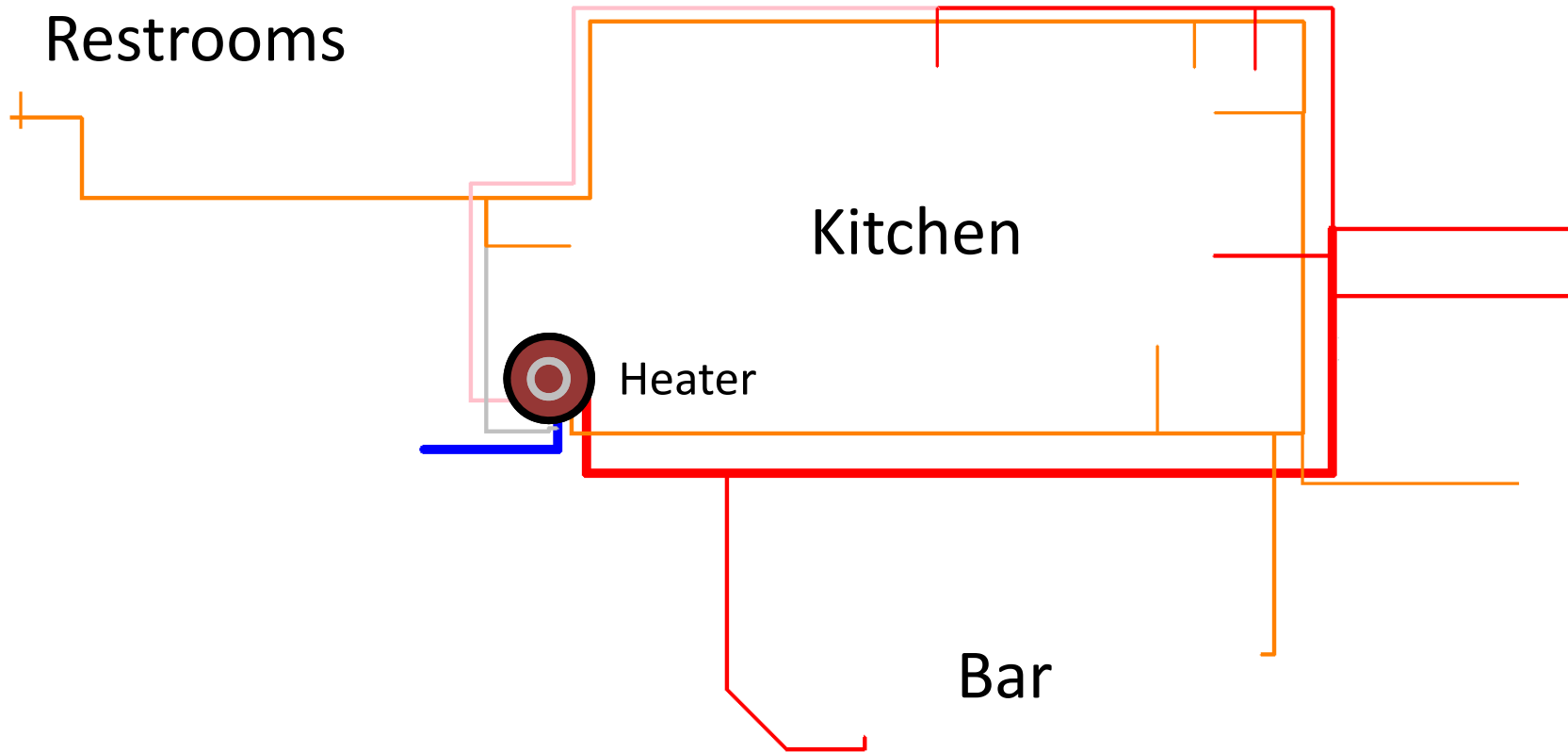


Updates From an In-Depth Hot Water System Replacement Project in a Full-Service Restaurant



Your online toolbox

- Reports
- Energy saving tips
- Design guides
- Cost calculators
- Energy Star
- Rebates



FOOD SERVICE TECHNOLOGY CENTER
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Food Service Technology Center

Promoting energy efficiency and performance in commercial food service since 1987.

FSTC News:

Redesigned Website Launches
More information and better organization for the ultimate online resource for commercial kitchen energy efficiency.

FSTC Partners with Conserve
The National Restaurant Association's Conserve program offers solutions for sustainability.

10 Ways to Save Natural Gas
These tips will save you money without compromising the comfort, performance or productivity of your kitchen.

Educational Seminars
Go green! Learn about energy efficiency, saving water, sustainability, lighting, and more!

Equipment Rebates
It pays to be efficient! Take advantage of cash incentives on energy saving equipment.

Green Your Restaurant

Being Green is about sustaining the environment and sustaining your bottom line. The FSTC is partnering with **NRA's Conserve** to introduce the industry's first comprehensive green recognition program. [» Learn More](#)

Events and Seminars

Latest Publications

Energy Efficiency for Foodservice with a 2010 Forecast f...
Jan 21st, 2010 - Downey, CA

Foodservice Refrigeration Chill-out
Jan 26th, 2010 - Tulare, CA

Food Service Refrigeration: Design and Operations, Tips ...
Jan 28th, 2010 - San Ramon, CA

[»more](#)

PG&E Foodservice Customers
Find local resources and third-party programs.

Energy Tips
From energy and water to refrigeration and lighting. No cost tips tool

Online Toolbox
Life-cycle cost calculators, rebate lists and design guides!

Codes and Standards
Find the latest regulations as they apply to the foodservice industry.

Video Corner

Richard Young explains why choosing energy-efficient appliances is a smart business decision. [» Watch More](#)



FSTC Affiliates

www.fishnick.com

SITE DESCRIPTION:

