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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.

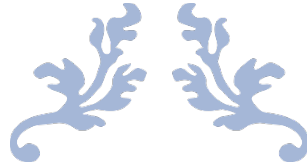
The practice of not replacing or maintaining an insulation system in a timely and correct manner reduces the full benefits of insulation, and in return, decreases the ROI. In many cases, significant other issues - such as excessive energy loss, corrosion under insulation (CUI), mold development, increased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

You can learn more on www.MechanicalInsulatorsLMCT.com, 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



INSULATION ENERGY APPRAISAL FINAL REPORT

For
JMA Armstrong
Salsbury, 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 JMA Armstrong facility listed at 138,271 Kbtu per year

An estimated 5 year saving of \$ 31,981.15, and a simple payback return on investment in 0.4 years.

Energy/Emissions Savings

Co₂ reduction at JMA Armstrong facility 27.93 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 JMA Armstrong facility on upkeep and maintaining their insulation systems. The JMA Armstrong facility insulation system is very well maintained also, and the findings show a relatively positive energy efficiency. Our analysis shows 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 JMA ARMSTRONG

Total Heat Loss
5 year savings
of
\$ 31,981.15

CO₂ Reduction of
27.93 MT/Year



Benefits:

- Simple payback period
- CO₂ Reduction
- Personnel safety

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

Middle School Boiler Room

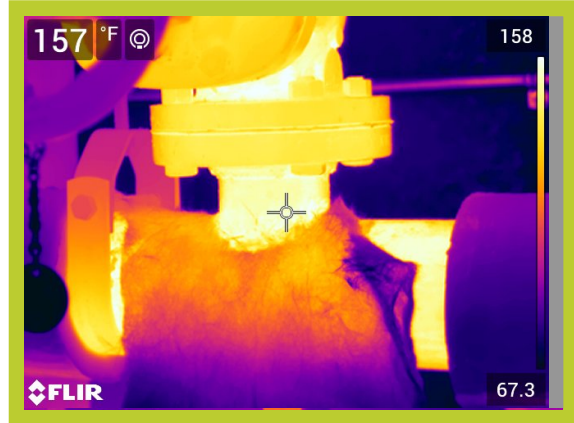
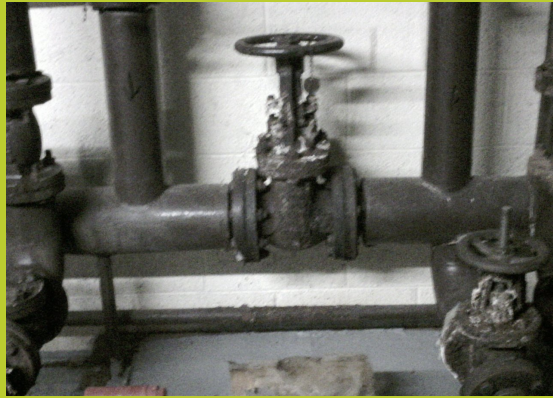


Operating Temperature,	155*F	Emittance of Surface	0.95
Ambient Temperature,	62*F	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	155	1098	\$1,363.44	\$1,363.44	\$6,817.2	0.25
1	71	159	\$196.80	\$48.61	\$243.05	0.04
1.5	67	123	\$154.40	\$50.46	\$252.30	0.03

*Estimated Calculations supplied by 3E Plus Mechanical Insulation Energy Calculator *

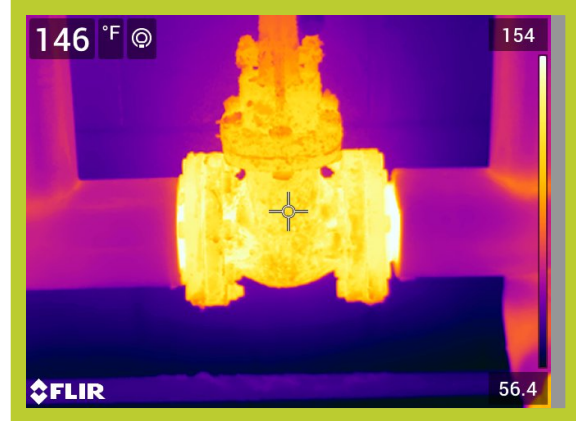
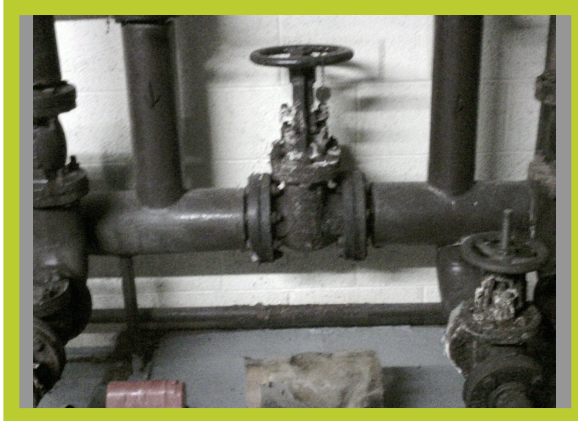
Middle School Boiler Room



