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**Pete Ielmini**, *Executive Director* 732-210-7084    **Gina Walsh**, *Deputy Director* 314-683-6136

The following pages will outline a case study, which shows the benefits in energy and cost savings of properly installed mechanical insulation.

Insulation is a proven means for conserving energy, reducing greenhouse gas emissions, increasing process productivity, providing a safer and more productive work environment, controlling condensation (which can lead to mold growth), supporting sustainable design technology and a host of other benefits.

Mechanical insulation does all of this, while providing a return on investment (ROI) rate, which is seldom rivaled. Despite the proven ROI, insulation is often overlooked and its benefits undervalued. Insulation is truly the lost or forgotten technology. Can you think of a more important time than now to think about how insulation can help you?

An insulation system is a technology, which needs to be engineered and maintained throughout the entire process. Several studies have estimated roughly 10 to 30 percent of all installed insulation is now missing or damaged.

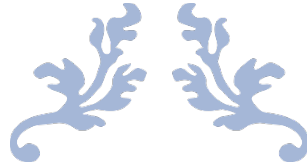
The practice of not replacing or maintaining an insulation system in a timely and correct manner reduces the full benefits of insulation, and in return, decreases the ROI. In many cases, significant other issues - such as excessive energy loss, corrosion under insulation (CUI), mold development, increased cost of operations and reduced process productivity or efficiency - develop.

You can learn more on [www.MechanicalInsulatorsLMCT.com](http://www.MechanicalInsulatorsLMCT.com), where additional case studies can be viewed.

Please do not hesitate to contact me should you have any additional questions.  
Thank you,

Peter Ielimi

Executive Director  
Mechanical Insulators Labor Management Cooperative Trust



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# INSULATION ENERGY APPRAISAL FINAL REPORT

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For  
Beaverbrook School  
Moncton, New Brunswick



Presented by:  
Joshua Sherrard  
Heat & Frost Training Centre  
1041 Bayside Drive  
Saint John, NB  
E2J 4Y2

## **Executive Summary**

The insulation energy appraisal evaluated the performance of mechanical rooms at your facility. All piping is currently insulated with 1-inch thick fiberglass insulation. Based on the analysis findings, the appraiser calculated a) the cost of operating line with existing insulation; b) the cost to operate with 1-inch-thick fiberglass vs 1 ½ thick fiberglass. He also calculated emission saving if each facility was properly insulated. These calculations are summarized below.

### **Energy Cost**

Heat loss at Beaverbrook facility listed at 50793 Kbtu per year

*An estimated 5 year saving of \$ 29,568.35, and a simple payback return on investment in 1.0 years*

### **Energy/Emissions Savings**

Co<sub>2</sub> reduction at Beaverbrook facility 28.38 Mt per year

### **Insulation and Energy Efficiency**

Insulation systems improve the energy efficiency of a plant and reduce the level of emissions of greenhouse gases into the atmosphere. Systems that have an upgraded insulation system can achieve an even more dramatic increase in savings. A properly selected, installed and maintained insulation system can, in many cases, provide an excellent return on investment and quick payback through cost savings. When compared to other conservation measures, the payback is often very quick - usually less than six months. The savings are significant in terms of reduced energy use, increased efficiency, and reduced greenhouse gas emissions.

### **Conclusion**

The appraiser commends Beaverbrook facility on upkeeping and maintaining their insulation systems. The Beaverbrook facility insulation system is very well maintained also, and the finding show a relatively positive energy efficiency. Our analysis show that though each facility is believed to be insulated with proper thicknesses. But due to facility maintenance, there are some areas that, if insulated to meet the rest of facility insulation standards, would be able to significantly reduce their energy loss and reduce the level of greenhouse gas emissions.

**Limitations:**

We have used information provided to us from various sources but information such as operational heating cycles and cooling cycles are based on conversations with maintenance personnel.

**Disclaimer:**

The results of the insulation energy audit are estimated based upon the data supplied or determined during the audit process and the 3E programs calculations. The results are not guaranteed nor warranted and may vary depending upon information provided and actual operating conditions. The results are intended to portray a reasonable estimate of potential energy savings and emissions reduction with the use of an upgraded and maintain insulation system.

