electricity per hour each, with no load. This is a major parasitic load. | | $3,400 | $5,803 | $0 | $5,803 | 0.6 | 0.5 | 0.5 | 0.5 |
| PUBLIC LIBRARY | Close air supply to meeting rooms | Programming, Damper setting | Part of reprogram building | $170 | $0 | $268 | $268 | 0.6 | 0.6 | 0.5 | 0.5 |
| PUBLIC LIBRARY | Turn off heat to fan coils | Programming, valve turning | Part of reprogram building | $340 | $0 | $463 | $463 | 0.7 | 0.7 | 0.6 | 0.6 |
| ICE PLANT | Installing digital controls for the ice machine boost system | The digital controls will automate the operation more and allow closer regulation of the equipment, this will reduce energy use and safety and reduce the labor cost | | $12,510 | $16,650 | $0 | $16,650 | 0.8 | 0.7 | 0.6 | 0.6 |
| PUBLIC LIBRARY | Turn Off Entry Cabinet Unit Heater | Manual switch off and close valve | | $170 | $0 | $209 | $209 | 0.8 | 0.7 | 0.7 | 0.7 |
| PUBLIC LIBRARY | Other Stage 1 Improvements (5 to 10% savings) | Reprogram, reset, Monitor | Mainly Maintenance staff work, training and monitoring | $1,700 | $0 | $1,996 | $1,996 | 0.9 | 0.8 | 0.7 | 0.7 |
| PH HARBORMASTER OFFICE | Disconnecting the overhead radiant ceiling heaters and replace with an oil fired Toyo stove. Replace 3 windows and 1 door SE side of office | The overhead radiant heater provides make up heat that the existing Toyo oil stove cannot handle. By adding a second smaller Toyo oil stove at the far end of the office the heat will be distributed more effectively. The fuel is less expensive than electricity for the same heat. The improvements of the windows and door will help save additional fuel | Fuel oil use will increase by 226 gallons. Electric will be less | $1,494 | $2,247 | -$605 | $1,642 | 0.9 | 0.8 | 0.8 | 0.7 |
| PUBLIC LIBRARY | Turn Off Air Handling Unit (AHU) | Reprogram Building Management System | No contractor cost if done in-house. Staff operates windows and monitors air quality. Staff operates AHU as needed. | $3,570 | $0 | $2,983 | $2,983 | 1.2 | 1.1 | 1.0 | 1.0 |
| PUBLIC LIBRARY | Turn Off Water Heater, Install Point of Use WH in Staff Restroom | Manual shutdown of WH and Recirc Pump, repipe &Install new WH | Cold water only in public restrooms | $2,110 | $840 | $0 | $840 | 2.5 | 2.3 | 2.1 | 2.0 |
| CITY HALL | Replace T12 Fluorescent tubes with T8 tubes | Maintenance has been replacing T12 tubes as the fixtures fail. Replacing a 4' T12 40 watt fluorescent tube with a 4' T8 32 watt tube saves 8 watts per tube. | The tubes and ballast needs to be changed. Some fixtures will need to be repaired or replaced during the changeover. This cost is included in this estimate. This project would be performed by an electrical contractor. | $9,048 | $3,273 | | $3,273 | 2.8 | 2.5 | 2.3 | 2.2 |