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THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	157	2937	\$ 455.73	\$ 455.73	\$2278.65	0.67
1	74	391	\$ 60.63	\$395.10	\$1975.50	0.09
1.5	69	285	\$ 44.19	\$411.54	\$2057.70	0.06

Middle School Boiler Room



Operating Temperature,	155°F	Emittance of Surface	0.95
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THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	155	3270	\$ 507.36	\$ 507.36	\$ 2536.80	0.74
1	74	431	\$ 66.93	\$440.43	\$2202.15	0.1
1.5	69	302	\$ 46.89	\$460.47	\$2302.35	0.07

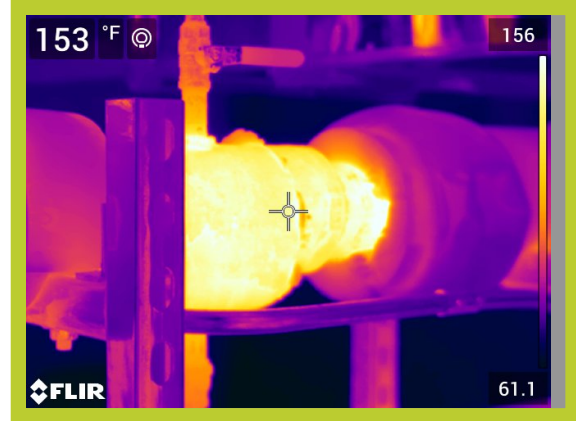
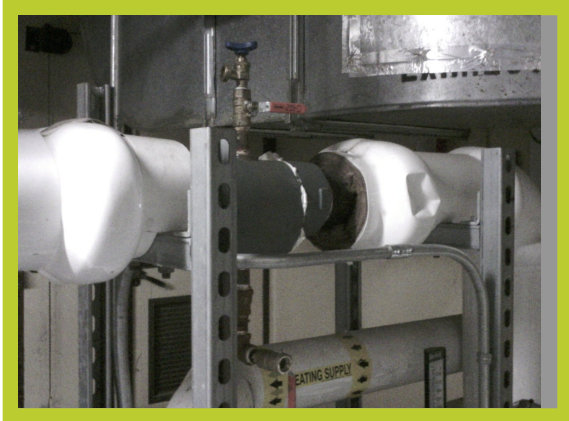
Middle School Boiler Room



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THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	158	2065	\$ 1,281.96	\$1,281.96	\$6,409.80	0.47
1	72	267	\$ 165.84	\$1,116.12	\$5,580.60	0.06
1.5	68	203	\$ 125.76	\$1,156.20	\$5,781.00	0.05

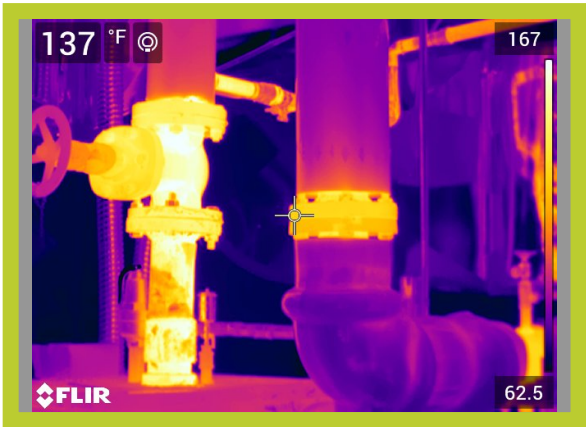
Middle School Boiler Room



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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	145	3199	\$ 661.72	\$ 661.72	\$3308.60	0.73
1	72	403	\$ 99.27	\$562.45	\$2812.25	0.09
1.5	68	296	\$74.70	\$587.02	\$2935.10	0.07

