

Energy Reduction Opportunities at St. Luke's Hospital

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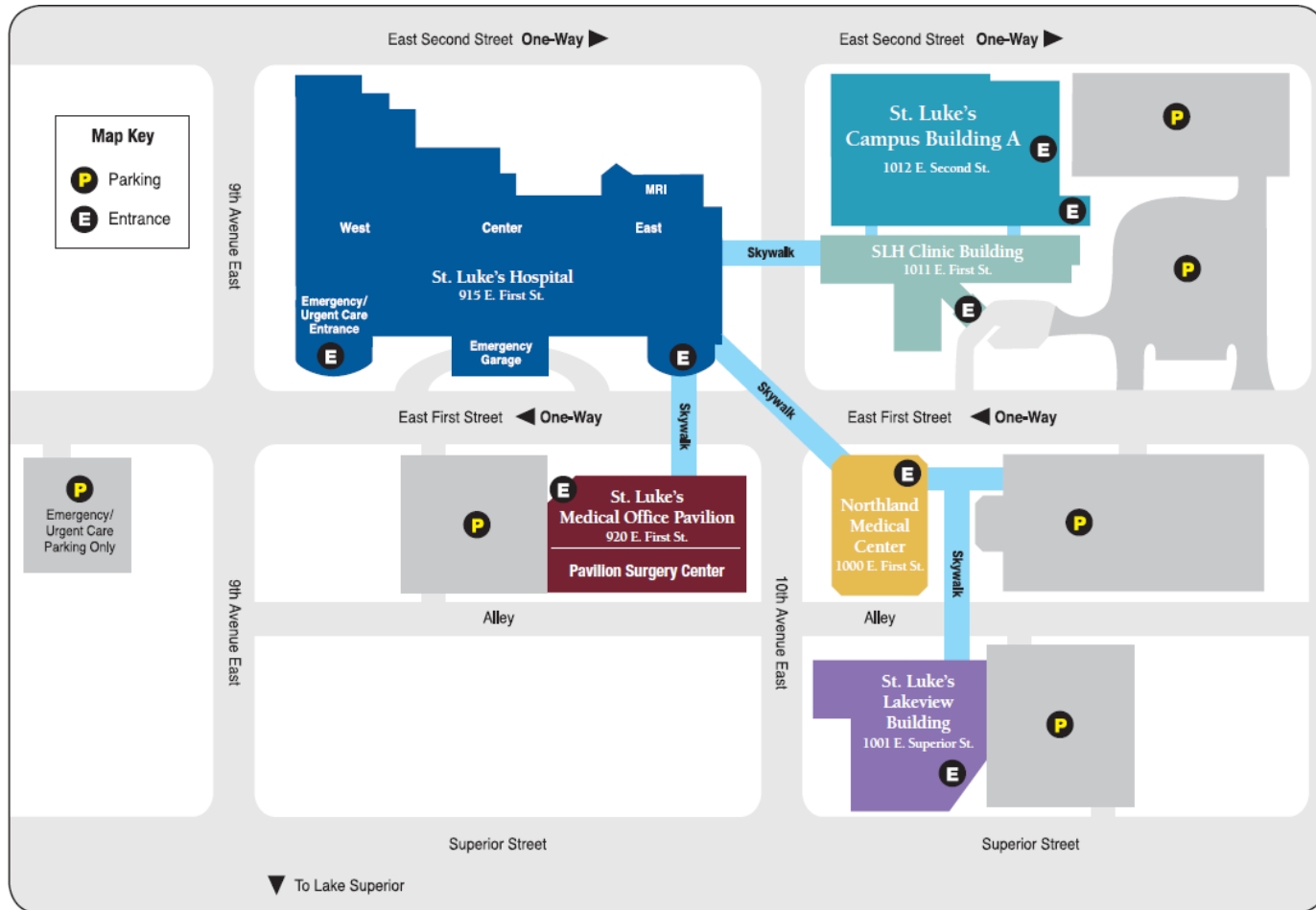
UNIVERSITY OF MINNESOTA

Company Overview

- Healthcare facility serving 500,000 residents
- 2,592 employees, 365 physicians
- Originally built in 1923
- Steam system
- Cooling tower and chiller system



Company Overview (con't)



Motivations for Change

- Rising energy costs
 - From 2010 to 2012
 - Electricity Consumption = 6.18% increase
 - Rate Increase of 4.85%
 - Steam Consumption = 4.96% decrease
 - Rate Increase of 26.48%
- MN Next Generation Act of 2007 and Conservation Improvement Program

Reasons for MnTAP Assistance

- Past MnTAP intern focus on waste reduction
- Lighting retrofit project
 - Exchanging T12 fixtures for T8 lamps and electronic ballasts
 - Exchanging Incandescent Lamps to CFL
- Steam trap leak testing
- Investigating new opportunities for energy savings
- Benchmarking
- Compartmentalizing energy consumption

Approach

- Understand processes and equipment
- High energy consuming processes



Finding Energy Opportunities

- Priorities
 - Lighting
 - Steam system and steam traps
- Data logging equipment
- Review case studies
- Surveying



Interior Lighting

- Currently, 21+ different light fixtures
 - T8, T12, CFL, PL CFL, and Incandescent fixtures.
 - Annual Electricity Cost = \$159,000



Interior Lighting (con't)

- Opportunities
 - T12 lamps, magnetic ballasts, and a few incandescent lamps have been discontinued
 - Inefficient and costly energy consumption
- Solutions
 - Audit, survey, prioritized retrofit project, efficient lighting fixture exchange, occupancy detectors.

