Southern NH Medical Center

2015 Energy and Process Improvement Projects

People / Quality / Growth / Service / Finance

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SNHMC Engineering Department


waiting
over-production
over-processing
8
LEAN
WASTES
defects
non-used talent
transport
motion
stock

Energy as the Ninth Waste

According to the EPA, there are three reasons for integrating Lean and Energy efficiency efforts (EPA 2007b):

Cost Savings:

Reducing energy costs has a significant impact on business performance. @ SNHHS one energy dollar saved = $40 income!

Climate Change and Environmental Risk:

Proactively addressing the environmental and climate impacts of energy use is increasingly important to industry and society. Failure to do so is a potential business risk.

Competitive Advantage:

Lowering recurring operating costs, improving staff morale, and responding to customer expectations for environmental performance and energy efficiency increases your competitive advantage.

Benefits to SNHHS

- $215,010 income via rebates
- $144,000+ Annual Savings
- Net Payback 2.81 years
- 5 yr. IRR = 48%, 10 yr. IRR = 61%
- 0.15 FTE Recovery Annually
- Increased Plant Reliability

Four of American College of Healthcare Executives (ACHE) Top 10 Issues Addressed

- Financial Challenges
- Patient Safety & Quality
- Patient Satisfaction
- Personnel Shortages

SNHMC Proposal

Five Measures applied for, in two categories:

- Deferred Maintenance:
  1. Chiller #1 Replacement
  2. Boiler Feed Pump Replacement
- Efficiency Improvements
  3. Cooling Tower Water Energy/Water Efficiency and Chemical Treatment System
  4. Outdoor Lighting
  5. Atrium Lighting

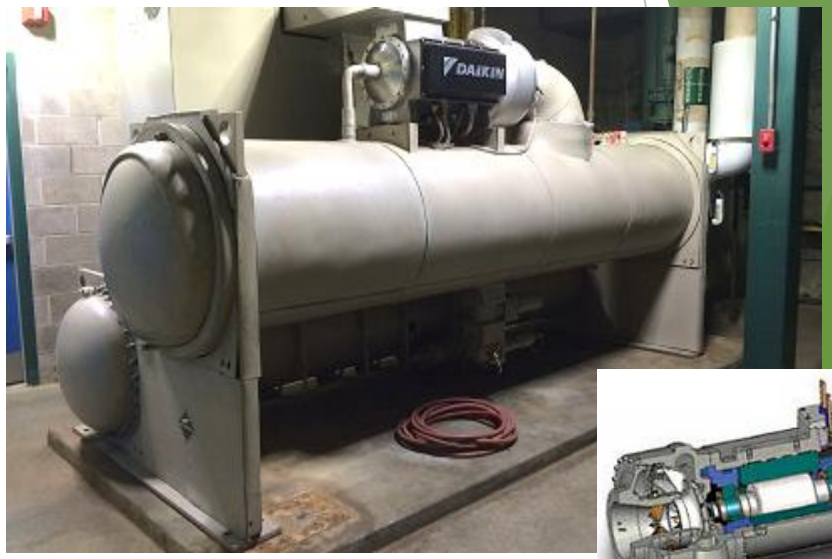
Facility Condition Index (FCI)

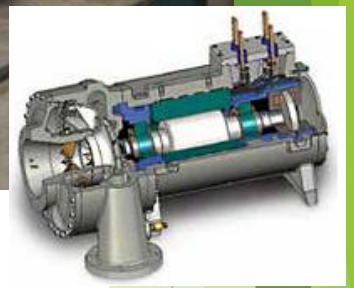
$$\frac{\text{Cost to Renovate}}{\text{Cost to Replace}} = \text{FCI}$$

Chiller #1 Replacement

Facility Condition Index = 0.6







- $180,000 to Rebuild / Upgrade
- $70K in 2014 to Repair
  - 1,300 lbs. Refrigerant Lost
  - Obsolete Refrigerant
- 23 Years old
  - Useful Life = 20 Years
- Dated Technology

$300,000 Installed Cost
Magnetic levitation (no oil)
50% Lower annual maintenance
50% Energy Reduction
$55,500 Annual Savings

Five Boiler Feed Pumps

Facility Condition Index = 0.36





- Obsolete Steam Turbine
  - $10K+ to rebuild
  - Caused multiple cold plant events
- Pumps Oversized by 30% to 130%
- No Automation
- 22 Years Old (20 Year Useful Life)
- 2014 repairs for one pump = $3,590