Middle School Boiler Room



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Ambient Temperature,	62°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	154	1550	\$ 721.44	\$ 721.44	\$3607.20	0.35
1	72	213	\$ 99.27	\$622.17	\$3110.85	0.05
1.5	68	161	\$ 74.70	\$646.74	\$3233.70	0.04

*Estimated Calculations supplied by 3E Plus Mechanical Insulation Energy Calculator *

Middle School Boiler Room



Operating Temperature,
Ambient Temperature,
Insulation selected

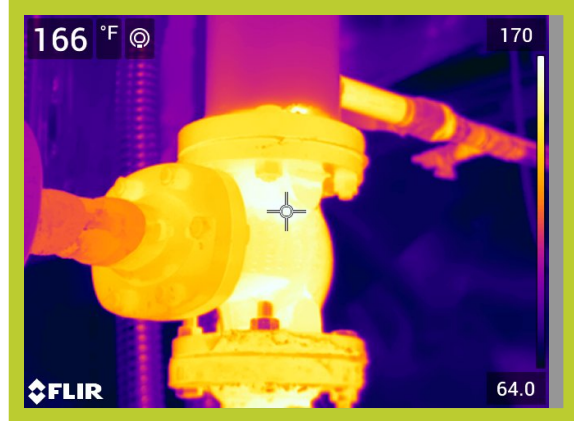
155°F
62°F
Fiberglass

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	154	885	\$ 137.25	\$ 137.25	\$686.25	0.2
1	70	134	\$ 20.79	\$116.46	\$582.30	0.03
1.5	67	106	\$ 16.50	\$120.75	\$603.75	0.02

Middle School Boiler Room



Operating Temperature,
Ambient Temperature,
Insulation selected

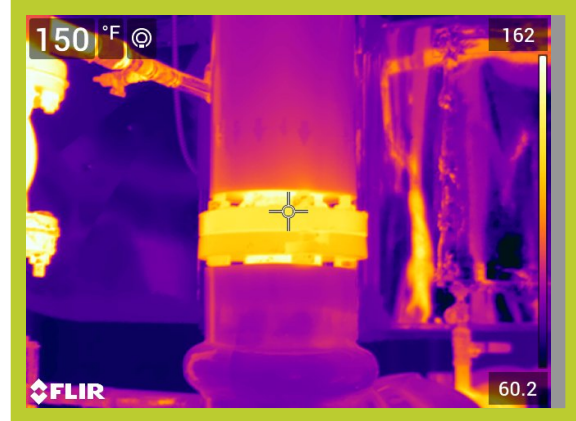
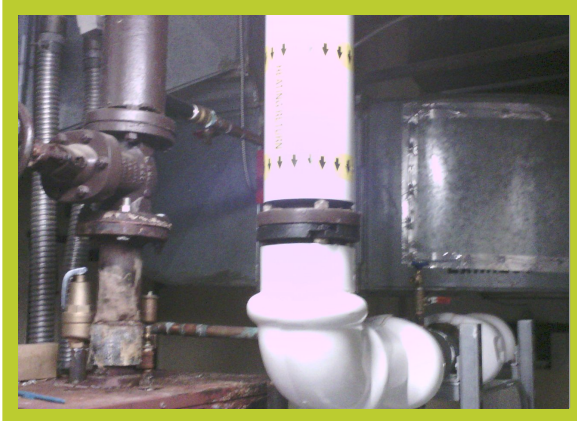
155°F
62°F
Fiberglass

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	153	2361	\$ 366.33	\$ 366.33	\$1831.65	0.54
1	72	314	\$48.75	\$317.58	\$1587.90	0.07
1.5	69	233	\$36.09	\$330.24	\$1651.20	0.05

