MECHANICAL INSULATORS
LMCT
Labor Management Cooperative Trust
ENERGY CONSERVATION SPECIALISTS

197 State Route 18, Suite 3000 S. East Brunswick, New Jersey 08819
www.MechanicalInsulatorsLMCT.com
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, 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

North & South Esk Regional /North & South Esk Elementary Schools

Miramchi, New Brunswick

Date of Presentation

November 22,2018

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 each facility (NSER/NSEE). 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 1inch 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 NSER facility listed at 2 392 Btu per day

An estimated 5 year saving of $1957.40, and a simple payback return on investment in 4.2 years

Heat loss at NSEE facility listed at 140 448 Btu per day

An estimated 5 year saving of $10 799.95, and a simple payback return on investment in 1.6 years

Energy/Emissions Savings

Co_2 reduction at NSER facility 1.95 Mt per year

Co_2 reduction at NSEE facility 9.95 Mt 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 NSER/NSEE Facilities on upkeeping and maintaining their insulation systems. The NSER facility insulation system is very well maintained, and the findings show a relatively positive energy efficiency. The NSEE faciality insulation system is very well maintain 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. There are some areas that due to facility maintenance, if insulated to meet the rest of facility insulation standard. Would be able to significantly reduce their energy loss and reduce level of greenhouse gas emissions.

ENERGY AUDIT

KING STREET ELEMENTARY

Total Heat Loss

5 year savings of

$15 217.05

CO_2 Reduction of

6.2 MT/Year

Benefits:

- Simple payback period
- CO_2 Reduction
- Personnel safety

Audit Done By:

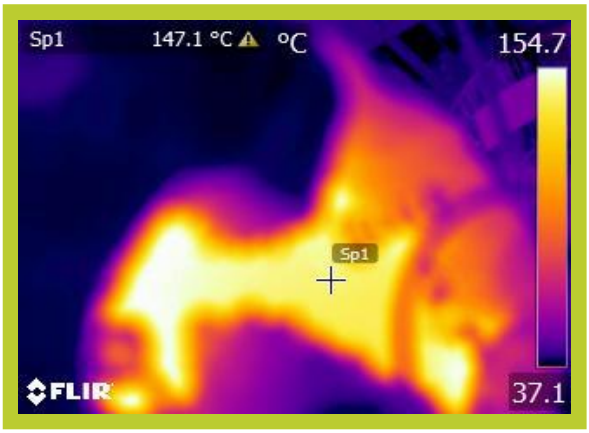
Joshua Sherrard

Certified Thermographer

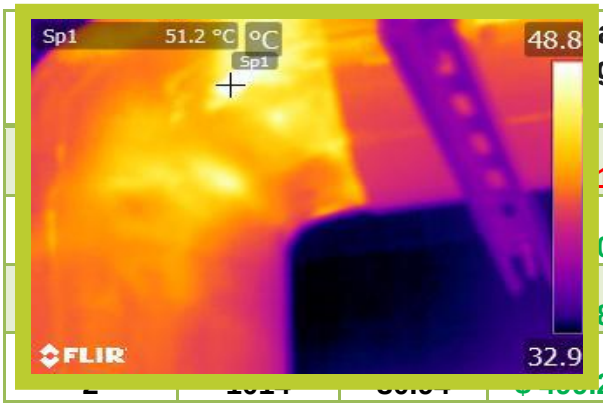
Certified 3E Plus Auditor

Boiler Room Ground Floor

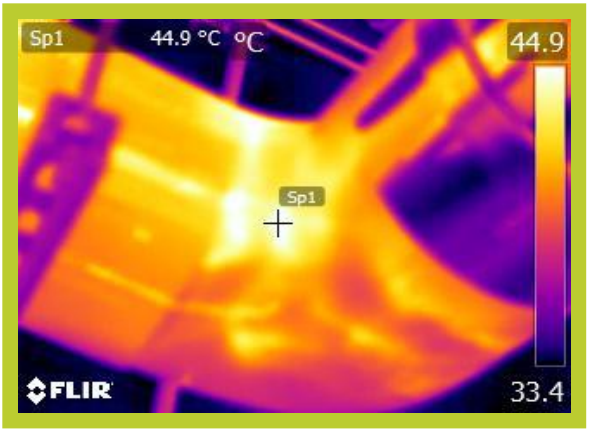
Boiler Room Ground Floor



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



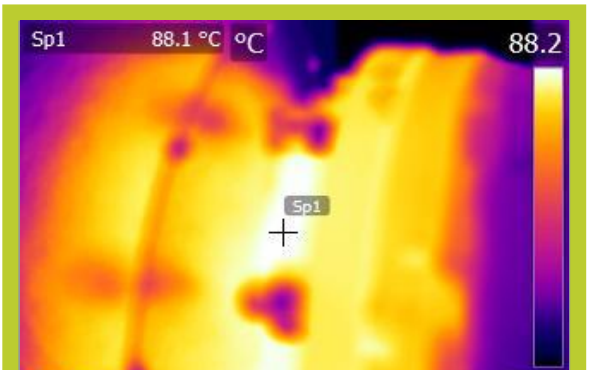
Boiler Room Ground Floor



Operating Temperature, *F	122
Ambient Temperature, *F	75
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 Fuel,$/Lb	$228

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

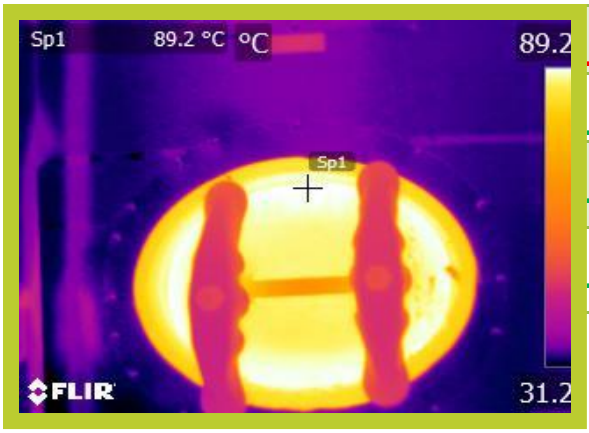


Operating Temperature, *F	194	Emittance of Surface	0.95
Ambient Temperature, *F	78	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Selected fuel	Pellet
		Cost of Fuel,$/KWH	$ 228

Thickness **(inches)**	Heat Loss **(Btu/h)**	Cost of Fuel **($/yr)**	**1st year Savings**	**5 Year Savings**	**20 Year Savings**	CO2 Emissions (lb/yr)
0	**43134**	**1316.16**	**$ 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)**	**1st year Savings**	**5 Year Savings**	**20 Year Savings**	CO2 Emissions (lb/yr)



.84
.56
.78
.96

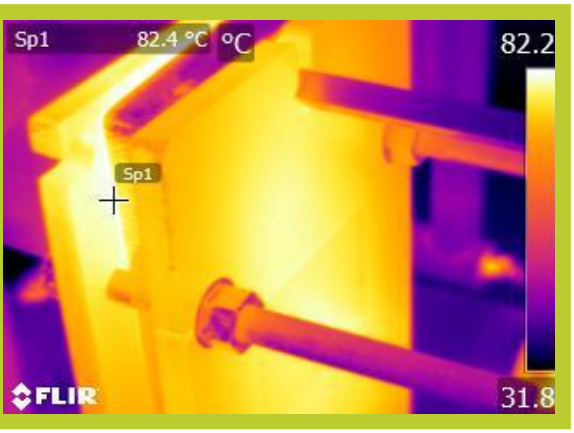
Operating Temperature, *F	192	Emittance of Surface	0.95
Ambient Temperature, *F	78	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Selected fuel	Pellet
		Cost of Fuel,$/KWH	$ 228

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)**	**1st 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

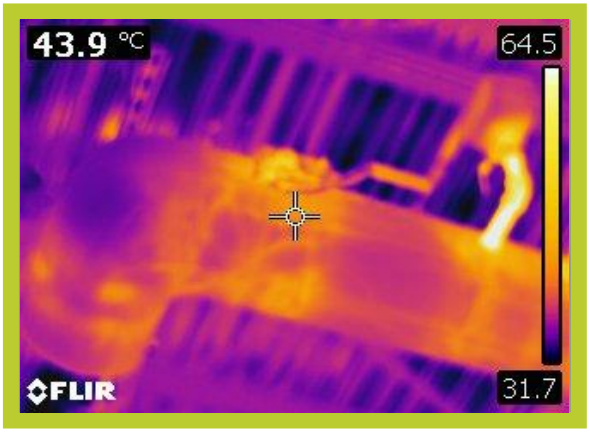


Operating Temperature, *F	178
Ambient Temperature, *F	78
Insulation selected	Fiberglass

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)**	**1st 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)**	**1st 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)**	**1st 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