- 66% Energy Reduction
- Fully Automated
- True N+1 Redundancy
- Designed for Ease of Maintenance

Cooling Tower Water Efficiency

Annual Savings = $ 27,322





- Timed backflush wastes water
- Closed tank
  - Internal condition hidden
- Periodic valve dysfunction:
  - Continuous backflush,
  - Loss of filtration

- **Improved automation & serviceability**
- **Electrohydrodynamic effect improves:**
  - **Heat transfer in Chillers**
  - **Evaporation in Cooling Towers**

Annual Savings	
Energy 12%	$ 18,450
Water 20%	$ 8,872

Tower Water Chemical Treatment Upgrade





- Existing liquid chemical injection system
- Utilizes multiple pumps, exposed tubing, storage and handling of chemical containers
- Spill hazard

- **Replacement : Continuous Solids Dissolving System**
  - **Eliminates pumping, exposed tubing**
  - **Solid chemicals are enclosed in sealed vessels**
  - **No handling or storage of liquid chemical drums**

Atrium Lighting

Annual Savings = $ 7,342





Annual Costs	
Energy	$ 4,868.81
Bulbs	$ 603.45
Lift	$ 800.00
Labor	$ 2,880 .00
Total:	$9,152.26

Annual Costs	
Energy	$ 1,810.17
Bulbs	$ 0.00
Lift	$ 0.00
Labor	$ 0.00
Total:	$ 1,810.17

Outdoor Lighting

Annual Savings = $ 38,777





Actual Cost = $150,258
Approved Rebate = $42,268
Actual Rebate = $ 47,217
Net Cost = ~~$107,990~~ $103,041

Annual Costs	
Energy	$ 33,791.00
Bulbs	$ 4,139.00
Lift	$ 2,500.00
Labor	$ 9,000.00
Total:	$ 49,430.00

Annual Costs	
Energy	$ 10,653.00
Bulbs	$ 0.00
Lift	$ 0.00
Labor	$ 0.00
Total:	$ 10,653.00

Project Approved

Energy Conservation Measures (ECMs)		Gross Cost	Utility Incentive	Net Cost	Cost Savings	Net Payback (years)
#	Description					
1	Lead Chiller Replacement	$ 299,900	$ 110,963	$188,937	$ 55,459	3.4
2	Water Treatment & Filtering	$ 98,920	$ 36,600	$ 62,320	$ 27,322	2.3
3	Boiler Pumps	$ 50,200	$ 18,574	$ 31,626	$ 16,624	1.9
4	Atrium Lighting	$ 4,474	$ 1,655	$ 2,818	$ 1,710	1.6
All	**Totals**	**$ 453,494**	**$ 167,793**	**$285,701**	**$ 101,114**	**2.8**

Rebates approved & signed June 21, 2015

Including all proposed measures.

Final operational inspection done before December 15, 2015

Outdoor Lighting:

Submitted for custom rebate

Total rebate offered: **$ 47,217.71** (payment received!)

Cost of all measures	$ 620,852
Rebates approved	**$ 215,010**
Net cost of all measures	$ 405,842
Anticipated Annual Savings	**$ 144,174**
Net Payback	**2.81 years**

Southern New Hampshire Health System

Process Improvement Summary

A3

SNHHS Pillar(s) Supported:

☑ *People* ☑ *Quality* ☑ *Service* ☑ *Growth* ☑ *Finance*

Goal Statement

Leverage utility company rebate programs to reduce the cost of major capital improvements that will improve plant efficiency and reliability.

Rationale / Previous Condition



Steps Implemented (I), Work in Progress (W), or Pending (P)

- ☑ Identify / Research Projects (I)
- ☑ Evaluate Cost / Benefits (I)
- ☑ Propose to Eversource (I)
- ☑ Eversource Approval / Agreement (I)
- ☑ Purchase / Install Equipment (I)
- ☑ Eversource Inspection / Rebate (I)

Identified Forms of Waste with Projected Annual Savings

Unnecessary Motion:

Lamp changes: **$20,000** ***annually***

Defects:

Equipment breakdowns due to age, deferred maintenance: **$74,000** ***in 2014***

Energy:

Old technologies wasting energy as compared to efficiency of current equipment offerings: **$124,252** ***annually***.