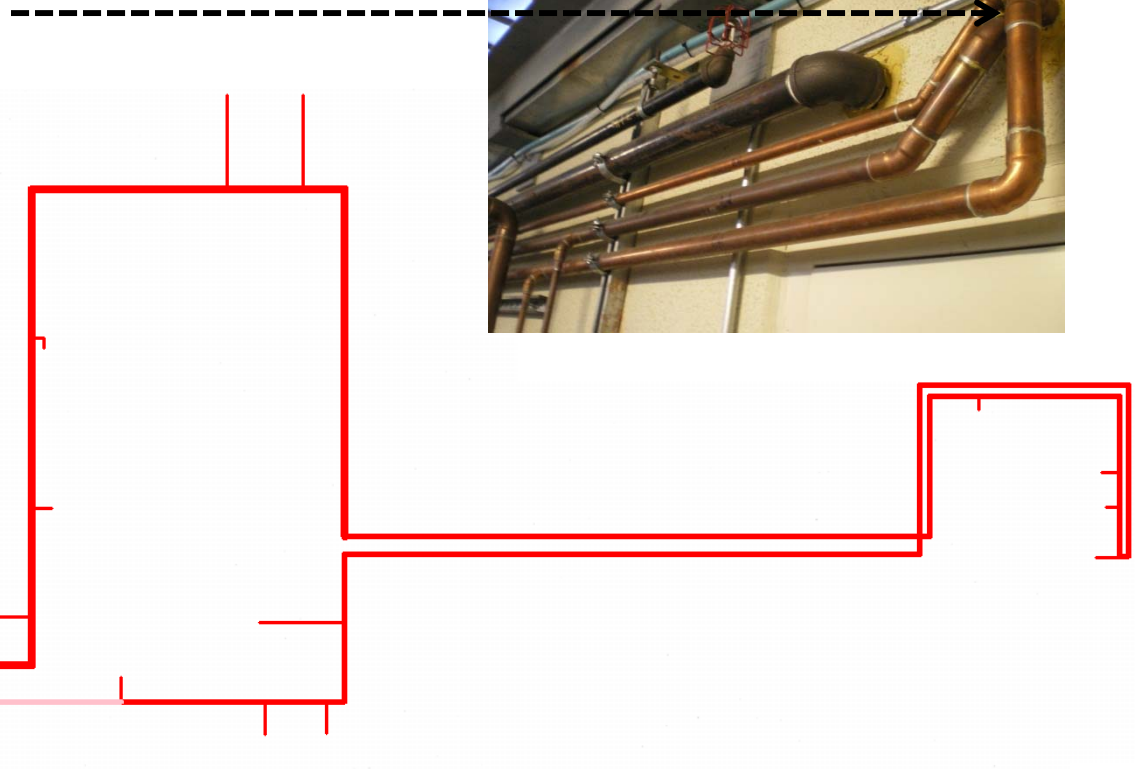
Full-Service Restaurant and Bar

- **PG&E Site:**
 - Medium sized FSR, built in 2011
 - Store size of 5,650 ft², including the patio
 - Open lunch and dinner (7 days/week)
- **Goals of Replacement Hot Water System Project:**
 - Monitor hot water heater and each point-of-use for energy and water consumption
 - Calculate heater efficiency, recirculation line heat loss, and overall system efficiency
 - Identify system deficiencies and analyze delivery performance
 - Upgrade system components and measure savings



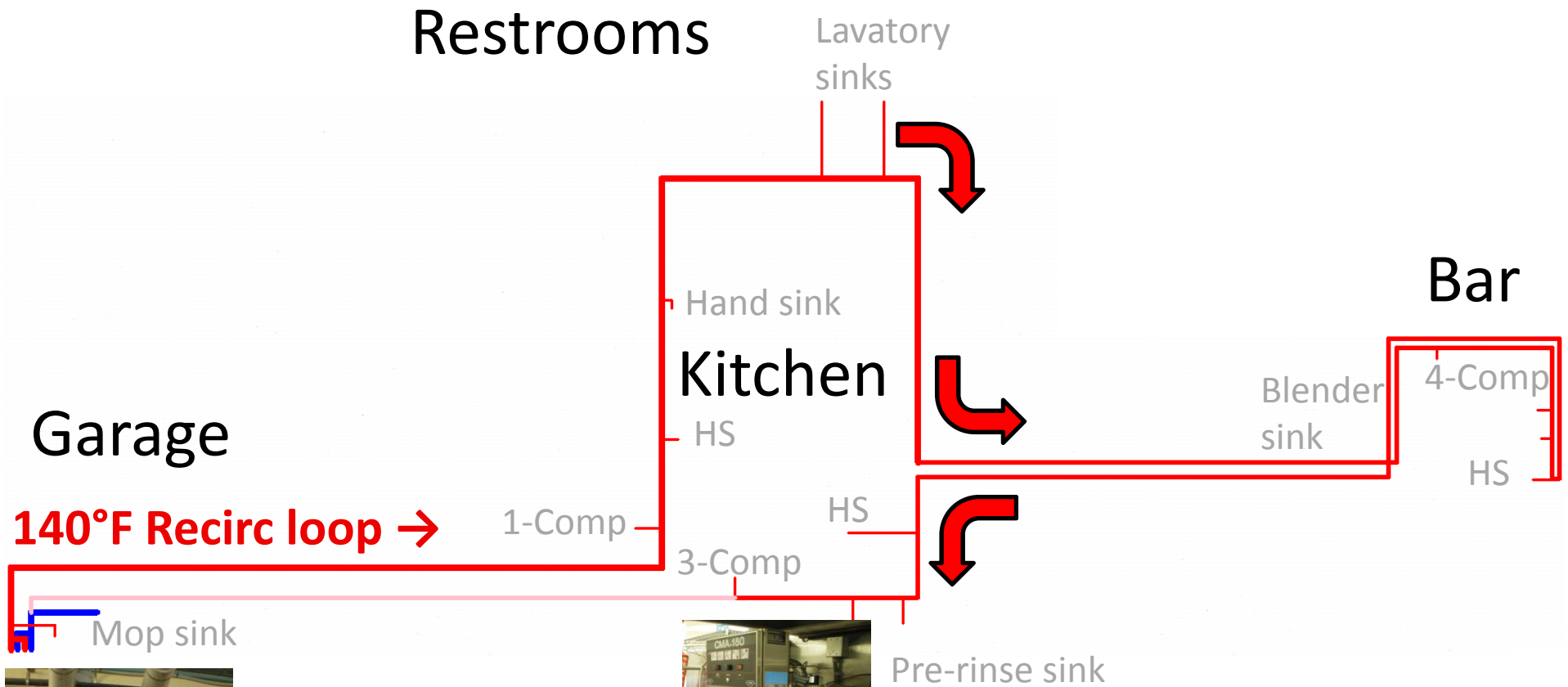
Recirculation System Heat Loss

- Cold, hot and return lines in very close proximity
- 360 ft. recirculation loop above false ceiling in kitchen and below slab to reach the bar

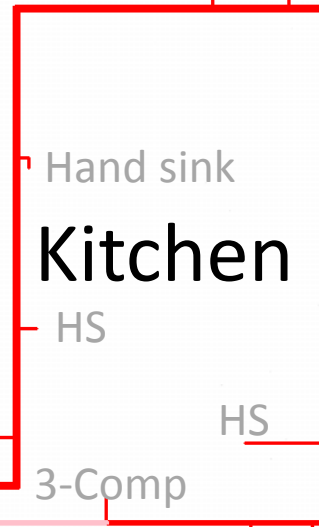


- Recirculation loop completely uninsulated
- 18 gallons of water in pipe

Baseline System (from plumbing drawings)



Baseline System (as installed)