ENERGY AUDIT NSEE

Total 5 year savings of $10 799.95

CO_2 Reduction of 9.95 MT/Year

Benefits:

- Simple payback period
- CO_2 Reduction
- Personnel safety

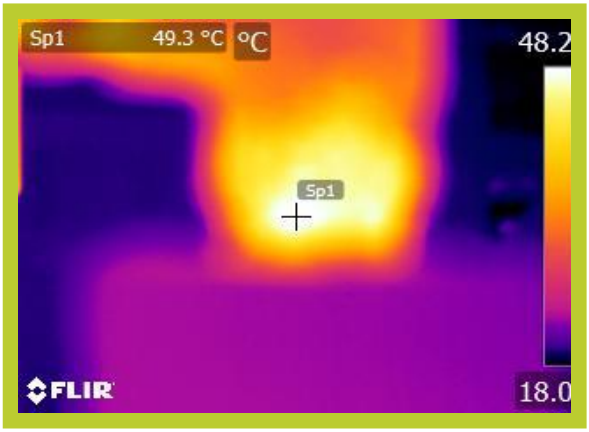
Audit Done By:

Joshua Sherrard

Certified Thermographer

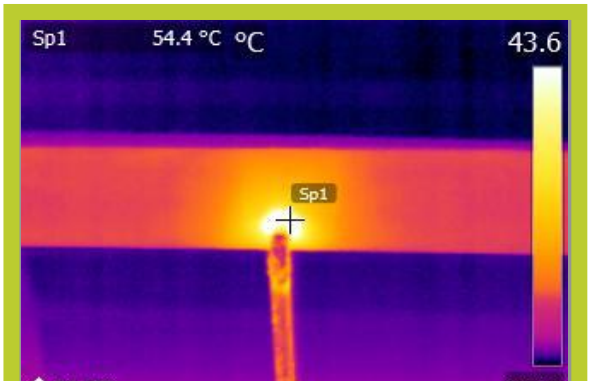
Certified 3E Plus Auditor

Mechanical 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	8750
		Selected fuel	Electric
		Cost of Fuel,$/KWH	13.51 ¢

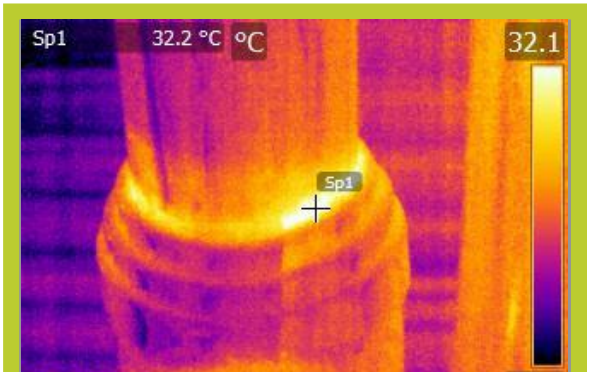
Thickness **(inches)**	Surface Temp **(°F)**	Heat Loss **(Btu/h)**	Cost of Fuel **($/yr)**	**1st year Savings**	**5 Year Savings**	**20 Year Savings**	CO2 Emissions (MT/yr)
0	**122**	**154**	**$59.27**	**59.27**	**296.25**	**1185**	**0.34**
1	**77**	**18**	**$6.95**	**52.32**	**261.6**	**1046.4**	**0.03**
1.5	**76**	**15**	**$5.63**	**53.64**	**268.2**	**1072.8**	**0.03**



Mechanical Room Second 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	8750
		Selected fuel	Electric
		Cost of Fuel,$/KWH	13.51 ¢

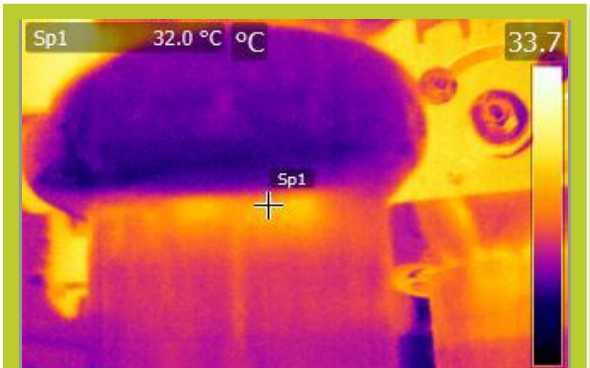
Thickness **(inches)**	Surface Temp **(°F)**	Heat Loss **(Btu/h)**	Cost of Fuel **($/yr)**	**1st year Savings**	**5 Year Savings**	**20 Year Savings**	CO2 Emissions (MT/yr)
0	**133**	**1714**	**$660.71**	**660.71**	**3,303.55**	**13,214.2**	**2.57**
1	**78**	**217**	**$83.63**	**577.08**	**2,885.4**	**11,541.6**	**0.41**
1.5	**77**	**174**	**$67.11**	**593.6**	**2,968**	**11,872**	**0.33**