Please contact the undersigned should you have questions about this report

Best regards,

Joshua Sherrard  
Energy Appraiser  
506 635 8609



# ENERGY AUDIT BEAVERBROOK SCHOOL



Total Heat Loss  
5 year savings  
of  
\$ 29,568.35

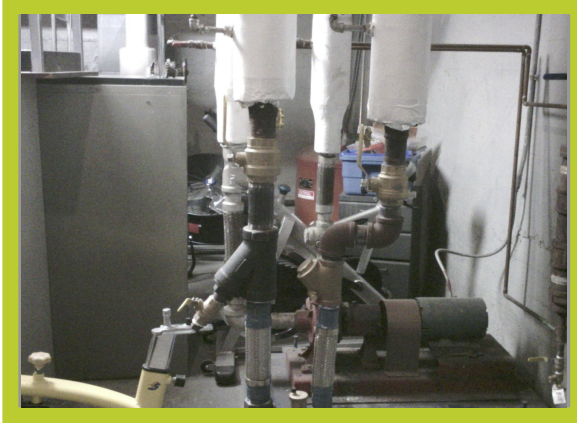
CO<sub>2</sub> Reduction of  
28.38 MT/Year

## Benefits:

- Simple payback period
- CO<sub>2</sub> Reduction
- Personnel safety

*Audit Done By:  
Joshua Sherrard  
Certified Thermographer  
Certified 3E Plus Auditor*

## Boiler Room



Operating Temperature,  
Ambient Temperature,  
Insulation selected

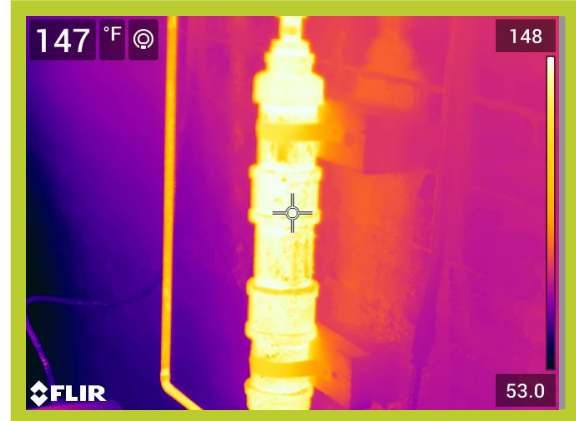
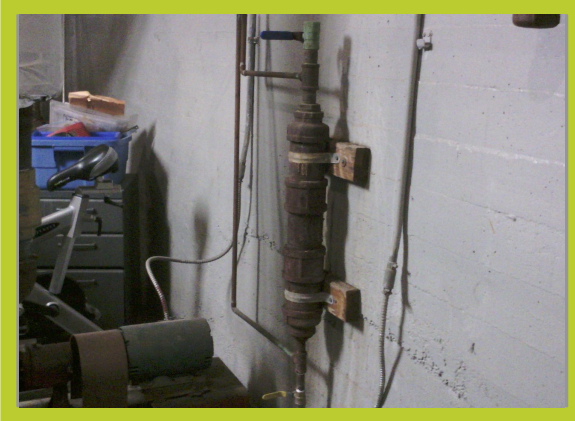
198°F  
70°F  
Fiberglass

Emittance of Surface  
Expected Useful Life of Insulation System  
Operating hours per year  
Efficiency of fuel Conversion%

0.95  
20 yrs.  
8760  
85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	198	8334	\$ 110.04	\$ 110.04	\$ 550.20	0.54
1	78	1134	\$ 15.00	\$ 95.04	\$ 475.20	0.06
1.5	74	900	\$ 11.88	\$ 98.16	\$ 490.80	0.06

## Boiler Room



Operating Temperature,  
Ambient Temperature,  
Insulation selected

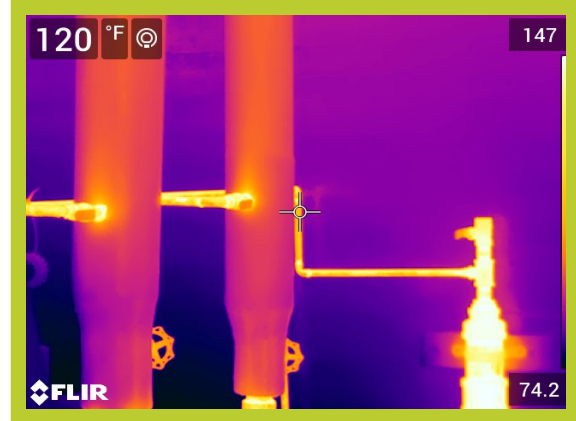
138°F  
70°F  
Fiberglass

Emittance of Surface  
Expected Useful Life of Insulation System  
Operating hours per year  
Efficiency of fuel Conversion%

