

A dynamic splash of water with many droplets and bubbles, creating a sense of movement and freshness. The water is a clear, vibrant blue, and the background is white, making the splash stand out.

# Water Hungry:

## A Water Conservation Study at Hennepin County Medical Center

Rachel Kosse

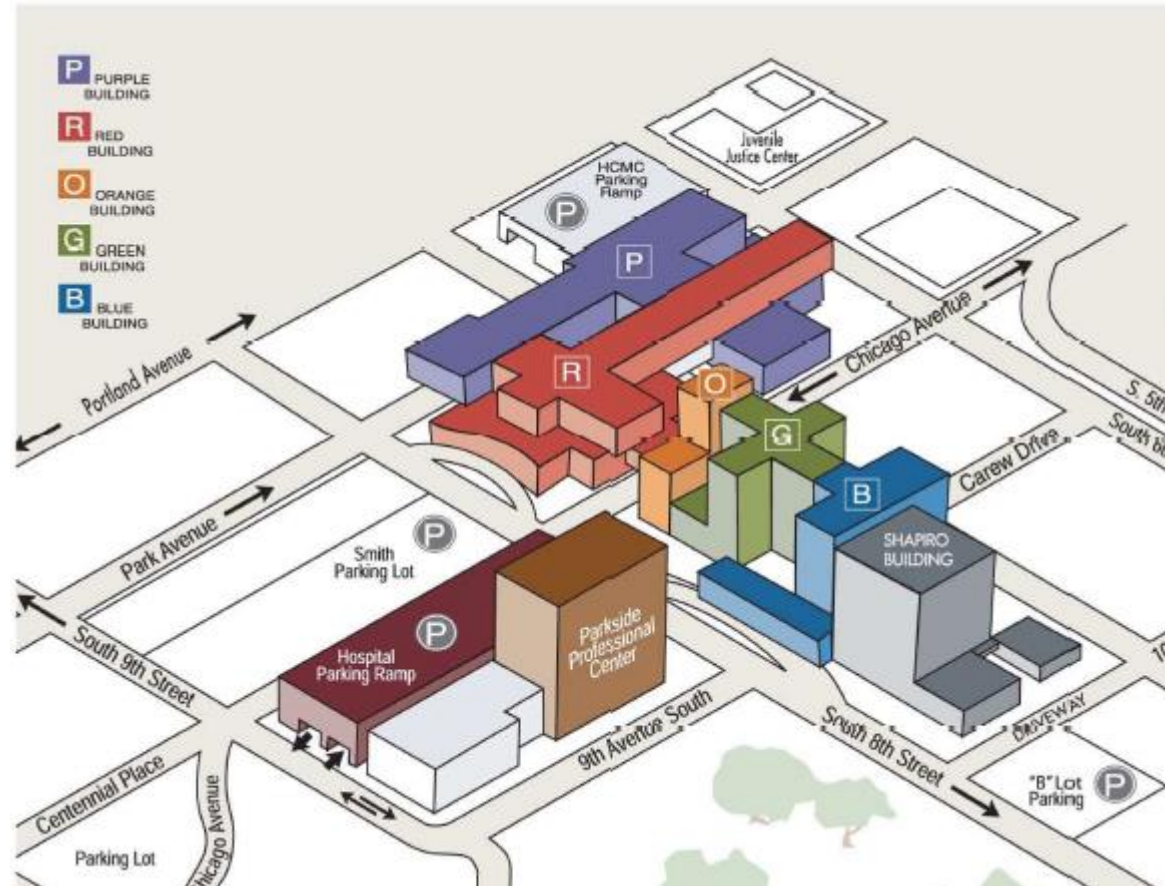


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# Snapshot

- 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

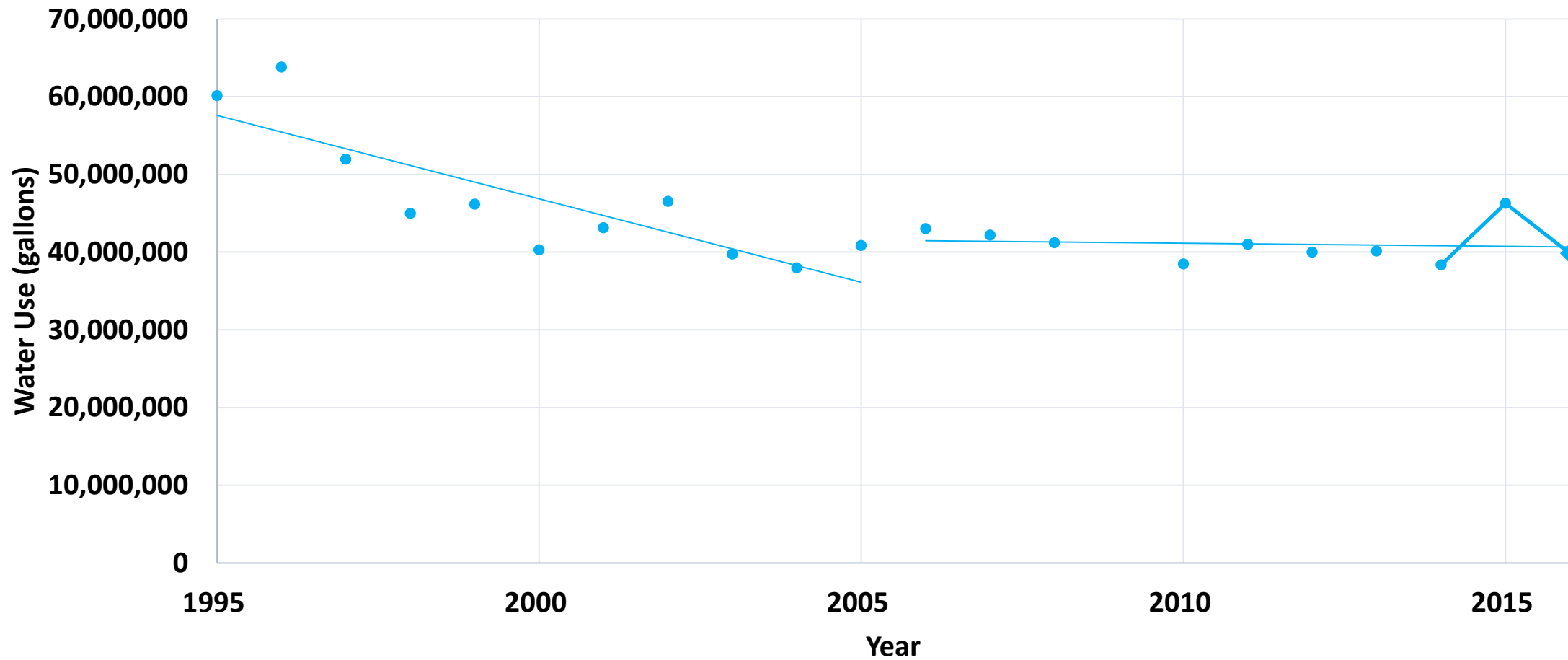


# Estimating Usages

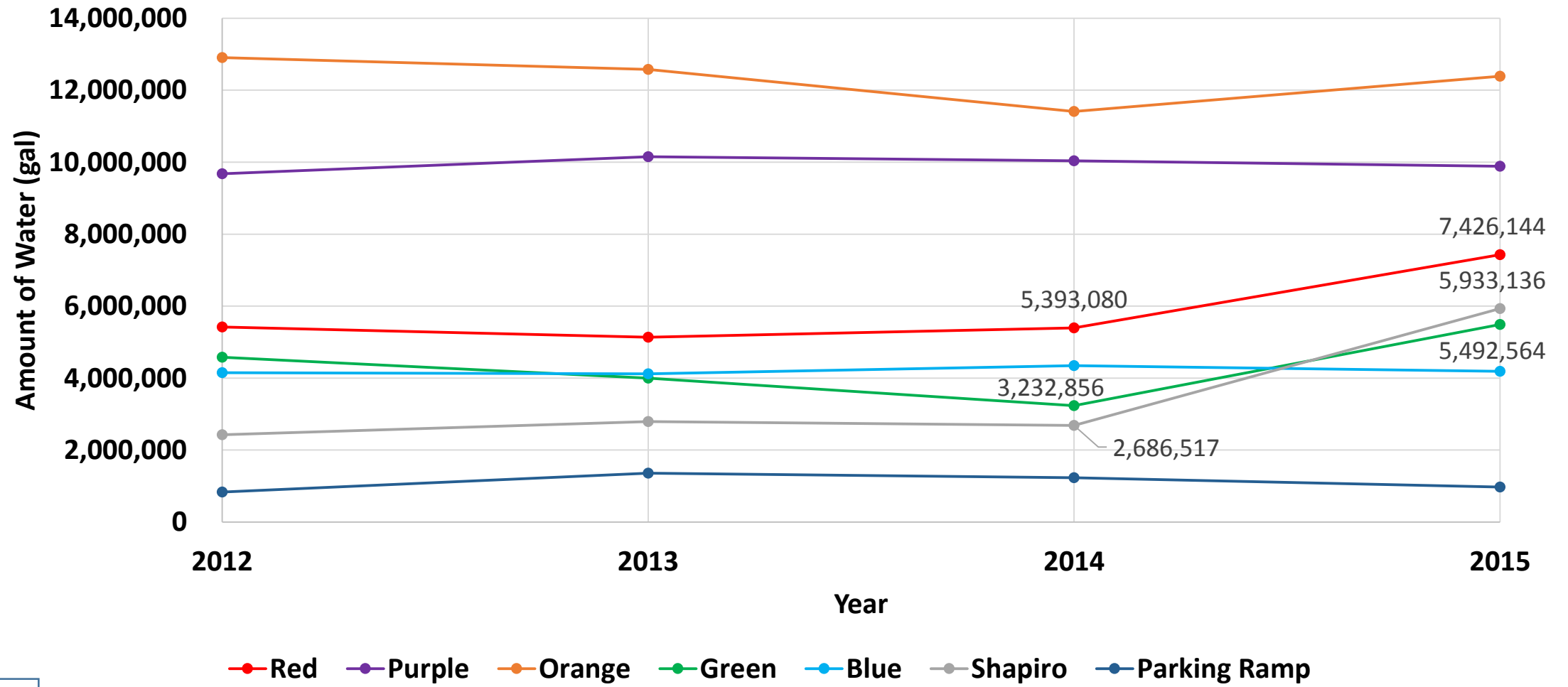
- **Complicated to estimate sink water use in a hospital**
  - Hand washing protocols and requirements are high
- **Estimated the amount of water used based on the amount of soap used**
  - After trying to base the estimate on the number of sinks and length of time spent washing hands
  - Additional assumptions: 20 seconds and 1 pump of soap



