Water Hungry:
A Water Conservation Study at Hennepin County Medical Center

Rachel Kosse
Snapshot

- 3 million square feet
- 6 campus buildings
- Over 6,000 full time equivalent employees
- 130,000 in-patient days
- 46 million gallons of water
Motivation

• Strives to be a leader in water and energy savings
• Looking for an expert in the sustainability field
• Ability to analyze resource use and ask questions
• 10% reduction in water use
Approach

• Documented water use by researching records
• Asked questions in meetings with experts in departments
• Quantified information by measuring flow rates and estimating usages and times
Estimating Usages

• Complicated to estimate sink water use in a hospital  
  • Hand washing protocols and requirements are high

• Estimated the amount of water used based on the amount of soap used  
  • After trying to base the estimate on the number of sinks and length of time spent washing hands  
  • Additional assumptions: 20 seconds and 1 pump of soap
Water Use Trends

Water Use (gallons) vs. Year

Year

1995
2000
2005
2010
2015

Water Use (gallons)

0
10,000,000
20,000,000
30,000,000
40,000,000
50,000,000
60,000,000
70,000,000
Water Use by Building

Year | Red | Purple | Orange | Green | Blue | Shapiro | Parking Ramp
---|---|---|---|---|---|---|---
2012 | 5,393,080 | 7,426,144 | 3,232,856 | 5,492,564 | 2,686,517 | 5,933,136 | 0
2013 | 5,393,080 | 7,426,144 | 3,232,856 | 5,492,564 | 2,686,517 | 5,933,136 | 0
2014 | 5,393,080 | 7,426,144 | 3,232,856 | 5,492,564 | 2,686,517 | 5,933,136 | 0
2015 | 5,393,080 | 7,426,144 | 3,232,856 | 5,492,564 | 2,686,517 | 5,933,136 | 0

Amount of Water (gal)

University of Minnesota
Benchmarking

Water Benchmarking by Square Foot

- Top 25
- HCMC 2015

Water Benchmarking by Patient Days

- Top 25
- HCMC 2015
- HCMC 2016 (Predicted)
Project Overview

1. Updating fixtures to efficient flow levels.
   • Sinks, showers, and toilets

2. Replace aging water intensive equipment
   • dishwashers, washers, sterilizers, and washing machines

3. Eliminating all unnecessary use of tap water to cool discharge water.

4. Reuse reject water from reverse osmosis systems
1. Domestic Fixture Savings

• **Sinks from 2.2 gpm to 1.0 gpm**
  • Currently 980,000 gallons saved (30%)
  • 2,300,000 gallons more potential savings
  • 12,000 therms in energy savings
  • $38,000 in savings with 0.20 year payback

• **Showers from 2.5 gpm to 1.5 gpm**
  • Currently 220,000 gallons saved (30%)
  • 520,000 more potential savings
  • 3,200 therms in energy savings
  • $9,000 in savings with 0.78 year payback
Domestic Fixture Savings (Continued)

• Toilets from 3.5 gpf to 1.6 gpf
  • Currently 240,000 gallons saved (25%)
  • 710,000 more potential savings
  • An additional **40,000** gallons if dual flush

• Retrofitting the toilets will cost $20,000
  • With current conservative estimates, the payback is long
  • 25 flushes per day would produce a 2 year payback
  • Recommended to investigate high use areas
  • Only updated toilets can be retrofitted
2. Equipment Replacements

• 3 washers are being replaced, 2 others
  • $32,000 and 2,130,000 gallons in savings with 5.06 year payback
  • 6,000 therms in energy savings

• 2 sterilizers plan to be replaced in 2017, 7 others
  • $53,800 and 2,840,000 gallons in savings with 6.69 year payback
  • 20,000 therms in energy savings

• 1 dishwasher
  • $16,500 and 720,000 gallons in savings with 7.77 year payback
  • 4,000 therms in energy savings

• Washing Machines
  • $7,000 and 530,000 gallons in savings with 0.43 year payback
  • 3,000 therms in energy savings
3. Discharge Water Tempering

• Cold water mixed with washer discharge water
  • Discharge needed to be cooled below 140°F

• Regulations now have maximum of 180°F
  • Over 1.5 million gallons of water saved among 4 washers
4. Reverse Osmosis Reject Water Reuse

- 510,000 gallons per year of reject water total
- Reject water reuse recommended
  - Floor cleaning – about 5,000 gallons per month
  - Irrigation – about 27,000 gallons monthly in summer months
  - Utilizing 35% or 180,000 gallons per year
## Summary Table

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<thead>
<tr>
<th>Title</th>
<th>Water Savings (gallons/yr)</th>
<th>Energy Savings (Therms)</th>
<th>Cost Reduction</th>
<th>Implementation Cost</th>
<th>Payback (yr)</th>
<th>Status</th>
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Takeaways

• Healthcare experience
• Develop water reducing techniques
• Communication among various departments
• Professionalism
Questions?

This project was supported in part by Metropolitan Council Environmental Services and Centerpoint Energy

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