0.95  
20 yrs.  
8760  
85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	138	4488	\$ 59.31	\$ 59.31	\$ 296.55	0.09
1	74	579	\$ 7.62	\$ 51.69	\$ 258.45	0.01
1.5	71	438	\$ 5.79	\$ 53.52	\$ 267.60	0.01

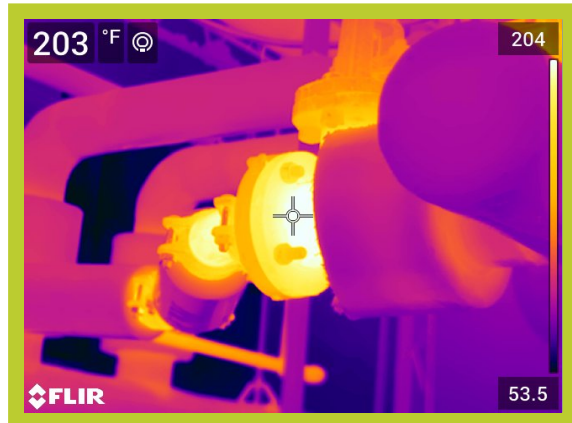
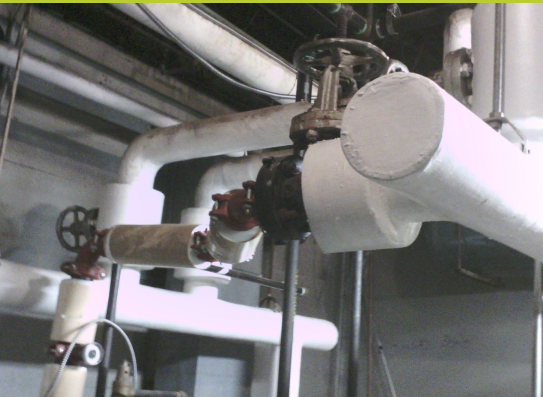
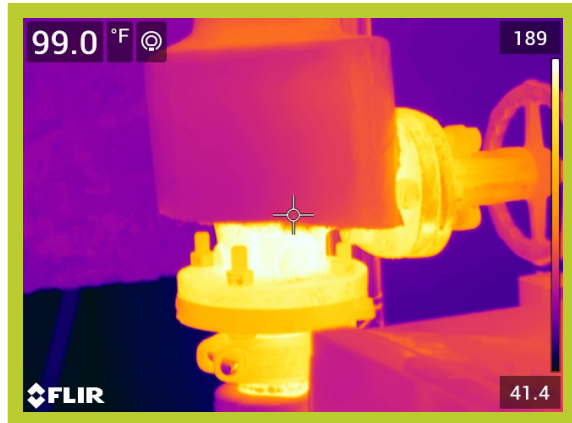
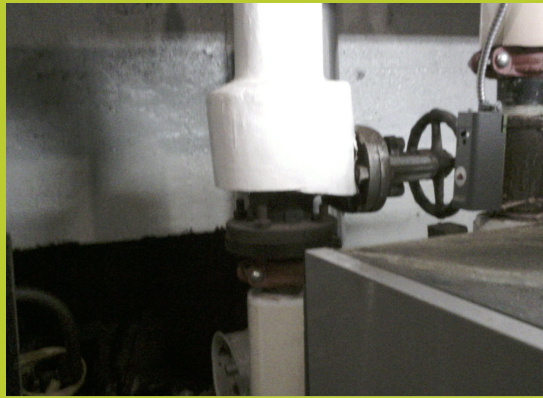
## Boiler Room



Operating Temperature,	125°F	Emittance of Surface	0.95
Ambient Temperature,	70°F	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	125	8064	\$ 106.56	\$ 106.56	\$ 532.80	0.36
1	70	1764	\$ 23.40	\$ 83.16	\$ 415.80	0
1.5	68	1440	\$ 19.08	\$ 87.48	\$ 437.40	0