Middle School Boiler Room



Operating Temperature,
Ambient Temperature,
Insulation selected

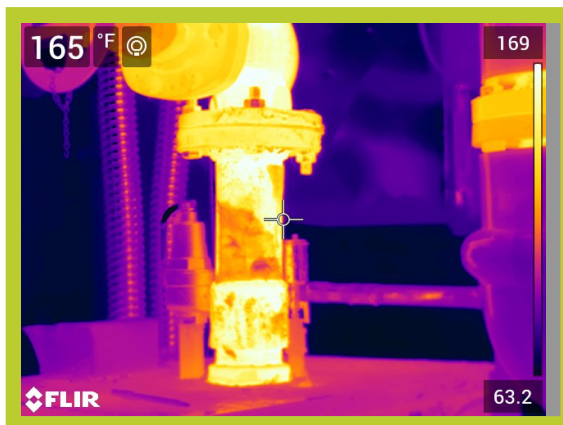
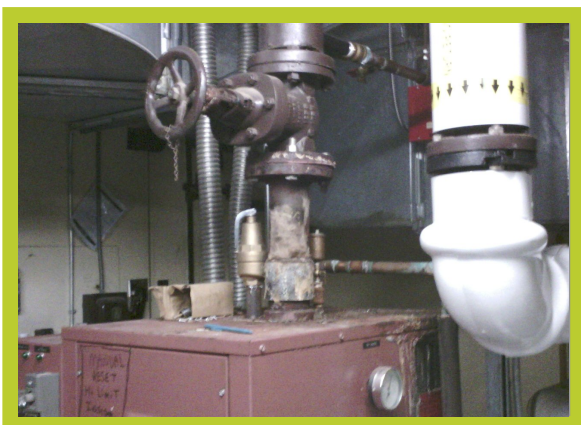
155°F
62°F
Fiberglass

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	150	2673	\$ 414.75	\$ 414.75	\$2073.75	0.61
1	73	359	\$ 55.77	\$358.98	\$1794.90	0.08
1.5	69	262	\$ 40.65	\$374.10	\$1870.50	0.06

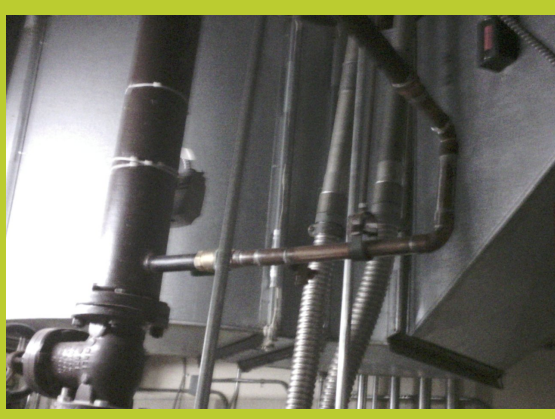
Middle School Boiler Room



Operating Temperature,	155°F	Emittance of Surface	0.95
Ambient Temperature,	62°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	165	2018	\$ 313.17	\$ 313.17	\$1565.85	0.46
1	71	226	\$35.10	\$278.07	\$1390.35	0.05
1.5	68	181	\$ 28.08	\$285.09	\$1425.45	0.04

Middle School Boiler Room



Operating Temperature,	155°F	Emittance of Surface	0.95
Ambient Temperature,	62°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	128	427	\$ 397.26	\$ 397.26	\$1986.30	0.09
1	66	72	\$ 67.14	\$330.12	\$1650.60	0.02
1.5	64	59	\$ 54.90	\$342.36	\$1711.80	0.01

Middle School Boiler Room



Operating Temperature,	155°F	Emittance of Surface	0.95
Ambient Temperature,	62°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	120	326	\$ 151.56	\$ 151.56	\$757.80	0.07
1	66	62	\$ 29.34	\$122.22	\$611.10	0.01
1.5	64	52	\$ 24.03	\$127.53	\$637.65	0.01

Upstairs Boiler Room



Operating Temperature,
Ambient Temperature,
Insulation selected

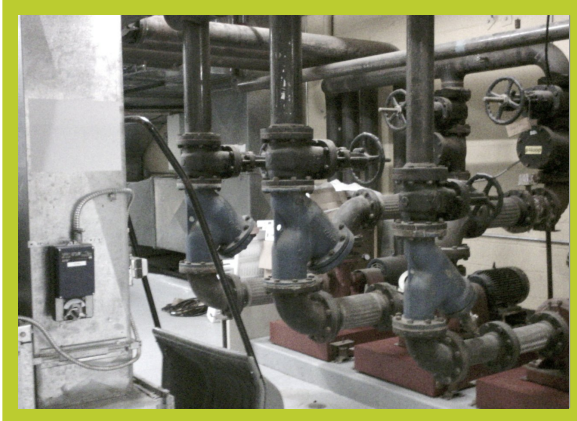
155°F
62°F
Fiberglass

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	110	215	\$ 33.39	\$ 33.39	\$166.95	0.05
1	65	50	\$ 7.74	\$25.65	\$128.25	0.01
1.5	63	39	\$ 6.06	\$27.33	\$136.65	0.01