Team Members

Michael Rose
Senior VP – Finance
Scott Cote,
VP Facilities & Emergency Preparedness;
Jenna Deshaies,
Safety Officer;
David Santuccio,
Facilities & Project Manager;
Melissa Deering,
Facilities Operations Manager;
Robert Cote,
Facilities Manager;
Stephen Barry,
Senior Electrician
Kenneth Gray,
Electrician
Scott Lever,
Mechanical & Utility Systems Manager

Current Condition



Outdoor Lighting
☑ Installation complete
☑ **$47,217.71** Rebate Received



Atrium Lighting
☑ Installation complete
☑ **$1,655** Rebate Received



Chiller
☑ Installation complete
☑ **$110,963** Rebate Received



Boiler Feed Pumps
☑ Installation complete
☑ **$18,574** Rebate Received



Tower Water Treatment
☑ Installation complete
☑ **$36,600** Rebate Received

Total Rebates Received: $214,409.71

Recommendations and Next Steps

❑ Applied for 2016 Rebate Program

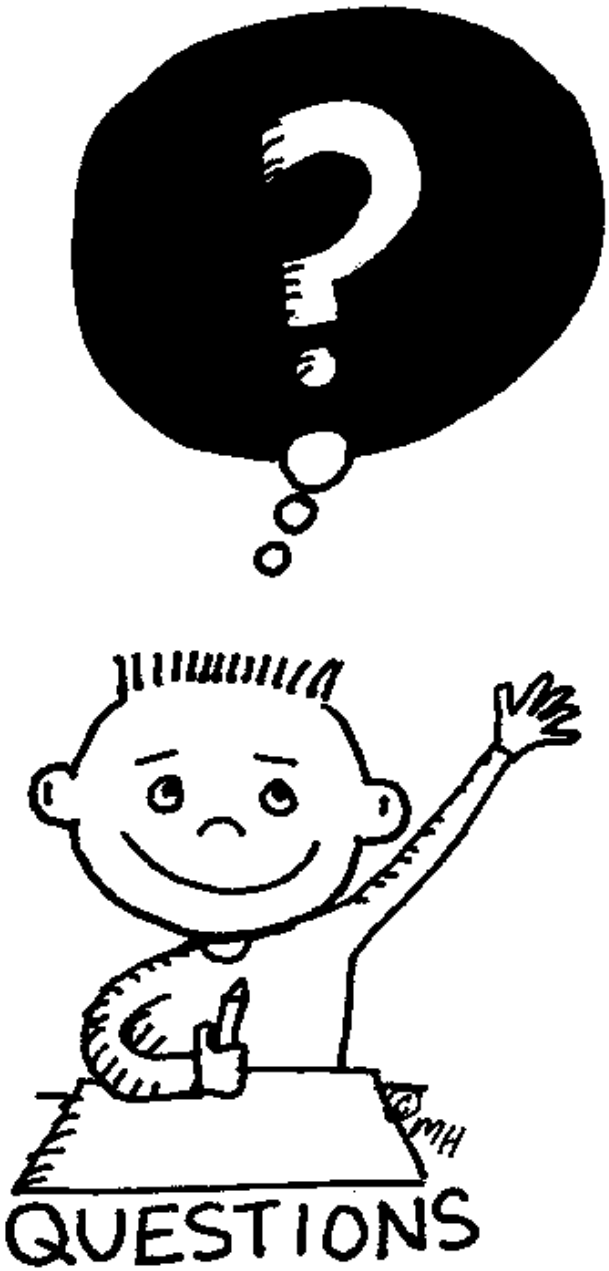
In accordance with NH RSA 151:13-A This Hospital Quality Improvement Document shall be confidential and privileged.

Credits

D. Wheatley. 2015. Comprehensive Energy Efficiency Project For Southern New Hampshire Health System (SNHHS). Arlington, Massachusetts: Energy & Fluids, Inc.

L. M. Freund, D. J. Bowen. 2015. Survey: Healthcare Finance, Reform - Top Issues Confronting Hospitals in 2014. Chicago, Illinois: American College of Healthcare Executives. https://www.ache.org/pubs/research/ceoissues.cfm

M. Sciortino, S. Watson, R. Presnar. 2009. The Importance of Energy Efficiency in Lean Manufacturing: Declaring Energy the Ninth Waste. ACEEE Summer Study on Energy Efficiency in Industry. Washington, D.C.: American Council for an Energy-Efficient Economy. http://aceee.org/files/proceedings/2009/data/papers/3_6.pdf


QUESTIONS