

# ENERGY AUDIT

HSC Administration Building

3935 Svedlund

Homer, AK 99603

ATTN: Keren Kelley



Submitted by:

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## **REPORT DISCLAIMER**

This energy audit is intended to identify and recommend potential areas of energy savings, estimate the value of the savings and approximate the costs to implement the recommendations. Any modifications or changes made to a building to realize the savings must be designed and implemented by licensed, experienced professionals in their fields. Lighting recommendations should all be first analyzed through a thorough lighting analysis to assure that the recommended lighting upgrades will comply with State of Alaska Statute and well as Illuminating Engineering Society (IES) recommendations. Wisdom and Associates, Inc. bears no responsibility for work performed as a result of this report.

Payback periods may vary from those forecasted due to the uncertainty of the final installed design, configuration, equipment selected, and installation costs of recommended Energy Conservation Measures (ECMs), or the operating schedules and maintenance provided by the owner. Furthermore, ECMs are typically interactive, so implementation of one ECM may impact the cost savings from another ECM. Wisdom and Associates, Inc. accepts no liability for financial loss due to ECMs that fail to meet the forecasted payback periods.

This audit meets the criteria of a Level 2 Investment Grade Audit (IGA) per the American Society of Heating, Refrigeration, Air-conditioning Engineers (ASHRAE) and the Association of Energy Engineers (AEE), and is valid for one year. The life of the IGA may be extended on a case-by-case basis.

## Introduction

This report is a comprehensive energy study, which included an analysis of major energy consuming components of the building.

Homer Senior Citizens – Administration Building

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Homer, AK 99603

Contact: Keren Kelley

The average annual energy costs at this facility are as follows:

Electricity	\$19,337.76
Oil	\$11,591.80
Propane	\$8,367.72
Total	\$39,297.28

The potential annual energy cost savings for each energy conservation measure are summarized in the executive summary along with a more detailed description in the energy conservation measures section. All calculations are available in the support documentation. This audit is consistent with an ASHRAE Level 2 audit. The evaluations are based on estimations and industry standard calculation methods. The cost of each measure for this level of auditing is +/- 30% until detailed engineering, specifications, and hard proposals are obtained. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

The comprehensive energy audit covers the 10,395 square foot community center/administration building.

Utility information was collected and analyzed for 24 months of energy use of the building. The utility information allows us to analyze the building's operational characteristics and calculate energy benchmarks for comparison to industry averages. A computer spreadsheet was used to calculate benchmarks and to graph utility information (see the Benchmarking section).

An Energy Use Index (EUI) was established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft<sup>2</sup>/yr.), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints and drawings are utilized to verify the gross area of the facility. The EUI can be a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance, therefore, a high potential for energy savings.

The site survey provided information for interpreting where energy was spent and finding energy savings opportunities within the facility. The building site visit was performed to survey all major building components and systems. The site visit included an inspection of energy consuming components.

**Executive Summary**

ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
1	Convert propane double convection oven and double range to natural gas.	\$1,000	\$9,183	\$183,653	\$184,653	18365%
2	Retrofit existing boiler burners with natural gas burners.	\$3,740	\$8,776	\$175,522	\$179,262	4693%
3	Reduce average building temperature 5 degrees through installation of programmable thermostats.	\$1,760	\$1,928	\$38,557	\$40,316	2191%
4	Replace all incandescent lamps in friendship center, dining area and offices with LED lamps.	\$928	\$830	\$13,286	\$14,214	1432%
5	Replace east entrance canopy light with LED and shut off during daylight hours.	\$25	\$22	\$344	\$370	1374%
6	Replace propane double convection oven and double range with natural gas appliances.	\$14,381	\$8,514	\$170,272	\$184,653	1184%
7	Replace existing oil boilers with modulating/condensing gas boilers.	\$30,251	\$8,100	\$162,003	\$192,255	536%
8	Replace all existing T-12 four foot fluorescent lamps with LED direct replacement tubes.	\$10,043	\$1,496	\$23,941	\$33,984	238%
9	Replace parking lot light with LED fixture.	\$1,542	\$206	\$3,293	\$4,835	214%
10	Reduce domestic hot water temperature, per 1 degree increment.	\$150	\$16	\$247	\$397	165%
11	Install 2" foam board sheathing on the inside of the original wood foundation.	\$2,882	\$168	\$3,350	\$6,232	116%
12	Replace main circulation pump with a variable speed pump.	\$683	\$24	\$359	\$1,042	53%
13	Add 6 inches of blown cellulose to the entire attic space.	\$17,152	\$474	\$9,489	\$26,641	55%
14	Replace east entry wall mount HPS fixture with LED (currently burned out).	\$386	\$7	\$105	\$491	27%
15	Replace lamps in outdoor wall lights with LED.	\$201	\$3	\$49	\$250	25%
16	Replace all existing T-8 four foot fluorescent lamps with LED direct replacement tubes.	\$5,297	\$68	\$1,086	\$6,383	20%
17	Place east entrance canopy light on photosensor and replace lamp with LED.	\$363	\$0	\$6	\$370	2%

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	<b>Non-Cost Effective Measures</b>					
18	Install 2" foam insulation on the crawlspace floor around the perimeter of the building.	\$3,176	-\$29	-\$573	\$2,603	-18%
19	Replace domestic hot water circulation pump with variable speed pump.	\$683	-\$12	-\$182	\$502	-27%
20	Replace CFL lamps in the office restroom with LED.	\$150	-\$3	-\$54	\$97	-36%
21	Replace existing wood framed windows with new vinyl windows.	\$17,567	-\$340	-\$6,798	\$10,769	-39%
22	Replace exit signs with no-power tritium exit signs.	\$1,216	-\$43	-\$695	\$521	-57%

The **ECM#** is the priority ranking of an Energy Conservation Measure. ECMs of the same color are overlapping.

The **Installed Cost** is the full upfront cost expected for the improvement.

The **Annualized NPV Savings** reflects the annualized Net Present Value savings over the life of the improvement, adjusted for general inflation, fuel price escalation, maintenance, discount rate and installed cost.

The **NPV Savings Over Improvement Life** reflects the Net Present Value of cumulative savings over the life of the improvement, adjusted for general inflation, fuel price escalation, maintenance, discount rate and installed cost.

The **Breakeven Cost** is the maximum cost in today's dollars that could be spent on an improvement and still be cost effective.

The **Return on Investment (ROI)** listed for each ECM is the net savings of the energy conservation measure divided by the installed cost listed.

Two or more improvements highlighted with the same color indicates multiple options for a single improvement.

## **Method of Analysis**

Post site visit work included an evaluation of the information gathered, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on HVAC, lighting, and building envelope improvements. Collected data was processed using Microsoft Excel spreadsheets and ASHRAE energy calculations to anticipate energy usage for each of the proposed energy conservation measures (ECMs). The actual building energy usage was entered directly from the utility bills provided. The anticipated energy usage was compared to the historical data to determine energy savings for the proposed ECMs.

It is important to note that the savings represented in this report should not be considered additive because of the interrelation of energy conservation measures. Implementation of more than one ECM often affects the savings of other ECMs.

ECMs were determined by identifying the building's unique properties and finding the most beneficial energy saving measures available that met the specific needs of the facility. The building construction type, function, operational schedule, existing conditions, and foreseen future plans were accounted for in the evaluation and final recommendations. Energy savings are calculated based on industry standard methods and estimations. Energy consumption is calculated based on manufacturer's information when new equipment is proposed.

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include materials and labor costs to estimate the full up-front investment required. Measures were analyzed based on life-cycle-cost techniques, which include the initial cost of the improvement, expected life of the improvement, annual energy cost, annual maintenance cost, and a discount rate of 3.0%/year. Energy cost escalation rates are taken from the current Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis from the US Department of Commerce. Maintenance costs are estimated at 2% of fuel cost related to an improvement unless otherwise noted. Expected life of improvements is taken from industry and government sources. Future savings are discounted to the present to account for the time-value of money (i.e. money's ability to earn interest over time).

All results are dependent on the quality of input data provided, and can only act as an approximation. In some instances, several methods may achieve the identified savings. This report is not intended as a final design document. The design professional or other persons following the recommendations shall accept responsibility and liability for the results.



## **Audit Overview/Building Description**

The Homer Seniors Citizens administration building is a multi-use facility that houses the administrative offices for the organization and provides services to the senior community. Functions include a full time kitchen serving meals for up to 100 people per day, a community area with activities for seniors, and a conference space used for exercise and small group activities. Meals are also delivered homebound seniors over 60 years of age. Operational hours are Monday through Friday from 9 am to 4 pm, with meals served to the public between 11:30 am and 1:00 pm, with special events for holidays.

The original part of the building which houses the administrative offices and the south facing side of the building was constructed in 1980. This portion of the building has an all-weather wood foundation. There have been at least two additions to the building since that time. The second addition has a concrete foundation insulated with spray foam. The third foundation under the dining room addition and kitchen storage area is constructed of insulated concrete forms. The above grade wall construction for all additions is typical stick framing. The roof system for the entire building is trusses with blown in cellulose insulation.

The kitchen provides meals to the public over 60 years of age and for the assisted living facility located next door. The kitchen is fitted with two commercial range/oven combination appliances and two convection ovens, all of which are supplied with a dedicated propane fuel source. The kitchen ventilation is provided through a roof-top exhaust which is operated during cooking activities. A propane fired make up air heater is located on the roof to provide pre-heated make up air for the kitchen exhaust system but this appliance is disabled and not currently in use. The kitchen also has a steam dish sanitizer that is powered by electricity.

Building heat is provided by two oil fired boilers. Domestic hot water is also provided by the boiler system through an indirect storage tank.

Lighting in the building is a mixture of incandescent and fluorescent fixtures. Many of the fixtures were in poor condition with lamps burnt out. Because of the number of lamps out at the time of the audit, replacing all lamps with working lamps may not result in the expected decrease in utility consumption.

This building is assessed and electrical demand charge for peak kW usage in a 15 minute increment per billing period. Review of the demand charges shows a very steady consumption. Demand charge savings are not included in any of the energy conservation measures listed since it is not possible to determine if any single efficiency measure is operating during the 15 minute peak usage period every month. Including these savings would likely overestimate the cost effectiveness. If there were a high peak load user in this building such as a very large electric motor or arena lighting such loads would be evaluated with demand charge savings.

## Energy Conservation Measures

Energy conservation measures are those measures which are considered as having the potential to be cost effective and appropriate energy improvement options for the building. Estimated costs are taken from the current Craftsman National Estimator and are adjusted for zip code. Different rates and averages can be applied to this report if requested.

Retrofits listed in this report to LED lighting may reduce the amount of measurable lumen output below Illumination Engineering Society recommendations which are based on light striking an object using a standard light meter. The human eye reacts to light reflected from an object, and new research has indicated that standard light meters do not accurately measure the sensitivity of the human eye to towards certain wavelengths of light. For LED lighting retrofits correction factors applied to conventional values of lumens per watt yield a value for pupil lumens per watt that are close to the original installation. Pupil lumens are a measure of how effectively the eye sees the light that is emitted, and allows for reduction in lighting wattage while still maintaining or increasing perceived light levels and quality.

Light Source	Watt	Total Lumens	Standard Lumens/Watt	Correction Factor	Pupil Lumnes	Pupil Lumens/Watt
<b>Low Pressure Sodium</b>	250	32500	130	0.2	9250	37
<b>High Pressure Sodium</b>	365	37000	101	0.62	25530	70
<b>Metal Halide</b>	455	36000	79	1.49	48960	108
<b>T8 Fluorescent</b>	36	2800	78	1.13	3080	85
<b>High Quality LED</b>	15	1500	100	1.9	2475	165
Source: White Paper on Energy Use in Alaska's Public Facilities, October 22, 2012						

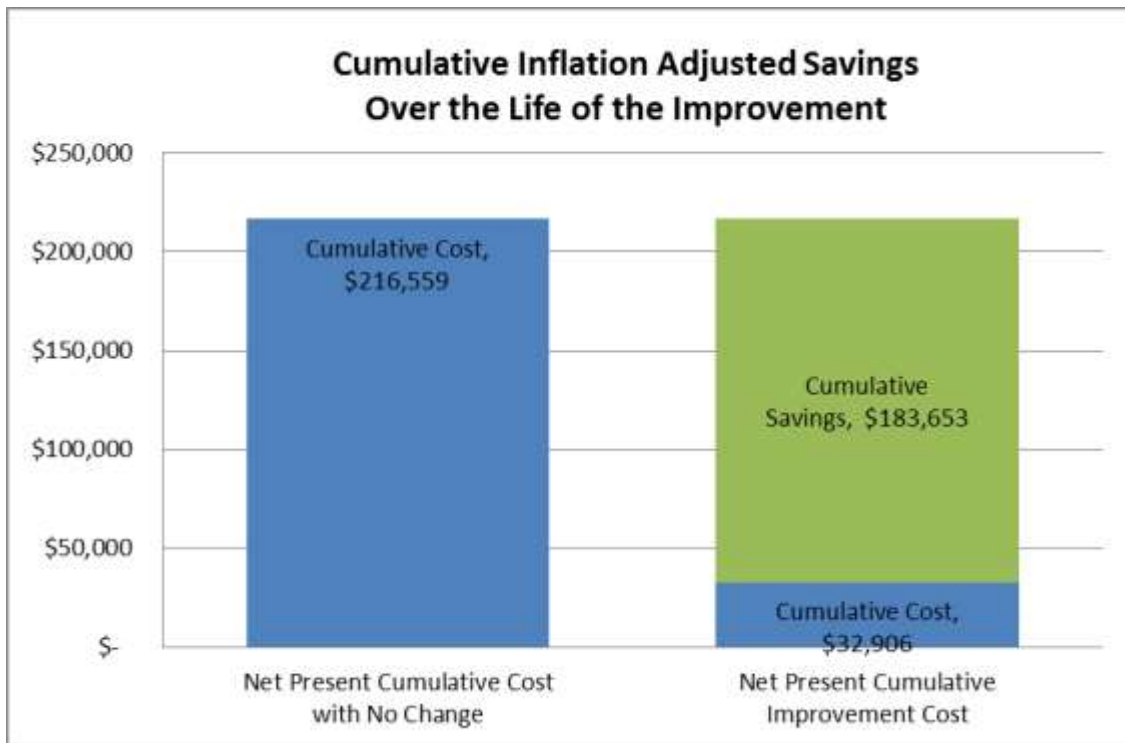
Lighting and electrical improvements are based on usage estimates apparent at the time of the audit and may not reflect actual usage or occupant behavior. Before committing to a complete lighting retrofit, it is recommended that a small sample of the new lamps you intend to use be installed and tested for a time before pursuing all of the recommended changes. Light output, color rendition, color temperature and personal preference all play a part in a satisfactory lighting retrofit. The benefit of reduced energy consumption is lost if fixtures have to be re-lamped after the retrofit or people are not comfortable with a new lighting scheme.

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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
1	Convert propane double convection oven and double range to natural gas.	\$1,000	\$9,183	\$183,653	\$184,653	18365%

This ECM assumes a life expectancy of 20 years for this measure. This improvement calls for replacing the current orifice and/or burner parts in the existing cooking equipment with natural gas compatible parts. Research into this measure indicates that such parts may or may not be available because of the age of the appliances. This measure overlaps ECM #6 which calls for outright replacement of the cooking appliances with new natural gas fired cooking appliances.

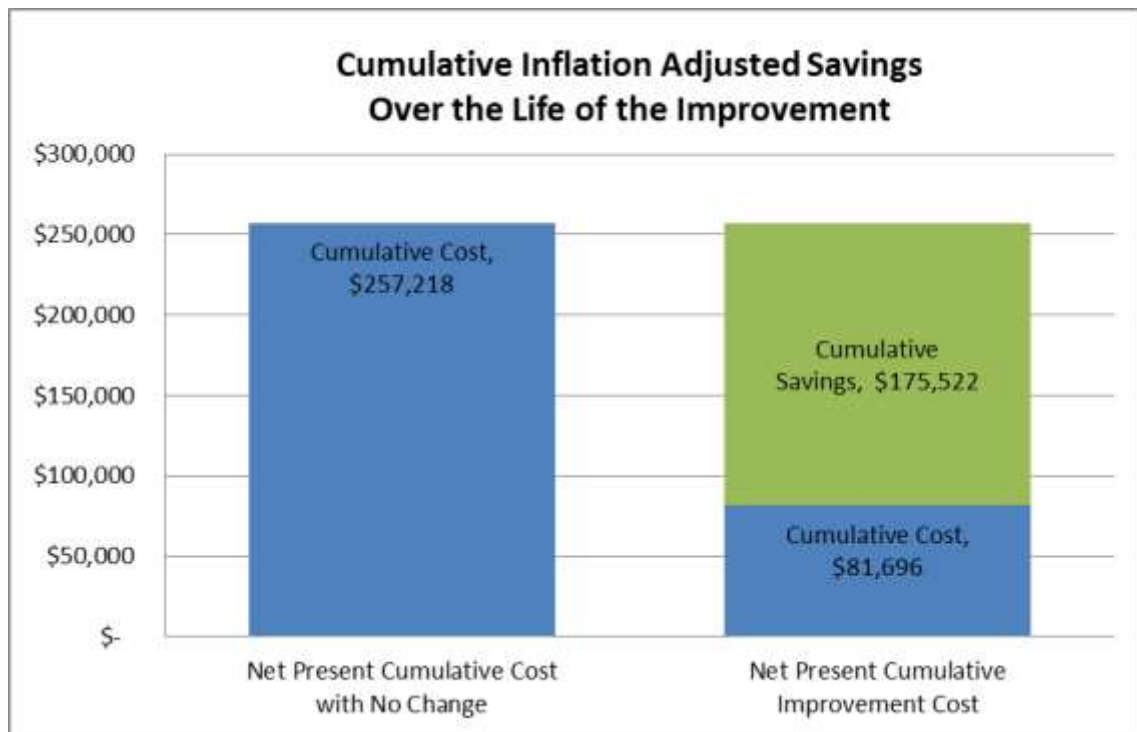


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
2	Retrofit existing boiler burners with natural gas burners.	\$3,740	\$8,776	\$175,522	\$179,262	4693%

This ECM assumes a life expectancy of 20 years for this measure. This improvement calls for replacement of the burners of the existing boilers with natural gas burners. According the boiler manufacturer the type of boiler currently installed can be retrofit with a natural gas gun. This measure overlaps ECM #8 which calls for outright replacement of both boilers with dedicated natural gas fired boilers.

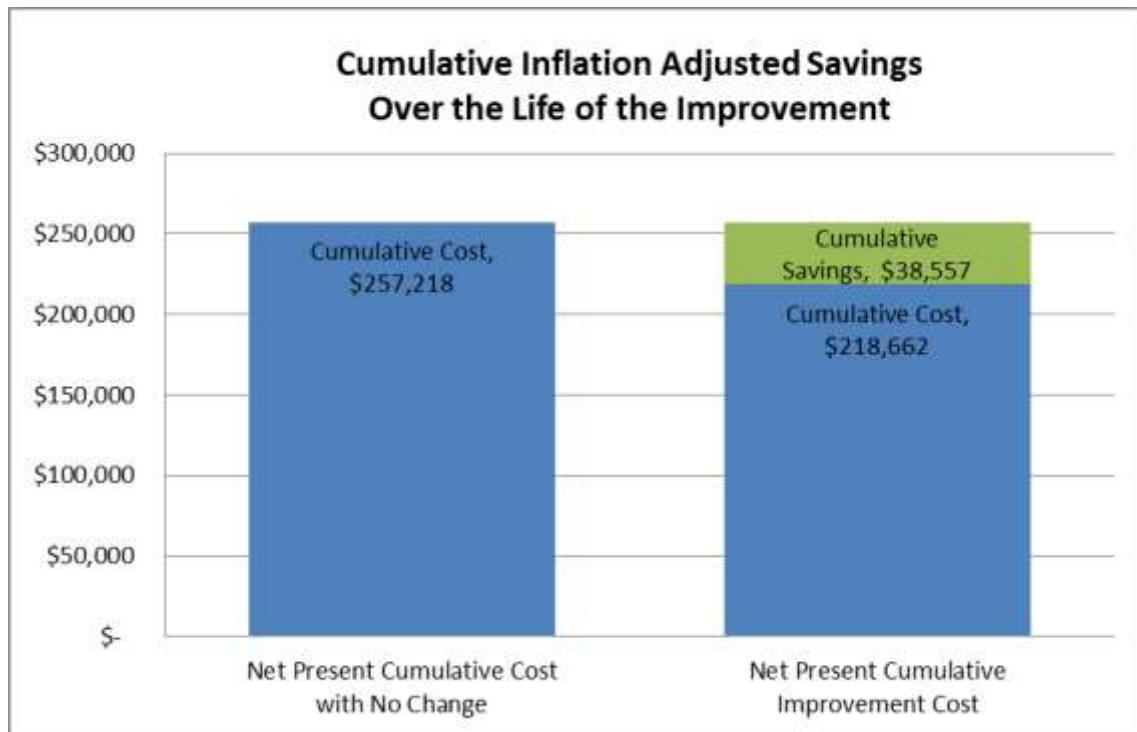


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
3	Reduce average building temperature 5 degrees through installation of programmable thermostats.	\$1,760	\$1,928	\$38,557	\$40,316	2191%

This ECM assumes a life expectancy of 20 years for this measure. This improvement calls for lowering the building temperature during weekends and other unoccupied times to reduce the overall fuel consumption. During the audit there was a noticeable lack of temperature control in the different zones, and the use of electric space heaters to make up temperature short-falls in the administrative section of the building. Newer, more accurate thermostats may help with this issue. The use of locking covers over the thermostats to prevent tampering is suggested.

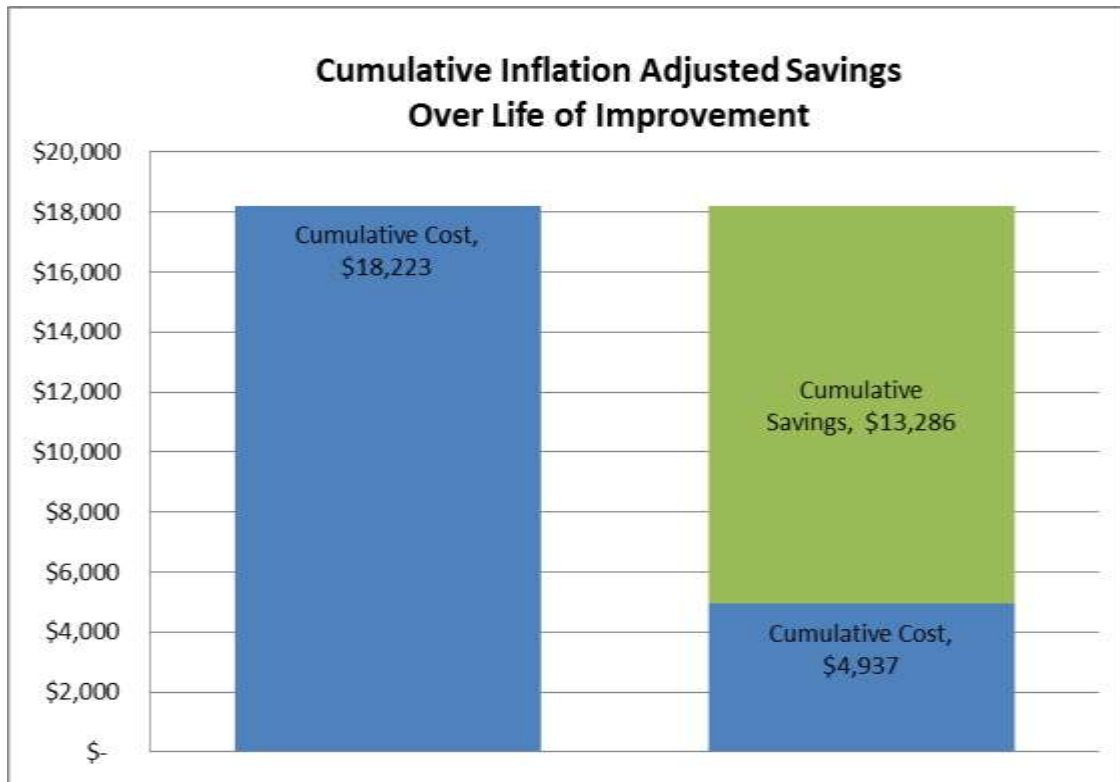


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
4	Replace all incandescent lamps in friendship center, dining area and offices with LED lamps.	\$928	\$830	\$13,286	\$14,214	1432%

This ECM assumes a life expectancy of 16 years for this measure. This improvement calls for replacing the current incandescent lamps with 10 Watt LED lamps. This will reduce the amount of measurable lumen output from what is currently installed. This recommendation is based on pupil lumens, which is the amount of light visible to the eye. Replacement with LED lamps should also result in reduced maintenance costs over fluorescent lamps because of the much longer life span of LED products.

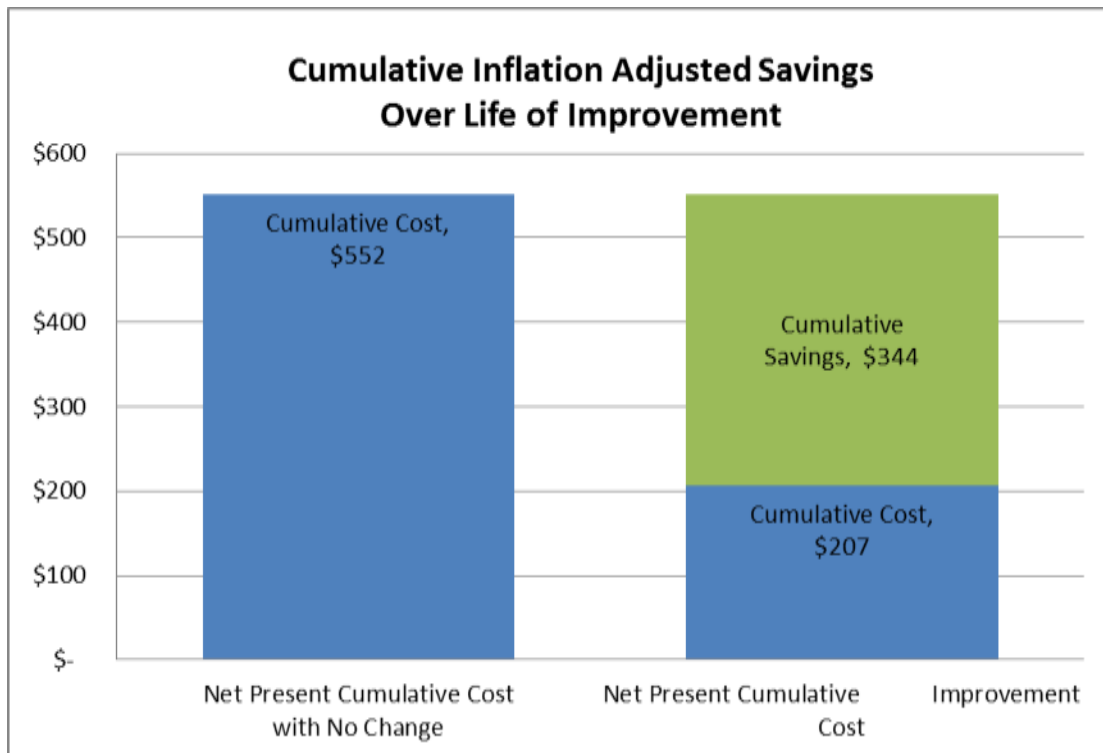


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
5	Replace east entrance canopy light with LED and shut off during daylight hours.	\$25	\$22	\$344	\$370	1374%

This ECM assumes a life expectancy of 16 years for this measure. This measure calls for replacing the existing compact fluorescent lamp installed in this fixture with a 10 Watt LED lamp. During the audit this lamp was on every day during daylight hours. Replacing the current compact fluorescent lamp with a 10 Watt LED lamp will reduce the amount of measurable lumen output from what is currently installed. This recommendation is based on pupil lumens, which is the amount of light visible to the eye. Replacement with LED lamps should also result in reduced maintenance costs over fluorescent lamps because of the much longer life span of LED products. Cold weather performance should improve as LED lamps are less sensitive to temperature. This improvement overlaps ECM #17.