## Boiler Room



Operating Temperature,  
Ambient Temperature,  
Insulation selected

189°F  
70°F  
Fiberglass

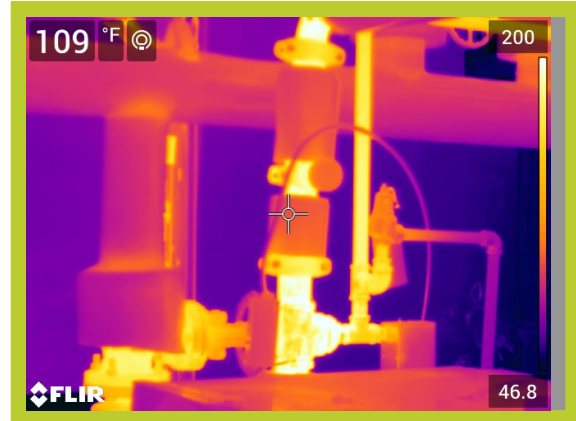
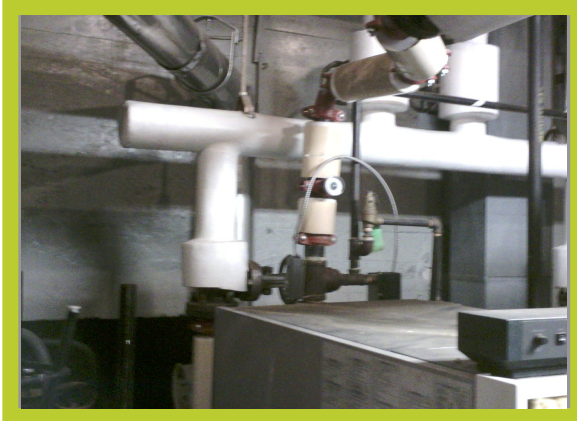
Emittance of Surface  
Expected Useful Life of Insulation System  
Operating hours per year  
Efficiency of fuel Conversion%

0.95  
20 yrs.  
8760  
85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	189	58068	\$ 767.04	\$ 767.04	\$ 3835.20	3.6
1	82	6936	\$ 91.68	\$ 675.36	\$ 3376.80	0.48
1.5	76	4848	\$ 64.08	\$ 702.96	\$ 3514.80	0.36



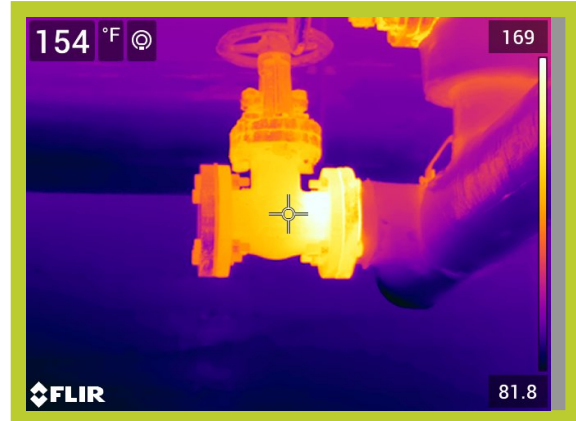
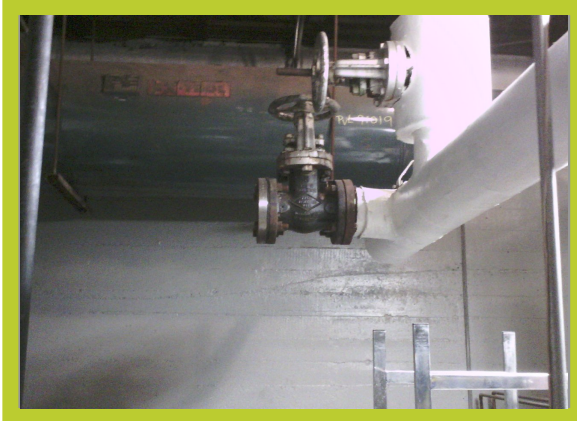
## Boiler Room



Operating Temperature,	178°F	Emittance of Surface	0.95
Ambient Temperature,	70°F	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	178	29655	\$ 444.00	\$ 444.00	\$ 2220.00	2.85
1	78	3765	\$ 56.40	\$ 387.60	\$ 1938.00	0.30
1.5	74	2835	\$ 42.45	\$ 401.55	\$ 2007.75	0.30