| Facility Name | Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AIRPORT TERMINAL | Separate Baggage area lighting switching | The baggage area's have two types of lighting. Fluorescent wall fixtures and HPS ceiling fixtures. The HPS ceiling fixtures are not needed most of the time. By separating the switching they can be controlled as needed. | | $610 | $189 | $0 | $189 | 3.2 | 2.9 | 2.7 | 2.6 |
| PUBLIC LIBRARY | Repair AHU Valve | Disassemble, repair as needed | Normal Maintenance | $270 | $0 | $83 | $83 | 3.3 | 3.0 | 2.7 | 2.6 |
| PUBLIC LIBRARY | Replace oil burner | purchase, install, tune burner | | $2,195 | $0 | $599 | $599 | 3.7 | 3.3 | 3.1 | 2.9 |
| AIRPORT TERMINAL | VARIABLE FREQUENCY DRIVES FOR Main Air handling unit, AHU Control Contractor method | Installing a Variable Frequency Drive on the Main AHU, controlled by a building Pressure Sensor and a CO2 sensor will allow the air handler fan to be demand sensitive, when demand is low the motor can ramp down to a slower speed and save considerable electricity and fuel. | Heating Fuel Savings still needs to be calculated | $14,945 | $2,010 | $0 | $2,010 | 7.4 | 6.8 | 6.2 | 5.9 |
| CITY HALL | Insulated shades for Lower entry area | Installing easy opening insulated shades will increase the R- Value by at least 3.5 and reduce radiation loss through the dark glass at night | | $2,715 | $352 | $0 | $352 | 7.7 | 7.0 | 6.4 | 6.2 |
| PRESSURE REDUCING STATIONS- Typical Vault | Add outside air temperature sensor to turn off Vault heating when outside temperature is above 50 deg F. Adding removable pipe insulation will keep condensation down an reduce the heat load | The pressure reducing Vaults have 3 kW heaters that cycle on regularly even when outside air temps are above 50 F. By turning off the heater during this time substantial electricity can be saved while still keep the vaults dry of condensation. Pipe insulation will also keep condensation down. | There are 20 pressure reducing stations. Equipment cost would be $150 per station and 4 hours labor per station. | $9,800 | $1,254 | $0 | $1,254 | 7.8 | 7.1 | 6.5 | 6.3 |
| POLICE STA/JAIL | Replace upper hot air furnace with a boiler, keep lower furnace for redundancy | By replacing the upper furnace with a boiler, two electric hot water heaters can be eliminated and their electrical load. The boiler will Use duct heaters and heat through the existing ductwork. The boiler system will use about 20% less fuel for the same heating. | | $24,510 | $1,314 | $1,592 | $2,906 | 8.4 | 7.7 | 7.0 | 6.7 |
| PORT & HARBOR MAIN SHOP | Air Compressor timer | The shop air compressor is powered up most of the time. It is very important to have full air when the workers show up in the morning. By installing a timer the unit could be turned off 10 hours per day and still be ready at 6:00 am | | $280 | $25 | $0 | $25 | 11.2 | 10.2 | 9.4 | 9.0 |
| AIRPORT TERMINAL | Install occupancy sensors on 3 vending machines, Snack Miser brand | Installing occupancy sensors the 3 vending machines that do not use refrigeration will save 100 watts an hour per unit when they are off, in this situation a majority of the time | | $410 | $35 | $0 | $35 | 11.7 | 10.6 | 9.8 | 9.4 |
| AIRPORT TERMINAL | Install Freezer curtains on three luggage bay doors | Installing freezer curtains on the garage doors in the luggage will reduce unit heater run time when the doors remain open and add an additional seal to the doors | | $5,125 | $22 | $361 | $383 | 13.4 | 12.2 | 11.1 | 10.7 |
| PUBLIC LIBRARY | Insulated shades for Lower south windows | Installing easy opening insulated shades will increase the R- Value by at least 3.5 and reduce radiation loss through the dark glass at night | | $10,352 | $0 | $597 | $597 | 17.4 | 15.8 | 14.5 | 13.9 |

# Appendix 8 Prioritized Projects List of Recommendations for Achieving Energy and Costs Savings from Facilities' Conservation Measures