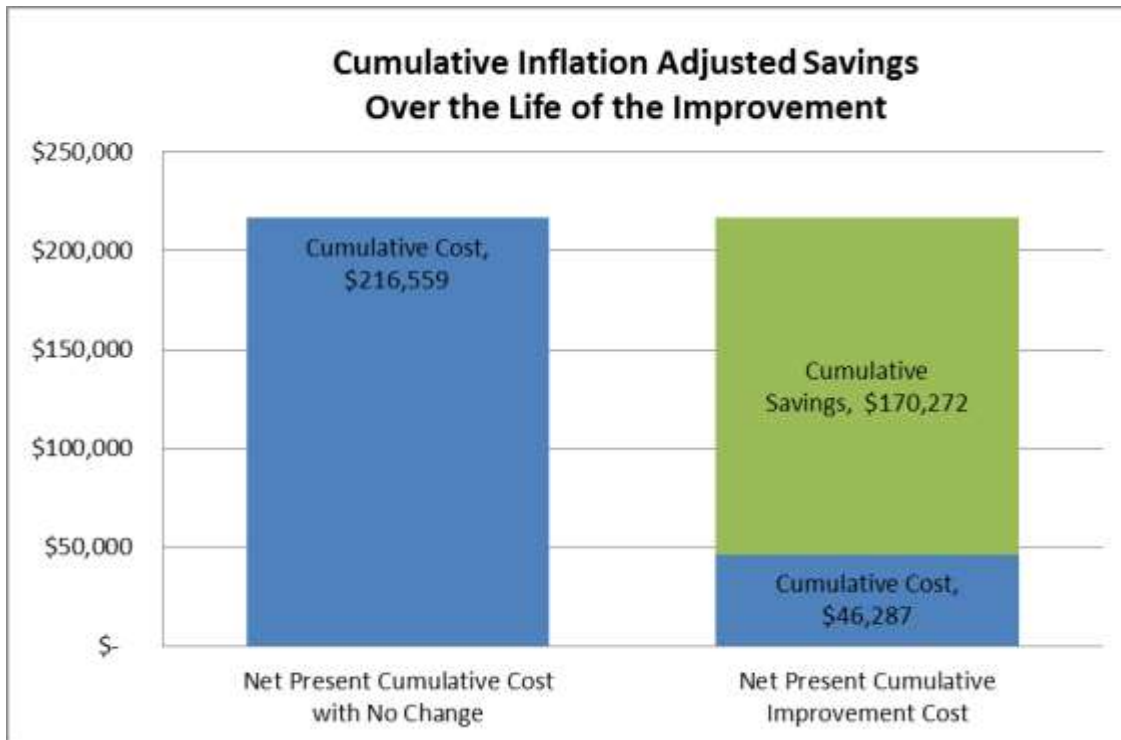


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
6	Replace propane double convection oven and double range with natural gas appliances.	\$14,381	\$8,514	\$170,272	\$184,653	1184%

This ECM assumes a life expectancy of 20 years for this measure. This improvement calls for replacing the existing propane fired cooking equipment in the kitchen with new equipment set up for natural gas. Replacement parts for conversion of the existing appliances from propane to natural gas may not be available, in which case this measure would be the next best alternative. This measure overlaps ECM #1 which calls for replacement of the burner assemblies and/or gas orifice of the current cooking equipment.



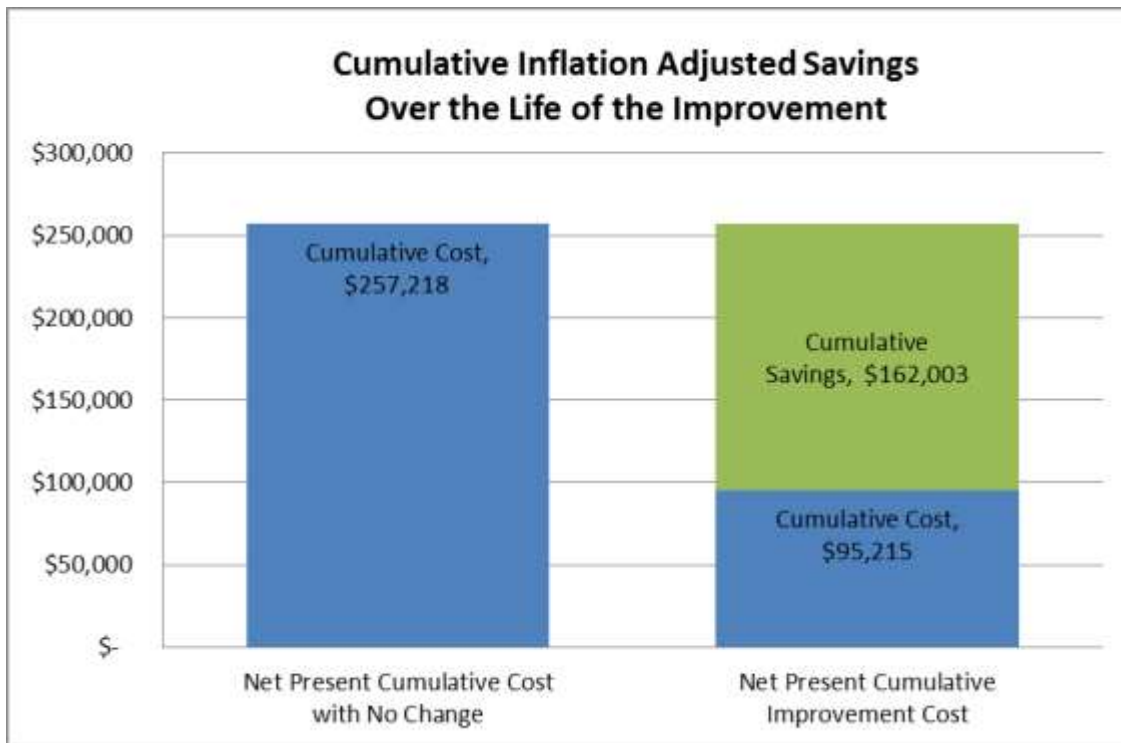


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
7	Replace existing oil boilers with modulating/condensing gas boilers.	\$30,251	\$8,100	\$162,003	\$192,255	536%

This ECM assumes a life expectancy of 20 years for this measure. This improvement calls for replacement of the current boilers with 96% AFUE efficiency rating or better modulating/condensing natural gas boilers. This improvement overlaps ECM #2 which calls for replacement of the burner systems of the current boilers only. This improvement will result in a better overall system efficiency than can be achieved by burner conversion alone. However, the initial cost is much higher than simply changing the burner assembly of the existing boilers, making this measure less cost effective. Also, the current distribution system may not be able to take full advantage of a condensing gas boiler system which relies on a return water temperature of less than 130 degrees to achieve full efficiency. A licensed heating contractor with experience in the setup and installation of condensing gas boilers should be consulted before pursuing this measure to ensure that the rated efficiency of the proposed boilers can actually be achieved with the current distribution system.

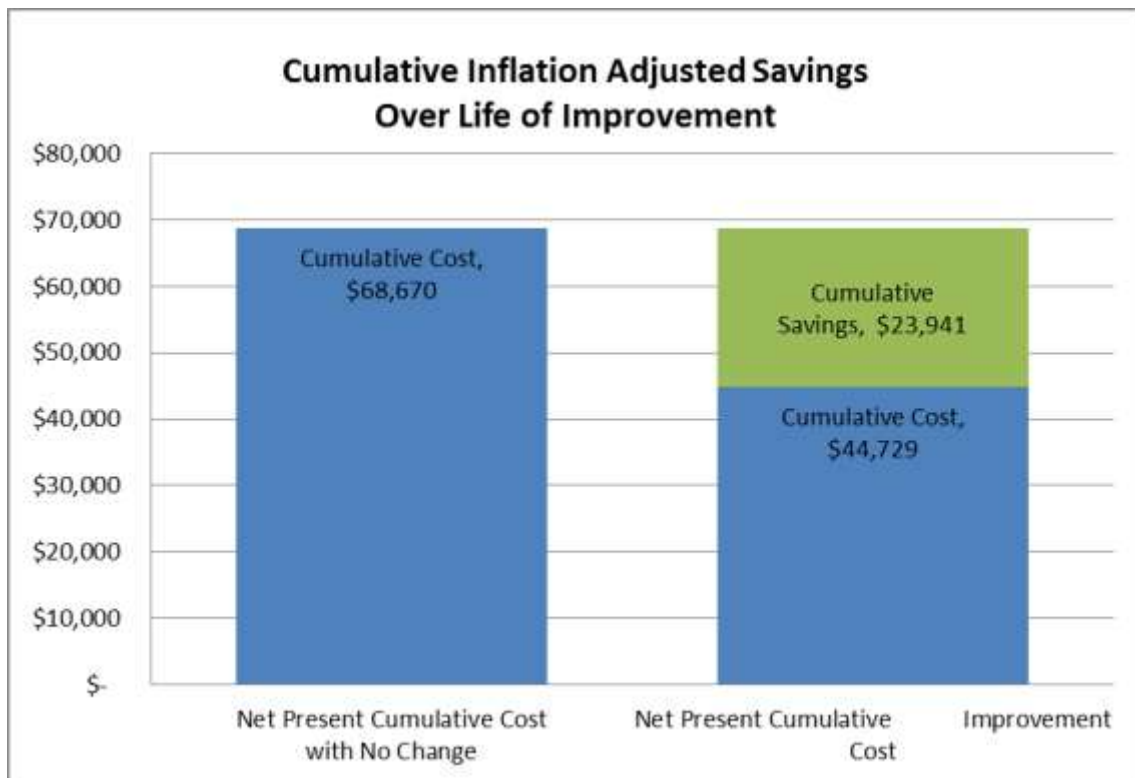


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
8	Replace all existing T-12 four foot fluorescent lamps with LED direct replacement tubes.	\$10,043	\$1,496	\$23,941	\$33,984	238%

This ECM assumes a life expectancy of 16 years for this measure. This improvement calls for the replacement of all of the existing T-12 lamps in the building with direct replacement LED 20 Watt tubes. Replacing the existing fluorescent tubes with LED tubes will reduce the amount of measurable lumen output from what is currently installed. This recommendation is based on pupil lumens, which is the amount of light visible to the eye. Replacement with LED lamps should also result in reduced maintenance costs over fluorescent lamps because of the much longer life span of LED products.

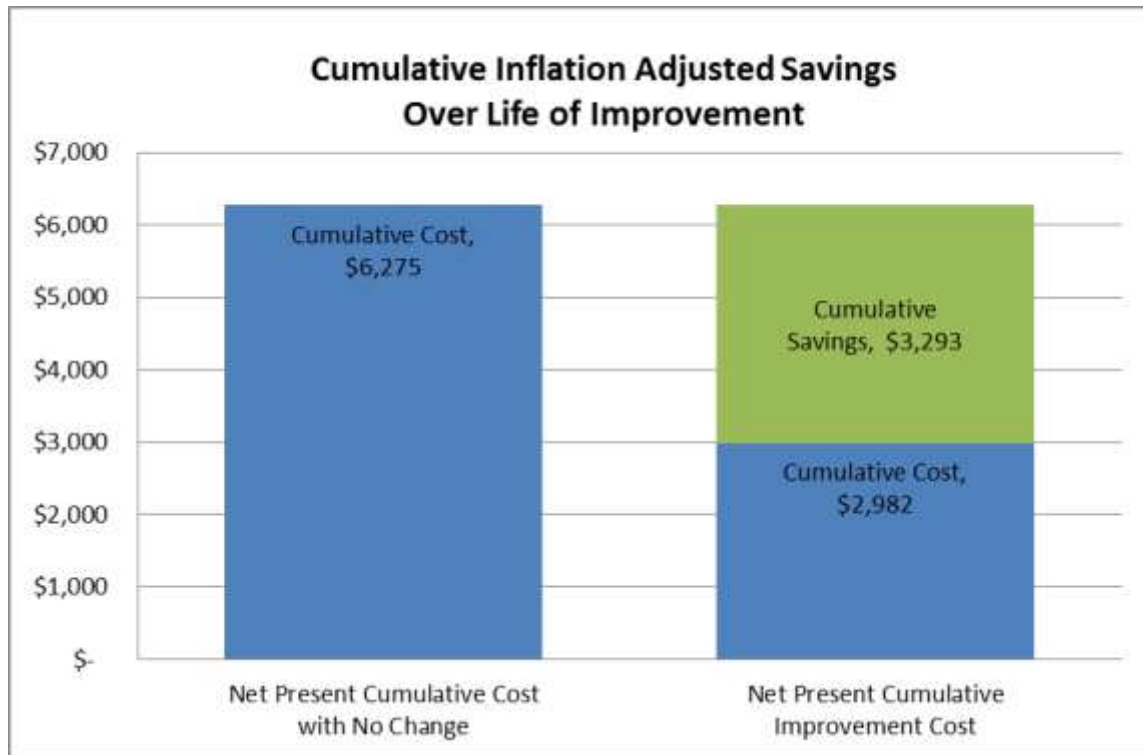


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
9	Replace parking lot light with LED fixture.	\$1,542	\$206	\$3,293	\$4,835	214%

This ECM assumes a life expectancy of 16 years for this measure. This improvement calls for the replacement of the high intensity discharge parking lot light over the east building entrance with a 90 Watt LED fixture. This recommendation is based on pupil lumens, which is the amount of light visible to the eye. Replacement of this fixture should result in reduced maintenance costs because of the long life of LED lamps.

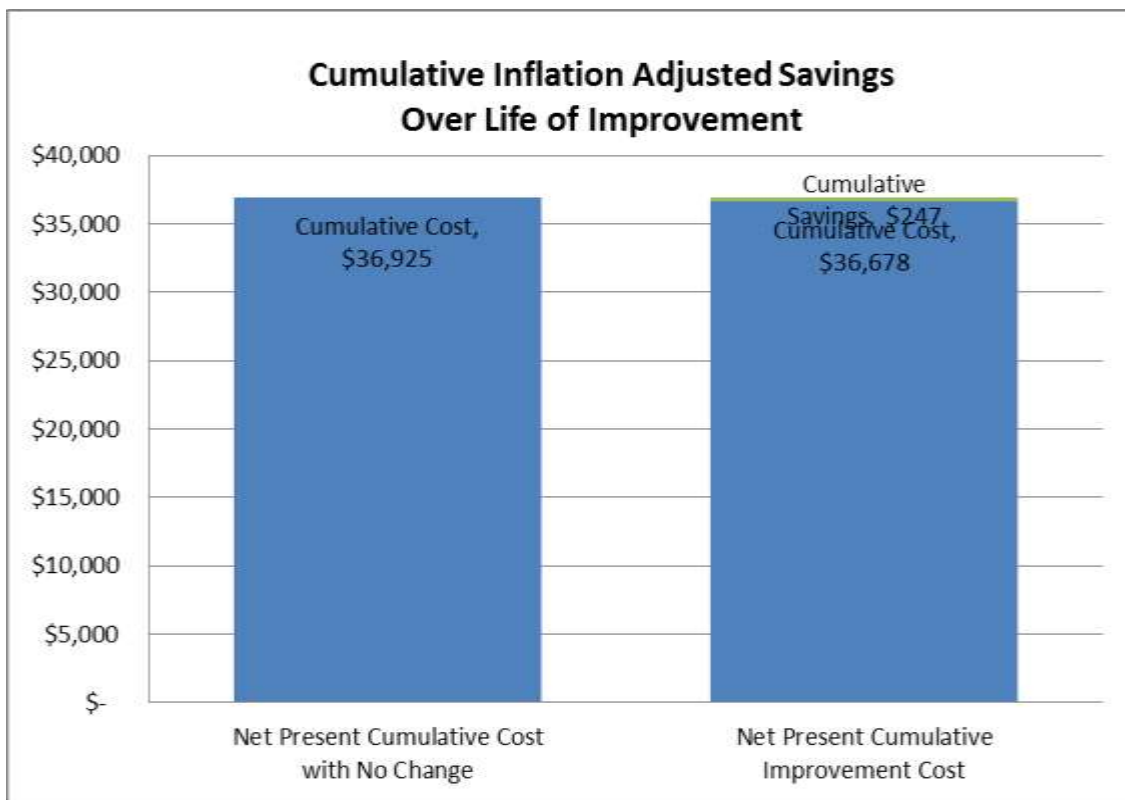


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
10	Reduce domestic hot water temperature, per 1 degree increment.	\$150	\$16	\$247	\$397	165%

This ECM assumes a life expectancy of 15 years for this measure. This measure calls for reducing the temperature of the domestic hot water. The temperature should be reduced in 1 to 2 degree increments until the output water temperature is no longer satisfactory. The cost of this measure is based on a service call by a heating professional for each temperature adjustment. If the heating system is converted from oil to natural gas fuel, the ROI will decrease due to the less expensive fuel cost.

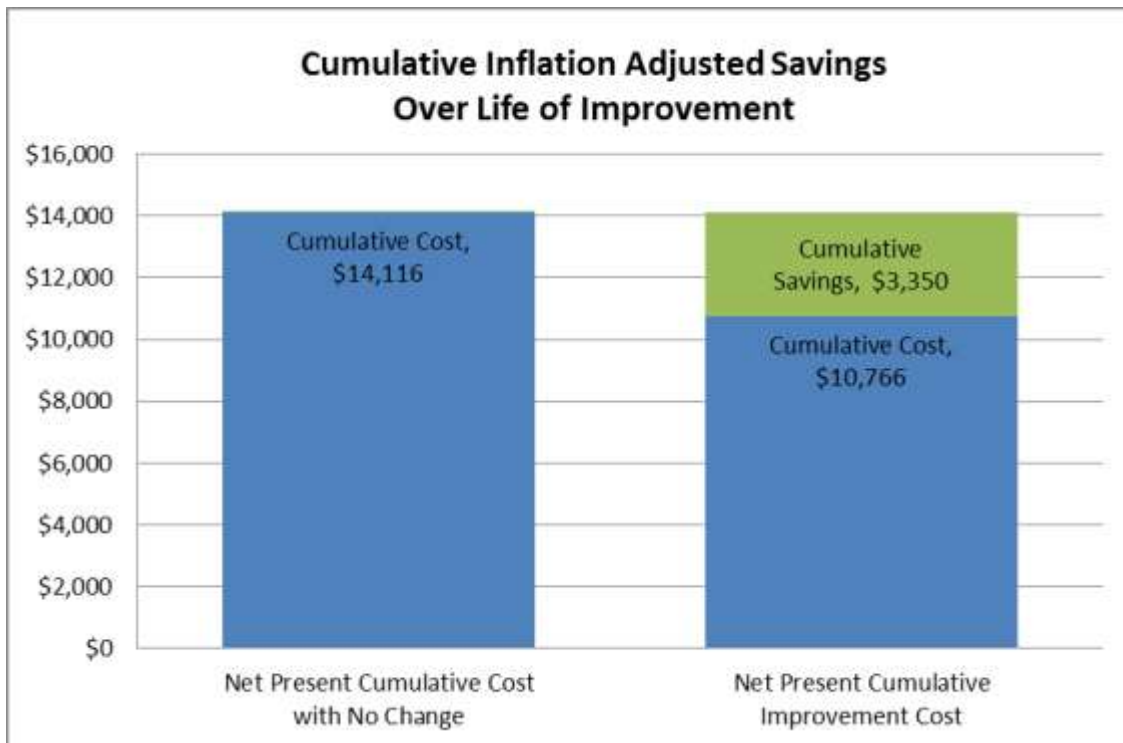


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
11	Install 2" foam board sheathing on the inside of the original wood foundation.	\$2,882	\$168	\$3,350	\$6,232	116%

This ECM assumes a life expectancy of 20 years for this measure. This improvement calls for the installation of an additional 2 inches of polystyrene foam board insulation on the inside of the original wood foundation. This measure will bring the insulation level on this part of the foundation up to par with the rest of the structure. The other two foundation types are already insulated with foam and have a much higher R-value than the original section. If the heating system is converted from oil to natural gas fuel, the ROI will decrease due to the less expensive fuel cost.

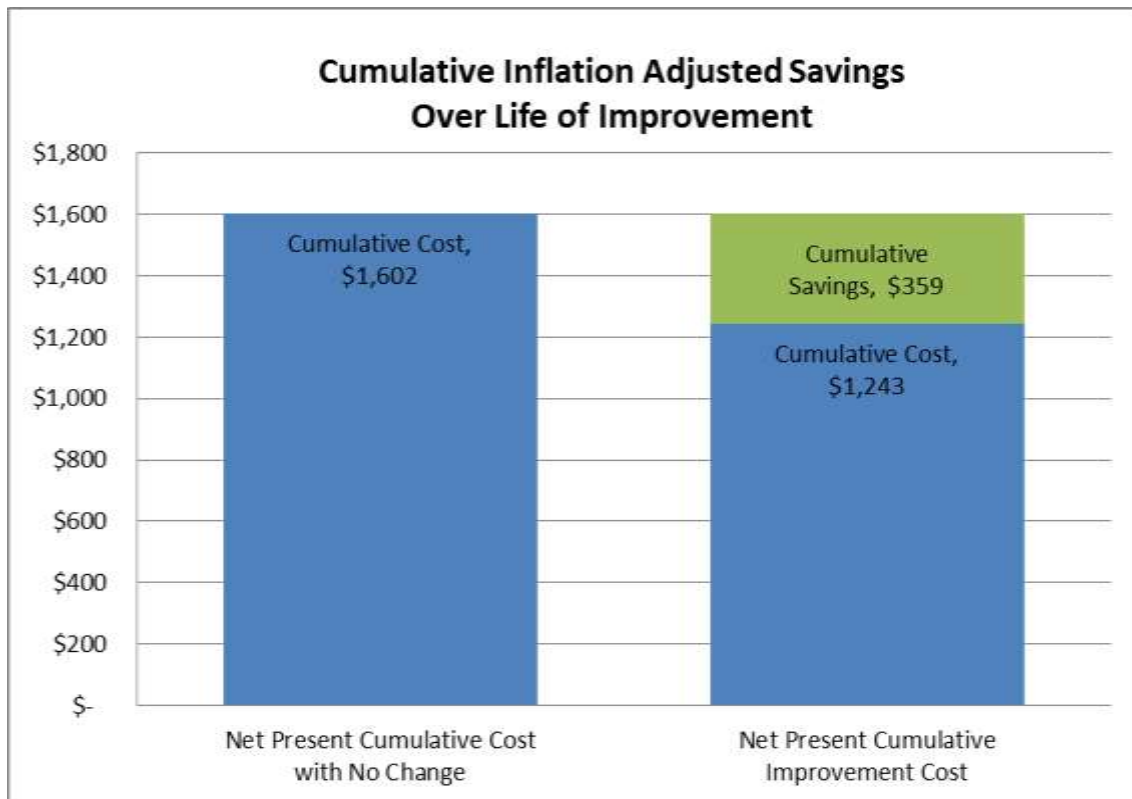


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
12	Replace main circulation pump with a variable speed pump.	\$683	\$24	\$359	\$1,042	53%

This ECM assumes a life of 16 years for this measure. This improvement calls for replacement of the existing circulation pump with a variable speed pump. Variable speed, permanent magnet circulation pumps are much more efficient than standard pumps. These pumps monitor the amount of power needed for pumping and adjust themselves to only deliver what is required.

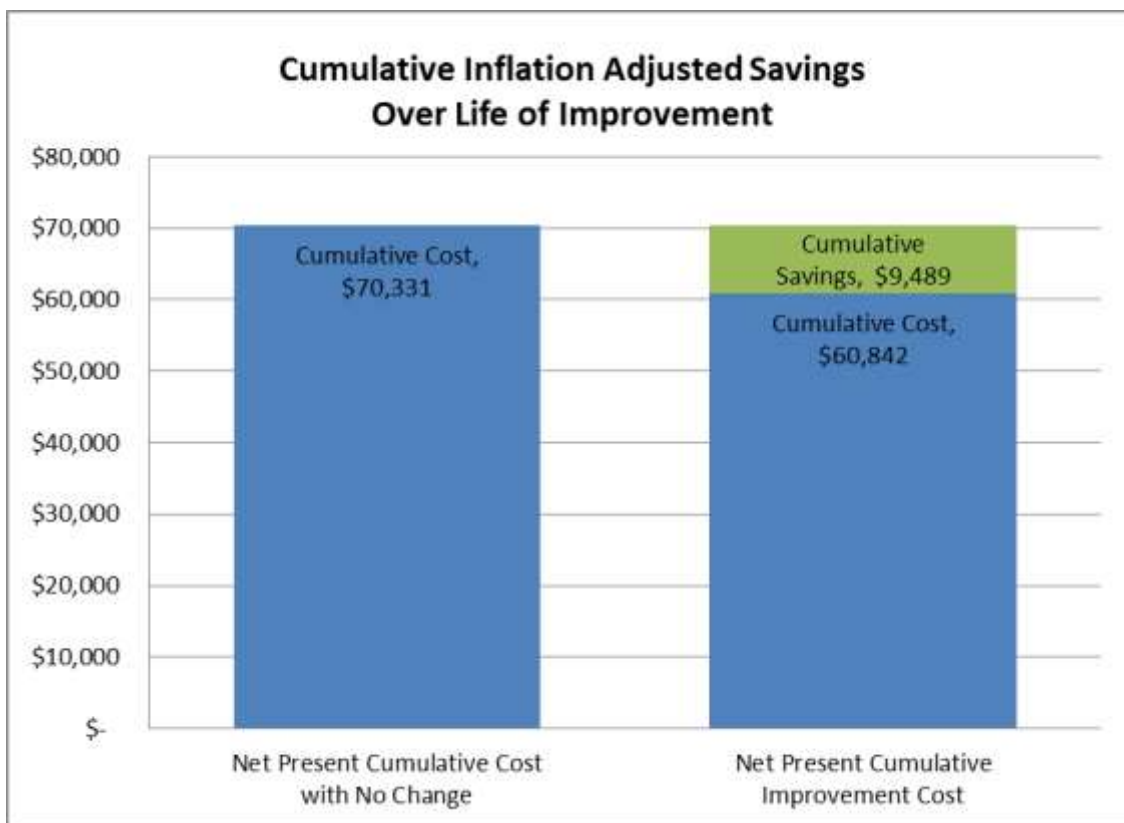


Energy Audit Report

December 23, 2013

ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
13	Add 6 inches of blown cellulose to the entire attic space.	\$17,152	\$474	\$9,489	\$26,641	55%

This ECM assumes a life expectancy of 20 years for this measure. This improvement calls for adding six inches of blown in cellulose insulation to the entire attic space of the building. Before insulating, it is recommended that any air leakage points into the attic be sealed. Proper attic ventilation must also be maintained after additional insulation is installed. If the heating system is converted from oil to natural gas fuel, the ROI will decrease due to the less expensive fuel cost.

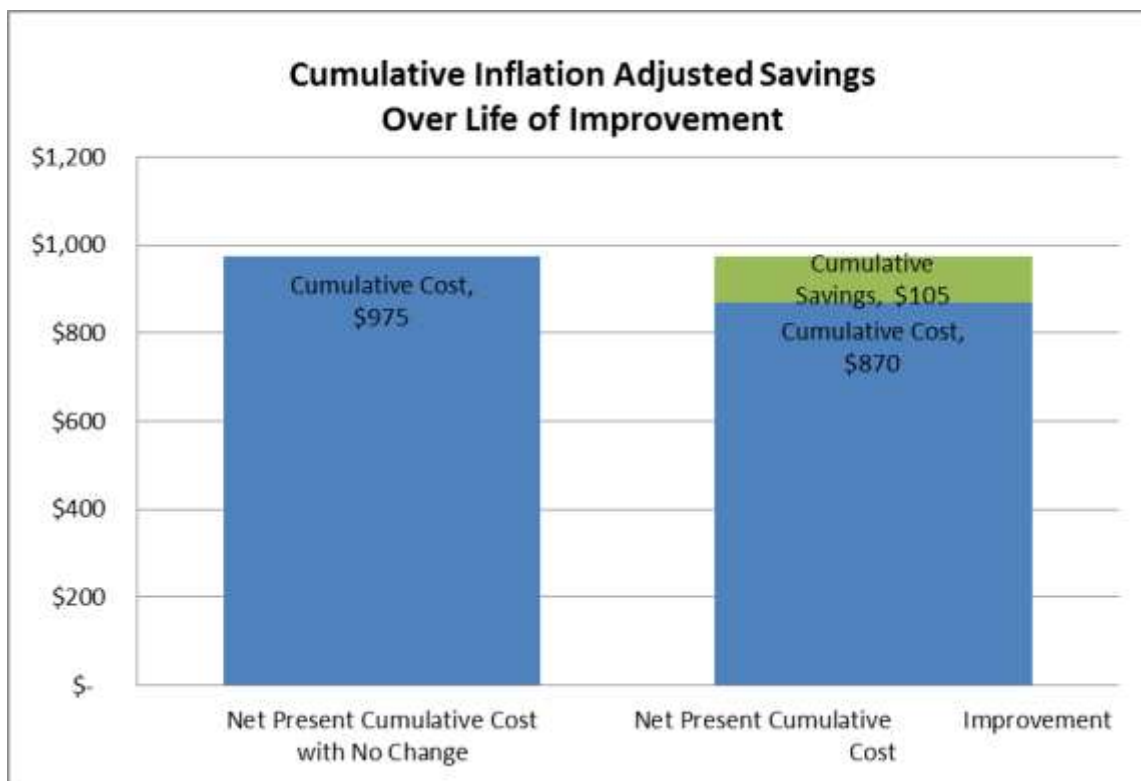


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
14	Replace east entry wall mount HPS fixture with LED (currently burned out).	\$386	\$7	\$105	\$491	27%

This ECM assumes a life expectancy of 16 years for this measure. This improvement calls for the replacement of the high intensity discharge entryway light at the east building entrance with a 30 Watt LED fixture. This fixture is currently not working. This recommendation is based on pupil lumens, which is the amount of light visible to the eye. Replacement of this fixture should result in reduced maintenance costs because of the long life of LED lamps. This fixture is currently burned out.