# Water Use Trends

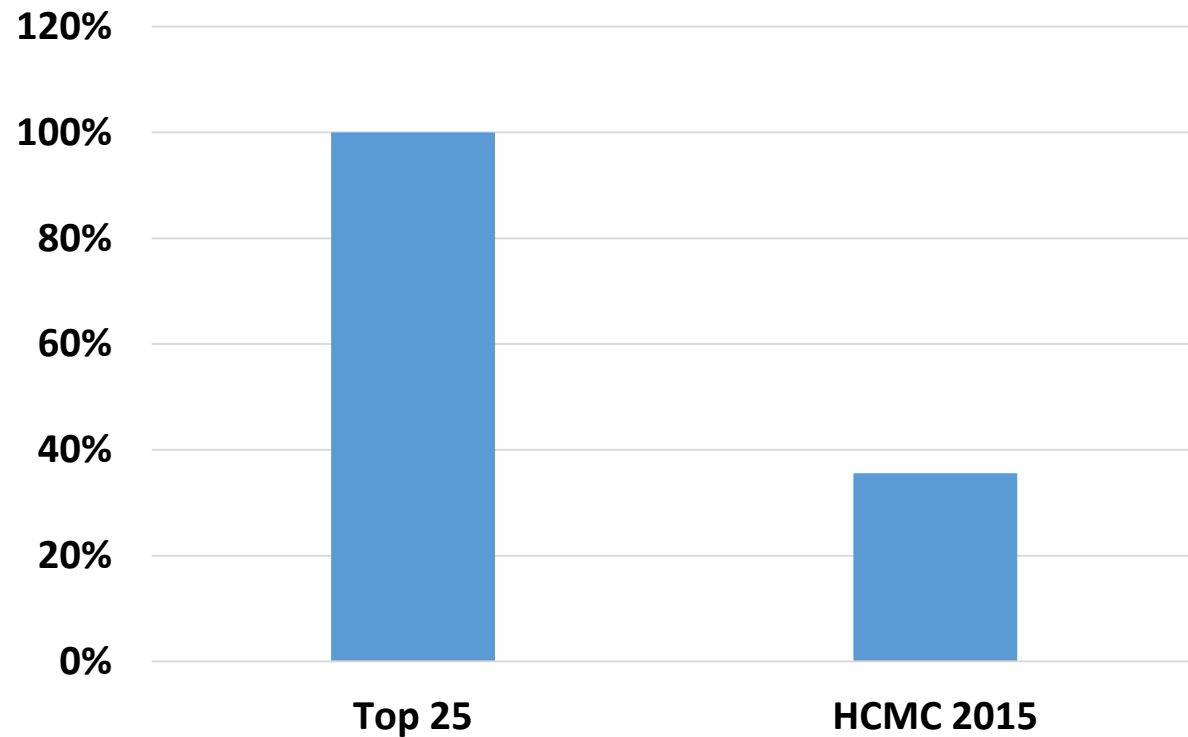


# Water Use by Building

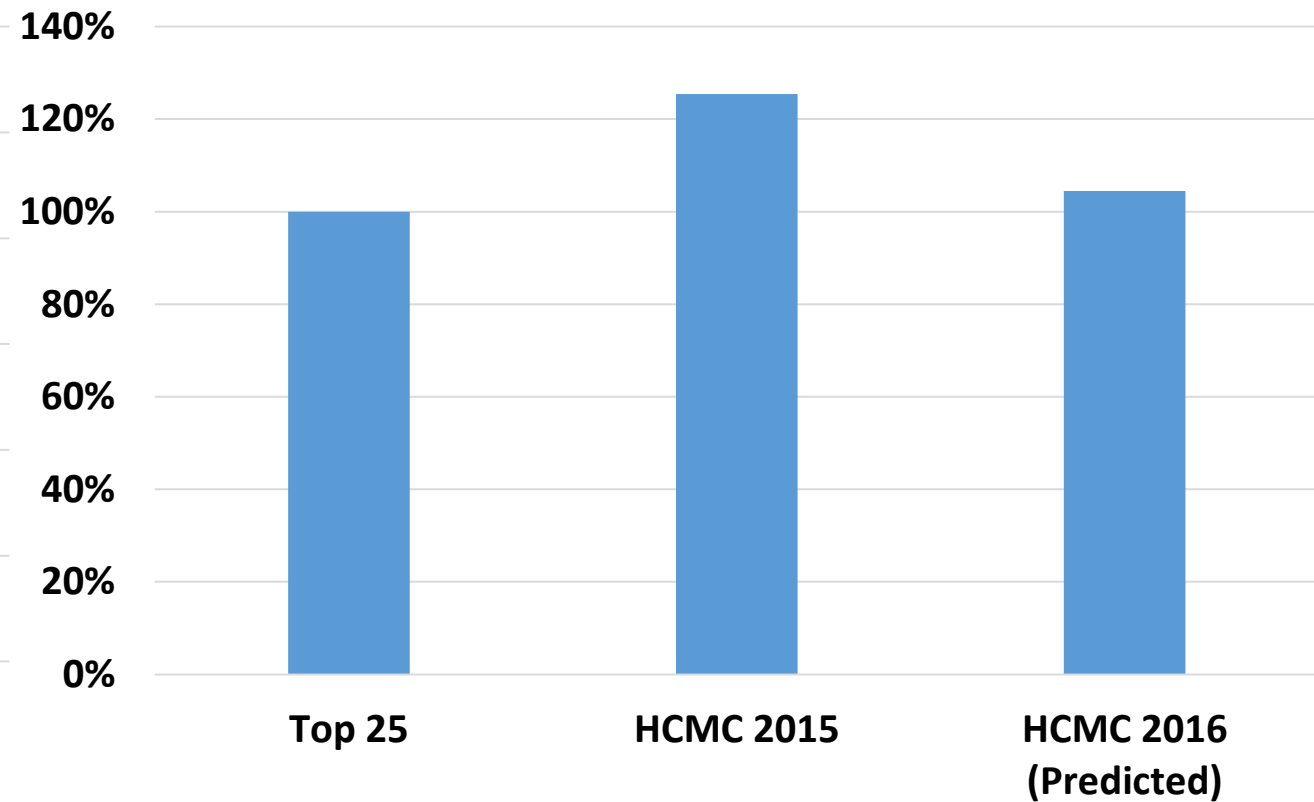


# Benchmarking

## Water Benchmarking by Square Foot



## Water Benchmarking by Patient Days



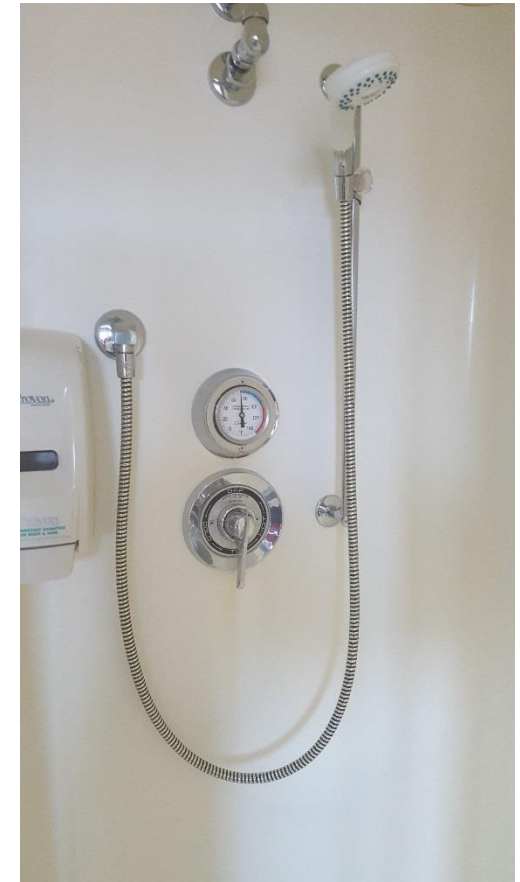


# Project Overview

- 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**

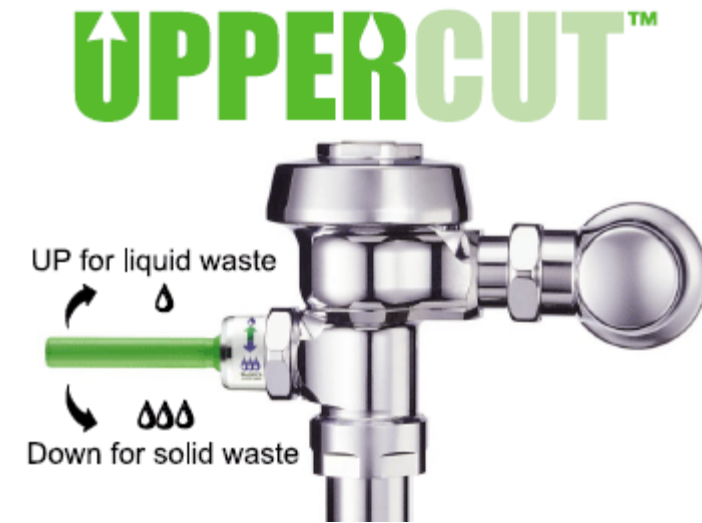
# 1. Domestic Fixture Savings

- **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

Title	Water Savings (gallons/yr)	Energy Savings (Therms)	Cost Reduction	Implementation Cost	Payback (yr)	Status
Domestic Fixture Updates						
Sink Aerator	3,300,000	12,000	\$38,000	\$7,500	0.20	Ongoing
Shower Heads	750,000	3,200	\$9,000	\$7,000	0.78	Ongoing
Toilet Replacement	1,100,000	N/A	\$10,000	TBD	TBD	Delayed
Toilet Retrofit	40,000	N/A	\$400	\$20,000	50	Delayed

Title	Water Savings (gal/yr)	Energy Savings (Therms)	Cost Reduction	Implementation Cost	Payback (yr)	Status
Equipment Replacements						
Washer	2,130,000	6,000	\$32,000	\$162,000	5.06	Implemented
Sterilizer	2,840,000	20,000	\$53,800	\$360,000	6.69	Requested
Dishwasher	720,000	4,000	\$16,500	\$130,000	7.77	Delayed
Washing Machines	530,000	3,000	\$7,000	\$3,000	0.43	Recommended
Discharge Water Tempering						
Water Tempering	1,500,000	N/A	\$14,000	N/A	Immediate	Implemented
Reverse Osmosis Reject Water Reuse						
RO Reuse	180,000	N/A	\$1,600	Unknown	Unknown	Investigate
<b>Total</b>	<b>13,020,000</b>	<b>48,200</b>	<b>\$182,600</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>



# 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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