## Boiler Room



Operating Temperature,  
Ambient Temperature,  
Insulation selected

170°F  
70°F  
Fiberglass

Emittance of Surface  
Expected Useful Life of Insulation System  
Operating hours per year  
Efficiency of fuel Conversion%

0.95  
20 yrs.  
8760  
85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	170	15012	\$ 224.76	\$ 224.76	\$ 1123.80	1.04
1	79	1856	\$ 27.76	\$ 197.00	\$ 985.00	0.12
1.5	74	1296	\$ 19.44	\$ 205.32	\$ 1026.60	0.08

## Boiler Room

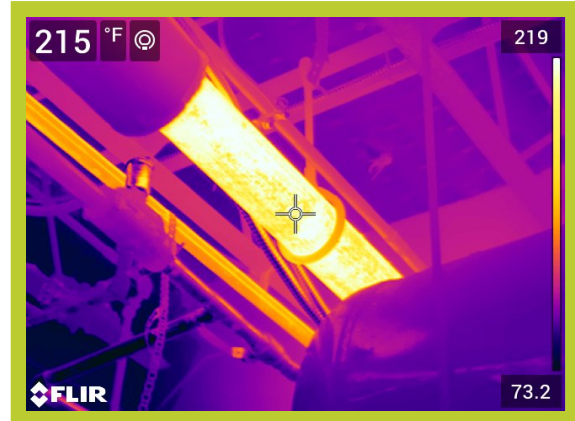


Operating Temperature,	180°F	Emittance of Surface	0.95
Ambient Temperature,	70°F	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	178	4524	\$ 59.76	\$ 59.76	\$ 298.80	0.27
1	78	597	\$ 7.89	\$ 51.87	\$ 259.35	0.03
1.5	74	462	\$ 6.09	\$ 53.67	\$ 268.35	0.03



## Boiler Room



Operating Temperature,  
Ambient Temperature,  
Insulation selected

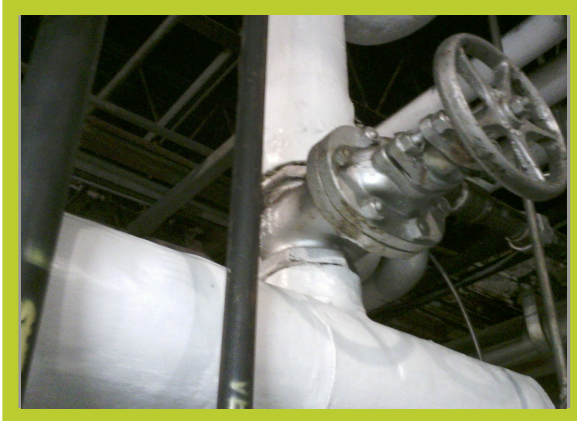
215°F  
70°F  
Fiberglass

Emittance of Surface  
Expected Useful Life of Insulation System  
Operating hours per year  
Efficiency of fuel Conversion%

0.95  
20 yrs.  
8760  
85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	215	21672	\$ 324.42	\$ 324.42	\$ 1622.10	1.5
1	83	2484	\$ 37.14	\$ 287.28	\$ 1436.40	0.18
1.5	77	1878	\$ 28.08	\$ 296.34	\$ 1481.70	0.12

## Boiler Room



Operating Temperature,  
Ambient Temperature,  
Insulation selected

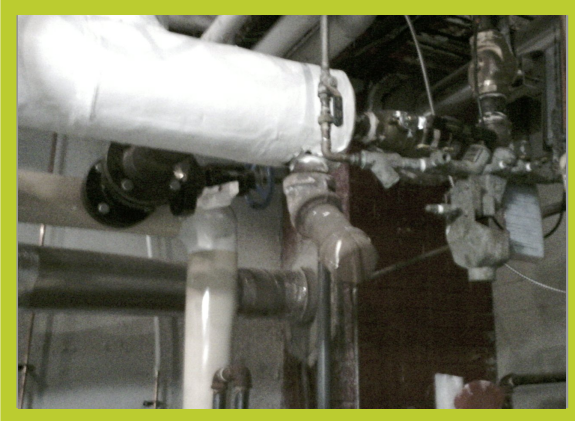
175°F  
70°F  
Fiberglass

Emittance of Surface  
Expected Useful Life of Insulation System  
Operating hours per year  
Efficiency of fuel Conversion%