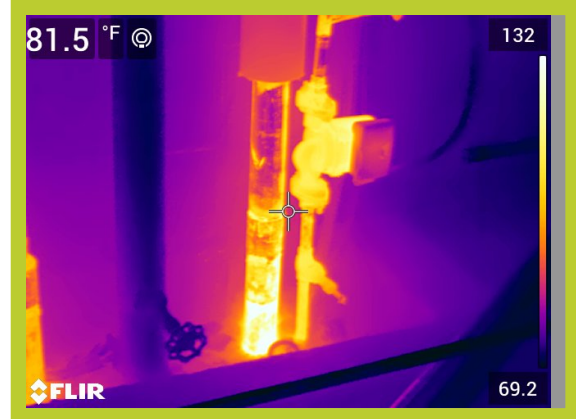
Upstairs Boiler Room



Operating Temperature,	155°F	Emittance of Surface	0.95
Ambient Temperature,	62°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	720	\$ 223.50	\$ 223.50	\$1117.50	0.16
1	68	120	\$ 37.26	\$186.24	\$931.20	0.03
1.5	64	83	\$ 25.86	\$197.64	\$988.20	0.02

Upstairs Boiler Room



Operating Temperature,
Ambient Temperature,
Insulation selected

155°F
62°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	114	396	\$ 122.82	\$122.82	\$614.10	0.09
1	66	73	\$ 22.74	\$100.08	\$500.40	0.02
1.5	64	58	\$ 18.06	\$104.76	\$523.80	0.01

Upstairs Boiler Room



Operating Temperature,	75°F	Emittance of Surface	0.95
Ambient Temperature,	65°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	75	18,330	\$ 949.00	\$ 949.00	\$4745.00	3.9
1	66	3120	\$ 165.10	\$783.90	\$3919.50	1.3
1.5	66	2470	\$ 126.10	\$822.90	\$4114.50	0

Upstairs Boiler Room



Operating Temperature,	75°F	Emittance of Surface	0.95
Ambient Temperature,	65°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	75	33,840	\$ 1,752.00	\$ 1,752.00	\$8,760.00	7.2
1	66	5,760	\$ 304.80	\$1,447.20	\$7,236.00	2.4
1.5	66	4,560	\$ 232.80	\$1,519.20	\$7,596.00	0

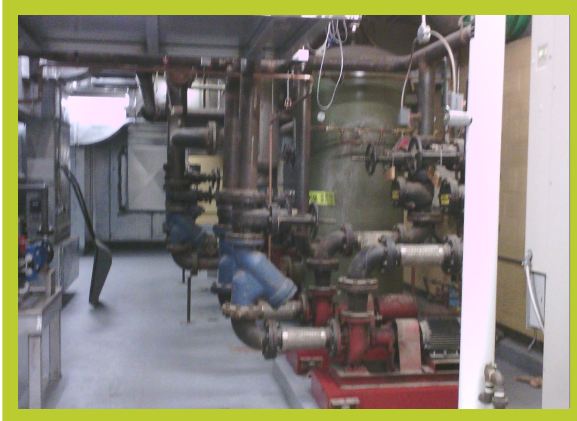
Upstairs Boiler Room



Operating Temperature,	75°F	Emittance of Surface	0.95
Ambient Temperature,	65°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	75	3,906	\$ 202.44	\$ 202.44	\$1012.20	0.84
1	66	714	\$ 37.80	\$164.64	\$823.20	0
1.5	66	504	\$ 26.46	\$175.98	\$879.90	0

Upstairs Boiler Room



Operating Temperature,
Ambient Temperature,
Insulation selected

75°F
65°F
Fiberglass

Emittance of Surface

0.95

Expected Useful Life of Insulation System

20 yrs.