Blender
sink

4-Comp

HS

135°F Heater out →

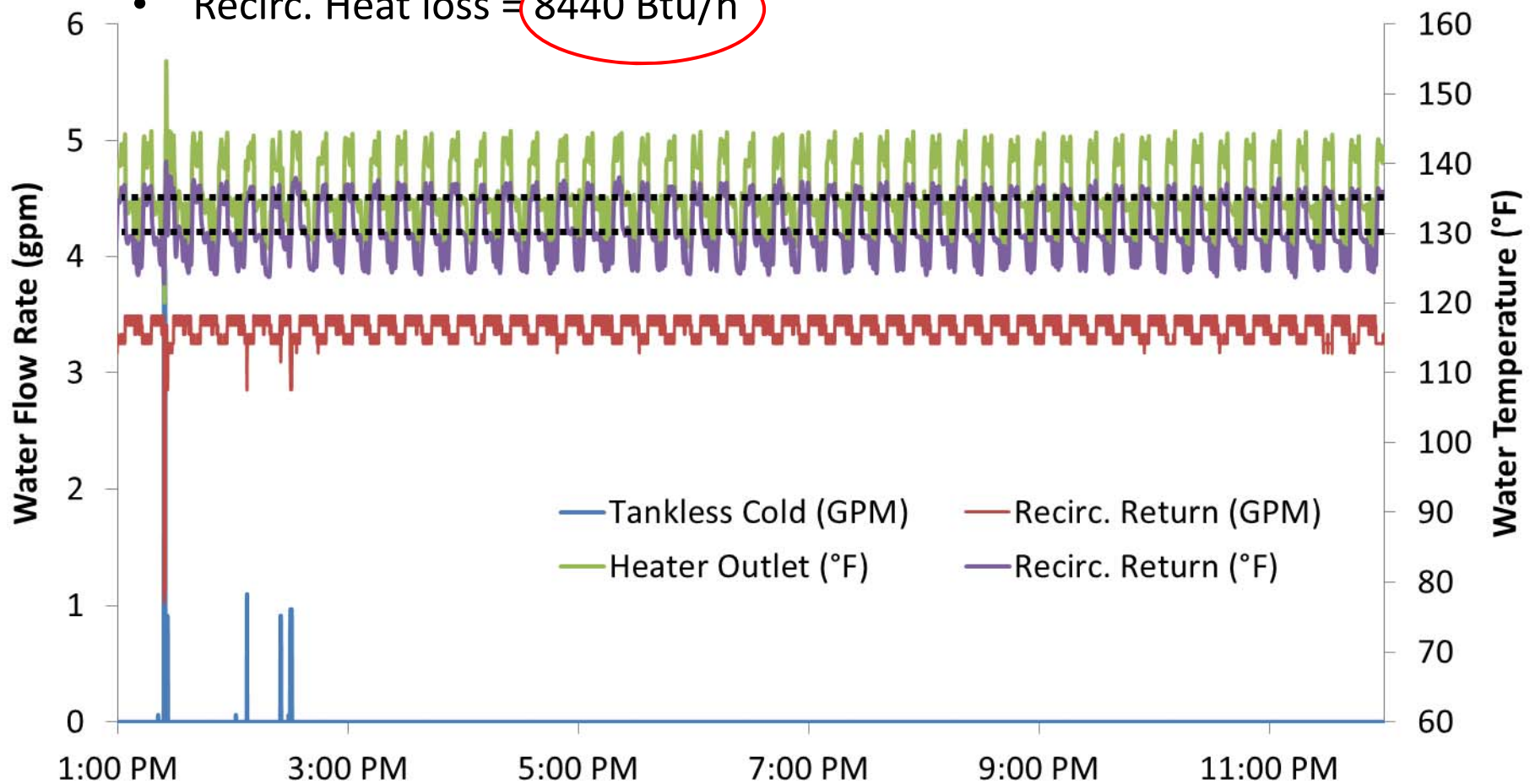
← 130°F Recirc return

- 200 ft. recirculation loop
- 11 gallons of water in pipe



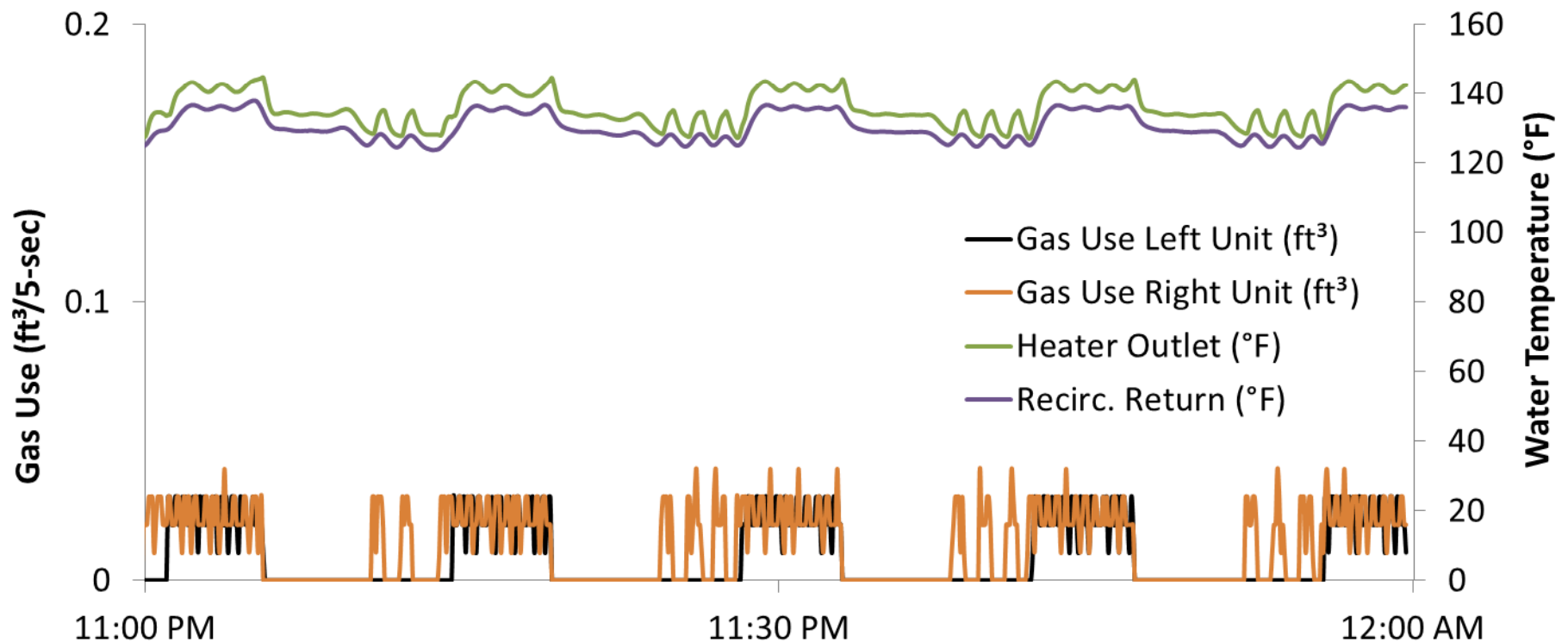
Recirculation Line Heat Loss Analysis

- Christmas Day analysis from 3pm-midnight (No water use conditions)
- Avg heater outlet – recirc return temperature (135.5°F – 130.4°F)
- Recirc. flow rate: 3.4 gpm
- Recirc. Heat loss = 8440 Btu/h

