



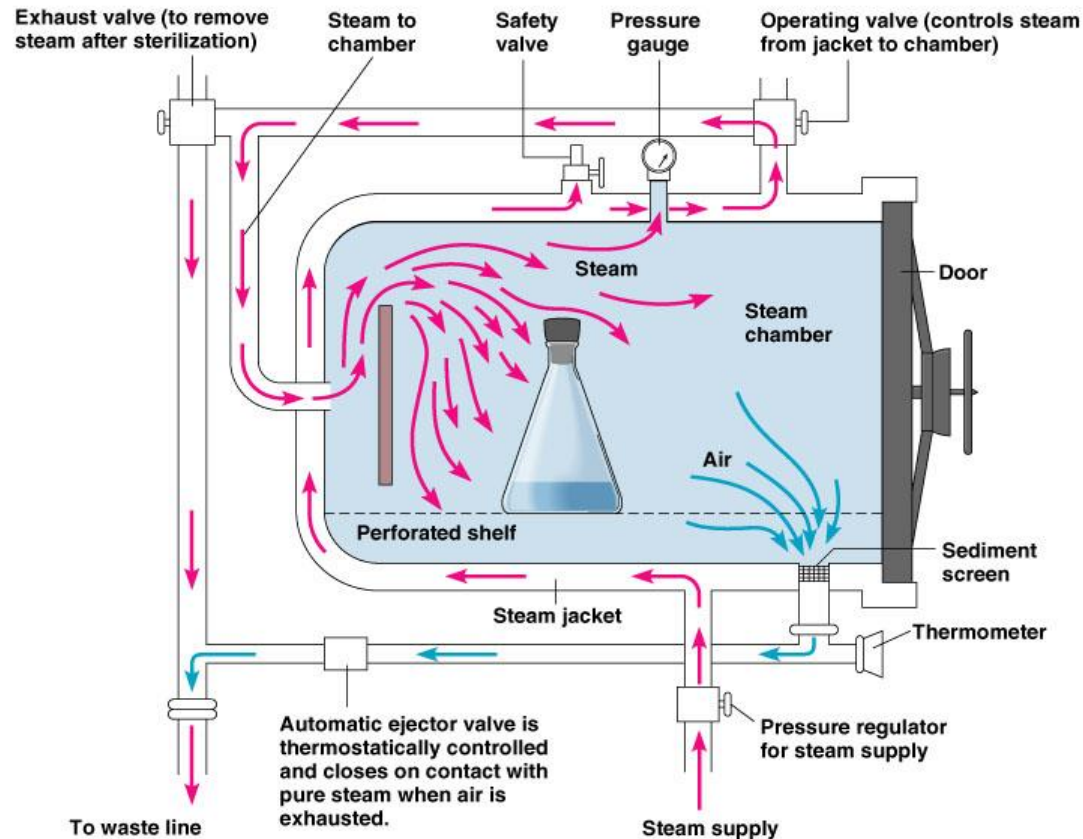
Autoclave study

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What is an autoclave?

- ▶ An autoclave is a pressure chamber used to **sterilize equipment and supplies** by subjecting them to **high pressure saturated steam** at 121°C (250°F) for around 15–20 minutes depending on the size of the load and the contents.