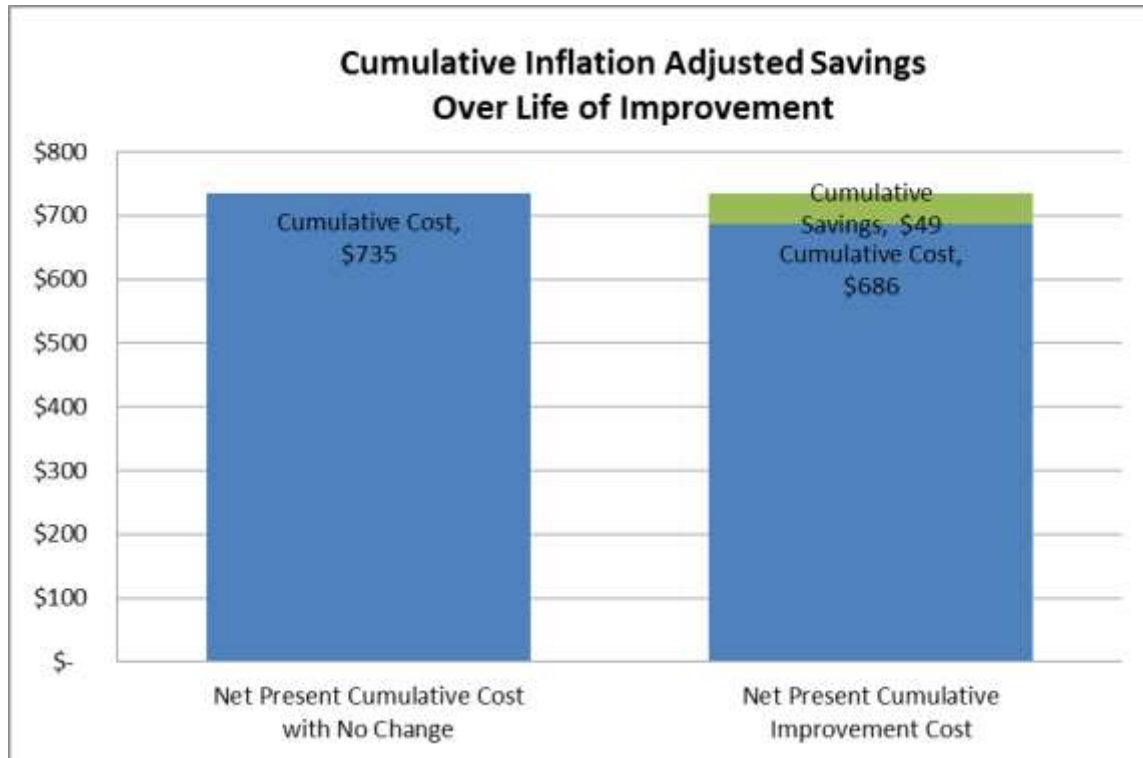


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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
15	Replace lamps in outdoor wall lights with LED.	\$201	\$3	\$49	\$250	25%

This ECM assumes a life expectancy of 16 years for this measure. This improvement calls for the replacement of the lamps at the exterior switched building fixtures with 10 Watt LED lamps. The currently installed lamps are a mixture of compact fluorescent lamps. Cold weather performance should improve as LED lamps are less sensitive to temperature. This recommendation is based on pupil lumens, which is the amount of light visible to the eye. Replacement of these lamps should result in reduced maintenance costs because of the long life of LED lamps.

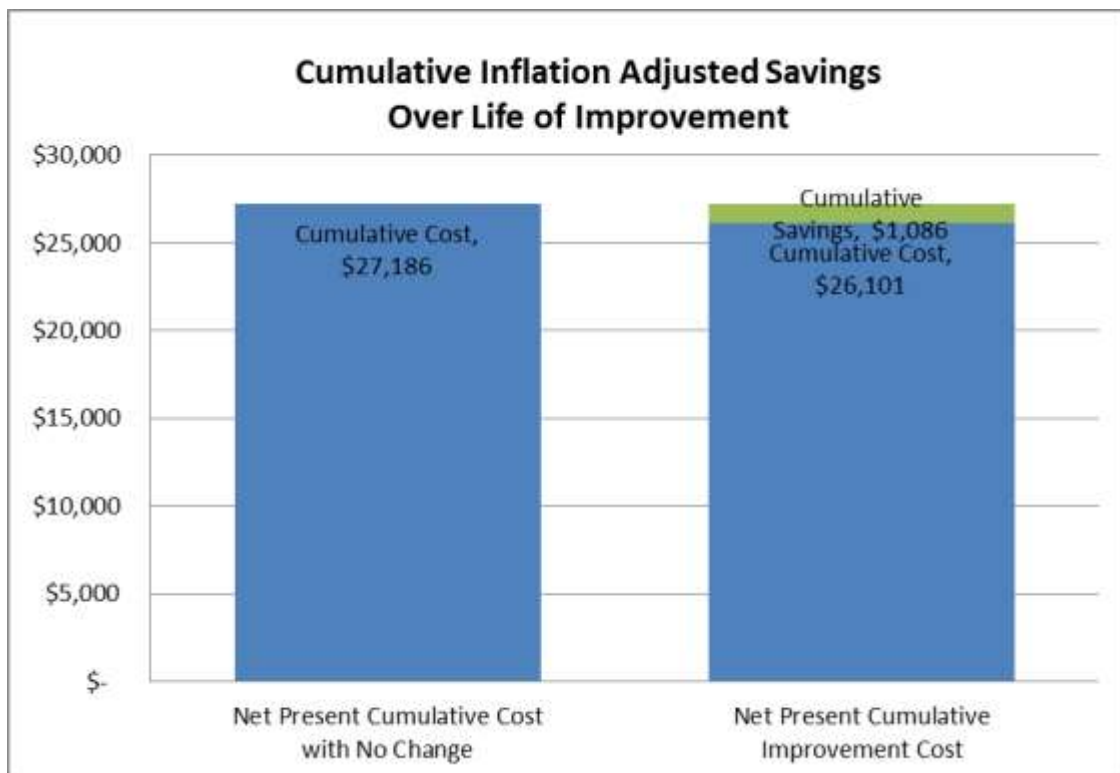


Energy Audit Report

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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
16	Replace all existing T-8 four foot fluorescent lamps with LED direct replacement tubes.	\$5,297	\$68	\$1,086	\$6,383	20%

This ECM assumes a life expectancy of 16 years for this measure. This improvement calls for the replacement of all of the existing T-8 lamps in the dining area soffits with direct replacement LED 20 Watt tubes. Replacing the existing fluorescent tubes with LED tubes will reduce the amount of measurable lumen output from what is currently installed. This recommendation is based on pupil lumens, which is the amount of light visible to the eye. Replacement with LED lamps should also result in reduced maintenance costs over fluorescent lamps because of the much longer life span of LED products.

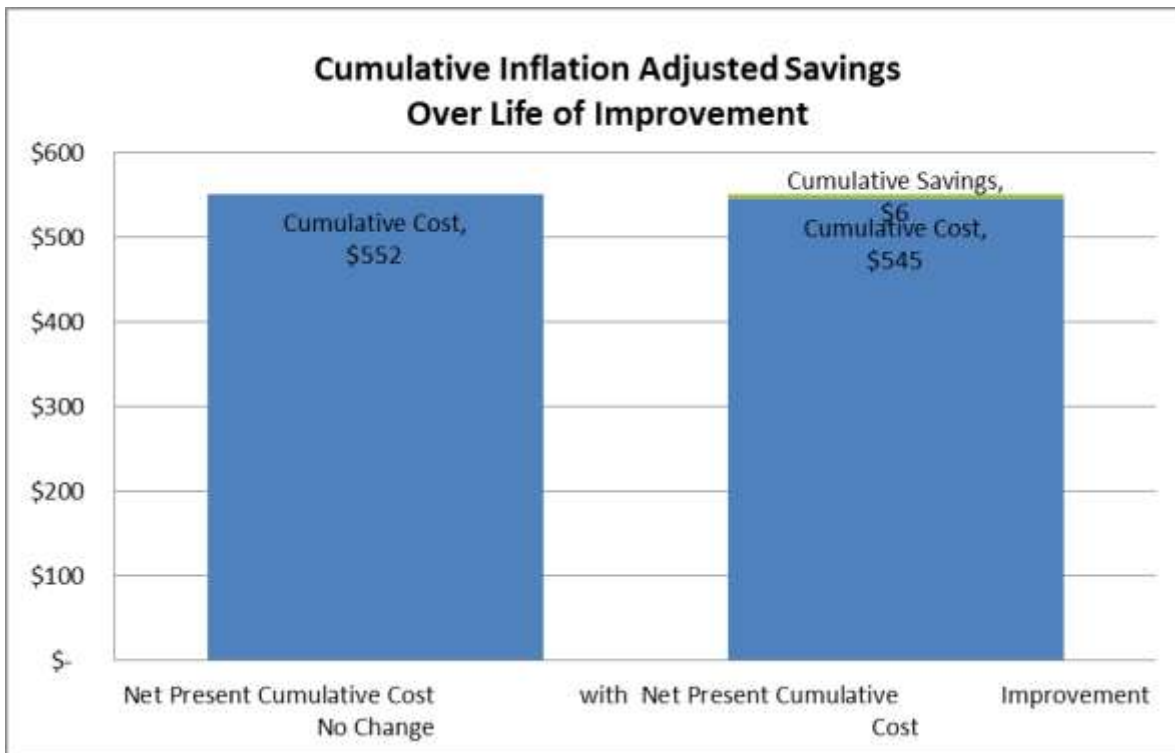


Energy Audit Report

December 23, 2013

ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
17	Place east entrance canopy light on photosensor and replace lamp with LED.	\$363	\$0	\$6	\$370	2%

This ECM assumes a life expectancy of 16 years for this measure. This improvement calls for the replacement of the lamp installed in the canopy light over the east entrance with a 10 Watt LED and the installation of a photo sensor. This improvement overlaps ECM #5. During the audit this lamp was on every day during daylight hours. Replacing the current compact fluorescent lamp with a 10 Watt LED lamp will reduce the amount of measurable lumen output from what is currently installed. This recommendation is based on pupil lumens, which is the amount of light visible to the eye. Replacement with LED lamps should also result in reduced maintenance costs over fluorescent lamps because of the much longer life span of LED products. Cold weather performance should improve as LED lamps are less sensitive to temperature.

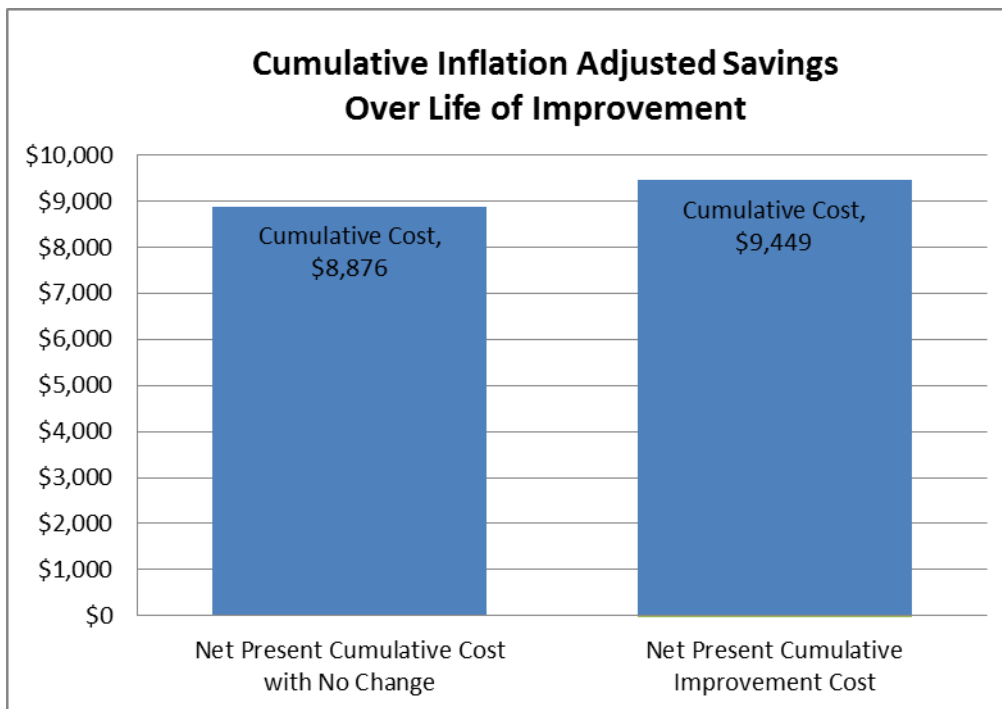


Energy Audit Report

December 23, 2013

ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
18	Install 2" foam insulation on the crawlspace floor around the perimeter of the building.	\$3,176	-\$29	-\$573	\$2,603	-18%

This ECM assumes a life expectancy of 20 years for this measure. At estimated prices this measure is not cost effective. This improvement calls for laying two foot wide polystyrene foam boards directly on the ground in the crawlspace around the perimeter of the exterior foundation wall. Foam was chosen over less expensive alternative such as fiberglass batt insulation because of greater durability and resistance to water.

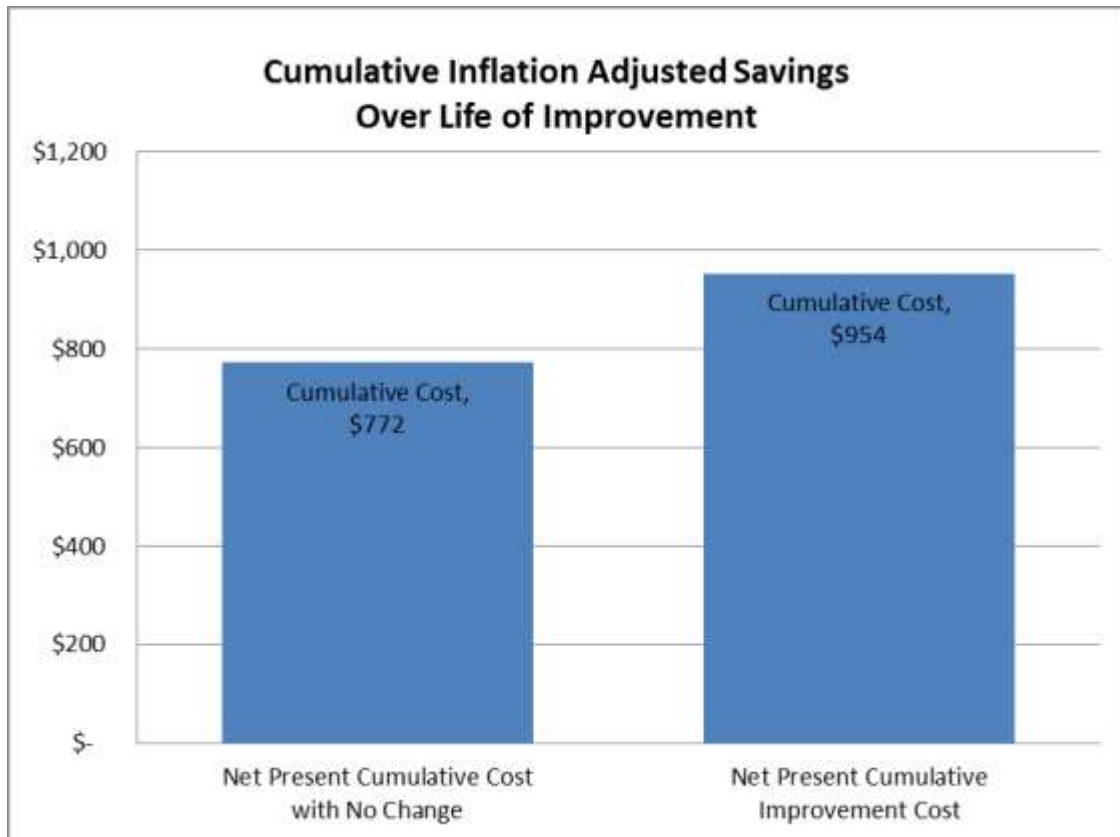


Energy Audit Report

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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
19	Replace domestic hot water circulation pump with variable speed pump.	\$683	-\$12	-\$182	\$502	-27%

This ECM assumes a life expectancy of 15 years for this measure. At estimated prices this measure is not cost effective. This improvement calls for replacement of the current domestic hot water circulation pumps with a variable speed pump.

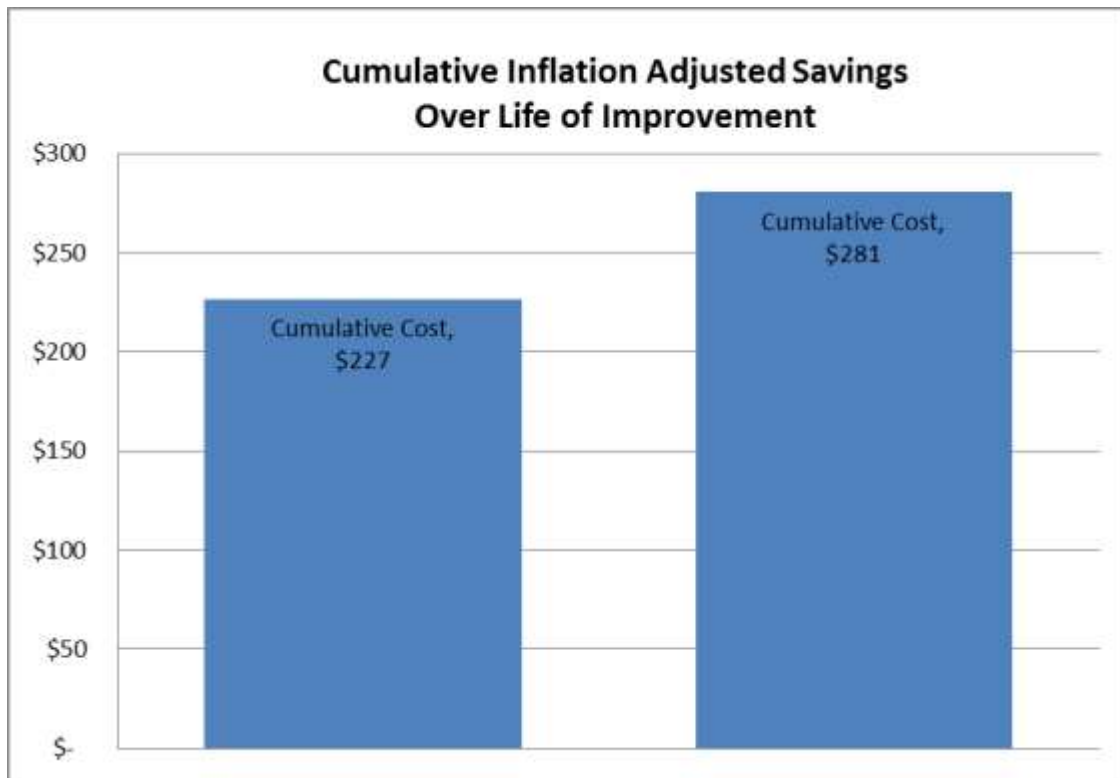


Energy Audit Report

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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
20	Replace CFL lamps in the office restroom with LED.	\$150	-\$3	-\$54	\$97	-36%

This ECM assumes a life expectancy of 15 years for this measure. At estimated prices this measure is not cost effective. There is not enough usage of these fixtures to justify the expense. Replacing the current compact fluorescent lamp with a 10 Watt LED lamp will reduce the amount of measurable lumen output from what is currently installed. This recommendation is based on pupil lumens, which is the amount of light visible to the eye. Replacement with LED lamps should also result in reduced maintenance costs over fluorescent lamps because of the much longer life span of LED products.

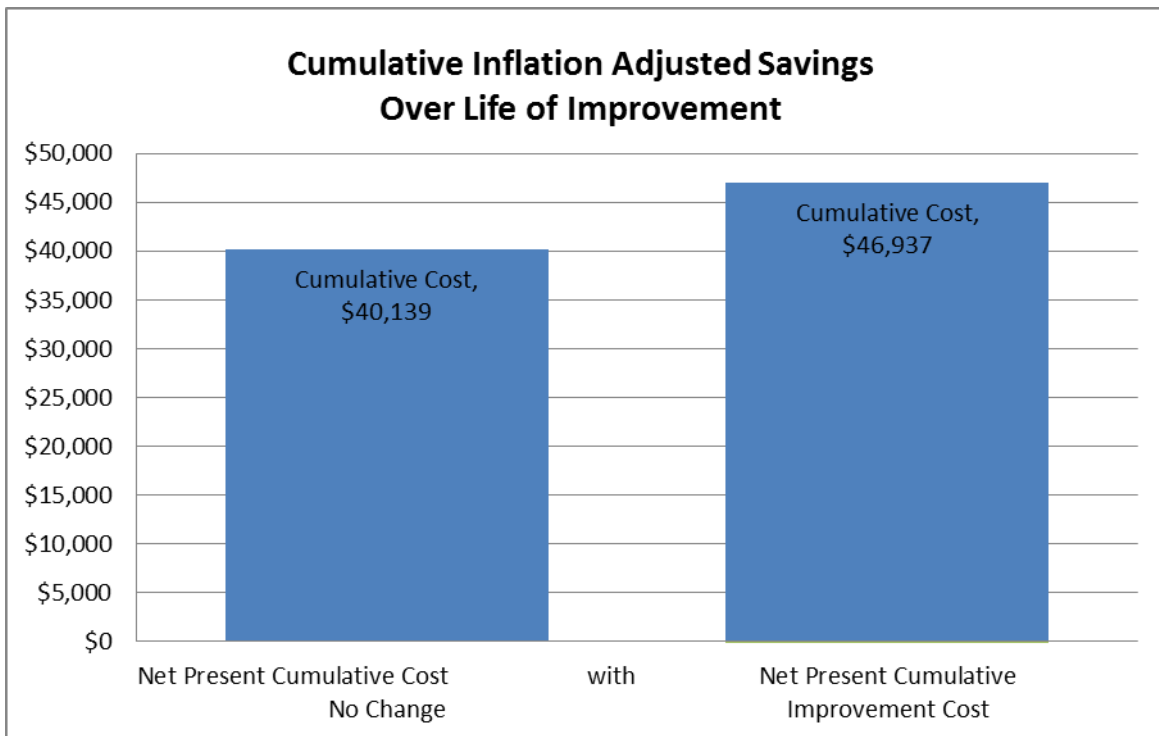


Energy Audit Report

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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
21	Replace existing wood framed windows with new vinyl windows.	\$17,567	-\$340	-\$6,798	\$10,769	-39%

This ECM assumes a life expectancy of 15 years for this measure. At estimated prices this measure is not cost effective. New vinyl framed windows with Low-E coating and Argon gas fill are only slightly more efficient than the existing windows.

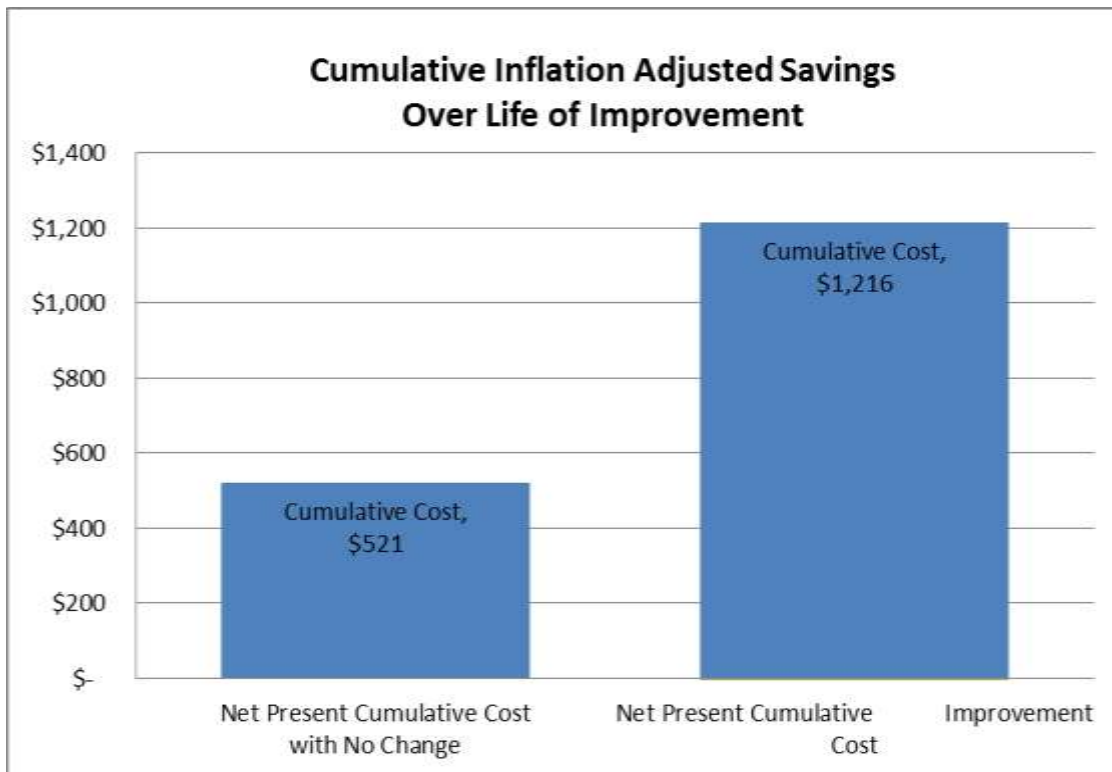


Energy Audit Report

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ECM #	Improvement Description	Installed Cost	Annualized NPV Savings	NPV Savings Over Improvement Life	Breakeven Cost	ROI
22	Replace exit signs with no-power tritium exit signs.	\$1,216	-\$43	-\$695	\$521	-57%

This ECM assumes a life expectancy of 16 years for this measure. At estimated prices this measure is not cost effective. Tritium gas is used to light these signs so there is no power consumption. However, the very high initial cost of these signs does not make the cost effective.





## **Operations and Maintenance Measures**

**Dedicated Maintenance Budget** – The lack of a dedicated maintenance budget for maintenance and upkeep of the energy using systems of the building, particularly the lighting, is resulting in excessive energy consumption and poor lighting conditions in the building. I recommend setting aside a portion of the operational budget to maintain the lighting and heating systems.

**Staff Training** – Visit [www.energystar.gov](http://www.energystar.gov) for free training materials and courses on energy conservation and awareness for building staff. Live web conferences, animated presentations and pre-recorded trainings are just some of the tools available. Creating an inclusive strategy that establishes roles and actions throughout the organization can help to integrate good energy management practices. When developing an action plan, consider brainstorming with various departments to identify ways they can contribute.

