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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](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  
King Street Elementary School  
Miramichi, New Brunswick



Presented By:  
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E2J 4Y2

## **Executive Summary**

The insulation energy appraisal evaluated the performance of mechanical rooms at King street Elementary facility. Most of mechanical piping system is currently insulated with 2-inch thick Fiberglass insulation. With the mechanical piping directly off boiler insulated with 2-inch Mineral Wool 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 vs 1 ½ thick insulation vs 2-inch thick insulation. He also calculated emission saving if each facility was properly insulated. These calculations are summarized below.

### **Energy Cost**

Heat loss at King Street facility listed at 99 678 Btu per year

*An estimated 5 year saving of \$15 217.05 , and a simple payback return on investment*

### **Energy/Emissions Savings**

Co<sub>2</sub> reduction at King Street facility 6.2 tonne per year

### **Insulation and Energy Efficiency**

Insulation systems improved 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 then six months. The savings are significant in terms of reduced energy use, increased efficiency, and reduced greenhouse gas emissions.

## **Conclusion**

The appraiser commends management of King Street school for taking initiative to build King Street as Leed Energy school. However, the finding shows that there are areas of concern in construction phase as some of the mechanical system was not properly insulated as per specifications. Thus, creating unnecessary heat loss resulting in increased operating cost and carbon emissions. Our analysis show that though each facility is believed to be insulated with proper thicknesses as a whole. There are some areas that due to improper insulation material use or installation, that if insulated to meet the facility insulation specifications. Would be able to significantly reduce their energy loss and reduce level of greenhouse gas emissions. The appraiser expert opinion that if King Street had been insulated with proper insulation products and installed as per specification designed by engineering firm hired. That it would be a leading standard as to how school in New Brunswick should be built.

**ENERGY**

**AUDIT**

**KING STREET**

**ELEMENTARY**

**Total Heat Loss**

**5 year savings of**

**\$15 217.05**

**CO<sub>2</sub> Reduction of**

**6.2 MT/Year**



**Benefits:**

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

*Audit Done By:*

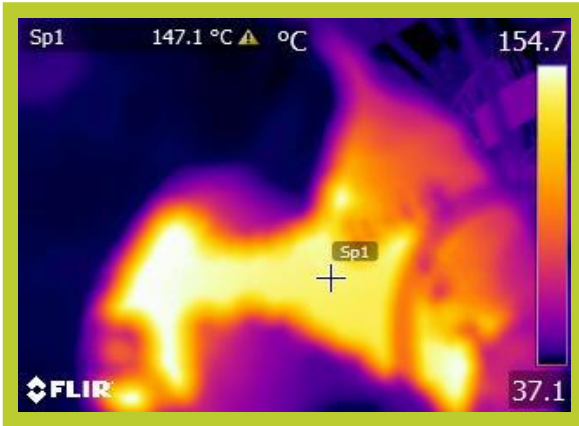
***Joshua Sherrard***

*Certified Thermographer*

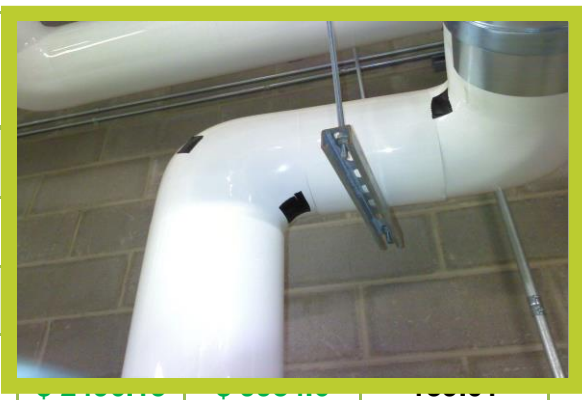
*Certified 3E Plus Auditor*

# Boiler Room Ground Floor

# Boiler Room Ground Floor

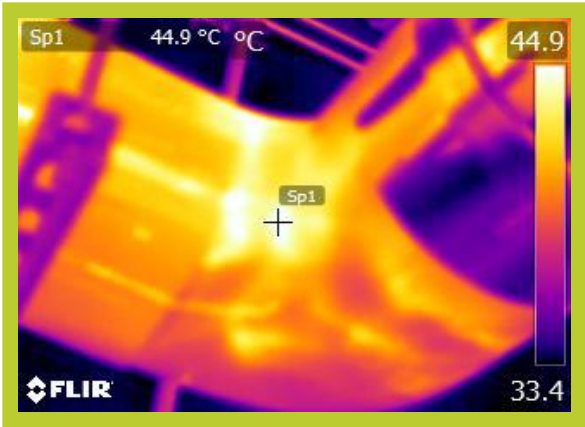


Operating Temperature, *F	302	Emittance of Surface	0.95
Ambient Temperature, *F	78	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Mineral Wool	Operating hours per year	8760
		Selected fuel	Pellet
		Cost of Fuel,\$/lb	\$ 228



