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ST. VINCENT PALLOTTI
HIGH SCHOOL

Pallotti High School Insulation Energy Audit

Prepared for: St. Vincent Pallotti High School

By: Brian S Cavey

April 24, 2020

Building Operations Manager
St Vincent Pallotti High School
113 St Marys Pl
Laurel, MD 20707

Dear Operations Manager,

Please find enclosed the Insulation Energy Appraisal for Boiler Room within the building at 113 St Marys Pl, Laurel, MD 20707. The appraisal evaluates and recommends energy saving opportunities through mechanical insulation. The appraisal provides estimated projects cost, savings and expected payback periods. The details in this report are based on an evaluation of energy consumption and an evaluation of the existing building systems and their operation at the time we conducted the appraisal.

We have developed an approach to identifying and recommending energy conservation measures of the mechanical insulation systems which provides short payback periods; this approach best positions the building against future increases in energy usage, more consistent budgeting of energy usage in the affected areas and cost reductions in both energy usage and equipment maintenance and repair. By implementing the recommended conservation measures you will experience significant energy reductions, cost savings and improved system performance, with an exceptional ROI. In addition, the measures recommended will help to improve building comfort levels, reduce potential employee heat stress issues and provide better working conditions for employees working in the affected areas.

This appraisal was performed and reviewed by a Certified Insulation Energy Appraiser. The National Insulation Association's Growing the Insulation Industry Committee created the Insulation Energy Appraisal Program (IEAP). The IEAP is a major industry initiative designed to give facility/energy managers a better understanding of the true dollar and performance value of an insulated system. The program is a tool that quantifies the amount of energy and actual dollars a facility is losing with its current in-place insulation system, and-as mentioned previously-demonstrates the real-world benefits of a more efficient system.

We trust this Energy Appraisal meets with your approval and acceptance.

Thank you for taking the time to allow us to present you with this appraisal to provide you with a glimpse of the potential savings that could be achieved by evaluating and properly insulating the mechanical systems in your facility. While the enclosed report is but a sample of the savings that would be achieved in one mechanical room, we have quantified energy loss, calculated potential energy savings as well as reductions in greenhouse gas emissions by utilizing State of the Art Energy Appraisal Software.

Clarifications

The information does not include any allowance incentives for emission reductions, nor does it include the following additional advantages to you of upgrading your mechanical insulation systems as recommended:

a. Potential tax benefits and credits from energy conservation investments
b. Enhanced personnel protection, noise control and fire safety
c. Condensation prevention and freeze protection
d. Reduced corrosion potential
e. Reduced equipment wear and tear
f. Reduced ongoing insulation maintenance expense
g. Improved process flows
h. More attractive and comfortable working environment

Mechanical Insulation is applied as a safeguard to protect personnel from burns. Insulation is used to reduce ambient temperatures to prevent personnel from working under stressful high temperature conditions. "*ASTM Standard Practice C 1057*" contains a Standard Practice for Determination of Skin Contact Temperature from heated surfaces. The Standard Industry Practice is to use 140°F as the maximum temperature of a heated surface that may be contacted by working personnel.

Design of Insulation Systems is a process that must utilize numerous criteria to determine the best materials, applications and temperature changes. We have evaluated the mechanical systems and the design requirements in order to provide solutions to best integrate the often conflicting demands of initial investment, durability, value and life cycle costs. We have tried to minimize the variation of temperature in processes and to minimize energy use.

Damaged / Inadequate Insulation

While we evaluated the boiler system within the facility, the energy loss due to damaged / inadequate insulation to other systems appears to be noteworthy. Due to the age of the systems, the frequent cycling of HVAC systems, the areas humidity levels and the physical abuse some of these systems have endured, a high percentage of the System Insulation is compromised to the point that it should be replaced. There are places in the facility where the insulation has been removed and has not been replaced. We did not include the energy savings from damaged insulation in any of our calculations.

If you were to choose to conduct a complete facility appraisal we would utilize information provided by your engineering staff including heating and cooling set points, process temperatures, total annual hours of operation, scheduled down times, type of energy used, cost of energy, facility design, HVAC system function and design, business functions and energy conservation strategies to provide a complete evaluation of the mechanical system insulation in your facility. Our report would include this information in conjunction with our expertise and training in analyzing and verifying with thermographs, installed material uses, wind velocities, area weather data, design and relative humidity values as well as facility, mechanical, and equipment geometries to evaluate the existing conditions at the Maritime Institute of Technology and Graduate Studies.

After completing our interview with the facility operations manager, we will review the facility layout system integration and will then conduct a comprehensive walk-through of the facility. We use thermographs to differentiate differences in temperature and to pinpoint underlying problems in energy usage. From this data, in conjunction with a visual survey, we will produce a comprehensive report to provide you with a wealth of detailed information about the locations, causes and extent of problems, potential solutions and calculation of available savings. After obtaining site specific data we will perform calculations, evaluate current and potential energy conservation measures, and then compile a comprehensive, detailed report with recommendations to reduce energy costs, to improve energy efficiency and reduce the carbon footprint. Our final reports will provide you vital information to determine energy loss patterns and potential fuel cost savings in both dollars and Btu's to reveal hidden problems, helping you determine the next course of action.