Operating hours per year

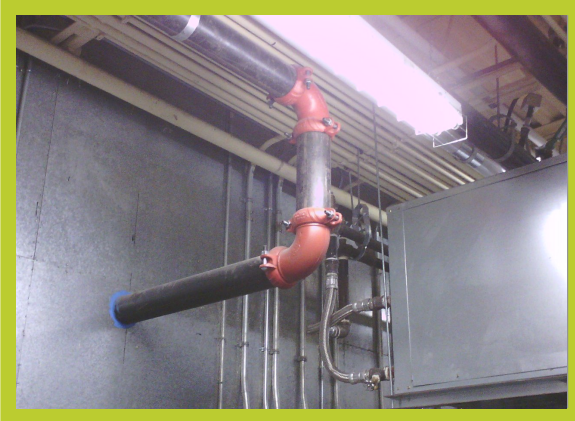
8760

Efficiency of fuel Conversion%

85%

THICKNESS	TEMPERATURE	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	75	33,698	\$ 1,743.00	\$ 1,743.00	\$8,715.00	8.3
1	66	5,976	\$ 310.42	\$1,432.58	\$7,162.90	1.66
1.5	66	332	\$ 227.42	\$1,515.58	\$7,577.90	1.66

Upstairs Boiler Room



Operating Temperature,
Ambient Temperature,
Insulation selected

75°F
65°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	75	3,132	\$ 161.88	\$ 161.88	\$809.40	0.72
1	66	516	\$ 26.88	\$135.00	\$675.00	0.12
1.5	66	384	\$ 19.92	\$141.96	\$709.80	0.12

Results

Simple Payback Period, yrs	0.4
Internal Rate of Return (IRR or ROI)	231.0%
Net Present Value,	\$125,151

Calculations

Year	Investment	Annual Savings	Annual Cash Flow	Cumulative Cash Flow
0	\$-2,769	\$0	\$-2,769	\$-2,769
1	\$0	\$6,396	\$6,396	\$3,627
2	\$0	\$6,396	\$6,396	\$10,023
3	\$0	\$6,396	\$6,396	\$16,419
4	\$0	\$6,396	\$6,396	\$22,815
5	\$0	\$6,396	\$6,396	\$29,211
6	\$0	\$6,396	\$6,396	\$35,607
7	\$0	\$6,396	\$6,396	\$42,003
8	\$0	\$6,396	\$6,396	\$48,399
9	\$0	\$6,396	\$6,396	\$54,795
10	\$0	\$6,396	\$6,396	\$61,191
11	\$0	\$6,396	\$6,396	\$67,587
12	\$0	\$6,396	\$6,396	\$73,983
13	\$0	\$6,396	\$6,396	\$80,379
14	\$0	\$6,396	\$6,396	\$86,775
15	\$0	\$6,396	\$6,396	\$93,171
16	\$0	\$6,396	\$6,396	\$99,567
17	\$0	\$6,396	\$6,396	\$105,963
18	\$0	\$6,396	\$6,396	\$112,359
19	\$0	\$6,396	\$6,396	\$118,755
20	\$0	\$6,396	\$6,396	\$125,151

Results

Simple Payback Period, yrs	1.4
Internal Rate of Return (IRR or ROI)	69.6%
Net Present Value,	\$158,366

Calculations

Year	Investment	Annual Savings	Annual Cash Flow	Cumulative Cash Flow
0	\$-12,254	\$0	\$-12,254	\$-12,254
1	\$0	\$8,531	\$8,531	\$-3,723
2	\$0	\$8,531	\$8,531	\$4,808
3	\$0	\$8,531	\$8,531	\$13,339
4	\$0	\$8,531	\$8,531	\$21,870
5	\$0	\$8,531	\$8,531	\$30,401
6	\$0	\$8,531	\$8,531	\$38,932
7	\$0	\$8,531	\$8,531	\$47,463
8	\$0	\$8,531	\$8,531	\$55,994
9	\$0	\$8,531	\$8,531	\$64,525
10	\$0	\$8,531	\$8,531	\$73,056
11	\$0	\$8,531	\$8,531	\$81,587
12	\$0	\$8,531	\$8,531	\$90,118
13	\$0	\$8,531	\$8,531	\$98,649
14	\$0	\$8,531	\$8,531	\$107,180
15	\$0	\$8,531	\$8,531	\$115,711
16	\$0	\$8,531	\$8,531	\$124,242
17	\$0	\$8,531	\$8,531	\$132,773
18	\$0	\$8,531	\$8,531	\$141,304
19	\$0	\$8,531	\$8,531	\$149,835
20	\$0	\$8,531	\$8,531	\$158,366