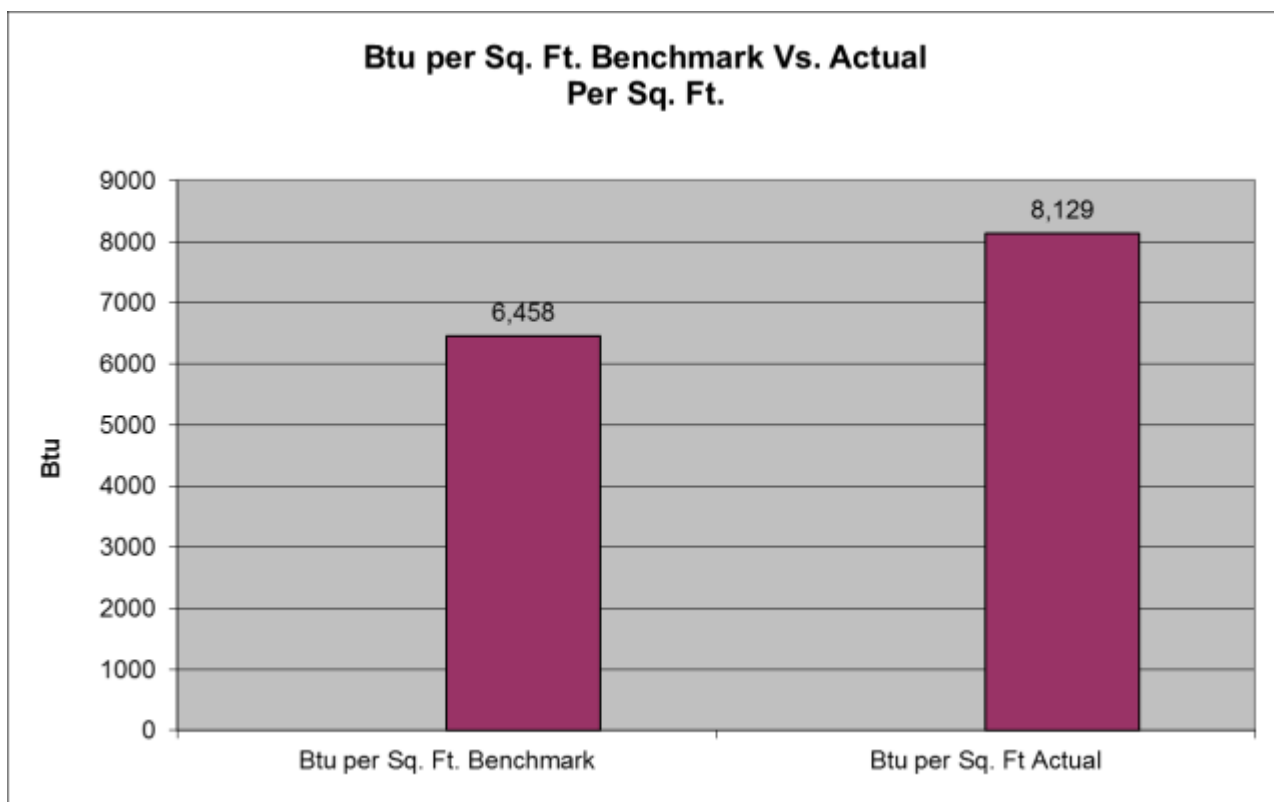
**After Hours** – The building manager/operator should be tasked with turning off all non-essential equipment at night, on weekends, or during other non-occupied times. Power strips can be turned off during off hours; also power strips can be connected to timers or occupancy sensors. Smart power strips with built-in occupancy sensors or activity sensors are available.

**Plug Loads** – Plug loads use up to an estimated 20% of electrical energy in commercial buildings. Most plugged in devices consume energy even when off. Power is drawn by devices in passive standby, such as a computer in “sleep” mode or a clock on a microwave, and active standby such as when a screen saver is on a computer screen or television screen. The majority of plug loads come from office equipment (computers, printers, copiers, etc.) and appliances (refrigerators, coffee machines, etc.). As equipment deteriorates or is scheduled for replacement, it is recommended that it be replaced with Energy Star certified equipment.

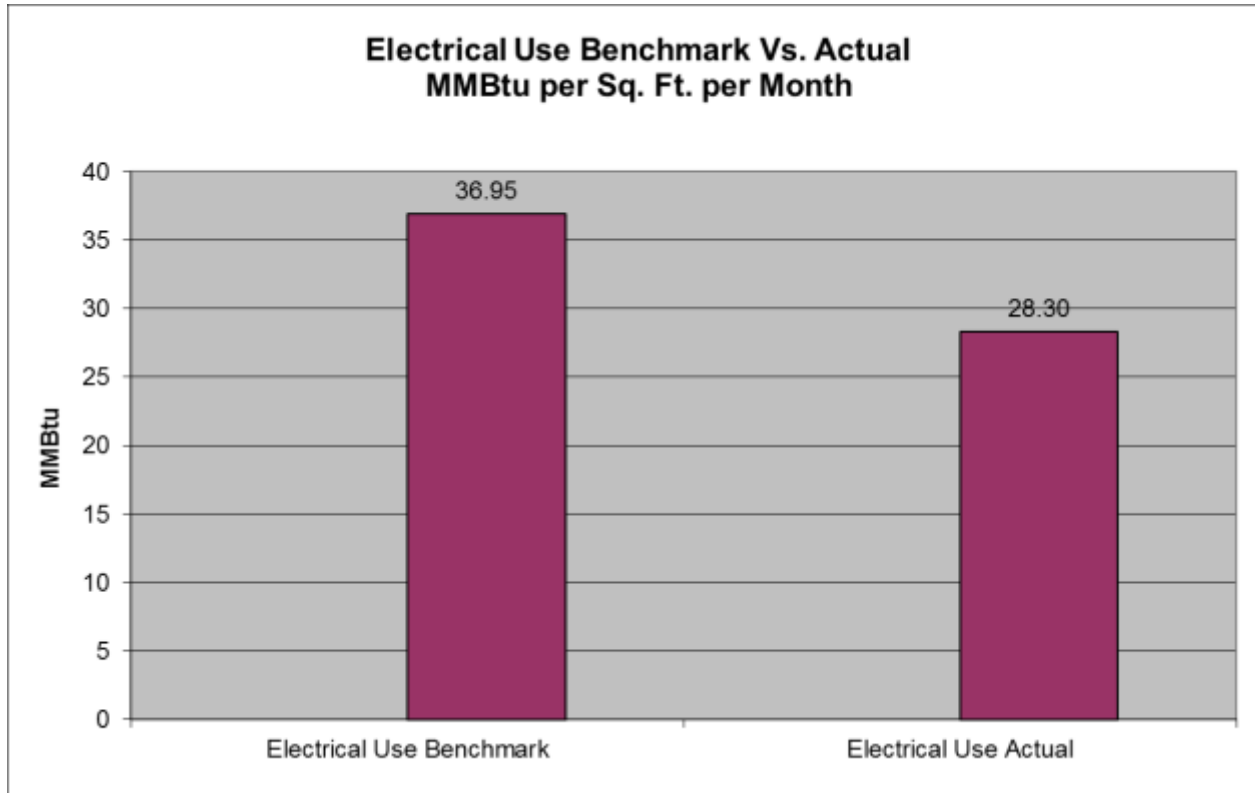
## Benchmark Information

Benchmarking and analysis of the utility bills was used to collect data about the building in terms of energy usage patterns, consumption, and comparison with similar buildings. Benchmarking was used to identify energy usage patterns and trends that showed a need for specific investigation of certain systems. Benchmarking also identified potential issues in how the building is operated which may lead to energy savings. Analysis of utility data provides a context for the audit.

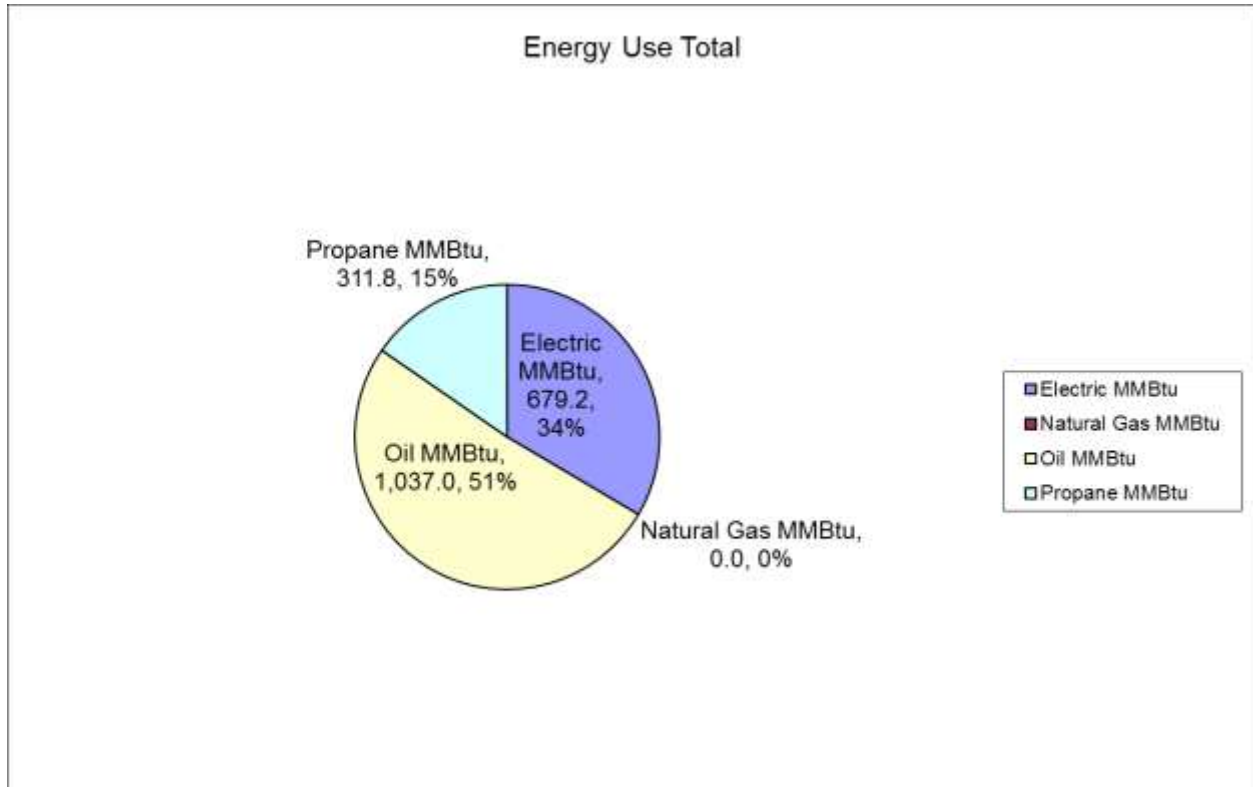
The BTU usage of the building per square foot is higher than buildings of similar occupancy. The high cost per BTU and high energy usage makes pursuing energy efficiency measures in this building worthwhile.



Electrical usage in terms of BTU per square foot is lower than the national average. The high cost per kWh of electricity makes pursuing electrical improvement worthwhile here.



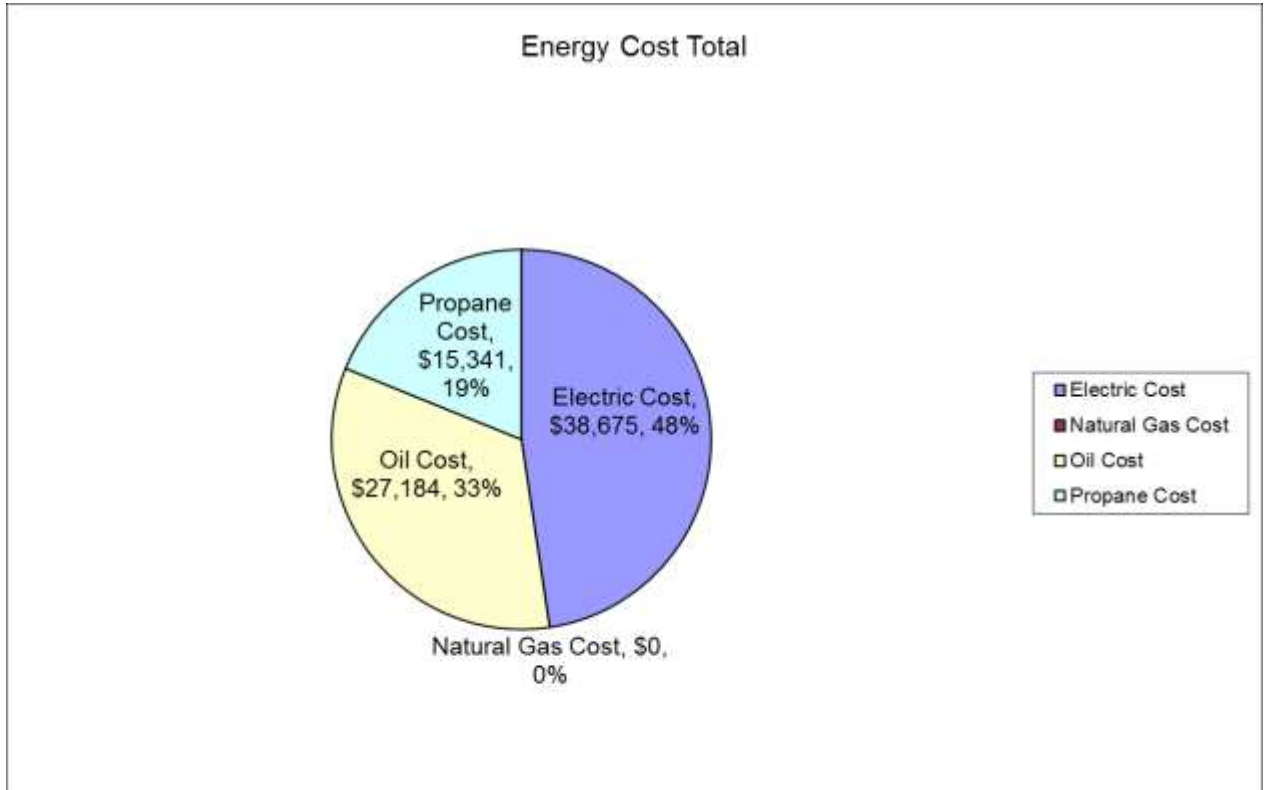
The total energy use profile shows the majority BTU consumption from oil, with electricity in second and propane in third.



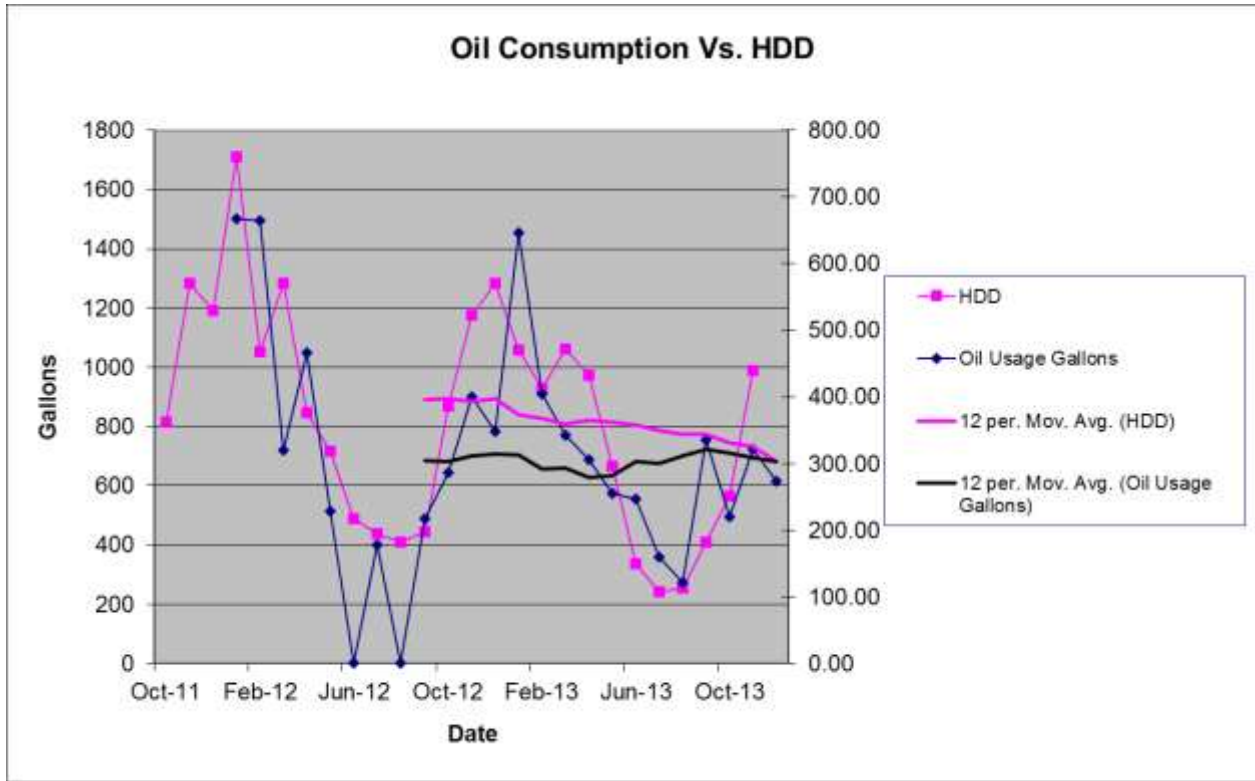
Energy Audit Report

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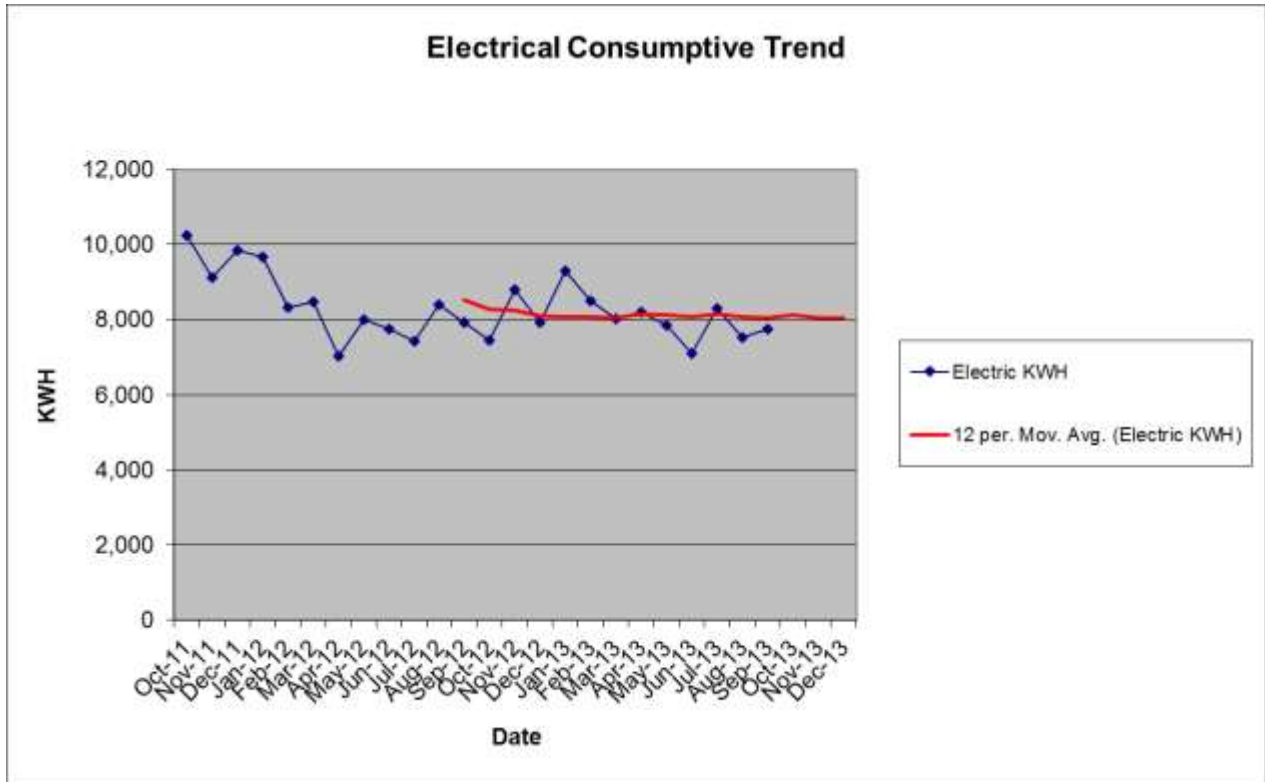
The energy cost total shows that electrical consumption is the largest cost because of the high cost per kWh in this location. The cost of oil, which is used for heating and hot water is second, and propane which is used for cooking is third.



Oil consumption has closely tracked heating degree days, which are a measure of the heat load on the building.



Electrical consumption has remained steady over the benchmarking period.



## Supporting Documentation

This section contains all of the supporting documentation for the audit, which may include all calculations, assumptions, and worksheets used to generate conclusions.

### Equipment Inventory

Designation	Location	Function	Make	Model	Type	Capacity	Efficiency	Motor Size	Notes
Boiler 1 & 2	Utility Room	Heat	Energy Kinetics	System 2000 - EK2	Hot Water Boiler	170-206,000 BTU/h	87.3-88.2%	N/A	<i>Two boilers in parallel</i>
Domestic Hot Water	Utility Room	Domesitc Hot Water	Bradford White	M280R6D S-1NCWW	Hot Water Storage Tank	80 Gal		N/A	
Primary Circulation Pump	Utility Room	Primary Heat Circulation	Grundfos	CP 26-64	Circulation Pump			N/A	<i>always on</i>
DHW Circulation Pump	Utility Room	Domesitc Hot Water Circulation	Grundfos	UP 15-18	Circulation Pump			N/A	<i>always on</i>
DHW Zone Pump	Utility Room	Domestic Hot Water Zone Heating	Grundfos	UP 15-18	Circulation Pump			N/A	<i>on demand</i>
Kitchen Exhaust	Kitchen Roof	Exhaust	Dayton	4YY18	Centrifugal				
Kitchen Makeup Air	Kitchen Roof	Heated Makeup Air	Rupp		Propane Fired				<i>Not in Operation</i>





# Energy Audit Report

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Natural Gas				Oil Usage Gallons				Propane				EUI				
Gas Usage Therms	Gas Cost \$	Gas Unit Cost \$/Therm	Gas MMBtu	Oil Usage Gallons	Oil Cost	Oil Cost per Gallon	Oil MMBtu	Propane Usage Gallons	Propane Cost	Propane Cost per Gallon	Propane MMBtu	HDD	CCD	Production	Btu/Sq. Ft	Cost \$/Sq Ft
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00	816			3,362	\$0.18
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00	1283			2,994	\$0.16
		#DIV/0!	0.00			#DIV/0!	0.00	168.6	793.94	4.71	15.40	1192			4,712	\$0.24
		#DIV/0!	0.00	667.00	\$2,497.59	\$3.74	93.38	184.3	867.87	4.71	16.83	1712			13,781	\$0.25
		#DIV/0!	0.00	664.00	\$2,607.25	\$3.93	92.96	211.4	995.48	4.71	19.31	1053			13,532	\$0.24
		#DIV/0!	0.00	320.00	\$1,304.84	\$4.08	44.80	244.5	1,151.35	4.71	22.33	1283			9,242	\$0.26
		#DIV/0!	0.00	465.90	\$1,898.47	\$4.07	65.23	228.8	1,077.42	4.71	20.90	848			10,596	\$0.24
		#DIV/0!	0.00	228.90	\$927.05	\$4.05	32.05	142.3	617.58	4.34	13.00	716			6,960	\$0.21
		#DIV/0!	0.00	0.00	\$0.00	#DIV/0!	0.00	241.5	1,048.11	4.34	22.06	488			4,664	\$0.23
		#DIV/0!	0.00	178.00	\$637.24	\$3.58	24.92	302.0	1,311.45	4.34	27.58	438			7,488	\$0.26
		#DIV/0!	0.00	0.00	\$0.00	#DIV/0!	0.00	130.0	564.29	4.34	11.87	410			3,904	\$0.20
		#DIV/0!	0.00	217.00	\$882.24	\$4.07	30.38	144.0	624.67	4.34	13.15	443			6,793	\$0.21
		#DIV/0!	0.00	286.00	\$112.93	\$0.39	40.04	101.0	435.57	4.31	9.22	869			7,190	\$0.19
		#DIV/0!	0.00	400.00	\$1,520.38	\$3.80	56.00	101.0	437.88	4.34	9.22	1175			9,165	\$0.21
		#DIV/0!	0.00	348.00	\$1,273.68	\$3.66	48.72	201.0	874.44	4.35	18.36	1284			9,059	\$0.26
		#DIV/0!	0.00	647.00	\$2,379.63	\$3.68	90.58	107.0	464.37	4.34	9.77	1057			12,710	\$0.21
		#DIV/0!	0.00	404.00	\$1,606.66	\$3.98	56.56	99.0	431.36	4.36	9.04	930			9,101	\$0.20
		#DIV/0!	0.00	342.00	\$1,282.88	\$3.75	47.88	103.0	448.30	4.35	9.41	1062			8,148	\$0.20
		#DIV/0!	0.00	306.00	\$1,177.33	\$3.85	42.84	101.0	439.61	4.35	9.22	974			7,700	\$0.20
		#DIV/0!	0.00	255.00	\$953.39	\$3.74	35.70	104.0	453.08	4.36	9.50	667			6,824	\$0.21
		#DIV/0!	0.00	247.00	\$886.77	\$3.59	34.58	86.5	375.76	4.34	7.90	338			6,422	\$0.18
		#DIV/0!	0.00	159.00	\$561.27	\$3.53	22.26	75.6	328.41	4.34	6.90	243			5,528	\$0.19
		#DIV/0!	0.00	122.00	\$445.40	\$3.65	17.08	205.0	935.57	4.56	18.72	256			5,918	\$0.24
		#DIV/0!	0.00	336.00	\$1,245.65	\$3.71	47.04	133.0	664.37	5.00	12.15	411			8,236	\$0.22
		#DIV/0!	0.00	220.00	\$802.26	\$3.65	30.80			#DIV/0!	0.00	564			2,963	\$0.00
		#DIV/0!	0.00	320.80	\$1,151.67	\$3.59	44.91			#DIV/0!	0.00	990			4,321	\$0.00
		#DIV/0!	0.00	273.70	\$1,029.11	\$3.76	38.32			#DIV/0!	0.00				3,686	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
		#DIV/0!	0.00			#DIV/0!	0.00			#DIV/0!	0.00				0	\$0.00
0.00	\$0.00	#DIV/0!	0.00	308.64	\$1,132.65	#DIV/0!	43.21	142.27	639.20	#DIV/0!	12.99	597.28	0.00	0.00	8,129	\$0.22
0.00	\$0.00	NA	0.00	7407.30	\$27,183.69	#DIV/0!	1037.03	3414.50	15340.88	#DIV/0!	311.85	21502.00	0.00	0.00	195,097	\$5.20
			25.207875				12.1275								6,458	
			0.00%				356.29%								125.87%	

**Climate & Fuel Assumptions**

**Client Information**

Client Name: Homer Seniors Address: 3935 Svedlund  
 Square Footage 10395

Days Occupied per Year	State	City	HDD	CDD	Avg. Temp
250	Alaska	Homer AP	9,821	0	38.1

**Fuels**

Natural Gas	\$0.74	\$ Per CCF	\$0.72 Per Therm
Oil	\$3.67	\$ Per Gallon	\$2.62 Per Therm
Electricity	\$0.19	\$ per KWH	\$5.68 Per Therm
Propane	\$4.49	\$ per Gallon	\$4.92 Per Therm
Wood		\$ Per Cord	\$0.00 Per Therm
Coal		\$ Per Ton	\$0.00 Per Therm

**Discount, Fuel Escalation, and Inflation Assumptions**

-----DISCOUNT & ESCALATION -----			
Enter 1 or 0 for each fuel type:		Years:	Rate:
	1 = Yes	Real Discount Rate (i) . . . . . 2005 - 2040 . . . . .	3.0%
	0 = No	Electricity. . . . . 2005 - 2015 . . . . .	2.7%
IOU Electricity Sour	1	(Investor Owned Utility) 2016 - 2025 . . . . .	3.1%
POU Electricity Sou	0	2026 - 2040 . . . . .	4.7%
Natural Gas Fuel?	1	Natural Gas . . . . . 2005 - 2015 . . . . .	1.3%
Propane Fuel?	0	And other fossil fuels 2016 - 2025 . . . . .	6.5%
Oil Fuel?	0	2026 - 2040 . . . . .	10.3%
		Maintenance . . . . . 2005 - 2040 . . . . .	3.0%
		Inflation 2005 - 2040 . . . . .	3.0%

\* IOU = Investor Owned Utility

\*\* POU = Publicly Owned Utility

**FUEL PRICE ESCALATION INFORMATION:**

Select value and key in above as decimal fraction.