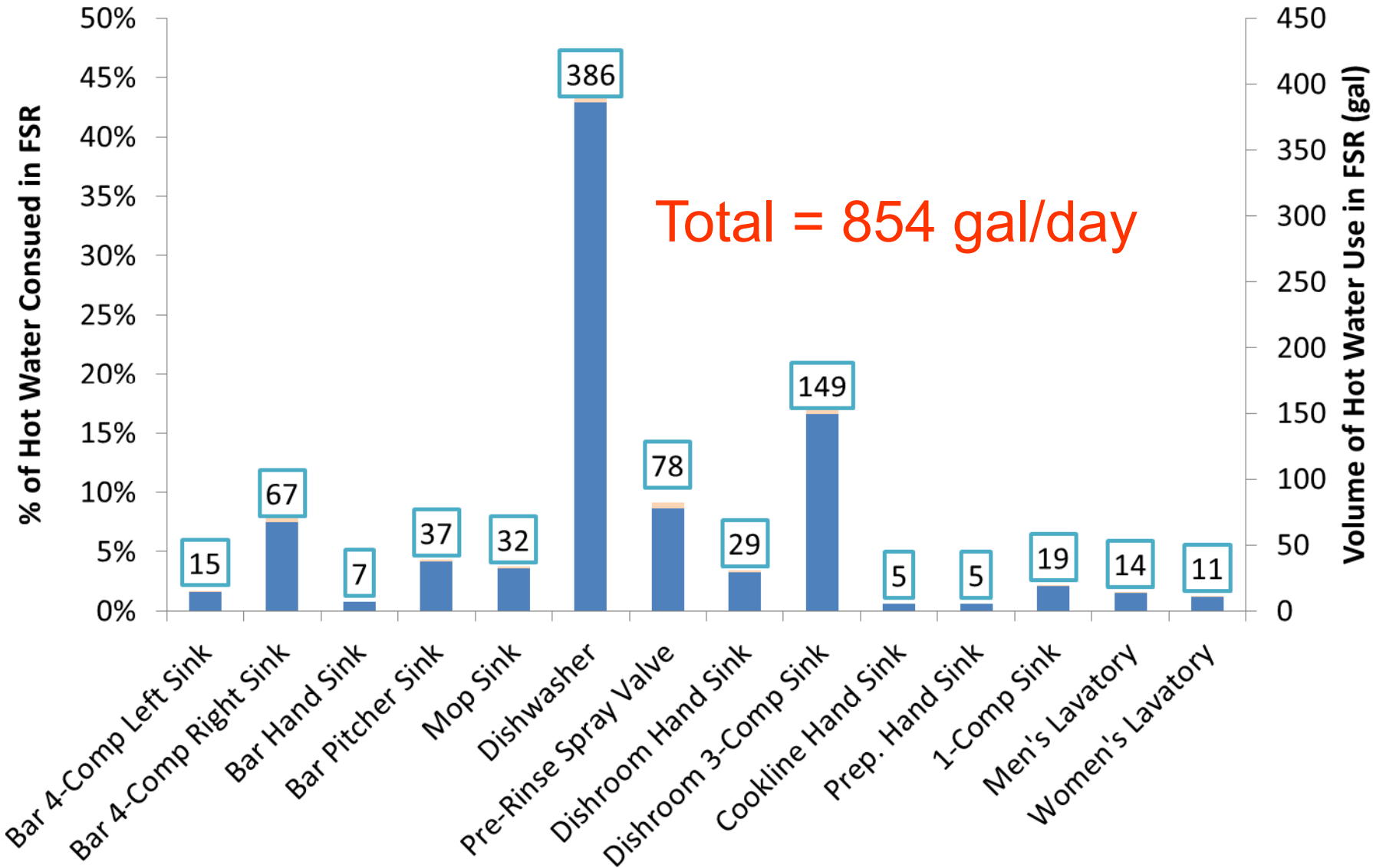


Water Heater + Recirc. Line Energy Use

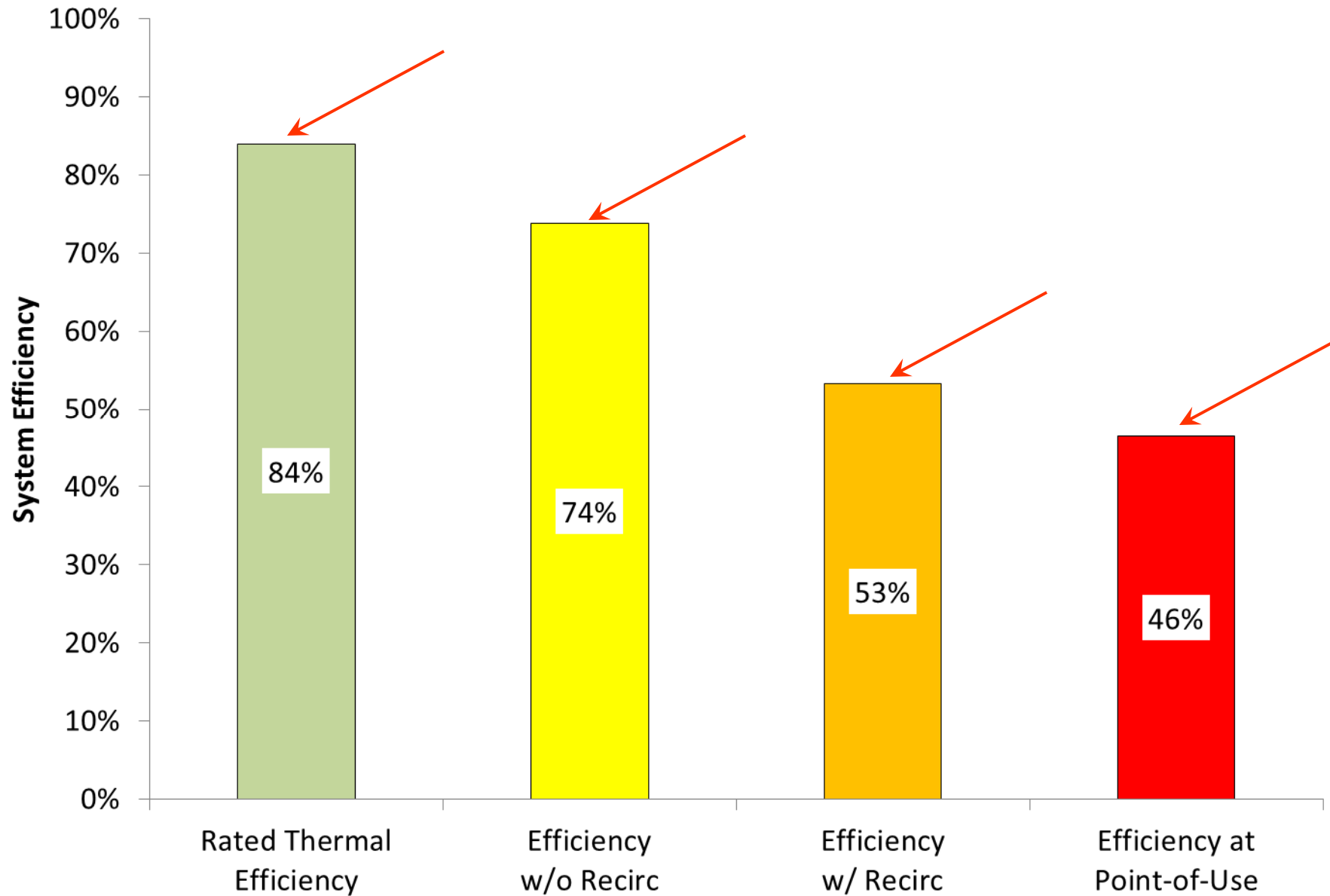
- Heat loss: Heater 5,190 Btu/h, Recirc 8,440 Btu/h, total = 13,630 Btu/h
- Duty cycle (no water use condition): 48%
- Electricity use: Heater 0.02 kW, Recirc 0.08 kW
- Electricity cost: Heater \$30, Recirc \$125, Demand \$25 Total \$180
- Gas cost: Heater \$1,200, **Total energy cost to operate recirc: \$1,380**