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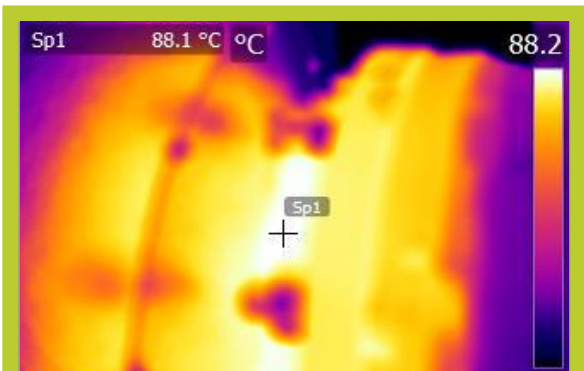
# Boiler Room Ground Floor



Operating Temperature, *F	122	Emittance of Surface	0.95
Ambient Temperature, *F	75	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Selected fuel	Pellet
		Cost of Fuel, \$/Lb	\$228

<b>0.5</b>	<b>17820</b>	<b>543.75</b>	<b>\$543.75</b>	<b>\$2718.75</b>	<b>\$10 875</b>	<b>2443.01</b>
<b>1</b>	<b>10383</b>	<b>316.77</b>	<b>\$226.98</b>	<b>\$1134.9</b>	<b>\$4539.6</b>	<b>1423.45</b>
<b>1.5</b>	<b>7452</b>	<b>227.7</b>	<b>\$316.05</b>	<b>\$1580.25</b>	<b>\$6321</b>	<b>1021.62</b>
<b>2</b>	<b>6030</b>	<b>184.02</b>	<b>\$359.73</b>	<b>\$1798.65</b>	<b>\$7194.6</b>	<b>826.67</b>



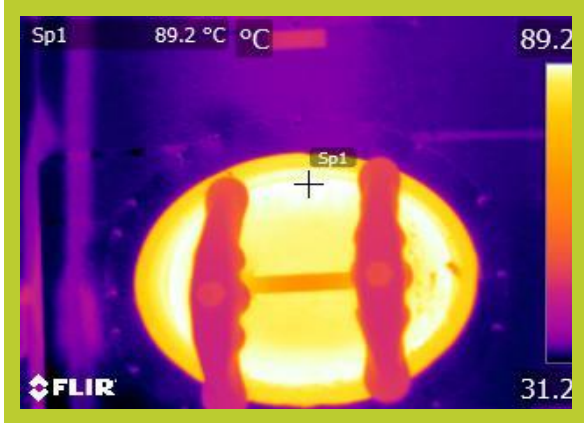
Operating Temperature, *F	194	Emittance of Surface	0.95
Ambient Temperature, *F	78	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Selected fuel	Pellet
		Cost of Fuel,\$/KWH	\$ 228

Thickness (inches)	Heat Loss (Btu/h)	Cost of Fuel (\$/yr)	1 <sup>st</sup> year Savings	5 Year Savings	20 Year Savings	CO2 Emissions (lb/yr)
0	43134	1316.16	\$ 1316.16	\$ 6580.8	\$ 26323.2	5919.42
1	4920	150.06	\$ 1166.1	\$ 5830.5	\$ 23322	674.50
1.5	3606	110.04	\$ 1206.12	\$ 6030.6	\$ 24122.4	494.36
2	2886	88.02	\$ 1228.14	\$ 6140.7	\$ 24562.8	395.65

*Boiler Room Ground Floor*

Thickness (inches)	Heat Loss (Btu/h)	Cost of Fuel (\$/yr)	1 <sup>st</sup> year Savings	5 Year Savings	20 Year Savings	CO2 Emissions (lb/yr)
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Operating Temperature, *F	192	Emittance of Surface	0.95
Ambient Temperature, *F	78	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Selected fuel	Pellet
		Cost of Fuel,\$/KWH	\$ 228

## Boiler Room Ground Floor



Operating Temperature, *F	194	Emittance of Surface	0.95
Ambient Temperature, *F	78	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Selected fuel	Pellet
		Cost of Fuel,\$/Lb	\$ 228