0.95  
20 yrs.  
8760  
85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	175	21630	\$ 323.82	\$ 323.82	\$ 1619.10	1.5
1	80	2670	\$ 39.96	\$ 283.86	\$ 1419.30	0.18
1.5	75	1944	\$ 29.10	\$ 294.72	\$ 1473.60	0.08

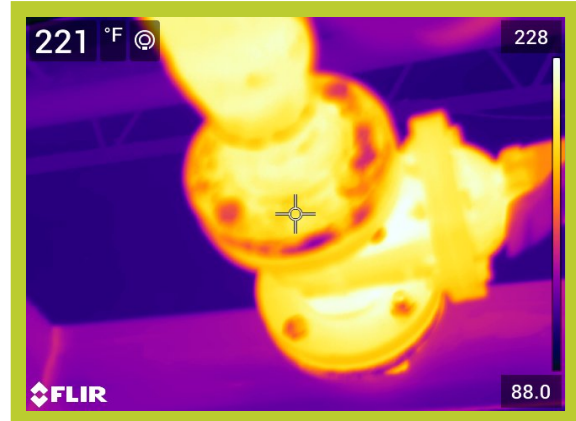
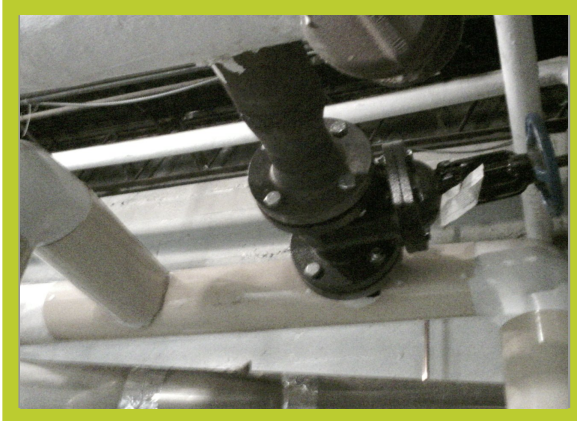
## Boiler Room



Operating Temperature,	227°F	Emittance of Surface	0.95
Ambient Temperature,	70°F	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	227	23994	\$ 348.48	\$ 348.48	\$ 1742.40	1.68
1	84	2712	\$ 44.52	\$ 303.96	\$ 1519.80	0.24
1.5	78	2052	\$ 34.44	\$ 314.04	\$ 1570.20	0.12

## Boiler Room



Operating Temperature,  
Ambient Temperature,  
Insulation selected

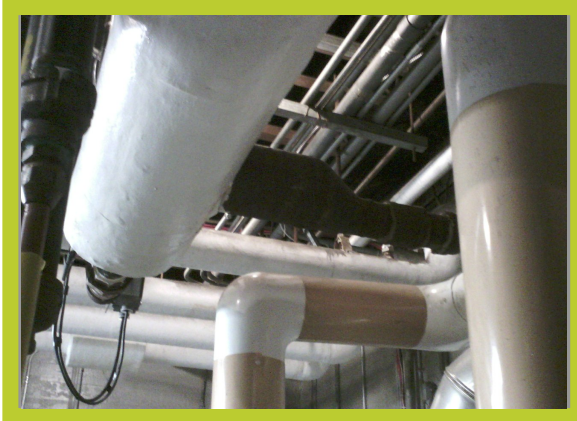
227°F  
70°F  
Fiberglass

Emittance of Surface  
Expected Useful Life of Insulation System  
Operating hours per year  
Efficiency of fuel Conversion%

0.95  
20 yrs.  
8760  
85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	227	39588	\$ 592.62	\$ 592.62	\$ 2963.10	2.76
1	87	4542	\$ 67.98	\$ 524.64	\$ 2623.20	0.3
1.5	80	3168	\$ 47.46	\$ 545.16	\$ 2725.80	0.24

## Boiler Room



Operating Temperature,  
Ambient Temperature,  
Insulation selected

220°F  
70°F  
Fiberglass

Emittance of Surface  
Expected Useful Life of Insulation System  
Operating hours per year  
Efficiency of fuel Conversion%