	Years:		
Electricity (Investor-Owned)	2005 - 2015 . . . . .	2.7%	0.027
	2016 - 2025 . . . . .	3.1%	0.031
	2026 - 2040 . . . . .	4.7%	0.047
Electricity (Public Owned)	2005 - 2015 . . . . .	2.7%	0.027
	2016 - 2025 . . . . .	3.1%	0.031
	2026 - 2040 . . . . .	4.7%	0.047
Natural Gas	2005 - 2015 . . . . .	1.3%	0.013
	2016 - 2025 . . . . .	6.5%	0.065
	2026 - 2040 . . . . .	10.3%	0.103
Oil	2005 - 2015 . . . . .	1.3%	0.013
	2016 - 2025 . . . . .	6.5%	0.065
	2026 - 2040 . . . . .	10.3%	0.103
Propane	2005 - 2015 . . . . .	Assume same as natural gas	
	2016 - 2025 . . . . .		
	2026 - 2040 . . . . .		

**ECM #1 Calculations**

**Heating Data**

System 1 - Location Served:							
	Fuel Type	Volume Served	AFUE	Thermostat Setpoint	Full Load KW (Electric Only)	Mo/Yr Operation (Electric Only)	Cost
Existing	Propane	100	100.00%	350.0			N/A
Proposed	Natural Gas	100	100.00%	350.0			\$1,000.00
Description of Retrofit	Convert propane double convection oven and double range to natural gas.						

**Heating System Summary**

	Existing Heating Systems	New Heating Systems
Average AFUE of All Heating Systems, proportional to volume	100.00%	100.00%
Average Cost Per Therm of Heating Fuels, proportional to volume	\$4.92	\$0.72
Average Thermostat Setpoint, proportional to volume	350	350
Therms required to heat the building over 1 year	1723	1,723.00
Estimated Demand Charges (electric)	\$0.00	\$0.00
Estimated Cost over 1 year	\$8,470.68	\$1,248.00
Estimated Cost of Heating System Replacements	\$1,000.00	
Estimated Savings per Year		\$7,222.68
Estimated Payback Period (years)	N/A	0.1

# Energy Audit Report

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ANNUAL REAL CASH FLOWS PROPOSED												ANNUAL REAL CASH FLOWS CURRENT											
(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth Annual Costs	Present Worth Cumulative Savings	(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth Annual Costs	Present Worth Cumulative Savings	Totals					
																		\$0	\$0				
2012	\$1,000	\$25	\$1,248	\$0	\$1,273	1.00	\$1,000	\$1,000	2012	\$1,000	\$0	\$0	\$0	\$0	1.00	\$0	\$0	\$0	\$1,000	\$0			
2013	0	26	1,264	0	1,290	0.97	1,252	\$2,252	2013	0	174	8,581	0	8,755	0.97	8,500	\$8,500	\$0	2013	0			
2014	0	26	1,281	0	1,307	0.94	1,232	\$3,484	2014	0	180	8,692	0	8,872	0.94	8,363	\$16,863	\$0	2014	0			
2015	0	27	1,297	0	1,325	0.92	1,212	\$4,697	2015	185	8,805	8,990	0	9,175	0.92	8,228	\$25,091	\$0	2015	185			
2016	0	28	1,314	0	1,342	0.89	1,193	\$5,889	2016	191	8,920	9,110	0	9,300	0.89	8,095	\$33,185	\$0	2016	191			
2017	0	29	1,400	0	1,429	0.86	1,232	\$7,122	2017	196	9,500	9,696	0	9,892	0.86	8,564	\$41,549	\$0	2017	196			
2018	0	30	1,491	0	1,520	0.84	1,273	\$8,395	2018	202	10,117	10,319	0	10,619	0.84	8,642	\$50,191	\$0	2018	202			
2019	0	31	1,587	0	1,618	0.81	1,316	\$9,710	2019	208	10,775	10,983	0	11,191	0.81	8,930	\$59,122	\$0	2019	208			
2020	0	32	1,691	0	1,722	0.79	1,360	\$11,070	2020	215	11,475	11,690	0	11,905	0.79	9,228	\$68,349	\$0	2020	215			
2021	0	33	1,801	0	1,833	0.77	1,405	\$12,475	2021	221	12,221	12,442	0	12,663	0.77	9,536	\$77,885	\$0	2021	221			
2022	0	34	1,918	0	1,951	0.74	1,452	\$13,927	2022	228	13,015	13,243	0	13,486	0.74	9,854	\$87,739	\$0	2022	228			
2023	0	35	2,042	0	2,077	0.72	1,500	\$15,427	2023	235	13,861	14,096	0	14,391	0.72	10,183	\$97,922	\$0	2023	235			
2024	0	36	2,175	0	2,211	0.70	1,550	\$16,978	2024	242	14,762	15,004	0	15,246	0.70	10,523	\$108,446	\$0	2024	242			
2025	0	37	2,316	0	2,353	0.68	1,602	\$18,580	2025	249	15,722	15,971	0	16,242	0.68	10,875	\$119,321	\$0	2025	249			
2026	0	38	2,467	0	2,505	0.66	1,656	\$20,236	2026	256	16,744	17,000	0	17,280	0.66	11,239	\$130,560	\$0	2026	256			
2027	0	39	2,721	0	2,760	0.64	1,771	\$22,007	2027	264	18,468	18,732	0	19,014	0.64	12,024	\$142,583	\$0	2027	264			
2028	0	40	3,001	0	3,041	0.62	1,895	\$23,902	2028	272	20,371	20,642	0	20,914	0.62	12,864	\$155,447	\$0	2028	272			
2029	0	41	3,310	0	3,352	0.61	2,028	\$25,930	2029	280	22,469	22,749	0	23,018	0.61	13,763	\$169,210	\$0	2029	280			
2030	0	42	3,651	0	3,694	0.59	2,170	\$28,100	2030	288	24,783	25,071	0	25,342	0.59	14,727	\$183,937	\$0	2030	288			
2031	0	44	4,027	0	4,071	0.57	2,322	\$30,422	2031	297	27,336	27,633	0	27,966	0.57	15,759	\$199,696	\$0	2031	297			
2032	0	45	4,442	0	4,487	0.55	2,485	\$32,906	2032	306	30,151	30,457	0	30,814	0.55	16,863	\$216,559	\$0	2032	306			
2033	0	46	4,900	0	4,946	0.54	2,659	\$35,565	2033	315	33,257	33,572	0	34,129	0.54	18,047	\$234,606	\$0	2033	315			
2034	0	48	5,404	0	5,452	0.52	2,846	\$38,410	2034	325	36,682	37,007	0	37,384	0.52	19,314	\$253,919	\$0	2034	325			
2035	0	49	5,961	0	6,010	0.51	3,045	\$41,456	2035	334	40,461	40,795	0	41,170	0.51	20,670	\$274,590	\$0	2035	334			
2036	0	51	6,575	0	6,626	0.49	3,259	\$44,715	2036	344	44,628	44,972	0	45,344	0.49	22,123	\$296,713	\$0	2036	344			
2037	0	52	7,252	0	7,303	0.48	3,489	\$48,204	2037	355	49,225	49,579	0	50,154	0.48	23,679	\$320,393	\$0	2037	355			
2038	0	54	7,999	0	8,053	0.46	3,734	\$51,938	2038	365	54,295	54,660	0	55,319	0.46	25,346	\$345,738	\$0	2038	365			
2039	0	55	8,823	0	8,879	0.45	3,997	\$55,935	2039	376	59,887	60,263	0	61,330	0.45	27,130	\$372,868	\$0	2039	376			
2040	0	57	9,732	0	9,789	0.44	4,279	\$60,214	2040	388	66,056	66,443	0	67,887	0.44	29,041	\$401,909	\$0	2040	388			
2041	0	59	10,734	0	10,793	0.42	4,580	\$64,794	2041	399	72,859	73,258	0	74,716	0.42	31,087	\$432,996	\$0	2041	399			
2042	0	61	11,840	0	11,901	0.41	4,903	\$69,697	2042	411	80,364	80,775	0	82,522	0.41	33,278	\$466,274	\$0	2042	411			
<b>Totals:</b>								<b>\$69,697 =30-year LCC</b>	<b>Totals:</b>	<b>\$8,302</b>	<b>\$844,480</b>	<b>\$0</b>	<b>\$0</b>	<b>\$852,782</b>		<b>\$466,274 =30-year LCC</b>	<b>\$0</b>						

Energy Audit Report

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**ECM #2 Calculations**

		Heating Data					
System 1 - Location Served:							
	Fuel Type	Volume Served	AFUE	Thermostat Setpoint	Full Load KW (Electric Only)	Mo/Yr Operation (Electric Only)	Cost
Existing	Oil	100	87.75%	70.0			N/A
Proposed	Natural Gas	100	80.00%	70.0			\$3,740.00
Description of Retrofit	Retrofit existing boiler burners with natural gas burners.						

**Heating System Summary**

	Existing Heating Systems	New Heating Systems
Average AFUE of All Heating Systems, proportional to volume	87.75%	80.00%
Average Cost Per Therm of Heating Fuels, proportional to volume	\$2.62	\$0.72
Average Thermostat Setpoint, proportional to volume	70	70
Therms required to heat the building over 1 year	3838	4,209.81
Estimated Demand Charges (electric)	\$0.00	\$0.00
Estimated Cost over 1 year	\$10,061.04	\$3,049.24
Estimated Cost of Heating System Replacements	\$3,740.00	
Estimated Savings per Year		\$7,011.80
Estimated Payback Period (years)	N/A	0.5

# Energy Audit Report

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ANNUAL REAL CASH FLOWS PROPOSED											
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Savings	Present Worth of Cumulative Costs	Present Worth of Cumulative Savings	Present Worth of Cumulative Costs
2,012	\$0	\$201	\$10,061	\$0	\$10,262	1.00	\$10,262	\$0	\$3,740	\$0	\$3,740
2,013	0	207	10,192	0	10,399	0.97	10,096	\$10,096.21	0	\$3,740	\$6,800
2,014	0	213	10,324	0	10,538	0.94	9,933	\$20,029	0	3,194	\$9,810
2,015	0	220	10,459	0	10,678	0.92	9,772	\$29,801	0	3,236	\$12,772
2,016	0	226	10,595	0	10,821	0.89	9,614	\$39,416	0	3,280	\$15,686
2,017	0	233	11,283	0	11,516	0.86	9,934	\$49,350	0	3,490	\$18,697
2,018	0	240	12,017	0	12,257	0.84	10,265	\$59,615	0	3,715	\$21,808
2,019	0	247	12,798	0	13,045	0.81	10,607	\$70,222	0	3,954	\$25,022
2,020	0	255	13,629	0	13,884	0.79	10,960	\$81,182	0	4,208	\$28,344
2,021	0	263	14,515	0	14,778	0.77	11,326	\$92,508	0	4,479	\$31,777
2,022	0	270	15,459	0	15,729	0.74	11,704	\$104,212	0	4,767	\$35,324
2,023	0	279	16,464	0	16,742	0.72	12,095	\$116,307	0	5,074	\$38,990
2,024	0	287	17,534	0	17,821	0.70	12,499	\$128,806	0	5,401	\$42,778
2,025	0	295	18,674	0	18,969	0.68	12,917	\$141,723	0	5,749	\$46,693
2,026	0	304	19,887	0	20,192	0.66	13,349	\$155,072	0	6,120	\$50,738
2,027	0	313	21,193	0	22,249	0.64	14,281	\$169,353	0	6,743	\$55,067
2,028	0	323	24,195	0	24,518	0.62	15,279	\$184,632	0	7,431	\$59,697
2,029	0	333	26,687	0	27,020	0.61	16,347	\$200,980	0	8,189	\$64,652
2,030	0	343	29,436	0	29,779	0.59	17,492	\$218,471	0	9,025	\$69,953
2,031	0	353	32,468	0	32,821	0.57	18,717	\$237,189	0	9,947	\$75,626
2,032	0	363	35,812	0	36,176	0.55	20,030	\$257,218	0	10,964	\$81,696
2,033	0	374	39,501	0	39,875	0.54	21,435	\$278,653	0	12,085	\$88,193
2,034	0	386	43,569	0	43,955	0.52	22,940	\$301,593	0	13,322	\$95,145
2,035	0	397	48,057	0	48,454	0.51	24,551	\$326,144	0	14,685	\$102,586
2,036	0	409	53,007	0	53,416	0.49	26,277	\$352,421	0	16,189	\$110,530
2,037	0	421	58,467	0	58,888	0.48	28,125	\$380,546	0	17,847	\$119,074
2,038	0	434	64,489	0	64,923	0.46	30,104	\$410,650	0	19,676	\$128,198
2,039	0	447	71,131	0	71,578	0.45	32,224	\$442,874	0	21,693	\$137,964
2,040	0	460	78,457	0	78,918	0.44	34,493	\$477,367	0	23,918	\$148,418
2,041	0	474	86,539	0	87,013	0.42	36,924	\$514,291	0	26,371	\$159,608
2,042	0	488	95,452	0	95,940	0.41	39,526	\$553,817	0	29,077	\$171,588
<b>Totals:</b>	<b>\$0</b>	<b>\$9,860</b>	<b>\$1,003,031</b>	<b>\$0</b>	<b>\$1,012,891</b>		<b>\$53,817</b>	<b>=\$30-year LCC</b>	<b>\$0</b>	<b>\$310,721</b>	<b>=\$30-year LCC</b>



**ECM #3 Calculations**

**Heating Data**

System 1 - Location Served:							
	Fuel Type	Volume Served	AFUE	Thermostat Setpoint	Full Load KW (Electric Only)	Mo/Yr Operation (Electric Only)	Cost
Existing	Oil	100	87.75%	70.0			N/A
Proposed	Oil	100	87.75%	65.0			\$1,759.79
Description of Retrofit	Reduce average building temperature 5 degrees through installation of programmable thermostats.						

**Heating System Summary**

	Existing Heating Systems	New Heating Systems
Average AFUE of All Heating Systems, proportional to volume	87.75%	87.75%
Average Cost Per Therm of Heating Fuels, proportional to volume	\$2.62	\$2.62
Average Thermostat Setpoint, proportional to volume	70	65
Therms required to heat the building over 1 year	3838	3,236.43
Estimated Demand Charges (electric)	\$0.00	\$0.00
Estimated Cost over 1 year	\$10,061.04	\$8,484.08
Estimated Cost of Heating System Replacements	\$1,759.79	
Estimated Savings per Year		\$1,576.97
Estimated Payback Period (years)	N/A	1.1

# Energy Audit Report

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ANNUAL REAL CASH FLOWS PROPOSED											
(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Savings	Present Worth of Cumulative Costs	Present Worth of Cumulative Savings	Present Value of Cumulative Savings
2012	\$1,760	\$170	\$ 8,484	\$0	\$8,654	1.00	\$1,760	\$1,760	\$1,760	\$1,760	\$ (177)
2013	0	175	8,594	0	8,769	0.97	8,514	\$10,274	\$10,274	\$18,650	\$ 1,380
2014	0	180	8,706	0	8,886	0.94	8,376	\$26,897	\$26,897	\$34,997	\$ 4,418
2015	0	185	8,819	0	9,005	0.92	8,819	\$43,997	\$43,997	\$54,375	\$ 5,975
2016	0	191	8,934	0	9,125	0.89	8,107	\$52,031	\$52,031	\$60,975	\$ 9,247
2017	0	197	9,051	0	9,248	0.86	7,584	\$70,217	\$70,217	\$79,768	\$ 12,740
2018	0	203	9,171	0	9,374	0.84	6,856	\$89,638	\$89,638	\$99,837	\$ 16,470
2019	0	209	9,292	0	9,501	0.81	6,243	\$110,377	\$110,377	\$121,269	\$ 20,454
2020	0	215	9,418	0	9,633	0.79	5,708	\$132,526	\$132,526	\$144,569	\$ 24,785
2021	0	221	9,548	0	9,769	0.77	5,251	\$157,453	\$157,453	\$171,238	\$ 29,742
2022	0	228	9,683	0	9,911	0.74	4,870	\$185,988	\$185,988	\$201,771	\$ 35,417
2023	0	235	9,823	0	10,058	0.72	4,557	\$218,662	\$218,662	\$236,737	\$ 41,916
2024	0	242	9,968	0	10,210	0.70	4,300	\$256,081	\$256,081	\$276,784	\$ 49,360
2025	0	249	10,118	0	10,367	0.68	4,099	\$298,942	\$298,942	\$322,659	\$ 57,887
2026	0	257	10,273	0	10,520	0.66	3,947	\$347,747	\$347,747	\$378,045	\$ 67,605
2027	0	264	10,433	0	10,677	0.64	3,831	\$403,218	\$403,218	\$438,441	\$ 78,850
2028	0	272	10,598	0	10,839	0.62	3,737	\$466,141	\$466,141	\$500,000	\$ 91,742
2029	0	280	10,768	0	11,008	0.61	3,661	\$537,141	\$537,141	\$603,000	\$ 106,447
2030	0	289	10,943	0	11,182	0.59	3,601	\$617,000	\$617,000	\$718,000	\$ 123,447
2031	0	298	11,123	0	11,361	0.57	3,554	\$706,500	\$706,500	\$836,000	\$ 142,447
2032	0	306	11,308	0	11,544	0.55	3,519	\$805,500	\$805,500	\$955,000	\$ 163,447
2033	0	316	11,498	0	11,731	0.54	3,493	\$914,000	\$914,000	\$1,084,000	\$ 186,447
2034	0	325	11,693	0	11,923	0.52	3,474	\$1,033,000	\$1,033,000	\$1,233,000	\$ 211,447
2035	0	335	11,893	0	12,120	0.51	3,461	\$1,162,000	\$1,162,000	\$1,393,000	\$ 238,447
2036	0	345	12,098	0	12,323	0.49	3,453	\$1,301,000	\$1,301,000	\$1,564,000	\$ 267,447
2037	0	355	12,308	0	12,531	0.48	3,450	\$1,450,000	\$1,450,000	\$1,746,000	\$ 298,447
2038	0	366	12,523	0	12,744	0.46	3,451	\$1,609,000	\$1,609,000	\$1,940,000	\$ 331,447
2039	0	377	12,743	0	12,963	0.45	3,456	\$1,778,000	\$1,778,000	\$2,147,000	\$ 366,447
2040	0	388	12,968	0	13,197	0.44	3,464	\$1,957,000	\$1,957,000	\$2,367,000	\$ 403,447
2041	0	400	13,200	0	13,447	0.42	3,474	\$2,146,000	\$2,146,000	\$2,600,000	\$ 442,447
2042	0	412	13,438	0	13,700	0.41	3,486	\$2,345,000	\$2,345,000	\$2,847,000	\$ 483,447
<b>Totals:</b>	<b>\$0</b>	<b>\$9,860</b>	<b>\$1,003,031</b>	<b>\$0</b>	<b>\$1,012,891</b>		<b>\$553,817</b>	<b>\$553,817</b>	<b>\$553,817</b>	<b>\$553,817</b>	<b>\$553,817</b>
											<b>\$468,772 =30-year LCC</b>
											<b>\$85,045</b>

**ECM #4 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description		
Number of Fixtures	37	37
Lamps per Fixture	1	1
Lamp Type	Inc	LED
Fixture Wattage	60	13.2
Hours on per Week	50	50
Cost of New Lamp		\$25.08
Cost of New Fixture		
Total KWH Cost	\$1,119.77	\$246.35
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$1,119.77	\$246.35
Yearly Savings		\$873.42
Total Retrofit Cost		\$927.96
Payback Period		1.1 years
Retrofit Description	Replace all incandescent lamps in friendship center, dining area and offices with LED lamps.	

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-----ANNUAL REAL CASH FLOWS PROPOSED-----																	
(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	First & Replace Costs	(Begin) Year	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Costs	Present Value of Cumulative Savings
2.012	\$0	\$22	\$-	\$-	\$1,142	1.00	\$0	\$928	2.012	\$5	\$-	\$-	\$246	1.00	\$928	\$928	
2.013	0	23	0	0	1,173	0.97	1,139	\$928	2.013	0	0	0	253	0.97	251	\$1,179	\$ (40)
2.014	0	24	0	0	1,205	0.94	1,136	0	2.014	5	0	0	260	0.94	250	\$1,428	\$ 846
2.015	0	24	0	0	1,213	0.92	1,132	0	2.015	5	0	0	267	0.92	249	\$1,677	\$ 1,729
2.016	0	25	0	0	1,246	0.89	1,129	0	2.016	6	0	0	274	0.89	248	\$1,926	\$ 2,610
2.017	0	26	0	0	1,284	0.86	1,130	0	2.017	6	0	0	283	0.86	249	\$2,175	\$ 3,492
2.018	0	27	0	0	1,324	0.84	1,131	0	2.018	6	0	0	291	0.84	249	\$2,423	\$ 4,374
2.019	0	28	0	0	1,365	0.81	1,132	0	2.019	6	0	0	300	0.81	249	\$2,673	\$ 5,258
2.020	0	28	0	0	1,407	0.79	1,133	0	2.020	6	0	0	310	0.79	249	\$2,922	\$ 6,142
2.021	0	29	0	0	1,451	0.77	1,135	0	2.021	6	0	0	319	0.77	250	\$3,172	\$ 7,027
2.022	0	30	0	0	1,496	0.74	1,136	0	2.022	7	0	0	329	0.74	250	\$3,421	\$ 7,912
2.023	0	31	0	0	1,542	0.72	1,137	0	2.023	7	0	0	339	0.72	250	\$3,671	\$ 8,799
2.024	0	32	0	0	1,590	0.70	1,138	0	2.024	7	0	0	350	0.70	250	\$3,922	\$ 9,687
2.025	0	33	0	0	1,640	0.68	1,139	0	2.025	7	0	0	361	0.68	251	\$4,172	\$ 10,575
2.026	0	34	0	0	1,690	0.66	1,140	0	2.026	7	0	0	372	0.66	251	\$4,423	\$ 11,464
2.027	0	35	0	0	1,770	0.64	1,158	0	2.027	8	0	0	389	0.64	255	\$4,678	\$ 12,368
2.028	0	36	0	0	1,853	0.62	1,177	0	2.028	8	0	0	408	0.62	259	\$4,937	\$ 13,286
2.029	0	37	0	0	1,940	0.61	1,196	0	2.029	8	0	0	427	0.61	263	\$5,200	\$ 14,219
2.030	0	38	0	0	2,031	0.59	1,216	0	2.030	8	0	0	447	0.59	267	\$5,468	\$ 15,167
2.031	0	39	0	0	2,127	0.57	1,235	0	2.031	9	0	0	468	0.57	272	\$5,739	\$ 16,131
2.032	0	40	0	0	2,227	0.55	1,255	0	2.032	9	0	0	490	0.55	276	\$6,015	\$ 17,110
2.033	0	42	0	0	2,331	0.54	1,276	0	2.033	9	0	0	513	0.54	281	\$6,296	\$ 18,105
2.034	0	43	0	0	2,441	0.52	1,296	0	2.034	9	0	0	537	0.52	285	\$6,581	\$ 19,116
2.035	0	44	0	0	2,556	0.51	1,317	0	2.035	10	0	0	562	0.51	290	\$6,871	\$ 20,143
2.036	0	46	0	0	2,676	0.49	1,339	0	2.036	10	0	0	589	0.49	295	\$7,166	\$ 21,188
2.037	0	47	0	0	2,802	0.48	1,360	0	2.037	10	0	0	616	0.48	299	\$7,465	\$ 22,249
2.038	0	48	0	0	2,933	0.46	1,383	0	2.038	11	0	0	645	0.46	304	\$7,769	\$ 23,327
2.039	0	50	0	0	3,071	0.45	1,405	0	2.039	11	0	0	676	0.45	309	\$8,078	\$ 24,423
2.040	0	51	0	0	3,216	0.44	1,428	0	2.040	11	0	0	707	0.44	314	\$8,392	\$ 25,537
2.041	0	53	0	0	3,367	0.42	1,451	0	2.041	12	0	0	741	0.42	319	\$8,712	\$ 26,669
2.042	0	54	0	0	3,525	0.41	1,475	0	2.042	12	0	0	775	0.41	324	\$9,036	\$ 27,819
<b>Totals:</b>	\$0	\$1,097	\$0	\$0	\$61,543		\$36,855	\$928	<b>Totals:</b>	\$241	\$0	\$13,298	\$14,468		\$9,036	<b>\$9,036</b>	<b>=30-year LCC</b>

**ECM #5 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description		
Number of Fixtures	1	1
Lamps per Fixture	1	1
Lamp Type	CFL	LED
Fixture Wattage	20	13.2
Hours on per Week	168	84
Cost of New Lamp		\$25.08
Cost of New Fixture		
Total KWH Cost	\$33.90	\$11.19
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$33.90	\$11.19
Yearly Savings		\$22.71
Total Retrofit Cost		\$25.08
Payback Period		1.1 years
Retrofit Description	Replace east entrance canopy light with LED and shut off during daylight hours.	

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-----ANNUAL REAL CASH FLOWS PROPOSED-----																	
(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Savings	(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Savings
2012	\$0	\$1	\$-	\$34	\$35	1.00	\$0	\$-	2012	\$25	\$-	\$-	\$11	\$11	1.00	\$25	\$-
2013	0	1	0	35	36	0.97	34	34.47	2013	\$25	--	0	11	12	0.97	11	\$36
2014	0	1	0	36	36	0.94	34	69	2014	0	0	0	12	12	0.94	11	\$48
2015	0	1	0	37	37	0.92	34	103	2015	0	0	0	12	12	0.92	11	\$59
2016	0	1	0	38	38	0.89	34	137	2016	0	0	0	12	13	0.89	11	\$70
2017	0	1	0	39	40	0.86	34	172	2017	0	0	0	13	13	0.86	11	\$82
2018	0	1	0	40	41	0.84	34	206	2018	0	0	0	13	13	0.84	11	\$93
2019	0	1	0	41	42	0.81	34	240	2019	0	0	0	14	14	0.81	11	\$104
2020	0	1	0	43	43	0.79	34	274	2020	0	0	0	14	14	0.79	11	\$116
2021	0	1	0	44	45	0.77	34	309	2021	0	0	0	14	15	0.77	11	\$127
2022	0	1	0	45	46	0.74	34	343	2022	0	0	0	15	15	0.74	11	\$138
2023	0	1	0	47	48	0.72	34	377	2023	0	0	0	15	16	0.72	11	\$150
2024	0	1	0	48	49	0.70	34	412	2024	0	0	0	16	16	0.70	11	\$161
2025	0	1	0	50	51	0.68	34	446	2025	0	0	0	16	17	0.68	11	\$172
2026	0	1	0	51	52	0.66	35	481	2026	0	0	0	17	17	0.66	11	\$184
2027	0	1	0	54	55	0.64	35	516	2027	0	0	0	18	18	0.64	12	\$195
2028	0	1	0	56	57	0.62	36	552	2028	0	0	0	19	19	0.62	12	\$207
2029	0	1	0	59	60	0.61	36	588	2029	0	0	0	19	20	0.61	12	\$219
2030	0	1	0	61	63	0.59	37	625	2030	0	0	0	20	21	0.59	12	\$231
2031	0	1	0	64	66	0.57	37	662	2031	0	0	0	21	22	0.57	12	\$244
2032	0	1	0	67	69	0.55	38	700	2032	0	0	0	22	23	0.55	13	\$256
2033	0	1	0	71	72	0.54	39	739	2033	0	0	0	23	24	0.54	13	\$269
2034	0	1	0	74	75	0.52	39	778	2034	0	0	0	24	25	0.52	13	\$282
2035	0	1	0	77	79	0.51	40	818	2035	0	0	0	26	26	0.51	13	\$295
2036	0	1	0	81	82	0.49	41	858	2036	0	0	0	27	27	0.49	13	\$308
2037	0	1	0	85	86	0.48	41	899	2037	0	0	0	28	28	0.48	14	\$322
2038	0	1	0	89	90	0.46	42	941	2038	0	0	0	29	30	0.46	14	\$336
2039	0	2	0	93	94	0.45	43	984	2039	0	0	0	31	31	0.45	14	\$350
2040	0	2	0	97	99	0.44	43	1,027	2040	0	1	0	32	33	0.44	14	\$364
2041	0	2	0	102	104	0.42	44	1,071	2041	0	1	0	34	34	0.42	14	\$378
2042	0	2	0	107	108	0.41	45	1,116	2042	0	1	0	35	36	0.41	15	\$393
<b>Totals:</b>	\$0	\$33	\$0	\$1,830	\$1,863		\$1,116	\$30-year LCC	<b>Totals:</b>	\$25	\$11	\$0	\$604	\$640		\$393	\$30-year LCC

**ECM #6 Calculations**

**Heating Data**

System 1 - Location Served:							
	Fuel Type	Volume Served	AFUE	Thermostat Setpoint	Full Load KW (Electric Only)	Mo/Yr Operation (Electric Only)	Cost
Existing	Propane	100	100.00%	350.0			N/A
Proposed	Natural Gas	100	100.00%	350.0			\$14,381.00
Description of Retrofit	Replace propane double convection oven and double range with natural gas appliances.						