Thickness (inches)	Heat Loss (Btu/h)	Cost of Fuel (\$/yr)	1 <sup>st</sup> year Savings	5 Year Savings	20 Year Savings	CO2 Emissions (lb/yr)
0.5	30757.5	938.25	\$938.25	\$4691.25	\$18765	4216.68
1	17370	529.65	\$408.6	\$2043	\$8172	899.62
1.5	11610	354.15	\$584.1	\$2920.5	\$11682	601.29
2	9337.5	284.85	\$653.4	\$3267	\$13068	480.12

## Boiler Room Ground Floor



Operating Temperature, \*F

178

Ambient Temperature, \*F

78

Insulation selected

Fiberglass

Emittance of Surface

0.95

Expected Useful Life of Insulation System

20 yrs.

Operating hours per year

8760

Selected fuel

Pellet

Cost of \$/Lb

\$ 228

Thickness (inches)	Heat Loss (Btu/h)	Cost of Fuel (\$/yr)	1 <sup>st</sup> year Savings	5 Year Savings	20 Year Savings	CO2 Emissions (lb/yr)
0	7789.5	237.69	\$237.69	\$1188.45	\$4753.8	1067.9
1	900	27.50	\$210.19	\$1050.95	\$4203.8	123.38
1.5	625.5	19.13	\$218.56	\$1092.8	\$4371.2	85.75
2	481.5	14.67	\$223.02	\$1115.1	\$4460.4	66.01

## Fan Room #1 Second Floor



Operating Temperature, *F	158	Emittance of Surface	0.95
Ambient Temperature, *F	80	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Selected fuel	Pellet
		Cost of \$/Lb	\$ 228

Thickness (inches)	Heat Loss (Btu/h)	Cost of Fuel (\$/yr)	1 <sup>st</sup> year Savings	5 Year Savings	20 Year Savings	CO2 Emissions (lb/yr)
0.5	536	18.54	\$18.54	\$92.7	\$370.8	83.28
1	323	11.15	\$7.39	\$36.95	\$147.8	50.18
1.5	242	8.39	\$10.15	\$50.75	\$203	37.6
2	203	6.99	\$11.55	\$57.75	\$231	31.54

# Fan Room #1 Second Floor



Operating Temperature, *F	140	Emittance of Surface	0.95
Ambient Temperature, *F	80	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Selected fuel	Pellet
		Cost of \$/Lb	\$ 228

Thickness (inches)	Heat Loss (Btu/h)	Cost of Fuel (\$/yr)	1 <sup>st</sup> year Savings	5 Year Savings	20 Year Savings	CO2 Emissions (lb/yr)
0.5	396	13.68	\$13.68	\$68.4	\$273.6	61.53
1	237	8.19	\$5.49	\$27.45	\$109.8	36.82
1.5	178	6.15	\$7.53	\$37.65	\$150.6	27.66
2	148	5.12	\$8.56	\$42.8	\$171.2	23

### Results

Simple Payback Period, yrs	2.5
Internal Rate of Return (IRR or ROI)	39.3%
Net Present Value,	\$53,120

### Calculations

Year	Investment	Annual Savings	Annual Cash Flow	Cumulative Cash Flow
0	-\$7,740	\$0	-\$7,740	-\$7,740
1	\$0	\$3,043	\$3,043	-\$4,697
2	\$0	\$3,043	\$3,043	-\$1,654
3	\$0	\$3,043	\$3,043	\$1,389
4	\$0	\$3,043	\$3,043	\$4,432
5	\$0	\$3,043	\$3,043	\$7,475
6	\$0	\$3,043	\$3,043	\$10,518
7	\$0	\$3,043	\$3,043	\$13,561
8	\$0	\$3,043	\$3,043	\$16,604
9	\$0	\$3,043	\$3,043	\$19,647
10	\$0	\$3,043	\$3,043	\$22,690
11	\$0	\$3,043	\$3,043	\$25,733
12	\$0	\$3,043	\$3,043	\$28,776
13	\$0	\$3,043	\$3,043	\$31,819
14	\$0	\$3,043	\$3,043	\$34,862
15	\$0	\$3,043	\$3,043	\$37,905
16	\$0	\$3,043	\$3,043	\$40,948
17	\$0	\$3,043	\$3,043	\$43,991
18	\$0	\$3,043	\$3,043	\$47,034
19	\$0	\$3,043	\$3,043	\$50,077
20	\$0	\$3,043	\$3,043	\$53,120

\*Calculation are based off Energy Cost Escalation Rate of 0%/yr