| Facility Name | Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HARBOR RESTROOMS | Add grid tied wind generator | Installing a wind generator will save and make power. This is a very good wind area, estimated 12 mph average. | | $20,222 | $1,056 | $0 | $1,056 | 19.1 | 17.4 | 16.0 | 15.3 |
| AIRPORT TERMINAL | Techmar Method-VARIABLE FREQUENCY DRIVES FOR Boiler CIRCULATION PUMPS, Eayrs Plumbing | Installing a Variable Frequency Drive on both Boiler circulation pumps controlled by a Differential Pressure Sensor will allow the pump and boiler system to be demand sensitive, when most zones are closed the pump can ramp down to a slower speed and save considerable electricity and fuel. | These are stand alone pumps with their own sensors, not connected to existing digital monitoring system. Fuel savings not computed, to many variables | $5,370 | $218 | $0 | $218 | 24.6 | 22.4 | 20.5 | 19.7 |
| HERC-01 KPC AND BGC | Automate pneumatic heating controls and add an Outside temperature reset | The existing controls only partially function. By replacing the existing controls with electronically operated controls greater precision and more even heating will accrue. The outside temperature reset will allow the heating system to respond more effectively to temperature changes. | Adding electronic controls will allow integration into a city wide energy monitoring system. Waiting for cost estimate numbers. An estimated 484 gallons of fuel can be saved annually resulting in $1,296 of annual savings. | | | $1,296 | $1,296 | | | | |
| ANIMAL SHELTER | Fresh air mixing system. Because of the function of this Facility, a lot of air exchanges are needed, therefore mixing warm exhaust air with fresh incoming air will have a large effect on energy use | Currently 100 % outside air is supplied without mixing. Controlled mixing of exhaust and fresh air can be monitored and controlled by co2 and temperature sensors and automatic cycles keeping air quality high and reducing energy use. | Waiting for cost estimate numbers. An estimated 136 gallons of fuel can be saved annually resulting in $364 of annual savings. | | | $364 | $364 | | | | |
| ANIMAL SHELTER | Improve HRV system, add heat exchanger to warm incoming air with the exhaust air | Heating the incoming air with the waste heat will reduce the load on the heating system and save fuel and electricity | Need contractor to inspect. Recommend Control Contractors | | | | | | | | |
| CITY HALL | Improving baseboard heating control | Installing some additional thermostats at critical locations the existing heating system can be used more effectively | Waiting on equipment costs numbers | | | | | | | | |
| PH HARBORMASTER OFFICE | Insulate and seal foundation skirting. | The foundation skirting leaks a lot of air and is poorly insulated. The inside surface is irregular and hard to seal, spray on Urethane foam may be effective. | Requires contractor bid or estimate | | | | | | | | |
| HARBOR RESTROOMS | Insulate Hot water pipes, Improve cold air return of furnace system | Insulating the hot water copper piping will greatly reduce heat loss and keep the heat where it is needed. The cold air return from the hot air furnace pulls through the utility area and not directly from the rooms, this causes cold outside air to be mixed in with the return. By reducing the heating of outside air the boiler will heat more effectively. | Need contractor to inspect. Recommend Control Contractors | | | | | | | | |
| PUBLIC LIBRARY | Monitor all building functions | Create logs of more sensors and actions | | $170 | | | | | | | |
| PUBLIC LIBRARY | Monitor oil burners | Install sensors, signal to BMS | | $490 | | | | | | | |

| Facility Name | Project | Project Details | Notes | Sum of Total Costs | Sum of Annual Electric Savings | Sum of Annual Heat Fuel Oil Savings | Sum of Total Annual Cash Savings | Sum of Years to Payback | Sum of Years to Payback with a 10% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 20% Increase in Heating Fuel and Electricity Rates | Sum of Years to Payback with a 25% Increase in Heating Fuel and Electricity Rates |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CITY WATER PLANT & MAINTENCE BUILDINGS | Use hydro turbines at some pressure reducing stations to heat the maintenance and water plant buildings | During upgrades to the pressure reducing station, hydro turbines can be installed to reduce the pressure and generate electricity that can be used to heat the buildings along the existing water line | Waiting on numbers Carey | | | | | | | | |
| **Grand Total** | | | | **$132,636** | **$35,288** | **$14,868** | **$50,156** | **2.6** | **2.4** | **2.2** | **2.1** |

# Appendix 9

**Homer Public Library Analysis- Methods to Reduce Energy Used for Heating and Ventilating**