**Heating System Summary**

	Existing Heating Systems	New Heating Systems
Average AFUE of All Heating Systems, proportional to volume	100.00%	100.00%
Average Cost Per Therm of Heating Fuels, proportional to volume	\$4.92	\$0.72
Average Thermostat Setpoint, proportional to volume	350	350
Therms required to heat the building over 1 year	1723	1,723.00
Estimated Demand Charges (electric)	\$0.00	\$0.00
Estimated Cost over 1 year	\$8,470.68	\$1,248.00
Estimated Cost of Heating System Replacements	\$14,381.00	
Estimated Savings per Year		\$7,222.68
Estimated Payback Period (years)	N/A	2.0

# Energy Audit Report

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-----ANNUAL REAL CASH FLOWS PROPOSED-----														
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth Annual Costs	Annual Electric Costs	Annual Nat.Gas Costs	Annual Maint. Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth Annual Costs	Present Worth of Cumulative Savings
2.012	\$0	\$169	\$8,471	\$0	\$8,640	1.00	\$8,640	\$0	\$128	\$0	\$128	1.00	\$128	\$14,381
2.013	0	174	8,581	0	8,755	0.97	8,500	0	26	0	8,526	0.97	8,254	\$15,633
2.014	0	180	8,692	0	8,872	0.94	8,363	0	27	0	8,390	0.94	8,017	\$16,865
2.015	0	185	8,805	0	8,990	0.92	8,228	0	26	0	8,254	0.92	7,912	\$18,078
2.016	0	191	8,920	0	9,110	0.89	8,095	0	28	0	8,123	0.89	7,766	\$19,270
2.017	0	196	9,000	0	9,696	0.86	8,364	0	29	0	8,393	0.86	8,047	\$20,503
2.018	0	202	10,117	0	10,319	0.84	8,642	0	30	0	8,672	0.84	8,353	\$21,776
2.019	0	208	10,775	0	10,983	0.81	8,930	0	31	0	8,961	0.81	8,686	\$23,091
2.020	0	215	11,475	0	11,690	0.79	9,228	0	32	0	9,260	0.79	8,999	\$24,451
2.021	0	221	12,221	0	12,442	0.77	9,536	0	33	0	9,569	0.77	9,318	\$25,856
2.022	0	228	13,015	0	13,243	0.74	9,854	0	34	0	9,888	0.74	9,646	\$27,308
2.023	0	235	13,861	0	14,096	0.72	10,183	0	35	0	10,218	0.72	9,983	\$28,808
2.024	0	242	14,762	0	15,004	0.70	10,523	0	36	0	10,559	0.70	10,331	\$30,359
2.025	0	249	15,722	0	15,971	0.68	10,875	0	37	0	10,912	0.68	10,683	\$31,961
2.026	0	256	16,744	0	17,000	0.66	11,239	0	38	0	11,277	0.66	11,045	\$33,617
2.027	0	264	18,468	0	18,732	0.64	12,024	0	39	0	12,063	0.64	11,816	\$35,388
2.028	0	272	20,371	0	20,642	0.62	12,864	0	40	0	12,904	0.62	12,600	\$37,283
2.029	0	280	22,469	0	22,749	0.61	13,763	0	41	0	13,804	0.61	13,451	\$39,311
2.030	0	288	24,783	0	25,071	0.59	14,727	0	42	0	14,769	0.59	14,418	\$41,481
2.031	0	297	27,336	0	27,633	0.57	15,759	0	44	0	15,801	0.57	15,457	\$43,803
2.032	0	306	30,151	0	30,457	0.55	16,863	0	45	0	16,908	0.55	16,516	\$46,287
2.033	0	315	33,257	0	33,572	0.54	18,047	0	46	0	18,100	0.54	17,766	\$48,946
2.034	0	325	36,682	0	37,007	0.52	19,314	0	48	0	19,372	0.52	19,031	\$51,791
2.035	0	334	40,461	0	40,795	0.51	20,670	0	49	0	20,729	0.51	20,388	\$54,837
2.036	0	344	44,628	0	44,972	0.49	22,123	0	51	0	22,182	0.49	21,841	\$58,096
2.037	0	355	49,225	0	49,579	0.48	23,679	0	52	0	23,738	0.48	23,396	\$61,585
2.038	0	365	54,295	0	54,660	0.46	25,346	0	54	0	25,400	0.46	25,058	\$65,319
2.039	0	376	59,887	0	60,263	0.45	27,130	0	55	0	27,185	0.45	26,842	\$69,316
2.040	0	388	66,056	0	66,443	0.44	29,041	0	57	0	29,100	0.44	28,751	\$73,595
2.041	0	399	72,859	0	73,258	0.42	31,087	0	59	0	31,146	0.42	30,760	\$78,175
2.042	0	411	80,364	0	80,775	0.41	33,278	0	61	0	33,339	0.41	32,969	\$83,078
Totals:	\$0	\$8,302	\$844,480	\$0	\$852,782		\$466,274	\$0	\$1,223	\$12,233	\$124,419		\$14,002	\$83,078 = 30-year LCC



**ECM #7 Calculations**

**Heating Data**

System 1 - Location Served:							
	Fuel Type	Volume Served	AFUE	Thermostat Setpoint	Full Load KW (Electric Only)	Mo/Yr Operation (Electric Only)	Cost
Existing	Oil	100	87.75%	70.0			N/A
Proposed	Natural Gas	100	96.00%	70.0			\$30,251.28
Description of Retrofit	Replace existing oil boilers with modulating/condensing gas boilers.						

**Heating System Summary**

	Existing Heating Systems	New Heating Systems
Average AFUE of All Heating Systems, proportional to volume	87.75%	96.00%
Average Cost Per Therm of Heating Fuels, proportional to volume	\$2.62	\$0.72
Average Thermostat Setpoint, proportional to volume	70	70
Therms required to heat the building over 1 year	3838	3,508.17
Estimated Demand Charges (electric)	\$0.00	\$0.00
Estimated Cost over 1 year	\$10,061.04	\$2,541.04
Estimated Cost of Heating System Replacements	\$30,251.28	
Estimated Savings per Year		\$7,520.01
Estimated Payback Period (years)	N/A	4.0

# Energy Audit Report

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ANNUAL REAL CASH FLOWS PROPOSED												ANNUAL REAL CASH FLOWS CURRENT											
(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Cumulative Present Worth of Costs	(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Cumulative Present Worth of Costs						
2,012	\$30,251	\$51	\$2,541	\$0	\$32,992	1.00	\$30,251	\$30,251	2,012	\$0	\$301	\$10,061	\$0	\$10,262	1.00	\$0	\$0						
2,013	0	52	2,574	0	2,626	0.97	2,550	\$22,801	2,013	207	10,192	0	10,399	0	0.97	10,096	\$10,096						
2,014	0	54	2,608	0	2,661	0.94	2,509	\$35,310	2,014	213	10,324	0	10,538	0	0.94	9,933	\$20,029						
2,015	0	56	2,641	0	2,697	0.92	2,468	\$37,778	2,015	220	10,459	0	10,678	0	0.92	9,772	\$29,801						
2,016	0	57	2,676	0	2,733	0.89	2,428	\$40,206	2,016	226	10,595	0	10,821	0	0.89	9,614	\$39,416						
2,017	0	59	2,850	0	2,909	0.86	2,509	\$42,715	2,017	233	11,283	0	11,516	0	0.86	9,534	\$49,350						
2,018	0	61	3,035	0	3,096	0.84	2,593	\$45,308	2,018	240	12,017	0	12,257	0	0.84	10,265	\$59,615						
2,019	0	63	3,232	0	3,295	0.81	2,679	\$47,987	2,019	247	12,798	0	13,045	0	0.81	10,607	\$70,222						
2,020	0	64	3,442	0	3,507	0.79	2,768	\$50,755	2,020	255	13,629	0	13,884	0	0.79	10,960	\$81,182						
2,021	0	66	3,666	0	3,732	0.77	2,861	\$53,615	2,021	263	14,515	0	14,778	0	0.77	11,326	\$92,508						
2,022	0	68	3,904	0	3,973	0.74	2,956	\$56,571	2,022	270	15,459	0	15,729	0	0.74	11,704	\$104,212						
2,023	0	70	4,158	0	4,228	0.72	3,055	\$59,626	2,023	279	16,464	0	16,742	0	0.72	12,095	\$116,307						
2,024	0	72	4,428	0	4,501	0.70	3,157	\$62,783	2,024	287	17,534	0	17,821	0	0.70	12,499	\$128,806						
2,025	0	75	4,716	0	4,791	0.68	3,262	\$66,045	2,025	295	18,674	0	18,969	0	0.68	12,917	\$141,723						
2,026	0	77	5,023	0	5,100	0.66	3,371	\$69,417	2,026	304	19,887	0	20,192	0	0.66	13,349	\$155,072						
2,027	0	79	5,540	0	5,619	0.64	3,607	\$73,023	2,027	313	21,936	0	22,249	0	0.64	14,281	\$169,353						
2,028	0	82	6,111	0	6,192	0.62	3,859	\$76,882	2,028	323	24,195	0	24,518	0	0.62	15,279	\$184,632						
2,029	0	84	6,740	0	6,824	0.61	4,129	\$81,011	2,029	333	26,687	0	27,020	0	0.61	16,347	\$200,980						
2,030	0	87	7,434	0	7,521	0.59	4,418	\$85,429	2,030	343	29,436	0	29,779	0	0.59	17,492	\$218,471						
2,031	0	89	8,200	0	8,289	0.57	4,727	\$90,156	2,031	353	32,468	0	32,821	0	0.57	18,717	\$237,189						
2,032	0	92	9,045	0	9,137	0.55	5,059	\$95,215	2,032	363	35,812	0	36,176	0	0.55	20,030	\$257,218						
2,033	0	95	9,976	0	10,071	0.54	5,414	\$100,638	2,033	374	39,501	0	39,875	0	0.54	21,435	\$278,653						
2,034	0	97	11,004	0	11,101	0.52	5,794	\$106,422	2,034	386	43,569	0	43,955	0	0.52	22,940	\$301,593						
2,035	0	100	12,137	0	12,238	0.51	6,201	\$112,653	2,035	397	48,057	0	48,454	0	0.51	24,551	\$326,144						
2,036	0	103	13,388	0	13,491	0.49	6,637	\$119,259	2,036	409	53,007	0	53,416	0	0.49	26,277	\$352,421						
2,037	0	106	14,766	0	14,873	0.48	7,103	\$126,263	2,037	421	58,467	0	58,888	0	0.48	28,125	\$380,546						
2,038	0	110	16,287	0	16,397	0.46	7,603	\$133,665	2,038	434	64,489	0	64,923	0	0.46	30,104	\$410,650						
2,039	0	113	17,965	0	18,078	0.45	8,138	\$142,104	2,039	447	71,131	0	71,578	0	0.45	32,224	\$442,874						
2,040	0	116	19,815	0	19,932	0.44	8,712	\$150,816	2,040	460	78,457	0	78,918	0	0.44	34,493	\$477,367						
2,041	0	120	21,856	0	21,976	0.42	9,325	\$160,142	2,041	474	86,539	0	87,013	0	0.42	36,924	\$514,291						
2,042	0	123	24,088	0	24,231	0.41	9,983	\$170,124	2,042	488	95,452	0	95,940	0	0.41	39,526	\$553,817						
<b>Totals:</b>	\$0	\$9,860	\$1,003,031	\$0	\$1,012,891		<b>\$170,124</b>	<b>\$2,386,069</b>	<b>Totals:</b>	\$0	\$9,860	\$1,003,031	\$0	\$1,012,891		<b>\$553,817</b>	<b>\$2,386,069</b>						

**ECM #8 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description		
Number of Fixtures	182	182
Lamps per Fixture	1	1
Lamp Type	T12	LED
Fixture Wattage	48.9	24.7
Hours on per Week	47	47
Cost of New Lamp		\$55.18
Cost of New Fixture		
Total KWH Cost	\$4,219.72	\$2,131.43
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$4,219.72	\$2,131.43
Yearly Savings		\$2,088.28
Total Retrofit Cost		\$10,042.76
Payback Period		4.8 years
Retrofit Description	Replace all existing T-12 four foot fluorescent lamps with LED direct replacement tubes.	

# Energy Audit Report

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-----ANNUAL REAL CASH FLOWS PROPOSED-----											
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual NatGas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth Annual	Total Annual Costs	Present Worth Annual	Present Worth Cumulative	Present Worth Cumulative Savings
2.012	\$0	\$84	\$-	\$4,220	\$4,304	1.00	\$4,304	\$2,174	\$10,043	\$10,043	\$10,043
2.013	0	87	0	4,334	4,421	0.97	4,292	2,189	2,233	12,211	(7,191)
2.014	0	90	0	4,451	4,540	0.94	4,280	2,248	2,293	14,372	(5,801)
2.015	0	92	0	4,571	4,663	0.92	4,267	2,309	2,355	16,528	(3,689)
2.016	0	95	0	4,694	4,789	0.89	4,255	2,371	2,419	18,677	(1,583)
2.017	0	98	0	4,840	4,938	0.86	4,259	2,445	2,494	20,828	525
2.018	0	101	0	4,990	5,091	0.84	4,263	2,520	2,571	22,982	2,634
2.019	0	104	0	5,144	5,248	0.81	4,267	2,599	2,651	25,137	4,746
2.020	0	107	0	5,304	5,411	0.79	4,271	2,679	2,733	27,295	6,860
2.021	0	110	0	5,468	5,578	0.77	4,275	2,762	2,818	29,454	8,976
2.022	0	113	0	5,638	5,751	0.74	4,280	2,848	2,905	31,616	11,094
2.023	0	117	0	5,813	5,929	0.72	4,284	2,936	2,995	33,780	13,214
2.024	0	120	0	5,993	6,113	0.70	4,288	3,027	3,088	35,946	15,336
2.025	0	124	0	6,179	6,303	0.68	4,292	3,121	3,184	38,113	17,460
2.026	0	128	0	6,370	6,498	0.66	4,296	3,218	3,282	40,283	19,586
2.027	0	131	0	6,670	6,801	0.64	4,365	3,369	3,435	42,488	21,746
2.028	0	135	0	6,983	7,118	0.62	4,436	3,527	3,596	44,729	23,941
2.029	0	139	0	7,311	7,451	0.61	4,508	3,693	3,763	47,006	26,172
2.030	0	144	0	7,655	7,799	0.59	4,581	3,867	3,939	49,320	28,439
2.031	0	148	0	8,015	8,163	0.57	4,655	4,048	4,123	51,671	30,743
2.032	0	152	0	8,391	8,544	0.55	4,730	4,239	4,316	54,060	33,084
2.033	0	157	0	8,786	8,943	0.54	4,807	4,438	4,517	56,489	35,463
2.034	0	162	0	9,199	9,360	0.52	4,885	4,646	4,728	58,956	37,880
2.035	0	167	0	9,631	9,798	0.51	4,964	4,865	4,949	61,464	40,337
2.036	0	172	0	10,084	10,255	0.49	5,045	5,093	5,180	64,012	42,834
2.037	0	177	0	10,558	10,734	0.48	5,127	5,333	5,422	66,602	45,371
2.038	0	182	0	11,054	11,236	0.46	5,210	5,583	5,675	69,233	47,949
2.039	0	187	0	11,573	11,761	0.45	5,295	5,846	5,941	71,908	50,570
2.040	0	193	0	12,117	12,310	0.44	5,381	6,121	6,218	74,625	53,232
2.041	0	199	0	12,687	12,886	0.42	5,468	6,408	6,509	77,387	55,939
2.042	0	205	0	13,283	13,488	0.41	5,557	6,709	6,813	80,194	58,689
<b>Totals:</b>	\$0	\$4,136	\$0	\$227,784	\$231,919		\$138,883	\$115,056	\$127,188	\$80,194	\$30-year LCC

**ECM #9 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description	Exterior Light Pole - Estimated 50,000 Lumen output new, 14,800 pupil lumens with 100w LED fixture, 14,800 pupil lumens.	
Number of Fixtures	1	1
Lamps per Fixture	1	1
Lamp Type	Sodium	LED
Fixture Wattage	455	104.4
Hours on per Week	84	84
Cost of New Lamp		
Cost of New Fixture		\$1,542.02
Total KWH Cost	\$385.56	\$88.47
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$385.56	\$88.47
Yearly Savings		\$297.10
Total Retrofit Cost		\$1,542.02
Payback Period		5.2 years
Retrofit Description	Replace parking lot light with LED fixture.	

Energy Audit Report

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ANNUAL REAL CASH FLOWS CURRENT										ANNUAL REAL CASH FLOWS PROPOSED									
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Cumulative Costs	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Cumulative Costs	Present Value of Savings		
2,012	\$0	\$8	\$-	\$386	\$393	1.00	\$0	\$-	\$1,542	\$-	\$-	\$88	\$90	1.00	\$1,542	\$1,542			
2,012	0	0	0	0	0	0.97	392	392	0	2	0	91	93	0.97	90	\$1,632	\$ (1,240)		
2,013	0	8	0	396	404	0.94	391	391	0	2	0	93	95	0.94	90	\$1,722	\$ (939)		
2,014	0	8	0	407	415	0.92	390	390	0	2	0	96	98	0.92	89	\$1,811	\$ (638)		
2,015	0	8	0	418	426	0.89	389	389	0	2	0	98	100	0.89	89	\$1,900	\$ (338)		
2,016	0	9	0	429	438	0.86	389	389	0	2	0	101	104	0.86	89	\$1,990	\$ (39)		
2,017	0	9	0	442	451	0.84	390	390	0	2	0	105	107	0.84	89	\$2,079	\$ 262		
2,018	0	9	0	456	465	0.81	390	390	0	2	0	108	110	0.81	89	\$2,169	\$ 562		
2,019	0	9	0	470	480	0.79	390	390	0	2	0	111	113	0.79	90	\$2,258	\$ 863		
2,020	0	10	0	485	494	0.77	391	391	0	2	0	115	117	0.77	90	\$2,348	\$ 1,164		
2,021	0	10	0	500	510	0.74	391	391	0	2	0	118	121	0.74	90	\$2,437	\$ 1,465		
2,022	0	10	0	515	526	0.72	391	391	0	2	0	122	124	0.72	90	\$2,527	\$ 1,767		
2,023	0	11	0	531	542	0.70	392	392	0	3	0	126	128	0.70	90	\$2,617	\$ 2,069		
2,024	0	11	0	548	559	0.68	392	392	0	3	0	130	132	0.68	90	\$2,707	\$ 2,371		
2,025	0	11	0	565	576	0.66	393	393	0	3	0	134	136	0.66	90	\$2,797	\$ 2,673		
2,026	0	12	0	582	594	0.64	399	399	0	3	0	140	143	0.64	92	\$2,889	\$ 2,980		
2,027	0	12	0	609	621	0.62	405	405	0	3	0	146	149	0.62	93	\$2,982	\$ 3,293		
2,028	0	12	0	638	650	0.61	412	412	0	3	0	153	156	0.61	95	\$3,076	\$ 3,610		
2,029	0	13	0	668	681	0.59	419	419	0	3	0	160	163	0.59	96	\$3,172	\$ 3,933		
2,030	0	13	0	699	713	0.57	425	425	0	3	0	168	171	0.57	98	\$3,270	\$ 4,260		
2,031	0	14	0	732	746	0.55	432	432	0	3	0	176	179	0.55	99	\$3,369	\$ 4,594		
2,032	0	14	0	767	781	0.54	439	439	0	3	0	184	187	0.54	101	\$3,470	\$ 4,932		
2,033	0	14	0	803	817	0.52	446	446	0	3	0	193	196	0.52	102	\$3,572	\$ 5,276		
2,034	0	15	0	840	855	0.51	454	454	0	3	0	202	205	0.51	104	\$3,676	\$ 5,625		
2,035	0	15	0	880	895	0.49	461	461	0	4	0	211	215	0.49	106	\$3,782	\$ 5,981		
2,036	0	16	0	921	937	0.48	468	468	0	4	0	221	225	0.48	107	\$3,890	\$ 6,342		
2,037	0	16	0	965	981	0.46	476	476	0	4	0	232	236	0.46	109	\$3,999	\$ 6,708		
2,038	0	17	0	1,010	1,027	0.45	484	484	0	4	0	243	247	0.45	111	\$4,110	\$ 7,081		
2,039	0	17	0	1,057	1,075	0.44	492	492	0	4	0	254	258	0.44	113	\$4,223	\$ 7,460		
2,040	0	18	0	1,107	1,125	0.42	500	500	0	4	0	266	270	0.42	115	\$4,337	\$ 7,845		
2,041	0	18	0	1,159	1,177	0.41	508	508	0	4	0	278	283	0.41	117	\$4,454	\$ 8,236		
2,042	0	19	0	1,214	1,232	0.41	508	508	0	4	0	278	283	0.41	117	\$4,454	\$ 8,236		
Totals:	\$0	\$378	\$0	\$20,813	\$21,191		\$12,690	\$12,690	\$1,542	\$87	\$0	\$4,776	\$6,404		\$4,454	\$4,454	\$30-year LCC		

December 23, 2013

**ECM #10 Calculations**

Incoming Water Temperature	46						
<b>Domestic Water Heating Data</b>							
	System 1 - Location Served:						
	Fuel Type	Gallons Hot Water/yr	AFUE	Thermostat Setpoint	Full Load KW (Electric Only)	Mo/Yr Operation (Electric Only)	Cost
Existing	Oil	96,507	87.75%	139.0			N/A
Proposed	Oil	96,507	87.75%	138.0			\$150.00
Description of Retrofit	Reduce domestic hot water temperature, per 1 degree increment.						

<b>Domestic Water Heating System Summary</b>		
	Existing	Proposed
Average AFUE of Domestic Hot Water Systems; proportional	87.75%	87.75%
Average Cost Per Therm of Heating Fuels; proportional	\$2.62	\$2.62
Average Thermostat Setpoint; proportional	139	138
Therms required for Domestic Hot Water over 1 year	852.00	842.84
Estimated Demand Charges (electric)	\$0.00	\$0.00
Estimated Cost over 1 year	\$2,233.46	\$2,209.44
Estimated Cost of Replacements	\$150.00	
Estimated Yearly Savings	N/A	\$24.02
Estimated Payback Period (years)	N/A	6.25

# Energy Audit Report

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ANNUAL REAL CASH FLOWS PROPOSED											
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth Annual Costs	Present Worth of Annual Costs	Present Worth of Cumulative Savings	Present Worth of Annual Costs	Present Worth of Cumulative Savings
2012	\$0	\$0	\$0	\$0	\$0	1.00	\$0	\$0	\$0	\$150	\$150
2013	0	0	0	0	0	0.97	2,197	2,196	0	2,173	2,323
2014	0	0	0	0	0	0.94	2,160	4,357	0	2,137	4,460
2015	0	0	0	0	0	0.92	2,125	6,482	0	2,102	6,562
2016	0	0	0	0	0	0.89	2,090	8,571	0	2,067	8,629
2017	0	0	0	0	0	0.86	2,161	10,732	0	2,137	10,766
2018	0	0	0	0	0	0.84	2,234	12,966	0	2,210	12,976
2019	0	0	0	0	0	0.81	2,310	15,276	0	2,283	15,262
2020	0	0	0	0	0	0.79	2,388	17,664	0	2,353	17,624
2021	0	0	0	0	0	0.77	2,470	20,134	0	2,443	20,067
2022	0	0	0	0	0	0.74	2,554	22,687	0	2,526	22,593
2023	0	0	0	0	0	0.72	2,640	25,328	0	2,612	25,205
2024	0	0	0	0	0	0.70	2,730	28,058	0	2,701	27,906
2025	0	0	0	0	0	0.68	2,823	30,881	0	2,792	30,699
2026	0	0	0	0	0	0.66	2,919	33,799	0	2,887	33,586
2027	0	0	0	0	0	0.64	3,126	36,925	0	3,092	36,678
2028	0	0	0	0	0	0.62	3,347	40,272	0	3,311	39,989
2029	0	0	0	0	0	0.61	3,584	43,856	0	3,546	43,535
2030	0	0	0	0	0	0.59	3,838	47,695	0	3,797	47,332
2031	0	0	0	0	0	0.57	4,110	51,805	0	4,066	51,398
2032	0	0	0	0	0	0.55	4,402	56,207	0	4,354	55,752
2033	0	0	0	0	0	0.54	4,714	60,920	0	4,663	60,415
2034	0	0	0	0	0	0.52	5,048	65,968	0	4,993	65,409
2035	0	0	0	0	0	0.51	5,405	71,374	0	5,347	70,756
2036	0	0	0	0	0	0.49	5,789	77,162	0	5,726	76,482
2037	0	0	0	0	0	0.48	6,199	83,361	0	6,132	82,615
2038	0	0	0	0	0	0.46	6,638	89,999	0	6,567	89,181
2039	0	0	0	0	0	0.45	7,109	97,108	0	7,032	96,214
2040	0	0	0	0	0	0.44	7,612	104,720	0	7,531	103,744
2041	0	0	0	0	0	0.42	8,152	112,872	0	8,064	111,809
2042	0	0	0	0	0	0.41	8,730	121,602	0	8,636	120,445
Totals:	\$0	\$0	\$0	\$0	\$0		\$121,602	\$121,602	\$0	\$120,445	\$120,445



# Energy Audit Report

December 23, 2013

## ECM #11 Calculations

Below Grade Wall - Original			Below Grade Wall - Proposed				
Component	Assembly 1		Component	Assembly 1			
	Framed Section	Insulated Section		Framed Section	Insulated Section		
2X4 wood framing	4.375		2X4 wood framing	4.375			
R-11 insulation		11	R-11 insulation		11		
			2" Foam Sheathing	10	10		
Total R-Values	4.375	11	Total R-Values	14.375	21		
Total U-Values	0.2286	0.0909	Total U-Values	0.0696	0.0476		
Percentage of Framing	10.00%	90.00%	Percentage of Framing	10.00%	90.00%		
Composite U-Value of Assembly	0.1047		Composite U-Value of Assembly	0.0498			
Composite R-Value of Assembly	9.5533		Composite R-Value of Assembly	20.0748			
Average Height Of Wall	4		Average Height Of Wall	4			
Wall Length	231		Wall Length	231			
Distance from Grade to top of wall	1		Distance from Grade to top of wall	1			
Wall Square Footage - Below Grade	693		Wall Square Footage - Below Grade	693			
Wall Square Footage - Above Grade	231		Wall Square Footage - Above Grade	231			
Total Square Footage	924		Total Square Footage	924			
Ground R-Value	6.56		Ground R-Value	6.56			
Total Below Ground R-Value	16.1111		Total Below Ground R-Value	26.6325			
Total Above Grade R-Value	9.5533		Total Above Grade R-Value	20.0748			
Above Grade Heat Loss BTU/h	771.34		Above Grade Heat Loss BTU/h	367.07			
Below Grade Heat Loss BTU/h	1,372.15		Below Grade Heat Loss BTU/h	830.06			
Total Below Grade Wall Heat Loss BTU/h	2,143.49		Total Below Grade Wall Heat Loss BTU/h	1,197.14			
Heating System Served	System 1		Heating System Served	System 1			
				Original Heating System	Proposed Heating System	Savings - Original Heating System	Savings - Proposed Heating System
Yearly Cost	\$560.94		Yearly Cost	\$313.28	\$313.28	\$247.66	\$247.66

# Energy Audit Report

December 23, 2013

-----ANNUAL REAL CASH FLOWS PROPOSED-----											
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat. Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Cumulative Savings	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs
2012	\$0	\$561	\$0	\$0	\$561	1.00	\$561	\$0	\$561	1.00	\$561
2013	\$2,882	0	0	0	\$2,882	0.97	\$2,812	\$2,882	\$2,882	0.97	\$2,812
2014	0	0	0	0	0	0.94	0	0	0	0.94	0
2015	0	0	0	0	0	0.92	0	0	0	0.92	0
2016	0	0	0	0	0	0.89	0	0	0	0.89	0
2017	0	0	0	0	0	0.86	0	0	0	0.86	0
2018	0	0	0	0	0	0.84	0	0	0	0.84	0
2019	0	0	0	0	0	0.81	0	0	0	0.81	0
2020	0	0	0	0	0	0.79	0	0	0	0.79	0
2021	0	0	0	0	0	0.77	0	0	0	0.77	0
2022	0	0	0	0	0	0.74	0	0	0	0.74	0
2023	0	0	0	0	0	0.72	0	0	0	0.72	0
2024	0	0	0	0	0	0.70	0	0	0	0.70	0
2025	0	0	0	0	0	0.68	0	0	0	0.68	0
2026	0	0	0	0	0	0.66	0	0	0	0.66	0
2027	0	0	0	0	0	0.64	0	0	0	0.64	0
2028	0	0	0	0	0	0.62	0	0	0	0.62	0
2029	0	0	0	0	0	0.61	0	0	0	0.61	0
2030	0	0	0	0	0	0.59	0	0	0	0.59	0
2031	0	0	0	0	0	0.57	0	0	0	0.57	0
2032	0	0	0	0	0	0.55	0	0	0	0.55	0
2033	0	0	0	0	0	0.54	0	0	0	0.54	0
2034	0	0	0	0	0	0.52	0	0	0	0.52	0
2035	0	0	0	0	0	0.51	0	0	0	0.51	0
2036	0	0	0	0	0	0.49	0	0	0	0.49	0
2037	0	0	0	0	0	0.48	0	0	0	0.48	0
2038	0	0	0	0	0	0.46	0	0	0	0.46	0
2039	0	0	0	0	0	0.45	0	0	0	0.45	0
2040	0	0	0	0	0	0.44	0	0	0	0.44	0
2041	0	0	0	0	0	0.42	0	0	0	0.42	0
2042	0	0	0	0	0	0.41	0	0	0	0.41	0
<b>Totals:</b>	<b>\$0</b>	<b>\$0</b>	<b>\$55,923</b>	<b>\$0</b>	<b>\$55,923</b>	<b>0.41</b>	<b>\$20,541</b>	<b>\$30,541</b>	<b>\$30,541</b>	<b>0.41</b>	<b>\$19,939</b>
											<b>\$19,939 =30-year LCC</b>

# Energy Audit Report

December 23, 2013

## ECM #12 Calculations

<b>Motor #1</b>										
	Horsepower	Motor Loading	Efficiency	KW	Operating Hours/yr	Yearly KW Demand	Yearly KW Demand Cost	Yearly KWH Consumption	Yearly KWH Cost	Totals
Existing	0.083	0.7	0.7	0.06	8760	0.74	\$0.00	542	\$105.23	\$105.23
Proposed	0.029	0.7	0.7	0.02	8760	0.26	\$0.00	190	\$36.77	\$36.77
Savings						0.48	\$0.00	353	\$68.46	\$68.46
Installed Cost		\$683.32								
Payback (years)		9.98								
Description of Improvement	Replace main circulation pump with a variable speed pump.									