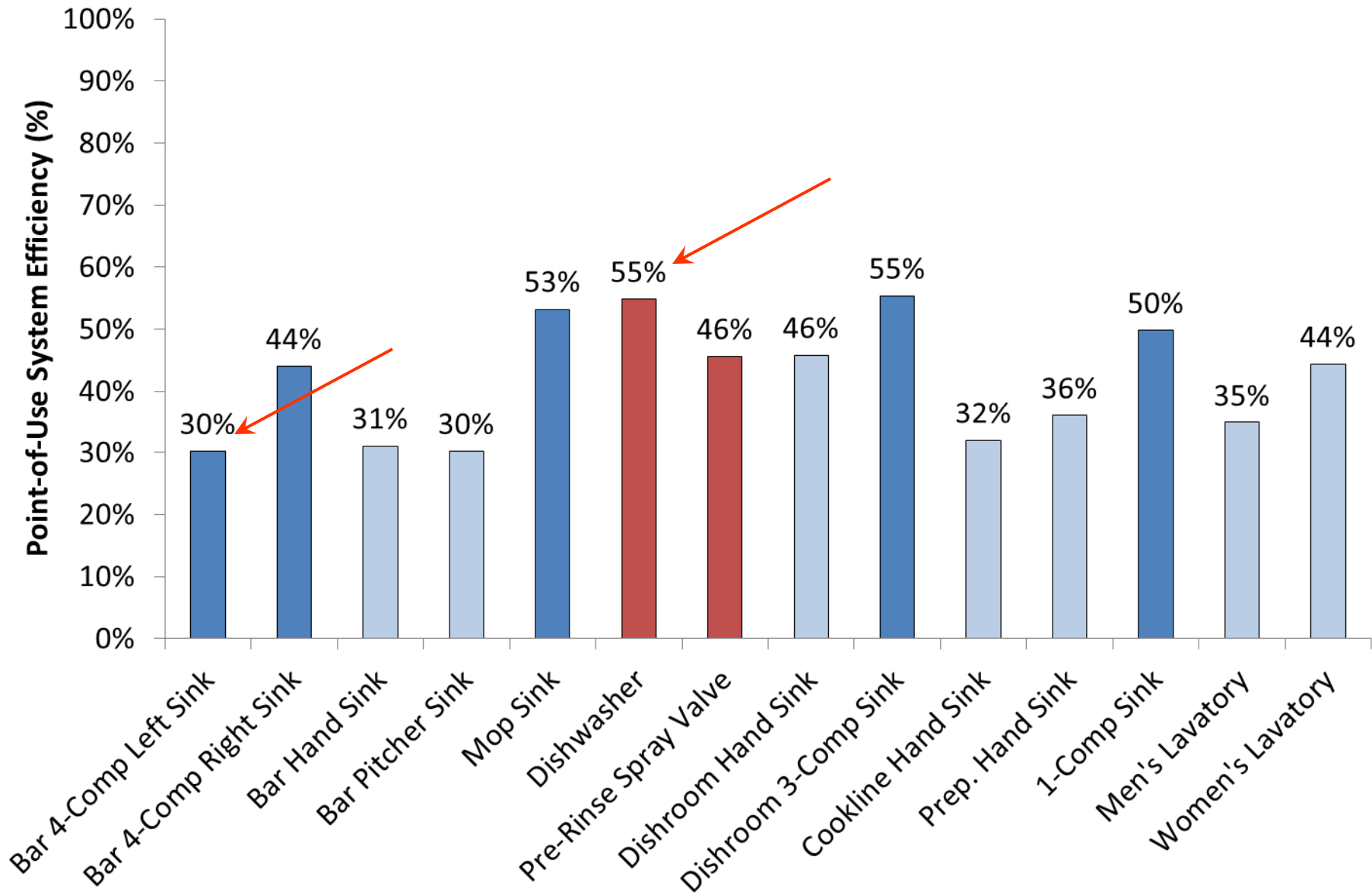
Average Daily Hot Water Use



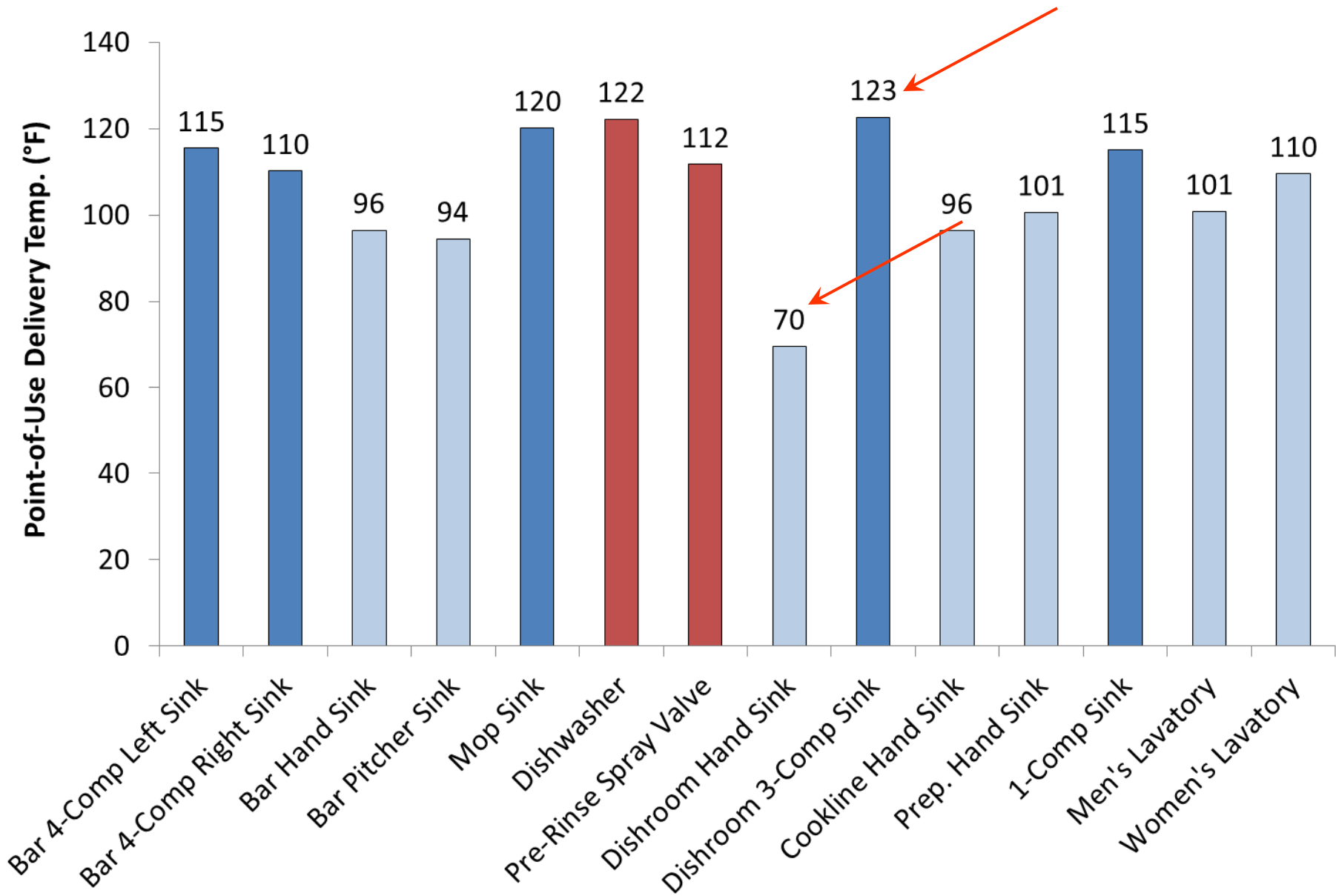
System Operating Efficiency



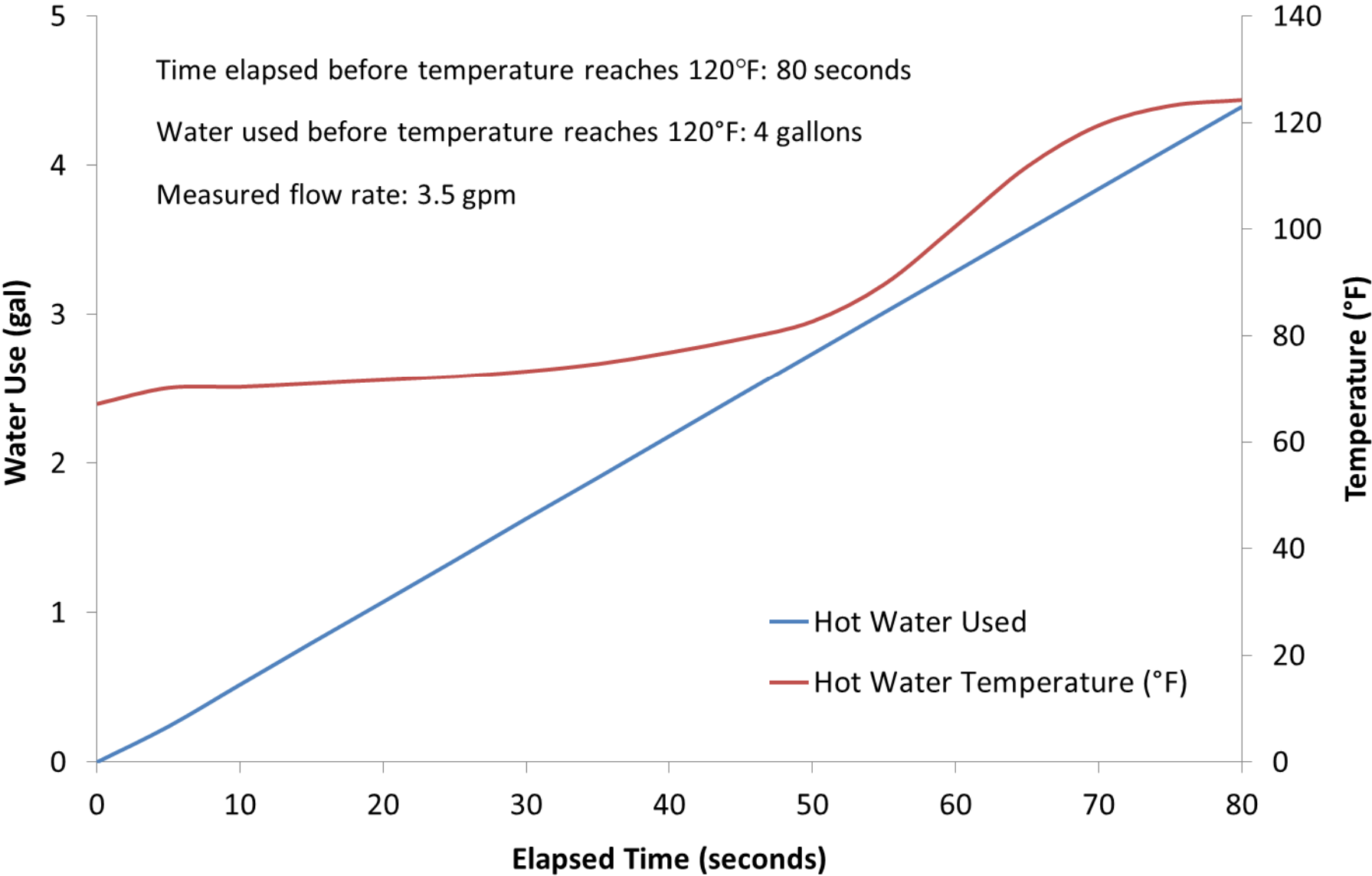
Efficiency at the Point-of-Use



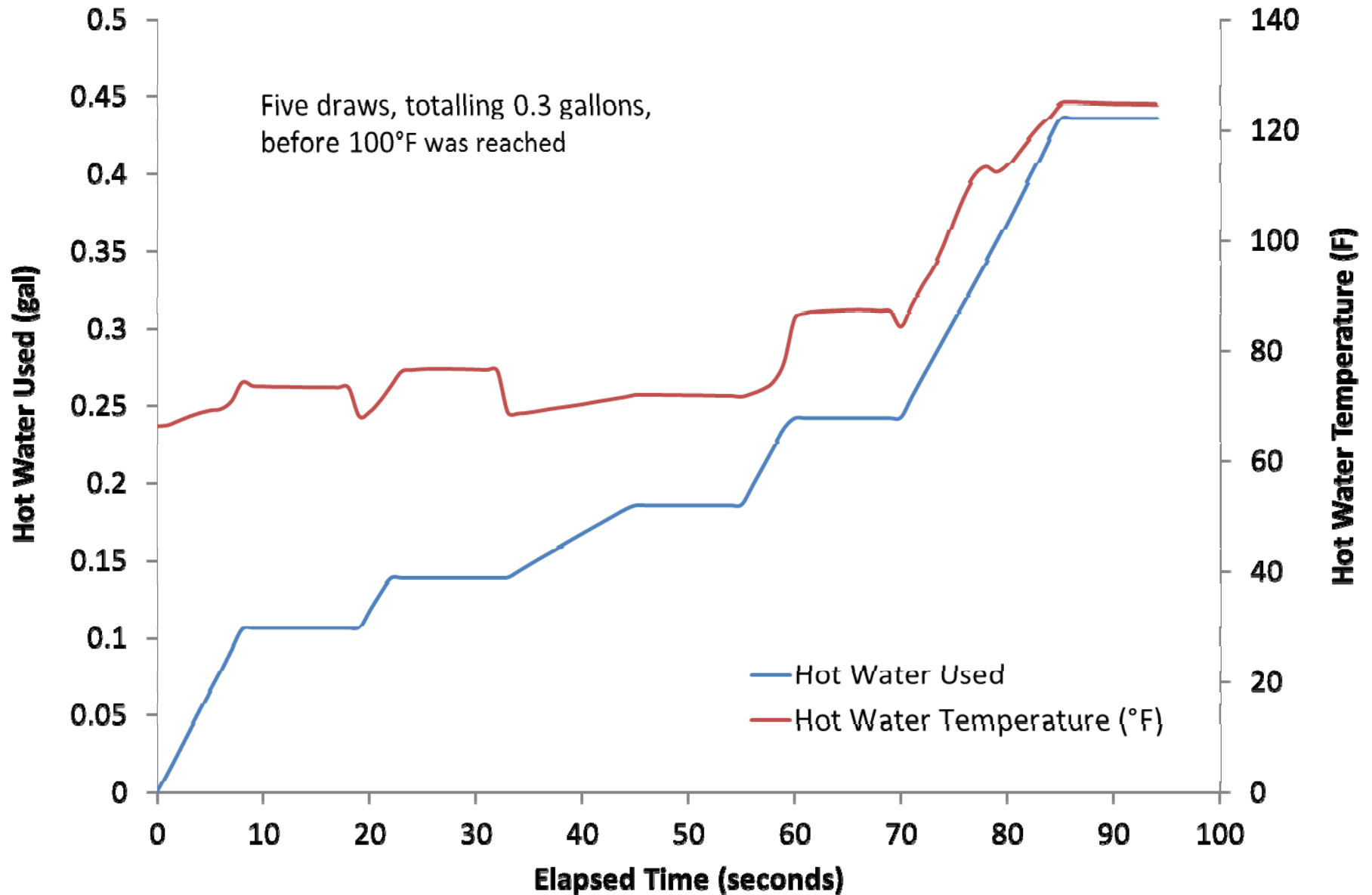