A thorough inspection of the Boiler Room after the removal of the original asbestos insulation shows the cost and fuel savings by adding insulation to uninsulated piping and equipment while also greatly reducing the CO2 emissions produced when using excessive amounts of energy because of the lack of insulation.

While inspecting the room, we found uninsulated: 24 feet of 10" steam piping, 75 feet of 8" steam piping, 12 feet of 6" steam piping, 18 feet of 4" steam piping, 78 feet of 3 " steam piping, 9 feet of 2" steam piping, 75 feet of 1 ½" boiler feed piping and 63 feet of 1 ¼" boiler feed piping. The attached charts show the energy usage and CO2 emissions of uninsulated piping and insulated piping. It is recommended to use 2" thickness of fiberglass insulation on the steam piping and 1 ½" thickness of fiberglass insulation on the boiler feed piping. The savings from insulating the items are significant with heat loss savings of 502,137 Btu/h and cost saving of $11,076.06 per year. Insulators and Allied Workers Local 24 Joint Apprenticeship Program will be donating the insulation and labor to insulate all of the piping in this report during the 2020 apprenticeship school saving Pallotti High School approximately $11,500 in costs. Using this cost, a return on investment of the insulation would be slightly less than one year.

We welcome the opportunity to meet with you to review and explain any questions you have concerning the attached report.

Sincerely yours,

Brian S Cavey, CIEA

10” steam piping (per foot)

Thickness (inches)	Surface Temp (°F)	Heat Loss (Btu/h)	Cost of Fuel ($/yr)	Installed Cost ($)	Payback (months)	Annual Return	CO2 Emissions (MT/yr)
0	349	3298	$73.06	$0.00	NA	NA	1.14
1	104	256	$5.67	$38.27	7	176%	0.09
1.5	93	169	$3.73	$44.61	8	155%	0.06
2	89	135	$2.98	$52.75	9	133%	0.05

8” steam piping (per foot)

Thickness (inches)	Surface Temp (°F)	Heat Loss (Btu/h)	Cost of Fuel ($/yr)	Installed Cost ($)	Payback (months)	Annual Return	CO2 Emissions (MT/yr)
0	349	2784	$61.67	$0.00	NA	NA	0.96
1	101	200	$4.43	$33.78	7	169%	0.07
1.5	92	144	$3.20	$38.79	8	151%	0.05
2	88	115	$2.55	$44.17	9	134%	0.04

6” steam piping (per foot)

Thickness (inches)	Surface Temp (°F)	Heat Loss (Btu/h)	Cost of Fuel ($/yr)	Installed Cost ($)	Payback (months)	Annual Return	CO2 Emissions (MT/yr)
0	349	2283	$50.58	$0.00	NA	NA	0.79
1	100	168	$3.73	$28.61	7	164%	0.06
1.5	92	120	$2.66	$33.13	8	145%	0.04
2	87	93	$2.06	$38.22	9	127%	0.03

4” steam piping (per foot)

Thickness (inches)	Surface Temp (°F)	Heat Loss (Btu/h)	Cost of Fuel ($/yr)	Installed Cost ($)	Payback (months)	Annual Return	CO2 Emissions (MT/yr)
0	349	1723	$38.16	$0.00	NA	NA	0.6
1	95	113	$2.51	$22.76	8	157%	0.04
1.5	88	84	$1.87	$26.55	9	137%	0.03
2	85	69	$1.53	$31.55	10	116%	0.02

3” steam piping (per foot)

Thickness (inches)	Surface Temp (°F)	Heat Loss (Btu/h)	Cost of Fuel ($/yr)	Installed Cost ($)	Payback (months)	Annual Return	CO2 Emissions (MT/yr)
0	349	1443	$31.96	$0.00	NA	NA	0.5
1	93	95	$2.11	$21.42	9	139%	0.03
1.5	87	70	$1.55	$25.04	10	121%	0.02
2	84	58	$1.28	$28.87	11	106%	0.02

2” steam piping (per foot)

Thickness (inches)	Surface Temp (°F)	Heat Loss (Btu/h)	Cost of Fuel ($/yr)	Installed Cost ($)	Payback (months)	Annual Return	CO2 Emissions (MT/yr)
0	349	1107	$24.53	$0.00	NA	NA	0.38
1	90	70	$1.55	$19.47	10	118%	0.02
1.5	85	53	$1.17	$22.49	12	104%	0.02

1 ½” boiler feed (per foot)

Thickness (inches)	Surface Temp (°F)	Heat Loss (Btu/h)	Cost of Fuel ($/yr)	Installed Cost ($)	Payback (months)	Annual Return	CO2 Emissions (MT/yr)
0	200	404	$8.96	$0.00	NA	NA	0.14
1	81	23	$0.52	$16.75	24	50%	0.01
1.5	79	18	$0.40	$19.55	27	44%	0.01

1 ¼” boiler feed (per foot)

Thickness (inches)	Surface Temp (°F)	Heat Loss (Btu/h)	Cost of Fuel ($/yr)	Installed Cost ($)	Payback (months)	Annual Return	CO2 Emissions (MT/yr)
0	200	372	$8.23	$0.00	NA	NA	0.13
1	81	23	$0.51	$16.13	25	48%	0.01
1.5	78	16	$0.35	$19.43	30	41%	0.01