# Energy Audit Report

## December 23, 2013

-----ANNUAL REAL CASH FLOWS PROPOSED-----											
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Savings	Present Annual Costs	Present Worth of Annual Costs	Present Worth of Cumulative Savings
2,012	\$0	0	0	0	\$37	1.00	\$37	\$683	0	\$683	\$683
2,013	0	0	0	0	0	0.97	0	0	0	0	0
2,014	0	0	0	0	0	0.94	0	0	0	0	0
2,015	0	0	0	0	0	0.92	0	0	0	0	0
2,016	0	0	0	0	0	0.89	0	0	0	0	0
2,017	0	0	0	0	0	0.86	0	0	0	0	0
2,018	0	0	0	0	0	0.84	0	0	0	0	0
2,019	0	0	0	0	0	0.81	0	0	0	0	0
2,020	0	0	0	0	0	0.79	0	0	0	0	0
2,021	0	0	0	0	0	0.77	0	0	0	0	0
2,022	0	0	0	0	0	0.74	0	0	0	0	0
2,023	0	0	0	0	0	0.72	0	0	0	0	0
2,024	0	0	0	0	0	0.70	0	0	0	0	0
2,025	0	0	0	0	0	0.68	0	0	0	0	0
2,026	0	0	0	0	0	0.66	0	0	0	0	0
2,027	0	0	0	0	0	0.64	0	0	0	0	0
2,028	0	0	0	0	0	0.62	0	0	0	0	0
2,029	0	0	0	0	0	0.61	0	0	0	0	0
2,030	0	0	0	0	0	0.59	0	0	0	0	0
2,031	0	0	0	0	0	0.57	0	0	0	0	0
2,032	0	0	0	0	0	0.55	0	0	0	0	0
2,033	0	0	0	0	0	0.54	0	0	0	0	0
2,034	0	0	0	0	0	0.52	0	0	0	0	0
2,035	0	0	0	0	0	0.51	0	0	0	0	0
2,036	0	0	0	0	0	0.49	0	0	0	0	0
2,037	0	0	0	0	0	0.48	0	0	0	0	0
2,038	0	0	0	0	0	0.46	0	0	0	0	0
2,039	0	0	0	0	0	0.45	0	0	0	0	0
2,040	0	0	0	0	0	0.44	0	0	0	0	0
2,041	0	0	0	0	0	0.42	0	0	0	0	0
2,042	0	0	0	0	0	0.41	0	0	0	0	0
<b>Totals:</b>	\$0	\$103	\$0	\$5,680	\$5,783		\$3,463	\$683	\$36	\$1,985	\$2,704
										<b>\$1,893</b>	<b>=30-year LCC</b>



# Energy Audit Report

## December 23, 2013

-----ANNUAL REAL CASH FLOWS PROPOSED-----												
(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i)^-n	Present Worth of Annual Costs	Present Cumulative Costs	Present Worth of Annual Costs	Present Cumulative Costs	Present Value of Cumulative Savings	
2012	\$0	\$0	\$0	\$1,736	\$1,736	1.00	\$1,736	\$17,152	1.00	\$17,152	\$0	
2013	0	0	0	1,759	1,759	0.97	1,707	\$18,859	0.97	\$18,859	\$ (16,111)	
2014	0	0	0	1,782	1,782	0.94	1,679	\$20,538	0.94	\$20,538	\$ (15,087)	
2015	0	0	0	1,805	1,805	0.92	1,652	\$22,190	0.92	\$22,190	\$ (14,080)	
2016	0	0	0	1,828	1,828	0.89	1,624	\$23,814	0.89	\$23,814	\$ (13,089)	
2017	0	0	0	1,947	1,947	0.86	1,679	\$25,494	0.86	\$25,494	\$ (12,065)	
2018	0	0	0	2,074	2,074	0.84	1,737	\$27,230	0.84	\$27,230	\$ (11,006)	
2019	0	0	0	2,208	2,208	0.81	1,796	\$29,026	0.81	\$29,026	\$ (9,911)	
2020	0	0	0	2,352	2,352	0.79	1,857	\$30,882	0.79	\$30,882	\$ (8,779)	
2021	0	0	0	2,505	2,505	0.77	1,920	\$32,802	0.77	\$32,802	\$ (7,609)	
2022	0	0	0	2,668	2,668	0.74	1,985	\$34,787	0.74	\$34,787	\$ (6,398)	
2023	0	0	0	2,841	2,841	0.72	2,052	\$36,839	0.72	\$36,839	\$ (5,147)	
2024	0	0	0	3,026	3,026	0.70	2,122	\$38,961	0.70	\$38,961	\$ (3,853)	
2025	0	0	0	3,222	3,222	0.68	2,194	\$41,155	0.68	\$41,155	\$ (2,515)	
2026	0	0	0	3,432	3,432	0.66	2,269	\$43,424	0.66	\$43,424	\$ (1,131)	
2027	0	0	0	3,785	3,785	0.64	2,430	\$45,854	0.64	\$45,854	\$ (350)	
2028	0	0	0	4,175	4,175	0.62	2,602	\$48,455	0.62	\$48,455	\$ (1,937)	
2029	0	0	0	4,605	4,605	0.61	2,786	\$51,242	0.61	\$51,242	\$ (3,635)	
2030	0	0	0	5,079	5,079	0.59	2,984	\$54,225	0.59	\$54,225	\$ (5,455)	
2031	0	0	0	5,603	5,603	0.57	3,195	\$57,420	0.57	\$57,420	\$ (7,403)	
2032	0	0	0	6,180	6,180	0.55	3,421	\$60,842	0.55	\$60,842	\$ (9,489)	
2033	0	0	0	6,816	6,816	0.54	3,664	\$64,506	0.54	\$64,506	\$ (11,724)	
2034	0	0	0	7,518	7,518	0.52	3,924	\$68,429	0.52	\$68,429	\$ (14,116)	
2035	0	0	0	8,292	8,292	0.51	4,202	\$72,631	0.51	\$72,631	\$ (16,678)	
2036	0	0	0	9,147	9,147	0.49	4,500	\$77,131	0.49	\$77,131	\$ (19,422)	
2037	0	0	0	10,089	10,089	0.48	4,818	\$81,949	0.48	\$81,949	\$ (22,360)	
2038	0	0	0	11,128	11,128	0.46	5,160	\$87,109	0.46	\$87,109	\$ (25,507)	
2039	0	0	0	12,274	12,274	0.45	5,526	\$92,635	0.45	\$92,635	\$ (28,876)	
2040	0	0	0	13,538	13,538	0.44	5,917	\$98,552	0.44	\$98,552	\$ (32,484)	
2041	0	0	0	14,933	14,933	0.42	6,337	\$104,888	0.42	\$104,888	\$ (36,348)	
2042	0	0	0	16,471	16,471	0.41	6,786	\$111,674	0.41	\$111,674	\$ (40,486)	
<b>Totals:</b>	\$0	\$0	\$0	\$173,078	\$190,230		<b>\$11,674</b>			<b>=30-year LCC</b>		

-----ANNUAL REAL CASH FLOWS CURRENT-----												
(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i)^-n	Present Worth of Annual Costs	Present Cumulative Costs	Present Worth of Annual Costs	Present Cumulative Costs	Present Value of Cumulative Savings	
2012	\$0	\$0	\$0	\$2,795	\$2,795	1.00	\$2,795	\$278,618	1.00	\$278,618	\$0	
2013	0	0	0	2,831	2,831	0.97	2,749	\$278,618	0.97	\$278,618	\$ (12,161)	
2014	0	0	0	2,868	2,868	0.94	2,703	\$278,618	0.94	\$278,618	\$ (12,161)	
2015	0	0	0	2,905	2,905	0.92	2,659	\$278,618	0.92	\$278,618	\$ (12,161)	
2016	0	0	0	2,943	2,943	0.89	2,615	\$278,618	0.89	\$278,618	\$ (12,161)	
2017	0	0	0	3,134	3,134	0.86	2,704	\$278,618	0.86	\$278,618	\$ (12,161)	
2018	0	0	0	3,338	3,338	0.84	2,795	\$278,618	0.84	\$278,618	\$ (12,161)	
2019	0	0	0	3,555	3,555	0.81	2,890	\$278,618	0.81	\$278,618	\$ (12,161)	
2020	0	0	0	3,786	3,786	0.79	2,989	\$278,618	0.79	\$278,618	\$ (12,161)	
2021	0	0	0	4,032	4,032	0.77	3,090	\$278,618	0.77	\$278,618	\$ (12,161)	
2022	0	0	0	4,294	4,294	0.74	3,195	\$278,618	0.74	\$278,618	\$ (12,161)	
2023	0	0	0	4,573	4,573	0.72	3,304	\$278,618	0.72	\$278,618	\$ (12,161)	
2024	0	0	0	4,870	4,870	0.70	3,416	\$278,618	0.70	\$278,618	\$ (12,161)	
2025	0	0	0	5,187	5,187	0.68	3,532	\$278,618	0.68	\$278,618	\$ (12,161)	
2026	0	0	0	5,524	5,524	0.66	3,652	\$278,618	0.66	\$278,618	\$ (12,161)	
2027	0	0	0	6,093	6,093	0.64	3,911	\$278,618	0.64	\$278,618	\$ (12,161)	
2028	0	0	0	6,721	6,721	0.62	4,188	\$278,618	0.62	\$278,618	\$ (12,161)	
2029	0	0	0	7,413	7,413	0.61	4,485	\$278,618	0.61	\$278,618	\$ (12,161)	
2030	0	0	0	8,177	8,177	0.59	4,803	\$278,618	0.59	\$278,618	\$ (12,161)	
2031	0	0	0	9,019	9,019	0.57	5,143	\$278,618	0.57	\$278,618	\$ (12,161)	
2032	0	0	0	9,948	9,948	0.55	5,508	\$278,618	0.55	\$278,618	\$ (12,161)	
2033	0	0	0	10,972	10,972	0.54	5,898	\$278,618	0.54	\$278,618	\$ (12,161)	
2034	0	0	0	12,103	12,103	0.52	6,316	\$278,618	0.52	\$278,618	\$ (12,161)	
2035	0	0	0	13,349	13,349	0.51	6,764	\$278,618	0.51	\$278,618	\$ (12,161)	
2036	0	0	0	14,724	14,724	0.49	7,243	\$278,618	0.49	\$278,618	\$ (12,161)	
2037	0	0	0	16,241	16,241	0.48	7,757	\$278,618	0.48	\$278,618	\$ (12,161)	
2038	0	0	0	17,913	17,913	0.46	8,306	\$278,618	0.46	\$278,618	\$ (12,161)	
2039	0	0	0	19,758	19,758	0.45	8,895	\$278,618	0.45	\$278,618	\$ (12,161)	
2040	0	0	0	21,794	21,794	0.44	9,525	\$278,618	0.44	\$278,618	\$ (12,161)	
2041	0	0	0	24,038	24,038	0.42	10,201	\$278,618	0.42	\$278,618	\$ (12,161)	
2042	0	0	0	26,514	26,514	0.41	10,924	\$278,618	0.41	\$278,618	\$ (12,161)	
<b>Totals:</b>	\$0	\$0	\$0	\$278,618	\$278,618		<b>\$152,160</b>			<b>=30-year LCC</b>		

**ECM #14 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description		
Number of Fixtures	1	1
Lamps per Fixture	1	1
Lamp Type	HPS	LED
Fixture Wattage	70.7	35.1
Hours on per Week	84	84
Cost of New Lamp		
Cost of New Fixture		\$385.92
Total KWH Cost	\$59.91	\$29.74
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$59.91	\$29.74
Yearly Savings		\$30.17
Total Retrofit Cost		\$385.92
Payback Period		12.8 years
Retrofit Description	Replace east entry wall mount HPS fixture with LED (currently burned out).	

# Energy Audit Report

December 23, 2013

ANNUAL REAL CASH FLOWS PROPOSED											
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth Annual Costs	Present Worth of Annual Cumulative Savings	Present Worth of Annual Cumulative Costs	Present Worth of Annual Cumulative Savings	Present Value c
2.012	\$0	\$1	\$-	\$60	\$61	1.00	\$386	\$386	\$386	\$386	\$386
2.013	0	1	0	62	63	0.97	31	31	31	31	\$416
2.014	0	1	0	63	64	0.94	32	32	32	32	\$446
2.015	0	1	0	65	66	0.92	33	33	33	33	\$476
2.016	0	1	0	67	68	0.89	34	34	34	34	\$506
2.017	0	1	0	69	70	0.86	35	35	35	35	\$536
2.018	0	1	0	71	72	0.84	36	36	36	36	\$566
2.019	0	1	0	73	75	0.81	37	37	37	37	\$597
2.020	0	2	0	75	77	0.79	38	38	38	38	\$627
2.021	0	2	0	78	79	0.77	39	39	39	39	\$657
2.022	0	2	0	80	82	0.74	41	41	41	41	\$687
2.023	0	2	0	83	84	0.72	42	42	42	42	\$717
2.024	0	2	0	85	87	0.70	43	43	43	43	\$747
2.025	0	2	0	88	89	0.68	44	44	44	44	\$778
2.026	0	2	0	90	92	0.66	45	45	45	45	\$808
2.027	0	2	0	95	97	0.64	47	47	47	47	\$839
2.028	0	2	0	99	101	0.62	49	49	49	49	\$870
2.029	0	2	0	104	106	0.61	50	50	50	50	\$902
2.030	0	2	0	109	111	0.59	53	53	53	53	\$934
2.031	0	2	0	114	116	0.57	56	56	56	56	\$967
2.032	0	2	0	119	121	0.55	59	59	59	59	\$1,000
2.033	0	2	0	125	127	0.54	62	62	62	62	\$1,034
2.034	0	2	0	131	133	0.52	65	65	65	65	\$1,068
2.035	0	2	0	137	139	0.51	68	68	68	68	\$1,103
2.036	0	2	0	143	146	0.49	71	71	71	71	\$1,139
2.037	0	3	0	150	152	0.48	74	74	74	74	\$1,175
2.038	0	3	0	157	160	0.46	78	78	78	78	\$1,212
2.039	0	3	0	164	167	0.45	82	82	82	82	\$1,249
2.040	0	3	0	172	175	0.44	85	85	85	85	\$1,287
2.041	0	3	0	180	183	0.42	89	89	89	89	\$1,326
2.042	0	3	0	189	191	0.41	94	94	94	94	\$1,365
<b>Totals:</b>	\$0	\$59	\$0	\$3,234	\$3,293		\$29	\$29	\$0	\$1,606	\$2,021
										<b>\$1,365</b>	<b>=30-year LCC</b>



**ECM #15 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description	Exterior CFL fixtures on manual switches	
Number of Fixtures	8	8
Lamps per Fixture	1	1
Lamp Type	CFL	LED
Fixture Wattage	20	13.2
Hours on per Week	28	28
Cost of New Lamp		\$25.08
Cost of New Fixture		
Total KWH Cost	\$45.19	\$29.83
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$45.19	\$29.83
Yearly Savings		\$15.37
Total Retrofit Cost		\$200.64
Payback Period		13.1 years
Retrofit Description	Replace lamps in outdoor wall lights with LED.	

# Energy Audit Report

## December 23, 2013

-----ANNUAL REAL CASH FLOWS PROPOSED-----																
(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Savings
2012	\$0	\$1	\$-	\$45	\$46	1.00	\$0	2012	\$201	\$-	\$-	\$30	\$201	1.00	\$201	\$201
2012	0	0	0	0	0	0.97	46	2012	0	0	0	0	0	0.97	30	185
2013	0	1	0	46	47	0.94	45.97	2013	0	1	0	31	31	0.94	30	169
2014	0	1	0	48	49	0.92	92	2014	0	1	0	31	32	0.92	30	154
2015	0	1	0	49	50	0.89	138	2015	0	1	0	32	33	0.89	30	138
2016	0	1	0	50	51	0.86	183	2016	0	1	0	33	34	0.86	30	123
2017	0	1	0	52	53	0.84	229	2017	0	1	0	34	35	0.84	30	107
2018	0	1	0	53	55	0.81	274	2018	0	1	0	35	36	0.81	30	92
2019	0	1	0	55	56	0.79	320	2019	0	1	0	36	37	0.79	30	76
2020	0	1	0	57	58	0.77	366	2020	0	1	0	37	38	0.77	30	61
2021	0	1	0	59	60	0.74	412	2021	0	1	0	40	41	0.74	30	45
2022	0	1	0	60	62	0.72	457	2022	0	1	0	41	42	0.72	30	30
2023	0	1	0	62	64	0.70	503	2023	0	1	0	42	43	0.70	30	14
2024	0	1	0	64	65	0.68	549	2024	0	1	0	44	45	0.68	30	2
2025	0	1	0	66	68	0.66	595	2025	0	1	0	45	46	0.66	30	17
2026	0	1	0	68	70	0.64	641	2026	0	1	0	47	48	0.64	31	33
2027	0	1	0	71	73	0.62	688	2027	0	1	0	49	50	0.62	31	49
2028	0	1	0	75	76	0.61	735	2028	0	1	0	52	53	0.61	32	66
2029	0	1	0	78	80	0.59	784	2029	0	1	0	54	55	0.59	32	83
2030	0	2	0	82	84	0.57	833	2030	0	1	0	57	58	0.57	33	99
2031	0	2	0	86	87	0.55	883	2031	0	1	0	59	60	0.55	33	117
2032	0	2	0	90	92	0.54	933	2032	0	1	0	62	63	0.54	34	134
2033	0	2	0	94	96	0.52	985	2033	0	1	0	65	66	0.52	35	152
2034	0	2	0	99	100	0.51	1,037	2034	0	1	0	68	69	0.51	35	170
2035	0	2	0	103	105	0.49	1,090	2035	0	1	0	71	72	0.49	36	188
2036	0	2	0	108	110	0.48	1,144	2036	0	1	0	75	76	0.48	36	207
2037	0	2	0	113	115	0.46	1,199	2037	0	1	0	78	79	0.46	37	226
2038	0	2	0	118	120	0.45	1,255	2038	0	1	0	82	83	0.45	37	245
2039	0	2	0	124	126	0.44	1,312	2039	0	1	0	86	87	0.44	38	265
2040	0	2	0	130	132	0.42	1,369	2040	0	1	0	90	91	0.42	39	285
2041	0	2	0	136	138	0.41	1,428	2041	0	1	0	94	95	0.41	39	305
2042	0	2	0	142	144	0.41	1,487	2042	0	1	0	94	95	0.41	39	305
<b>Totals:</b>	\$0	\$44	\$0	\$2,440	\$2,484		\$1,487 =30-year LCC	<b>Totals:</b>	\$201	\$29	\$0	\$1,610	\$1,840		\$1,182 =30-year LCC	

**ECM #16 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description		
Number of Fixtures	96	96
Lamps per Fixture	1	1
Lamp Type	T8	LED
Fixture Wattage	28.75	22
Hours on per Week	60	60
Cost of New Lamp		\$55.18
Cost of New Fixture		
Total KWH Cost	\$1,670.57	\$1,278.35
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$1,670.57	\$1,278.35
Yearly Savings		\$392.22
Total Retrofit Cost		\$5,297.28
Payback Period		13.5 years
Retrofit Description	Replace all existing T-8 four foot fluorescent lamps with LED direct replacement tubes.	

# Energy Audit Report

## December 23, 2013

-----ANNUAL REAL CASH FLOWS PROPOSED-----													
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth Annual Costs	Present Value of Cumulative Savings	ANNUAL REAL CASH FLOWS CURRENT			Present Value of Cumulative Savings	
									First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs		Annual Electric Costs
2.012	\$0	\$33	\$-	\$1,671	\$1,704	1.00	\$0	\$-	\$5,297	\$1,304	1.00	\$5,297	\$-
2.012	0	--	--	--	--	0.97	\$0	\$-	\$5,297	\$1,304	0.97	\$5,297	\$-
2.013	0	34	0	1,716	1,750	0.97	1,699	\$ 1,699.12	1,339	1,339	0.97	1,306	\$6,597
2.014	0	35	0	1,762	1,797	0.94	1,694	\$ 3,393	1,375	1,375	0.94	1,296	\$7,894
2.015	0	37	0	1,810	1,846	0.92	1,689	\$ 5,083	1,413	1,413	0.92	1,293	\$9,187
2.016	0	38	0	1,858	1,896	0.89	1,685	\$ 6,767	1,451	1,451	0.89	1,289	\$10,476
2.017	0	39	0	1,916	1,955	0.86	1,686	\$ 8,454	1,496	1,496	0.86	1,290	\$11,766
2.018	0	40	0	1,975	2,015	0.84	1,688	\$ 10,141	1,542	1,542	0.84	1,292	\$13,058
2.019	0	41	0	2,037	2,078	0.81	1,689	\$ 11,831	1,590	1,590	0.81	1,293	\$14,350
2.020	0	42	0	2,100	2,142	0.79	1,691	\$ 13,522	1,639	1,639	0.79	1,294	\$15,644
2.021	0	44	0	2,165	2,209	0.77	1,693	\$ 15,215	1,690	1,690	0.77	1,295	\$16,940
2.022	0	45	0	2,232	2,277	0.74	1,694	\$ 16,909	1,742	1,742	0.74	1,296	\$18,236
2.023	0	46	0	2,301	2,347	0.72	1,696	\$ 18,605	1,796	1,796	0.72	1,298	\$19,534
2.024	0	48	0	2,373	2,420	0.70	1,697	\$ 20,302	1,852	1,852	0.70	1,299	\$20,833
2.025	0	49	0	2,446	2,495	0.68	1,699	\$ 22,001	1,909	1,909	0.68	1,300	\$22,133
2.026	0	51	0	2,522	2,572	0.66	1,701	\$ 23,702	1,969	1,969	0.66	1,301	\$23,434
2.027	0	52	0	2,640	2,693	0.64	1,728	\$ 25,430	2,021	2,021	0.64	1,322	\$24,757
2.028	0	54	0	2,765	2,818	0.62	1,756	\$ 27,186	2,115	2,115	0.62	1,344	\$26,101
2.029	0	55	0	2,895	2,950	0.61	1,785	\$ 28,971	2,215	2,215	0.61	1,366	\$27,466
2.030	0	57	0	3,031	3,087	0.59	1,814	\$ 30,785	2,319	2,319	0.59	1,388	\$28,854
2.031	0	59	0	3,173	3,232	0.57	1,843	\$ 32,627	2,428	2,473	0.57	1,410	\$30,264
2.032	0	60	0	3,322	3,382	0.55	1,873	\$ 34,500	2,542	2,588	0.55	1,433	\$31,697
2.033	0	62	0	3,478	3,540	0.54	1,903	\$ 36,403	2,662	2,709	0.54	1,456	\$33,154
2.034	0	64	0	3,642	3,706	0.52	1,934	\$ 38,337	2,787	2,836	0.52	1,480	\$34,634
2.035	0	66	0	3,813	3,879	0.51	1,965	\$ 40,303	2,918	2,968	0.51	1,504	\$36,138
2.036	0	68	0	3,992	4,060	0.49	1,997	\$ 42,300	3,055	3,107	0.49	1,528	\$37,666
2.037	0	70	0	4,180	4,250	0.48	2,030	\$ 44,330	3,198	3,252	0.48	1,553	\$39,219
2.038	0	72	0	4,376	4,448	0.46	2,063	\$ 46,392	3,349	3,404	0.46	1,578	\$40,797
2.039	0	74	0	4,582	4,656	0.45	2,096	\$ 48,488	3,506	3,563	0.45	1,604	\$42,401
2.040	0	76	0	4,797	4,874	0.44	2,130	\$ 50,619	3,671	3,729	0.44	1,630	\$44,031
2.041	0	79	0	5,023	5,101	0.42	2,165	\$ 52,783	3,843	3,904	0.42	1,657	\$45,688
2.042	0	81	0	5,259	5,340	0.41	2,200	\$ 54,983	4,024	4,086	0.41	1,683	\$47,371
Totals:	\$0	\$1,637	\$0	\$90,179	\$91,816		\$54,983	\$-30-year LCC	\$69,006	\$75,557		\$47,371	\$-30-year LCC

**ECM #17 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description	exterior canopy CFL over main east facing entry	
Number of Fixtures	1	1
Lamps per Fixture	1	1
Lamp Type	CFL	LED
Fixture Wattage	20	13.2
Hours on per Week	168	84
Cost of New Lamp		\$25.08
Cost of New Fixture		\$338.25
Total KWH Cost	\$33.90	\$11.19
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$33.90	\$11.19
Yearly Savings		\$22.71
Total Retrofit Cost		\$363.33
Payback Period		16.0 years
Retrofit Description	Place east entrance canopy light on photosensor and replace lamp with LED.	