Point-of-Use Delivery Temperature



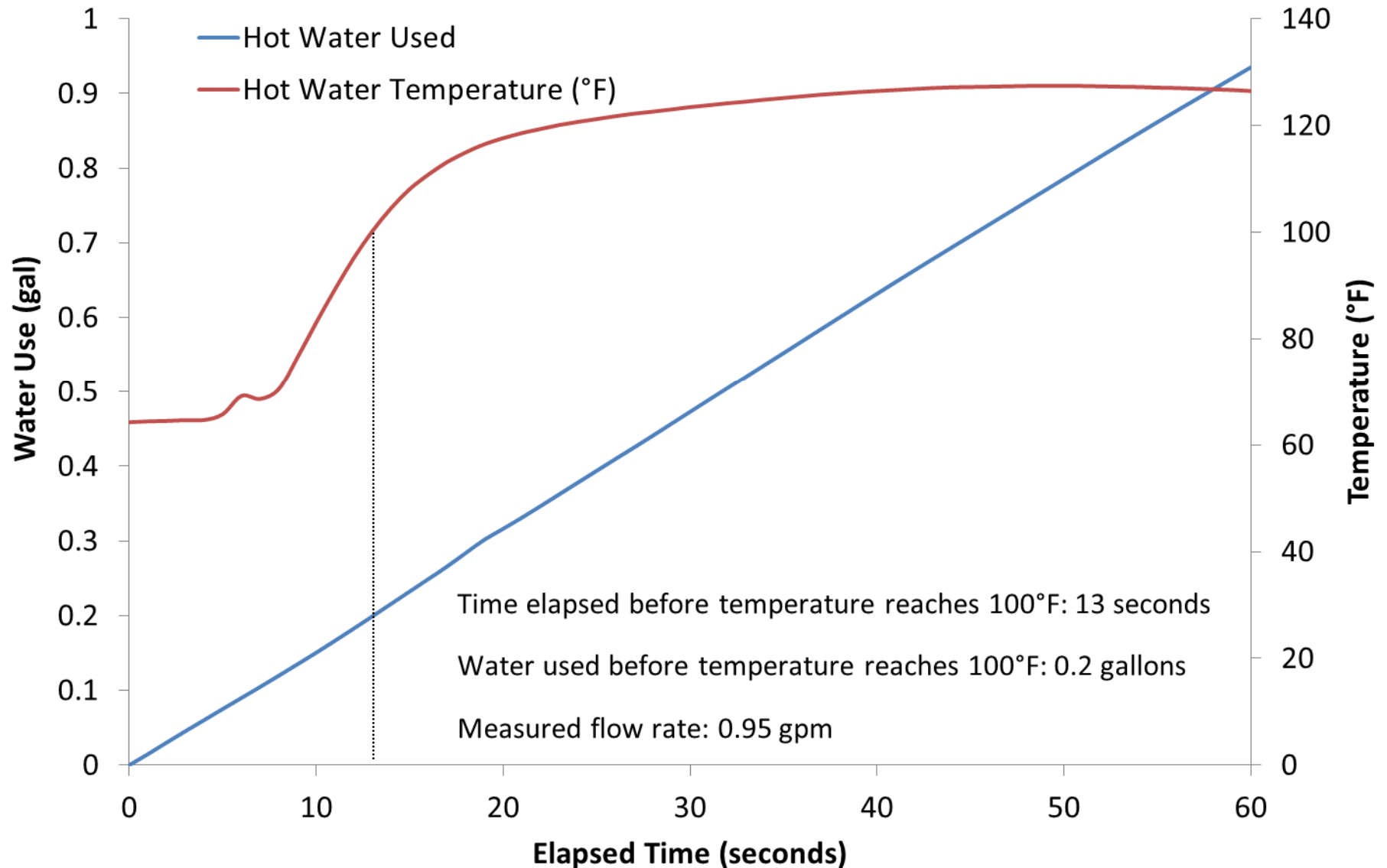
Delivery Performance at Bar 4-Compartment Sink



Delivery Performance at Women's Lavatory



Delivery Performance at Women's Lavatory



Annual Hot Water Costs

Recirc. Pump and
Recirc. Line Costs:
Gas cost \$1,200
