How reusable insulation saves energy, cuts emissions and spells sustainability

APPA 2018 Annual Conference & Exhibition

August 4, 2018

1

Today's Agenda

PART I

- *What to know about insulation*
- *Understand fundamentals of energy surveys & how to conduct*
- *Spot energy-saving opportunities in your system*
- *7 questions to ask when buying*

PART II

- *Case Study: University of Maryland Medical Center*
- *What we learned at UMMC*

PART III

- *Tools of the trade*
- *How to work with an ESCO to secure credits*
- *Tactics for recouping energy from problematic heat-loss areas*

2

What to know about insulation

- Engineered insulation ***saves billions of Btu/h***
- ***Money spent*** on engineered blankets can be ***recovered***
- ***Engineered blankets eliminate repetitive material & labor costs – a green solution!***
- High-performance, ***reusable insulation lasts decades***
- ***Virtually any component can be insulated effectively*** with the right tools . . .

3

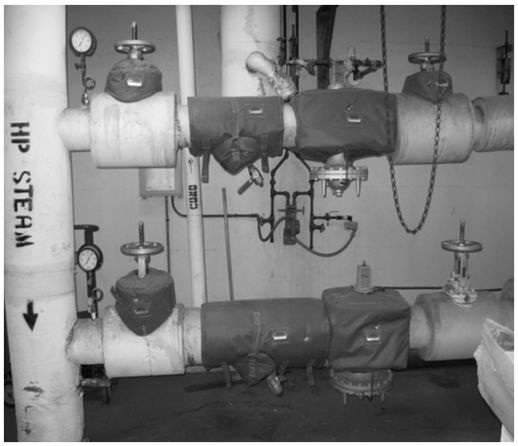
What you need to know about insulation

Worst Practices

What you need to know about insulation

Before

After



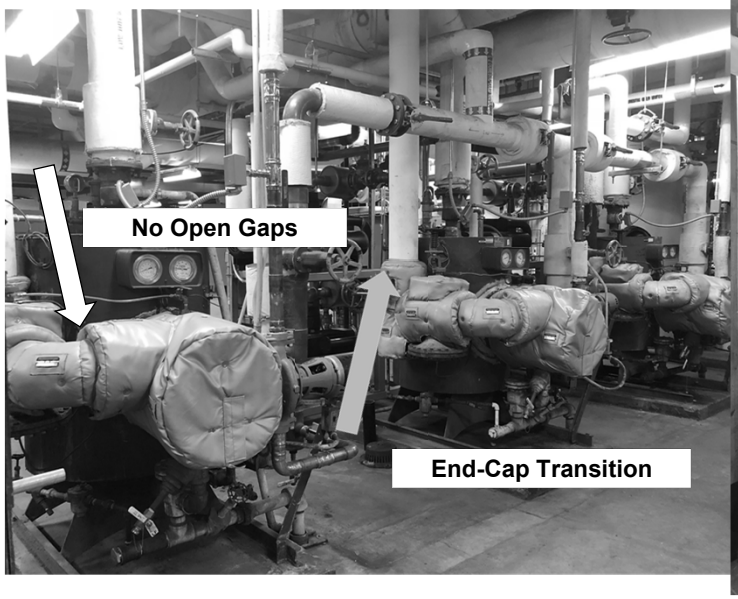
5

8” 150# Gate Valve
8” 150# Strainer

Before

After

Best Practices



What to **look out** for . . .

- ***Poor* craftsmanship**
- ***Lack of standards***
- **Components *not* insulated**
- ***Not truly reusable***

8

7 questions to ask when buying insulation

- **Is it reusable?**
- **Does it have CSI 3-Part Performance Specifications?**
- **Is it designed and produced via CAD & CNC?**
- **Are there embossed, metal ID tags for quick, accurate install?**
- **Is the fit guaranteed with a warranty?**
- **Can it handle a temp. range from 45 F to 2,000 F?**
- **Does it meet OSHA & DOE thermal standards?**

9

Today's Agenda

PART II

- *Case Study: University of Maryland Medical Center*
- *Lessons learned at UMMC*