# Energy Audit Report

December 23, 2013

-----ANNUAL REAL CASH FLOWS CURRENT-----										-----ANNUAL REAL CASH FLOWS PROPOSED-----									
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Cumulative Costs	(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Cumulative Costs		
2012	\$0	\$1	\$-	\$34	\$35	1.00	\$0	\$-	2012	\$363	\$-	\$-	\$11	\$363	1.00	\$363	\$363		
2013	0	1	0	35	36	0.97	34	34.7	2013	0	0	0	11	12	0.97	11	375		
2014	0	1	0	36	36	0.94	34	69	2014	0	0	0	12	12	0.94	11	386		
2015	0	1	0	37	37	0.92	34	103	2015	0	0	0	12	12	0.92	11	397		
2016	0	1	0	38	38	0.89	34	137	2016	0	0	0	12	13	0.89	11	409		
2017	0	1	0	39	40	0.86	34	172	2017	0	0	0	13	13	0.86	11	420		
2018	0	1	0	40	41	0.84	34	206	2018	0	0	0	13	13	0.84	11	431		
2019	0	1	0	41	42	0.81	34	240	2019	0	0	0	14	14	0.81	11	443		
2020	0	1	0	43	43	0.79	34	274	2020	0	0	0	14	14	0.79	11	454		
2021	0	1	0	44	45	0.77	34	309	2021	0	0	0	14	15	0.77	11	465		
2022	0	1	0	45	46	0.74	34	343	2022	0	0	0	15	15	0.74	11	477		
2023	0	1	0	47	48	0.72	34	377	2023	0	0	0	15	16	0.72	11	488		
2024	0	1	0	48	49	0.70	34	412	2024	0	0	0	16	16	0.70	11	499		
2025	0	1	0	50	51	0.68	34	446	2025	0	0	0	16	17	0.68	11	511		
2026	0	1	0	51	52	0.66	35	481	2026	0	0	0	17	17	0.66	11	522		
2027	0	1	0	54	55	0.64	35	516	2027	0	0	0	18	18	0.64	12	534		
2028	0	1	0	56	57	0.62	36	552	2028	0	0	0	19	19	0.62	12	545		
2029	0	1	0	59	60	0.61	36	588	2029	0	0	0	19	20	0.61	12	557		
2030	0	1	0	61	63	0.59	37	625	2030	0	0	0	20	21	0.59	12	569		
2031	0	1	0	64	66	0.57	37	662	2031	0	0	0	21	22	0.57	12	582		
2032	0	1	0	67	69	0.55	38	700	2032	0	0	0	22	23	0.55	13	594		
2033	0	1	0	71	72	0.54	39	739	2033	0	0	0	23	24	0.54	13	607		
2034	0	1	0	74	75	0.52	39	778	2034	0	0	0	24	25	0.52	13	620		
2035	0	1	0	77	79	0.51	40	818	2035	0	0	0	26	26	0.51	13	633		
2036	0	1	0	81	82	0.49	41	858	2036	0	0	0	27	27	0.49	13	647		
2037	0	1	0	85	86	0.48	41	899	2037	0	0	0	28	28	0.48	14	660		
2038	0	1	0	89	90	0.46	42	941	2038	0	0	0	29	30	0.46	14	674		
2039	0	2	0	93	94	0.45	43	984	2039	0	0	0	31	31	0.45	14	688		
2040	0	2	0	97	99	0.44	43	1,027	2040	0	1	0	32	33	0.44	14	702		
2041	0	2	0	102	104	0.42	44	1,071	2041	0	1	0	34	34	0.42	14	717		
2042	0	2	0	107	108	0.41	45	1,116	2042	0	1	0	35	36	0.41	15	731		
<b>Totals:</b>	\$0	\$33	\$0	\$1,830	\$1,863		\$1,116	\$30-year LCC	<b>Totals:</b>	\$363	\$11	\$0	\$604	\$978		\$731	\$30-year LCC		



Energy Audit Report

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-----ANNUAL REAL CASH FLOWS CURRENT-----												-----ANNUAL REAL CASH FLOWS PROPOSED-----											
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Costs	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Costs							
2012	\$0	\$0	\$353	\$0	\$353	1.00	\$0	\$0	\$3,176	--	\$249	\$0	\$249	1.00	\$3,176	\$3,176							
2013	0	0	357	0	357	0.97	347	346.87	0	0	252	0	252	0.97	245	3,421							
2014	0	0	362	0	362	0.94	341	688	0	0	256	0	256	0.94	241	3,662							
2015	0	0	367	0	367	0.92	336	1,024	0	0	259	0	259	0.92	237	3,899							
2016	0	0	371	0	371	0.89	330	1,354	0	0	262	0	262	0.89	233	4,133							
2017	0	0	396	0	396	0.86	341	1,695	0	0	280	0	280	0.86	241	4,374							
2018	0	0	421	0	421	0.84	353	2,047	0	0	298	0	298	0.84	249	4,623							
2019	0	0	449	0	449	0.81	365	2,412	0	0	317	0	317	0.81	258	4,881							
2020	0	0	478	0	478	0.79	377	2,789	0	0	338	0	338	0.79	267	5,147							
2021	0	0	509	0	509	0.77	390	3,179	0	0	360	0	360	0.77	276	5,423							
2022	0	0	542	0	542	0.74	403	3,583	0	0	383	0	383	0.74	285	5,708							
2023	0	0	577	0	577	0.72	417	4,000	0	0	408	0	408	0.72	295	6,003							
2024	0	0	615	0	615	0.70	431	4,431	0	0	434	0	434	0.70	305	6,307							
2025	0	0	655	0	655	0.68	446	4,876	0	0	463	0	463	0.68	315	6,622							
2026	0	0	697	0	697	0.66	461	5,337	0	0	493	0	493	0.66	326	6,948							
2027	0	0	769	0	769	0.64	494	5,831	0	0	543	0	543	0.64	349	7,297							
2028	0	0	848	0	848	0.62	529	6,359	0	0	599	0	599	0.62	374	7,670							
2029	0	0	936	0	936	0.61	566	6,926	0	0	661	0	661	0.61	400	8,070							
2030	0	0	1,032	0	1,032	0.59	606	7,532	0	0	729	0	729	0.59	428	8,499							
2031	0	0	1,138	0	1,138	0.57	649	8,181	0	0	804	0	804	0.57	459	8,958							
2032	0	0	1,255	0	1,255	0.55	695	8,876	0	0	887	0	887	0.55	491	9,449							
2033	0	0	1,385	0	1,385	0.54	744	9,620	0	0	979	0	979	0.54	526	9,975							
2034	0	0	1,527	0	1,527	0.52	797	10,417	0	0	1,079	0	1,079	0.52	563	10,538							
2035	0	0	1,685	0	1,685	0.51	854	11,271	0	0	1,191	0	1,191	0.51	603	11,141							
2036	0	0	1,858	0	1,858	0.49	914	12,185	0	0	1,313	0	1,313	0.49	646	11,787							
2037	0	0	2,050	0	2,050	0.48	979	13,164	0	0	1,448	0	1,448	0.48	692	12,479							
2038	0	0	2,261	0	2,261	0.46	1,048	14,212	0	0	1,598	0	1,598	0.46	741	13,220							
2039	0	0	2,494	0	2,494	0.45	1,123	15,335	0	0	1,762	0	1,762	0.45	793	14,013							
2040	0	0	2,750	0	2,750	0.44	1,202	16,537	0	0	1,944	0	1,944	0.44	850	14,863							
2041	0	0	3,034	0	3,034	0.42	1,287	17,824	0	0	2,144	0	2,144	0.42	910	15,773							
2042	0	0	3,346	0	3,346	0.41	1,379	19,203	0	0	2,365	0	2,365	0.41	974	16,747							
Totals:	\$0	\$0	\$35,162	\$0	\$35,162		\$19,203	\$30-year LCC	\$3,176	\$0	\$24,849	\$0	\$28,025		\$16,747	\$30-year LCC							



Energy Audit Report

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**ECM #19 Calculations**

<b>Motor #2</b>										
	Horsepower	Motor Loading	Efficiency	KW	Operating Hours/yr	Yearly KW Demand	Yearly KW Demand Cost	Yearly KWH Consumption	Yearly KWH Cost	Totals
Existing	0.04	0.7	0.7	0.03	8760	0.36	\$0.00	261	\$50.71	\$50.71
Proposed	0.014	0.7	0.7	0.01	8760	0.13	\$0.00	91	\$17.75	\$17.75
Savings						0.23	\$0.00	170	\$32.96	\$32.96
Installed Cost		\$683.32								
Payback (years)		20.73								
Description of Improvement	Replace domestic hot water circulation pump with variable speed pump.									

Energy Audit Report

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-----ANNUAL REAL CASH FLOWS PROPOSED-----															
(Begin) Year	First & Replace Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	First & Replace Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Savings
2012	\$0	\$1	\$	\$51	\$52	1.00	\$0	\$683	--	\$0	\$18	\$18	1.00	\$683	\$683
2012	\$0	--	--	--	\$0	1.00	\$0	\$683	--	--	--	\$683	1.00	\$683	\$683
2013	0	1	0	52	53	0.97	52	0	0	0	18	19	0.97	18	\$701
2014	0	1	0	53	55	0.94	51	0	0	0	19	19	0.94	18	\$719
2015	0	1	0	55	56	0.92	51	0	0	0	19	20	0.92	18	\$737
2016	0	1	0	56	58	0.89	51	0	0	0	20	20	0.89	18	\$755
2017	0	1	0	58	59	0.86	51	0	0	0	20	21	0.86	18	\$773
2018	0	1	0	60	61	0.84	51	0	0	0	21	21	0.84	18	\$791
2019	0	1	0	62	63	0.81	51	0	0	0	22	22	0.81	18	\$809
2020	0	1	0	66	67	0.79	51	0	0	0	22	23	0.79	18	\$827
2021	0	1	0	66	67	0.77	51	0	0	0	23	23	0.77	18	\$845
2022	0	1	0	68	69	0.74	51	0	0	0	24	24	0.74	18	\$863
2023	0	1	0	70	71	0.72	51	0	0	0	24	25	0.72	18	\$881
2024	0	1	0	72	73	0.70	52	0	0	0	25	26	0.70	18	\$899
2025	0	1	0	74	76	0.68	52	0	0	0	26	27	0.68	18	\$917
2026	0	2	0	77	78	0.66	52	0	0	0	27	27	0.66	18	\$935
2027	0	2	0	80	82	0.64	52	0	0	0	28	29	0.64	18	\$954
2028	0	2	0	84	86	0.62	53	0	0	0	29	30	0.62	19	\$972
2029	0	2	0	88	90	0.61	54	0	0	0	31	31	0.61	19	\$991
2030	0	2	0	92	94	0.59	55	0	0	0	32	33	0.59	19	\$1,010
2031	0	2	0	96	98	0.57	56	0	0	0	34	34	0.57	20	\$1,030
2032	0	2	0	101	103	0.55	57	0	0	0	35	36	0.55	20	\$1,050
2033	0	2	0	106	107	0.54	58	0	0	0	37	38	0.54	20	\$1,070
2034	0	2	0	111	112	0.52	59	0	0	0	39	39	0.52	21	\$1,091
2035	0	2	0	116	118	0.51	60	0	0	0	41	41	0.51	21	\$1,112
2036	0	2	0	121	123	0.49	61	0	0	0	42	43	0.49	21	\$1,133
2037	0	2	0	127	129	0.48	62	0	0	0	44	45	0.48	22	\$1,154
2038	0	2	0	133	135	0.46	63	0	0	0	46	47	0.46	22	\$1,176
2039	0	2	0	139	141	0.45	64	0	0	0	49	49	0.45	22	\$1,198
2040	0	2	0	146	148	0.44	65	0	0	0	51	52	0.44	23	\$1,221
2041	0	2	0	152	155	0.42	66	0	0	0	53	54	0.42	23	\$1,244
2042	0	2	0	160	162	0.41	67	0	0	0	56	57	0.41	23	\$1,267
Totals:	\$0	\$50	\$0	\$2,737	\$2,787		\$1,669	\$683	\$17	\$0	\$958	\$1,659		\$1,267	\$1,267
															=30-year LCC

**ECM #20 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description		
Number of Fixtures	6	6
Lamps per Fixture	1	1
Lamp Type	CFL	LED
Fixture Wattage	23	13.2
Hours on per Week	10	10
Cost of New Lamp		\$25.08
Cost of New Fixture		
Total KWH Cost	\$13.92	\$7.99
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$13.92	\$7.99
Yearly Savings		\$5.93
Total Retrofit Cost		\$150.48
Payback Period		25.4 years
Retrofit Description	Replace CFL lamps in the office restroom with LED.	

# Energy Audit Report

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-----ANNUAL REAL CASH FLOWS PROPOSED-----									
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Costs	Present Value of Cumulative Savings
2,012	\$0	--	--	--	\$150	1.00	0	0	0
2,013	0	0	0	0	8	0.97	8	8	\$ (144)
2,014	0	0	0	0	8	0.94	8	8	\$ (138)
2,015	0	0	0	0	9	0.92	9	8	\$ (132)
2,016	0	0	0	0	9	0.89	9	8	\$ (126)
2,017	0	0	0	0	9	0.86	9	8	\$ (120)
2,018	0	0	0	0	9	0.84	9	8	\$ (114)
2,019	0	0	0	0	10	0.81	10	8	\$ (108)
2,020	0	0	0	0	10	0.79	10	8	\$ (102)
2,021	0	0	0	0	11	0.77	11	8	\$ (96)
2,022	0	0	0	0	11	0.74	11	8	\$ (90)
2,023	0	0	0	0	11	0.72	11	8	\$ (84)
2,024	0	0	0	0	12	0.70	12	8	\$ (78)
2,025	0	0	0	0	12	0.68	12	8	\$ (72)
2,026	0	0	0	0	12	0.66	12	8	\$ (66)
2,027	0	0	0	0	13	0.64	13	8	\$ (60)
2,028	0	0	0	0	13	0.62	13	8	\$ (54)
2,029	0	0	0	0	14	0.61	14	9	\$ (48)
2,030	0	0	0	0	14	0.59	14	9	\$ (41)
2,031	0	0	0	0	15	0.57	15	9	\$ (35)
2,032	0	1	0	0	16	0.55	16	9	\$ (28)
2,033	0	1	0	0	16	0.54	16	9	\$ (21)
2,034	0	1	0	0	17	0.52	17	9	\$ (14)
2,035	0	1	0	0	18	0.51	18	9	\$ (7)
2,036	0	1	0	0	19	0.49	19	10	\$ (0)
2,037	0	1	0	0	20	0.48	20	10	\$ (7)
2,038	0	1	0	0	21	0.46	21	10	\$ (14)
2,039	0	1	0	0	22	0.45	22	10	\$ (22)
2,040	0	1	0	0	23	0.44	23	10	\$ (29)
2,041	0	1	0	0	24	0.42	24	10	\$ (37)
2,042	0	1	0	0	25	0.41	25	11	\$ (45)
Totals:	\$0	\$14	\$0	\$751	\$765		\$458	\$30-year LCC	
Totals:	\$150	\$8	\$0	\$431	\$590		\$413	\$30-year LCC	



# Energy Audit Report

December 23, 2013

ANNUAL REAL CASH FLOWS CURRENT												ANNUAL REAL CASH FLOWS PROPOSED											
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i)^-n	Present Worth of Annual Costs	Cumulative Savings	(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i)^-n	Present Worth of Annual Costs	Cumulative Savings						
2012	\$0	\$0	\$1,595	\$0	\$1,595	1.00	\$1,595	\$0	2012	\$17,567	\$0	\$1,167	\$0	\$1,167	1.00	\$17,567	\$17,567						
2013	0	0	1,616	0	1,616	0.97	1,569	\$ 1,568.66	2013	0	0	1,182	0	1,182	0.97	1,148	\$ 18,715						
2014	0	0	1,637	0	1,637	0.94	1,543	\$ 3,111	2014	0	0	1,198	0	1,198	0.94	1,129	\$ 19,843						
2015	0	0	1,658	0	1,658	0.92	1,517	\$ 4,629	2015	0	0	1,213	0	1,213	0.92	1,110	\$ 20,954						
2016	0	0	1,680	0	1,680	0.89	1,492	\$ 6,121	2016	0	0	1,229	0	1,229	0.89	1,092	\$ 22,046						
2017	0	0	1,789	0	1,789	0.86	1,543	\$ 7,664	2017	0	0	1,309	0	1,309	0.86	1,129	\$ 23,175						
2018	0	0	1,905	0	1,905	0.84	1,595	\$ 9,259	2018	0	0	1,394	0	1,394	0.84	1,167	\$ 24,342						
2019	0	0	2,029	0	2,029	0.81	1,650	\$ 10,909	2019	0	0	1,484	0	1,484	0.81	1,207	\$ 25,549						
2020	0	0	2,161	0	2,161	0.79	1,706	\$ 12,615	2020	0	0	1,581	0	1,581	0.79	1,248	\$ 26,797						
2021	0	0	2,301	0	2,301	0.77	1,764	\$ 14,378	2021	0	0	1,684	0	1,684	0.77	1,290	\$ 28,087						
2022	0	0	2,451	0	2,451	0.74	1,824	\$ 16,202	2022	0	0	1,793	0	1,793	0.74	1,334	\$ 29,422						
2023	0	0	2,610	0	2,610	0.72	1,886	\$ 18,087	2023	0	0	1,910	0	1,910	0.72	1,380	\$ 30,801						
2024	0	0	2,780	0	2,780	0.70	1,950	\$ 20,037	2024	0	0	2,034	0	2,034	0.70	1,427	\$ 32,228						
2025	0	0	2,960	0	2,960	0.68	2,016	\$ 22,053	2025	0	0	2,166	0	2,166	0.68	1,475	\$ 33,703						
2026	0	0	3,153	0	3,153	0.66	2,084	\$ 24,137	2026	0	0	2,307	0	2,307	0.66	1,525	\$ 35,228						
2027	0	0	3,477	0	3,477	0.64	2,232	\$ 26,369	2027	0	0	2,544	0	2,544	0.64	1,633	\$ 36,861						
2028	0	0	3,836	0	3,836	0.62	2,390	\$ 28,759	2028	0	0	2,807	0	2,807	0.62	1,749	\$ 38,610						
2029	0	0	4,231	0	4,231	0.61	2,560	\$ 31,319	2029	0	0	3,096	0	3,096	0.61	1,873	\$ 40,483						
2030	0	0	4,667	0	4,667	0.59	2,741	\$ 34,060	2030	0	0	3,415	0	3,415	0.59	2,006	\$ 42,489						
2031	0	0	5,147	0	5,147	0.57	2,935	\$ 36,996	2031	0	0	3,766	0	3,766	0.57	2,148	\$ 44,637						
2032	0	0	5,677	0	5,677	0.55	3,143	\$ 40,139	2032	0	0	4,154	0	4,154	0.55	2,300	\$ 46,937						
2033	0	0	6,262	0	6,262	0.54	3,366	\$ 43,505	2033	0	0	4,582	0	4,582	0.54	2,463	\$ 49,400						
2034	0	0	6,907	0	6,907	0.52	3,605	\$ 47,110	2034	0	0	5,054	0	5,054	0.52	2,638	\$ 52,037						
2035	0	0	7,618	0	7,618	0.51	3,860	\$ 50,970	2035	0	0	5,575	0	5,575	0.51	2,825	\$ 54,862						
2036	0	0	8,403	0	8,403	0.49	4,134	\$ 55,104	2036	0	0	6,149	0	6,149	0.49	3,025	\$ 57,887						
2037	0	0	9,269	0	9,269	0.48	4,427	\$ 59,531	2037	0	0	6,782	0	6,782	0.48	3,239	\$ 61,126						
2038	0	0	10,223	0	10,223	0.46	4,741	\$ 64,271	2038	0	0	7,481	0	7,481	0.46	3,469	\$ 64,594						
2039	0	0	11,276	0	11,276	0.45	5,077	\$ 69,348	2039	0	0	8,251	0	8,251	0.45	3,715	\$ 68,309						
2040	0	0	12,438	0	12,438	0.44	5,436	\$ 74,784	2040	0	0	9,101	0	9,101	0.44	3,978	\$ 72,287						
2041	0	0	13,719	0	13,719	0.42	5,822	\$ 80,606	2041	0	0	10,038	0	10,038	0.42	4,260	\$ 76,547						
2042	0	0	15,132	0	15,132	0.41	6,234	\$ 86,840	2042	0	0	11,072	0	11,072	0.41	4,562	\$ 81,108						
<b>Totals:</b>	<b>\$0</b>	<b>\$0</b>	<b>\$159,011</b>	<b>\$0</b>	<b>\$159,011</b>		<b>\$86,540</b>	<b>=30-year LCC</b>	<b>Totals:</b>	<b>\$17,567</b>	<b>\$0</b>	<b>\$116,349</b>	<b>\$0</b>	<b>\$133,916</b>		<b>\$81,108</b>	<b>=30-year LCC</b>						

**ECM #22 Calculations**

KWH Cost	\$0.19	Demand Cost (KW)
Space Description		
Number of Fixtures	3	3
Lamps per Fixture	1	1
Lamp Type	LED	Tritium
Fixture Wattage	6.3	0
Hours on per Week	168	168
Cost of New Lamp		\$405.26
Cost of New Fixture		
Total KWH Cost	\$32.03	\$0.00
Total Demand Cost	\$0.00	\$0.00
Total Yearly Cost	\$32.03	\$0.00
Yearly Savings		\$32.03
Total Retrofit Cost		\$1,215.78
Payback Period		38.0 years
Retrofit Description	Replace exit signs with no-power tritium exit signs.	

# Energy Audit Report

December 23, 2013

-----ANNUAL REAL CASH FLOWS CURRENT-----										-----ANNUAL REAL CASH FLOWS PROPOSED-----									
(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Costs	(Begin) Year	First & Replace. Costs	Annual Maint. Costs	Annual Nat.Gas Costs	Annual Electric Costs	Total Annual Costs	Present Worth Factor (1+i) <sup>-n</sup>	Present Worth of Annual Costs	Present Worth of Cumulative Costs		
2012	\$0	\$1	\$-	\$32	\$33	1.00	\$0	\$-	2012	\$1,216	\$0	\$-	\$0	\$1,216	1.00	\$1,216	\$1,216		
2012	0	--	--	--	\$0	0.97	\$3	\$32.58	2012	\$1,216	--	--	--	\$1,216	0.97	0	\$1,216		
2013	0	1	0	33	34	0.94	33	\$32.58	2013	0	0	0	0	0	0.94	0	\$1,216		
2014	0	1	0	34	34	0.92	32	\$65	2014	0	0	0	0	0	0.92	0	\$1,216		
2015	0	1	0	35	35	0.89	32	\$97	2015	0	0	0	0	0	0.89	0	\$1,216		
2016	0	1	0	36	36	0.86	32	\$130	2016	0	0	0	0	0	0.86	0	\$1,216		
2017	0	1	0	37	37	0.84	32	\$162	2017	0	0	0	0	0	0.84	0	\$1,216		
2018	0	1	0	38	39	0.81	32	\$194	2018	0	0	0	0	0	0.81	0	\$1,216		
2019	0	1	0	39	40	0.79	32	\$227	2019	0	0	0	0	0	0.79	0	\$1,216		
2020	0	1	0	40	41	0.77	32	\$259	2020	0	0	0	0	0	0.77	0	\$1,216		
2021	0	1	0	42	42	0.74	32	\$292	2021	0	0	0	0	0	0.74	0	\$1,216		
2022	0	1	0	43	44	0.72	33	\$324	2022	0	0	0	0	0	0.72	0	\$1,216		
2023	0	1	0	44	45	0.70	33	\$357	2023	0	0	0	0	0	0.70	0	\$1,216		
2024	0	1	0	45	46	0.68	33	\$389	2024	0	0	0	0	0	0.68	0	\$1,216		
2025	0	1	0	47	48	0.66	33	\$422	2025	0	0	0	0	0	0.66	0	\$1,216		
2026	0	1	0	48	49	0.64	33	\$454	2026	0	0	0	0	0	0.64	0	\$1,216		
2027	0	1	0	51	52	0.62	34	\$488	2027	0	0	0	0	0	0.62	0	\$1,216		
2028	0	1	0	53	54	0.61	34	\$521	2028	0	0	0	0	0	0.61	0	\$1,216		
2029	0	1	0	55	57	0.59	35	\$555	2029	0	0	0	0	0	0.59	0	\$1,216		
2030	0	1	0	58	59	0.57	35	\$590	2030	0	0	0	0	0	0.57	0	\$1,216		
2031	0	1	0	61	62	0.55	36	\$626	2031	0	0	0	0	0	0.55	0	\$1,216		
2032	0	1	0	64	65	0.54	36	\$662	2032	0	0	0	0	0	0.54	0	\$1,216		
2033	0	1	0	67	68	0.52	37	\$698	2033	0	0	0	0	0	0.52	0	\$1,216		
2034	0	1	0	70	71	0.51	38	\$735	2034	0	0	0	0	0	0.51	0	\$1,216		
2035	0	1	0	73	74	0.49	38	\$773	2035	0	0	0	0	0	0.49	0	\$1,216		
2036	0	1	0	77	78	0.48	39	\$811	2036	0	0	0	0	0	0.48	0	\$1,216		
2037	0	1	0	80	81	0.46	40	\$850	2037	0	0	0	0	0	0.46	0	\$1,216		
2038	0	1	0	84	85	0.45	40	\$890	2038	0	0	0	0	0	0.45	0	\$1,216		
2039	0	1	0	88	89	0.44	41	\$930	2039	0	0	0	0	0	0.44	0	\$1,216		
2040	0	1	0	92	93	0.42	42	\$971	2040	0	0	0	0	0	0.42	0	\$1,216		
2041	0	2	0	96	98	0.41	42	\$1,012	2041	0	0	0	0	0	0.41	0	\$1,216		
2042	0	2	0	101	102	0.41	42	\$1,054	2042	0	0	0	0	0	0.41	0	\$1,216		
<b>Totals:</b>	\$0	\$31	\$0	\$1,729	\$1,760		<b>\$1,054</b>	<b>=\$30-year LCC</b>	<b>Totals:</b>	\$1,216	\$0	\$0	\$0	\$1,216		<b>\$1,216</b>	<b>=\$30-year LCC</b>		



**Cost Estimates**

Construction Estimate							Page 1
File Name: homer seniors admin.est							
Qty	Craft@Hours	Unit	Material	Labor	Equipment	Total	
LED Lamps							
10 watt							
1.00	BE@.1760	Ea	16.50	8.58	0.00	25.08	
LED street light							
90 watt							
1.00	BE@3.520	Ea	1,370.60	171.42	0.00	1,542.02	
Daylight sensor							
1.00	E4@2.200	Ea	182.60	155.65	0.00	338.25	
LED Wall Pack							
30 watt							
1.00	BE@3.520	Ea	214.50	171.42	0.00	385.92	
LED tubes							
22w							
1.00	E4@.2200	Ea	39.60	15.58	0.00	55.18	
Lighted exit signs							
Single							
1.00	CE@1.680	Ea	264.00	141.26	0.00	405.26	
Dual-fuel boiler burners							
150-275,000 btu input							
1.00	SN@8.800	Ea	990.00	880.00	0.00	1,870.00	
Hydronic hot water generators							
12 BHP, 404 MBtu/Hr							
1.00	M5@35.20	Ea	11,458.48	3,520.00	147.16	15,125.64	
Variable speed circulation pump, 1/12 HP							
1.00	MI@4.400	Ea	347.60	335.72	0.00	683.32	
60 inch gas range 2 oven 6 burners 24 inch griddle							
1.00	--@8.800	Ea	4,631.00	440.00	0.00	5,071.00	
Double convection oven manual control							
1.00	--@8.800	Ea	8,870.40	440.00	0.00	9,310.40	
Perimeter foundation insulation							
2" x 4' x 4'							
1.00	BC@.0330	SF	1.63	1.50	0.00	3.12	
Stabilized cellulose insulation							
40 SF bag at \$10.40							
1.00	BC@.0220	SF	0.66	0.99	0.00	1.65	

Energy Audit Report

December 23, 2013

Construction Estimate

File Name: homer seniors admin.est

Page 2

Qty	Craft@Hours	Unit	Material	Labor	Equipment	Total
Removal of windows						
Wood (36 SF per CY)						
1.00	BL@.1386	SF	0.00	5.92	0.00	5.92
Horizontal sliding insulated low-E glass vinyl windows						
5'0" x 4'0"						
1.00	B1@3.300	Ea	477.22	158.31	0.00	635.54
Time control thermostat						
1.00	--@.0000	Ea	251.37	0.00	0.00	251.37

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Total Manhours, Material, Labor, and Equipment:						
	80.8		29,116.16	6,446.35	147.16	35,709.67
				Subtotal:		35,709.67
				Estimate Total:		35,709.67