0.95  
20 yrs.  
8760  
85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	180	6812	\$ 102.00	\$ 102.00	\$ 510.00	0.48
1	78	876	\$ 13.08	\$ 88.92	\$ 444.60	0.08
1.5	72	604	\$ 9.04	\$ 92.96	\$ 464.80	0.04



## Boiler Room



Operating Temperature,	180°F	Emittance of Surface	0.95
Ambient Temperature,	70°F	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	180	20964	\$ 313.92	\$ 313.92	\$ 1569.60	1.44
1	75	2640	\$ 39.60	\$ 274.32	\$ 1371.60	0.24
1.5	72	1512	\$ 30.00	\$ 283.92	\$ 1419.60	0.12

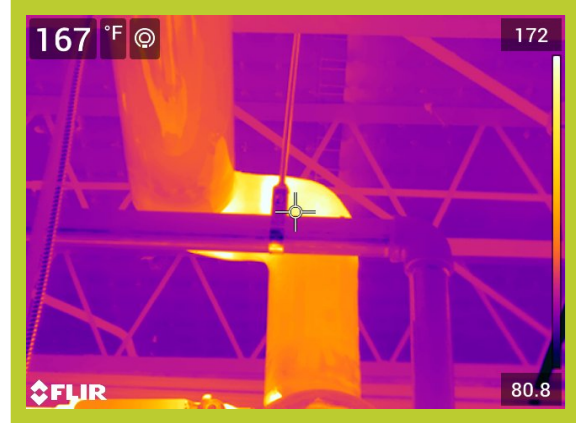
## Boiler Room



Operating Temperature,	180°F	Emittance of Surface	0.95
Ambient Temperature,	70°F	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	180	20964	\$ 313.92	\$ 313.92	\$ 1569.60	1.44
1	75	2640	\$ 39.60	\$ 274.32	\$ 1371.60	0.24
1.5	72	1512	\$ 30.00	\$ 283.92	\$ 1419.60	0.12

## Boiler Room



Operating Temperature,  
Ambient Temperature,  
Insulation selected

180°F  
70°F  
Fiberglass

Emittance of Surface  
Expected Useful Life of Insulation System  
Operating hours per year  
Efficiency of fuel Conversion%

0.95  
20 yrs.  
8760  
85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	180	20964	\$ 313.92	\$ 313.92	\$ 1569.60	1.44
1	75	2640	\$ 39.60	\$ 274.32	\$ 1371.60	0.24
1.5	72	1512	\$ 30.00	\$ 283.92	\$ 1419.60	0.12



## Gym



Operating Temperature,	180°F	Emittance of Surface	0.95
Ambient Temperature,	72°F	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	180	33912	\$ 507.60	\$ 507.60	\$ 2538.00	2.4
1	77	4512	\$ 67.68	\$ 439.92	\$ 2199.60	0.24
1.5	73	3504	\$ 52.38	\$ 455.22	\$ 2276.10	0.24

### Results

Simple Payback Period, yrs	1.0
Internal Rate of Return (IRR or ROI)	96.4%
Net Present Value,	\$112,125

### Calculations

Year	Investment	Annual Savings	Annual Cash Flow	Cumulative Cash Flow
0	\$-6,135	\$0	\$-6,135	\$-6,135
1	\$0	\$5,913	\$5,913	\$-222
2	\$0	\$5,913	\$5,913	\$5,691
3	\$0	\$5,913	\$5,913	\$11,604
4	\$0	\$5,913	\$5,913	\$17,517
5	\$0	\$5,913	\$5,913	\$23,430
6	\$0	\$5,913	\$5,913	\$29,343
7	\$0	\$5,913	\$5,913	\$35,256
8	\$0	\$5,913	\$5,913	\$41,169
9	\$0	\$5,913	\$5,913	\$47,082
10	\$0	\$5,913	\$5,913	\$52,995
11	\$0	\$5,913	\$5,913	\$58,908
12	\$0	\$5,913	\$5,913	\$64,821
13	\$0	\$5,913	\$5,913	\$70,734
14	\$0	\$5,913	\$5,913	\$76,647
15	\$0	\$5,913	\$5,913	\$82,560
16	\$0	\$5,913	\$5,913	\$88,473
17	\$0	\$5,913	\$5,913	\$94,386
18	\$0	\$5,913	\$5,913	\$100,299
19	\$0	\$5,913	\$5,913	\$106,212
20	\$0	\$5,913	\$5,913	\$112,125