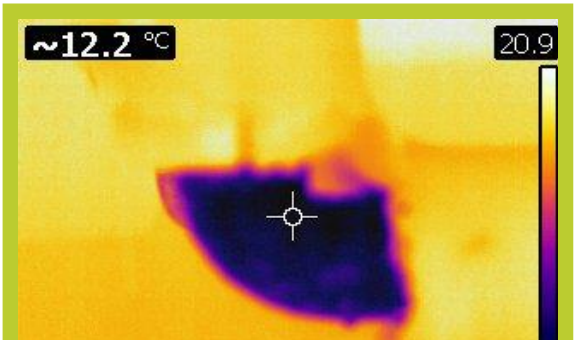
Mechanical Room Second Floor

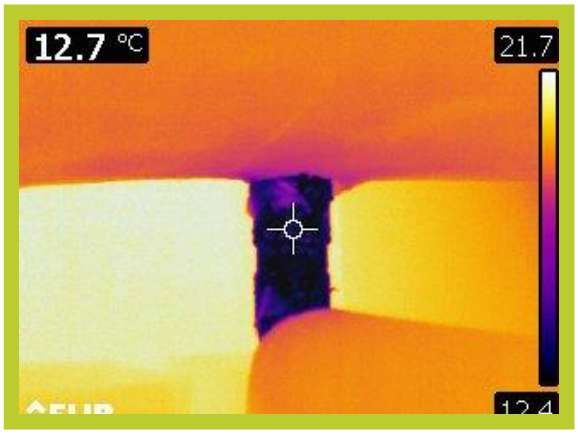
Operating Temperature, *F	122	Emittance of Surface	0.95
Ambient Temperature, *F	75	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8750
		Selected fuel	Electric
		Cost of Fuel,$/KWH	13.51 ¢

Thickness **(inches)**	Surface Temp **(°F)**	Heat Loss **(Btu/h)**	Cost of Fuel **($/yr)**	**1st year Savings**	**5 Year Savings**	**20 Year Savings**	CO2 Emissions (MT/yr)
0	**90**	**3792**	**$1,751.66**	**1751.66**	**8758.3**	**35033.2**	**8.56**
1	**78**	**479**	**$221.07**	**1530.59**	**7652.95**	**30611.8**	**1.08**
1.5	**77**	**384**	**$177.41**	**1574.25**	**7871.25**	**31485**	**0.87**



Mechanical Room Ground Floor





Thickness **(inches)**	Surface Temp **(°F)**	Heat Flow **(Btu/h/FT)**
0	**54**	**32**
1	**73**	**4**

Results	
Simple Payback Period, yrs	1.6
Internal Rate of Return (IRR or ROI)	63.4%
Net Present Value,	$39,775

Calculations				
Year	**Investment**	**Annual Savings**	**Annual Cash Flow**	**Cumulative Cash Flow**
0	$-3,405	$0	$-3,405	$-3,405
1	$0	$2,159	$2,159	$-1,246
2	$0	$2,159	$2,159	$913

3	$0	$2,159	$2,159	$3,072
4	$0	$2,159	$2,159	$5,231
5	$0	$2,159	$2,159	$7,390
6	$0	$2,159	$2,159	$9,549
7	$0	$2,159	$2,159	$11,708
8	$0	$2,159	$2,159	$13,867
9	$0	$2,159	$2,159	$16,026
10	$0	$2,159	$2,159	$18,185
11	$0	$2,159	$2,159	$20,344
12	$0	$2,159	$2,159	$22,503
13	$0	$2,159	$2,159	$24,662
14	$0	$2,159	$2,159	$26,821
15	$0	$2,159	$2,159	$28,980
16	$0	$2,159	$2,159	$31,139
17	$0	$2,159	$2,159	$33,298
18	$0	$2,159	$2,159	$35,457
19	$0	$2,159	$2,159	$37,616
20	$0	$2,159	$2,159	$39,775

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