Electricity cost \$125
Demand charge \$20



- **Total Cost: \$21,730**
- **Water Cost: \$9,300**
- **Gas Cost: \$2,860**
- **Electricity Cost and Demand Charge: \$9,570**

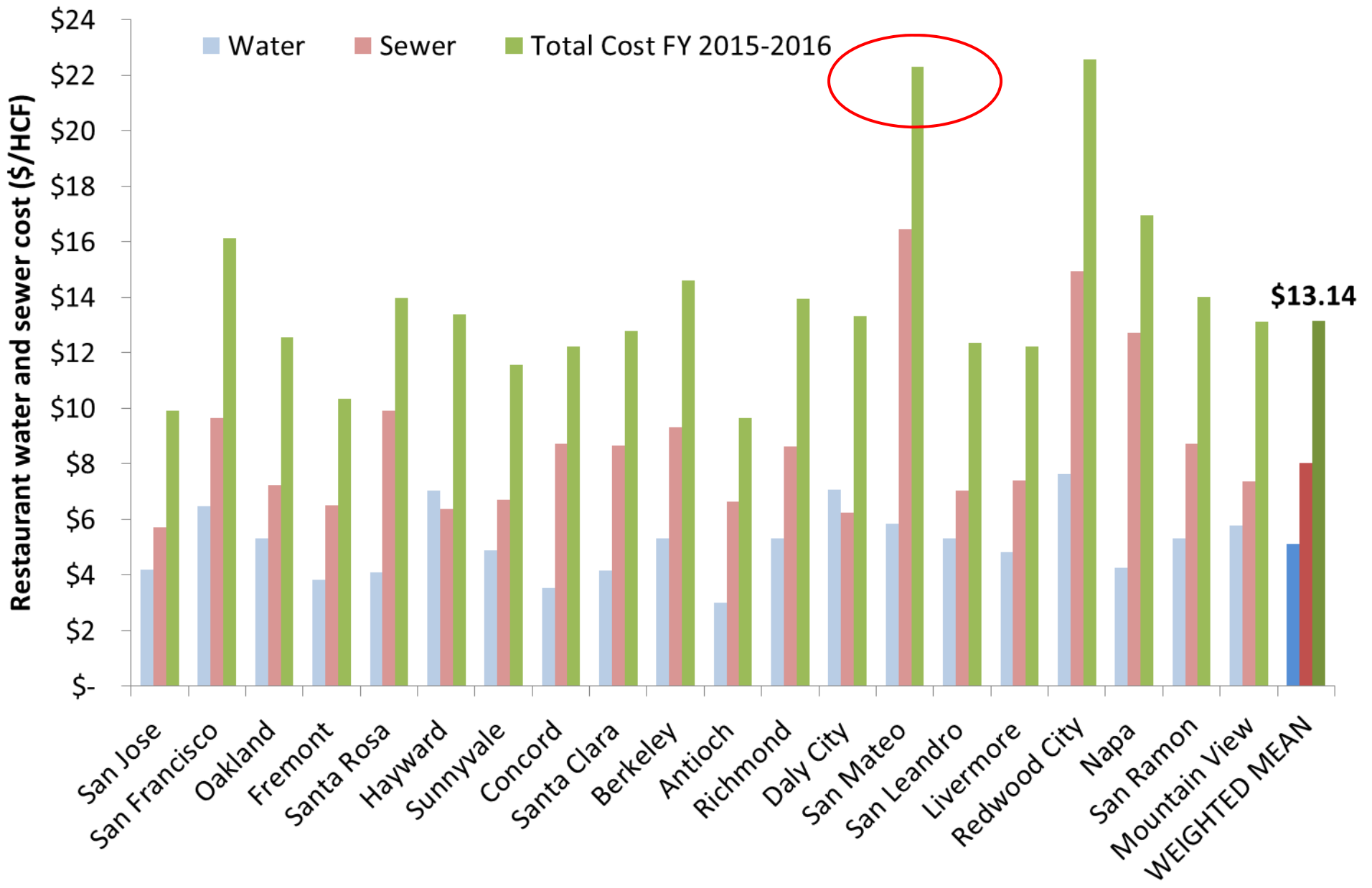
Water Costs:
AVG. 855 gal/d
Water and Sewer \$9,300