10

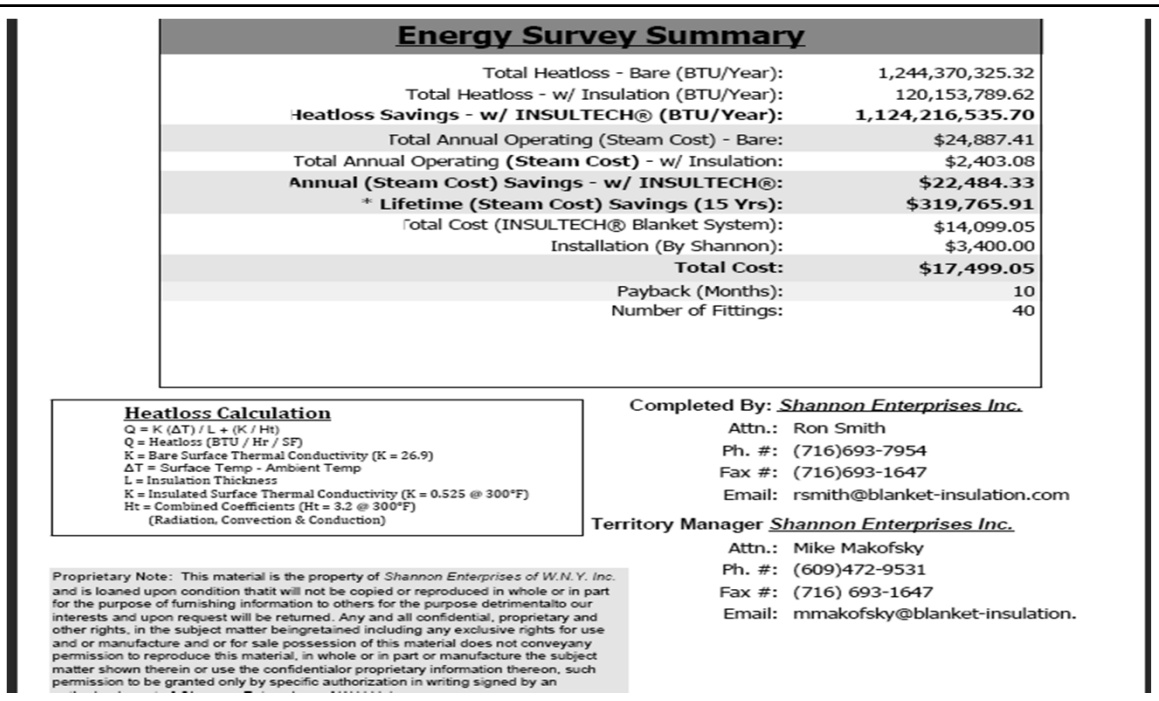
Case Study: Univ. of Maryland Medical Center

BACKGROUND:

- 4 central plants deliver steam to 2.1-million-sq.-ft. teaching hospital, includes 294,000-sq.-ft. Gudelsky Building & R. Adams Cowley Shock Trauma Center.
- HVAC system: 56 air handling units, 14 chillers, 13 cooling towers, 3 ice storage tanks & district steam (provided by Veolia North America) for heating.
- Also use district steam for hot water & sterilization.

SITUATION:

- Thought of insulation as “set it, forget it.”
- Learned about reusable insulation as green solution.
- Agreed to free energy survey of campus; showed reusable insulation reducing annual steam costs by 80 %, decreasing ambient room temp by 25° F.



Energy Survey Summary

Total Heatloss - Bare (BTU/Year):	1,244,370,325.32
Total Heatloss - w/ Insulation (BTU/Year):	120,153,789.62
Heatloss Savings - w/ INSULTECH® (BTU/Year):	**1,124,216,535.70**
Total Annual Operating (Steam Cost) - Bare:	$24,887.41
Total Annual Operating **(Steam Cost)** - w/ Insulation:	$2,403.08
Annual (Steam Cost) Savings - w/ INSULTECH®:	**$22,484.33**
* **Lifetime (Steam Cost) Savings (15 Yrs):**	**$319,765.91**
Total Cost (INSULTECH® Blanket System):	$14,099.05
Installation (By Shannon):	$3,400.00
Total Cost:	**$17,499.05**
Payback (Months):	10
Number of Fittings:	40

Heatloss Calculation

Q = K (ΔT) / L + (K / Ht)
Q = Heatloss (BTU / Hr / SF)
K = Bare Surface Thermal Conductivity (K = 26.9)
ΔT = Surface Temp - Ambient Temp
L = Insulation Thickness
K = Insulated Surface Thermal Conductivity (K = 0.525 @ 300°F)
Ht = Combined Coefficients (Ht = 3.2 @ 300°F)
(Radiation, Convection & Conduction)

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12

Energy Survey Summary

Total Heatloss - Bare (BTU/Year):	821,973,155.52
Total Heatloss - w/ Insulation (BTU/Year):	81,090,396.25
Heatloss Savings - w/ INSULTECH® (BTU/Year):	**740,882,759.27**
Total Annual Operating (Steam Cost) - Bare:	$16,439.46
Total Annual Operating **(Steam Cost)** - w/ Insulation:	$1,621.81
Annual (Steam Cost) Savings - w/ INSULTECH®:	**$14,817.66**
* **Lifetime (Steam Cost) Savings (15 Yrs):**	**$207,002.28**
Total Cost (INSULTECH® Blanket System):	$11,962.55
Installation (By Shannon):	$3,300.00
Total Cost:	**$15,262.55**
Payback (Months):	12
Number of Fittings:	35

Heatloss Calculation

Q = K (ΔT) / L + (K / Ht)
Q = Heatloss (BTU / Hr / SF)
K = Bare Surface Thermal Conductivity (K = 26.9)
ΔT = Surface Temp - Ambient Temp
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13

Case Study: Univ. of Maryland Medical Center

SOLUTION:

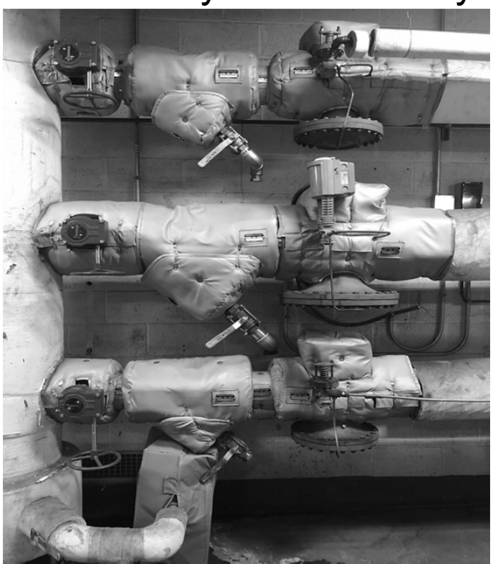
- Three-phase project. 2017 thru Q1 2018. Installed custom-fit, reusable insulation blankets made w/ PTFE Nomex® fiber & polypropylene side-release buckles.
- Phase 1: 100 components, including chilled water pumps; 3- day project.
- Phase 2: Insulated semi-instantaneous indirect water heaters and pumps.
- Phase 3: Veolia bought custom-fit reusable insulation to cover mechanical room components which had non-reusable insulation or no insulation.

Case Study: Univ. of Maryland Medical Center

RESULTS:

- Dollars recouped from insulation go to insulating more components.
- Expect **$436,000 in saved steam costs** for 100 components insulated.
- Expect heat-loss savings of 1.5 billion BTU/year.
- **Emissions savings** from reusable blankets will exceed **152 lbs. of NO_x and over 50 tons of CO_2 per year.**
- **Payback period for phases 1 & 2 = ≈ 10 mos.**
- Improved safety; ambient temp in steam stations now 80° F.
- Surface temp of blankets covering steam components safe to touch.

Case Study: Univ. of Maryland Medical Center



UMMC's steam pressure reducing station in the North Hospital sub-basement mechanical room.

*"**Once** we were **really educated** about the construction of reusable blankets, the savings and safety, **we were sold**."*

Richie Stever

Director of Operations & Maintenance

UMMC

16

Today's Agenda

PART III

- *Tools of the trade*
- *How to work with an ESCO to secure credits*
- *Tactics for recouping energy from problematic heat-loss areas*

17

Energy Survey Services with Infrared Measurements (Get and use an I-R Gun)

Before

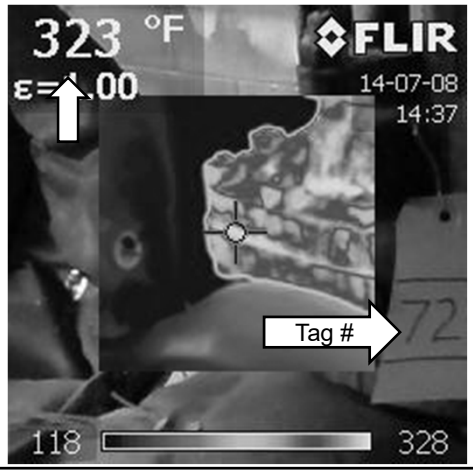
After

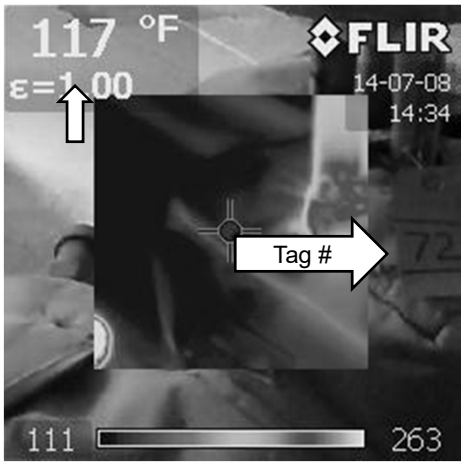
18

M&V (measurement & verification) Reporting Proves Savings

Hold vendor responsible for estimates

***Thermography* validates Performance**





19

How to work with an ESCO to secure credits

STEPS to take:

- ❑ Explore the Database of State Incentives for Renewables & Efficiency (DSIRE) is a comprehensive U.S. source on incentives for energy efficiency
  - o Visit http://www.dsireusa.org/
- ❑ Ask ESCO and/or Utility Companies to secure incentives for Therms reduction
  - o Therms are how utilities gauge incentive %
- ❑ Contact Utility Company to see if they offer financial incentives to share cost of surveys & steam system upgrades.
  - o In N.Y., National Grid offers up to $10,000 to cover 50% of the cost of a pre-approved engineering study.
- ❑ Read about Office of Energy Efficiency & Renewable Energy's (part of U.S. DoE) FEMP Energy Incentive Program; it's a place for energy-efficiency project funding.
  - o https://energy.gov/eere/office-energy-efficiency-renewable-energy

20

Post M&V reports <u>must</u> include:

Fitting, Tag#, Thermographic & Digital Photo

Note >200 degree temperature drop

21

Thank you, questions & contacts

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22