T12 to T8 and I to CFL Retrofit Project

- Opportunities
 - Status, direction, more efficient available fixtures
- Solutions
 - Scheduled fixture exchanging by room or dept.

Retrofit	Power Savings (kW)	Energy Savings (kWh)	Annual Electric Savings	Annual Maintenance Savings	Rebate	Cost	Payback
T12 and T8 to F32T8 at 28W	147	582,085	\$39,277	\$12,835	\$29,476	\$95,897	1.27
T12 and T8 to F32T8 at 28W with OS	147	701,035	\$43,942	\$12,835	\$29,476	\$135,852	1.87
Incandescent and CFL to LED	45.64	120,983	\$9,838	- \$462	\$9,128	\$21,611	1.33
Incandescent and CFL to LED with OS	45.64	122,063	\$9,881	- \$462	\$9,128	\$25,047	1.69

Northland Parking Ramp Lights

- 54 150W HPS light fixtures
 - Annual Electricity Cost = \$4,800
- Opportunities
 - Inefficient technology
- Solutions
 - T8 vapor tight fixtures, LEDs

New Fixture	Power Savings (kW)	Energy Savings (kWh)	Annual Electric Savings	Annual Maintenance Savings	Rebate	Cost	Payback
F32T8 2 Lamp	7.02	61,495	\$3,293	\$3,682	\$1,404	\$9,115	1.11
LED	5.56	48,723	\$2,609	\$4,868	\$1,112	\$30,618	3.95

Steam Traps

- 151 steam traps
 - About 52 used in heating season or used for redundancy



Steam Traps (con't)

- Opportunities
 - No regular inspection
 - Blow through, rapid cycling, leaking, plugged/flooded
- Solutions
 - Ultrasonic audit, repair, replace.

Number of Failed Traps	Est. Steam Loss (per year)	Annual Cost
13	14,890,666	\$256,715

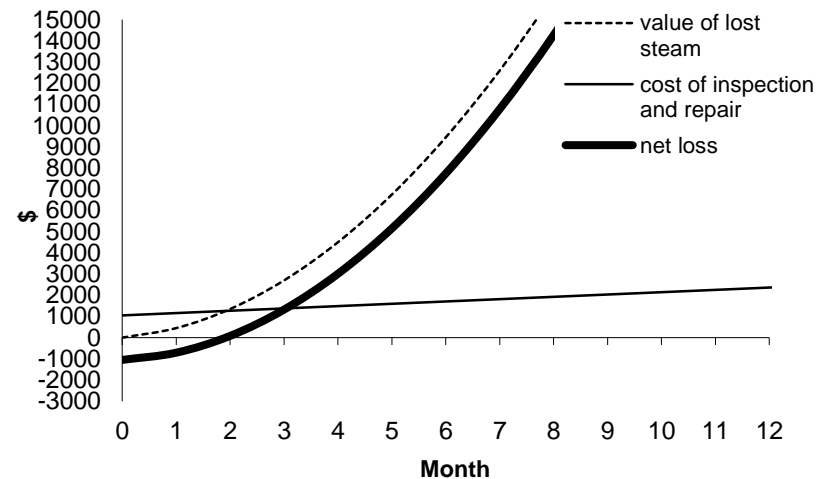
Steam Traps (con't)

Month	Cumulative Trap Failure ^a	Monthly Steam Loss Cost	Cumulative Steam Loss Cost	Monthly Inspection & Repair ^b Cost	Cumulative Cost of Not Repairing
0	0.00	-	-	\$1,050	- \$1,050
1	0.27	\$450	\$450	\$1,159	- \$710
2	0.55	\$900	\$1,349	\$1,269	\$81
3	0.82	\$1,349	\$2,699	\$1,378	\$1,321
4	1.09	\$1,799	\$4,498	\$1,487	\$3,011
5	1.37	\$2,249	\$6,747	\$1,597	\$5,150

^a linear 2.0% failure rate per year

^b based on estimated inspection time (30 hrs) and labor rate (\$35/hr)

^c \$200 per trap in materials; 2 hours labor per trap



Recommended Process Changes

Recommendation	Reduced Energy (per year)	Implementation Cost	Rebate	Utility Savings (per year)	Maintenance Savings (per year)	Payback
Retrofit All Incandescent and CFL Lamps with LED Lamps and Install OS	122,063 kWh	\$26,582	\$9,128	\$9,881	- \$505	1.69
Retrofit 48" T8 and T12 Fixtures to F32T8 28W Fixtures and Install OS	701,035 kWh	\$135,852	\$29,476	\$43,942	\$12,835	1.87
Retrofit Northland Parking Ramp HPS Fixtures to 2 T8 Lamp Vapor Tight Fixtures	61,495 kWh	\$9,115	\$1,404	\$3,293	\$3,682	1.11
Repair or Replace Failed Steam Traps	14,890,666 lbs of steam	\$5,200	None	\$256,715	None	0.20

Personal Benefits

- Practical understanding of systems
- Data analysis techniques
- Cost analysis understanding
- Dealing with unknowns
- Career exposure

Questions?