Water Heating Costs:
Gas cost \$1,660
Electricity cost \$55
Demand charge \$5

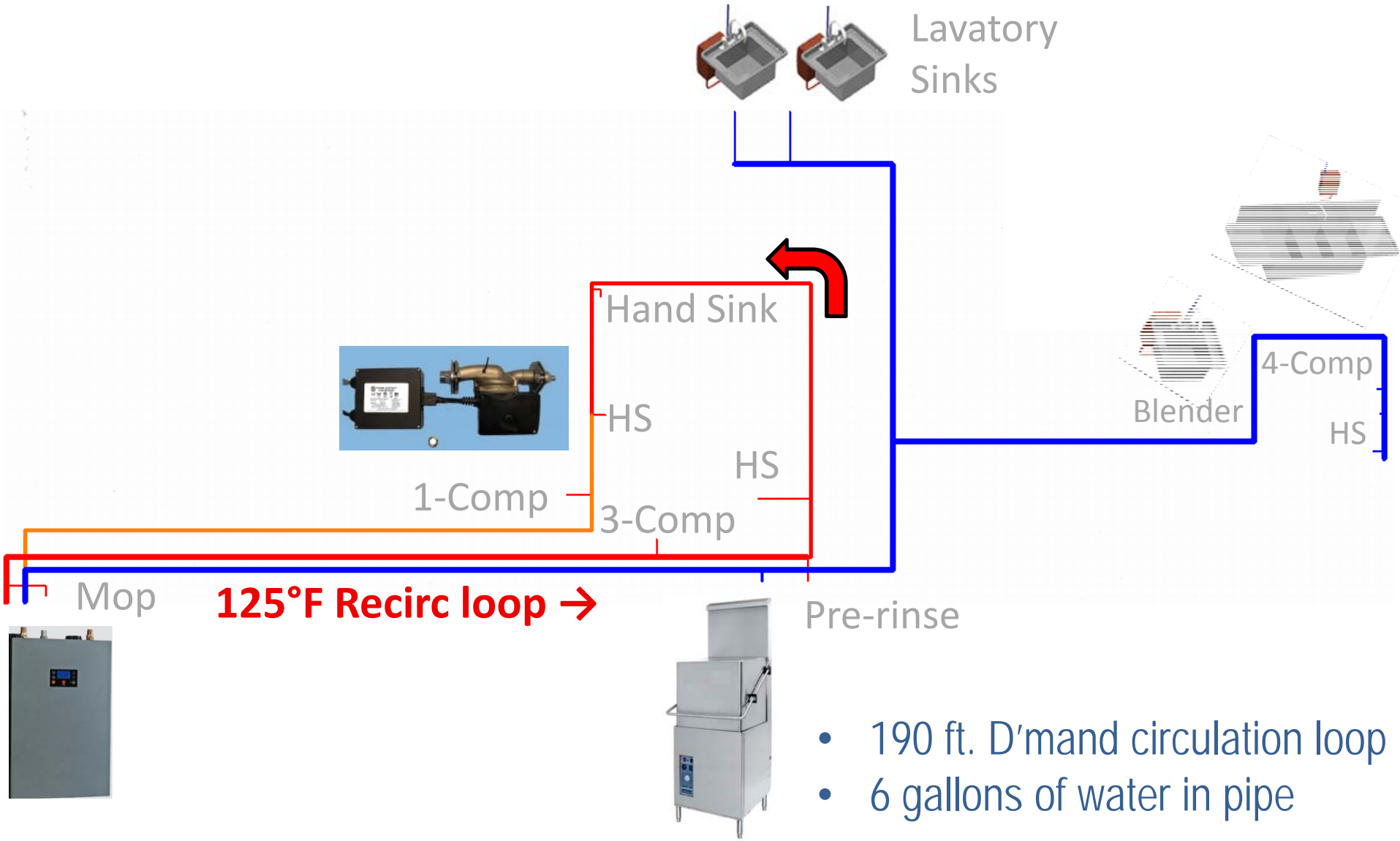


Dishwasher Costs:
Electricity cost \$7,050
Demand charge \$2,320





Optimized Hot Water System



- 190 ft. D'mand circulation loop
- 6 gallons of water in pipe

Reduced Gas Load of Optimized System

Existing: 2 Rinnai R94LSi, 2008 model

- Input Gas Rate of 199,000 Btu/h
- Rated at 84% TE, Power 79W, 2W Standby
- Maximum winter flow rate of 7.8 gpm at 85°F temperature rise (140°F - 55°F), 3.9 gpm each



Replacement: 1 IntelliHot iQ250, 2014 model

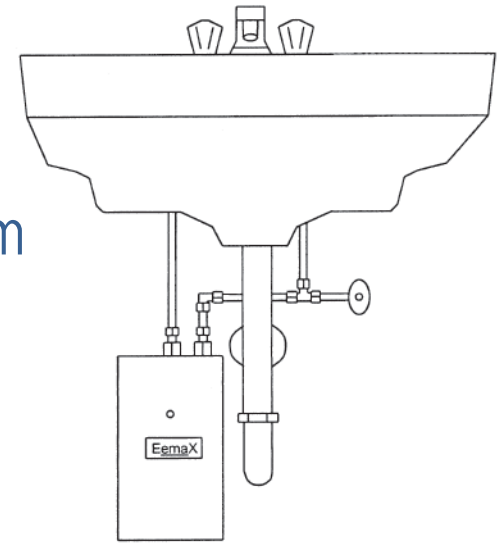
- Input Gas Rate of 250,000 Btu/h
- Rated at 96% TE, Power 500W, 8W Standby
- Maximum winter flow rate of 6.9 gpm at 70°F temperature rise (125°F - 55°F)



Electrical Load Addition to Optimized System

3 Hand Sink POU Heaters

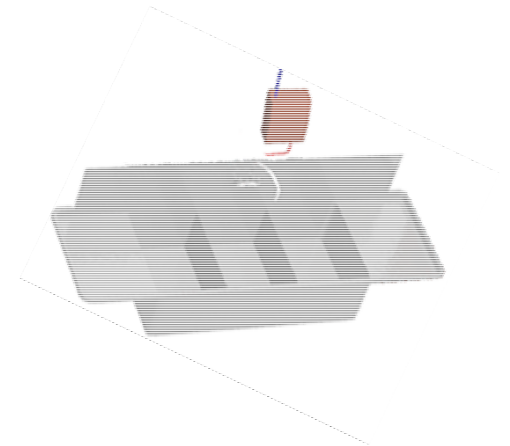
- Accumix model MT004277T
- 4.1kW @ 277V 1-phase, 14.8 Amps on #14 wire
- Provides a 56°F rise at **0.5 gpm**, reduced from 1.5 gpm
- Unit will easily supply hot water between 100-108°F in winter when cold water supply temperature is lowest
- 0.3 GPM turn-on water flow rate
- No scalding or temperature spikes
- Top mount water fittings
- Ideal unit specifications for commercial lavatory sinks
- Unit is UPC 413.1 Code Compliant
- The integrated mixing valve meets ASSE 1070-2004



Electrical Load Addition to Optimized System

Bar 4 Comp Sink and Bar Hand Sink = 24 kW

- Series Three model EDO24480T2T FS
- 24kW @ 480V 3-phase, 29 Amps/phase on #10 wire
- Provides a 66°F rise at 2.5 gpm or 55°F rise at 3.0 gpm
- Outlet Temperature factory set at 120°F



No Added Electrical Load for Dishwasher Change Out

Existing: CMA-180

- 12 kW booster which provides a 40°F Rise
- 7 kW tank heater
- 0.96 Gal/Rack
- 52 Gal/Hour
- Minimum 60 sec cycle
- Electrical: 208V 1 Phase 78 Amps or 3 Phase 49 Amps



Replacement: Champion Genesis DH5000 with Heat Recovery

- 10 kW booster which provides a 70°F Rise
- 5 kW tank heater
- 0.83 Gal/Rack
- 31 Gal/Hour
- Minimum 90 sec cycle
- Electrical: 208V 1 Phase 79 Amps or 3 Phase 48 Amps



Recirculation Pump Change Out

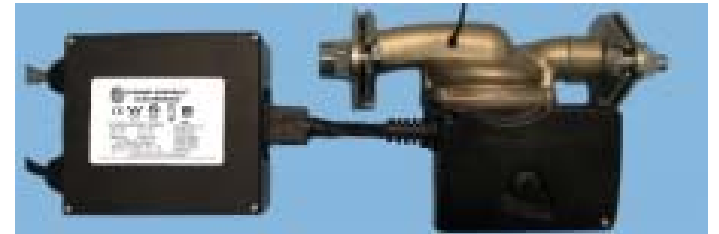
Existing: Grunfos Pump

- Operates 24/7
- Fixed Speed



Replacement: D'Mand Kontrols S3-100

- Pump activates with motion sensor on last kitchen hand sink before the return line



*Thank you
for your
Attention!*

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