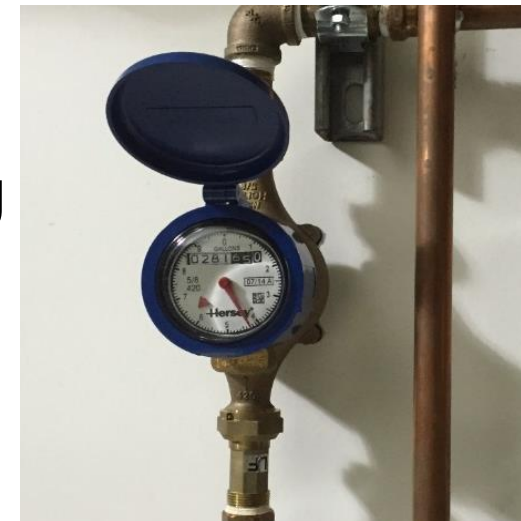


Autoclave in
Genomics
Building
Capacity:
540 Liters

UCR autoclaves numbers

- › 37 autoclaves on campus
- › Most of them are “Medical-grade” type
- › Started monitoring two “Steris” autoclaves in August 2015
 - › Entomology = Building #1: One autoclave in the building
 - › Stand alone steam supply ; 24”x36”x36” ; 2001
 - › Live energy monitoring: boiler + autoclave
 - › Also has a water meter that is measured weekly
 - › # of runs per day recorded
 - › Genomic = Building #2: 8 autoclaves in the building
 - › Connected to steam plant ; 36” ; 2008
 - › Live water monitoring only
 - › # of runs per day recorded

Designed for constant operation



Water meter installed on autoclave in Entomology

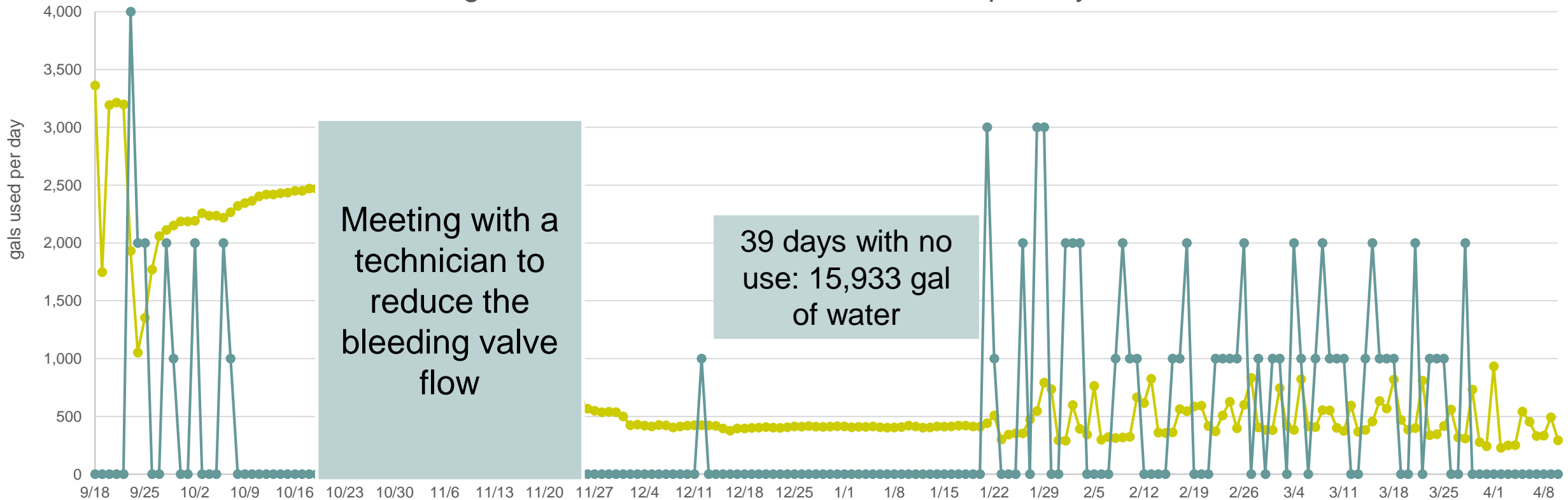
Autoclave Study Goals

- ▶ How often are autoclaves used on campus?
 - ▶ # of runs per day
 - ▶ Weekend vs weekday
- ▶ How much water / energy do they use?
 - ▶ During a run / When idle
- ▶ What are the more efficient options?
 - ▶ Water and energy
- ▶ How to ensure the procurement of efficient units?
 - ▶ Stakeholders

Building #2: WATER – Daily use

Daily Water use in Genomics Building

—● gallons of water used —● # of runs per day * 1000



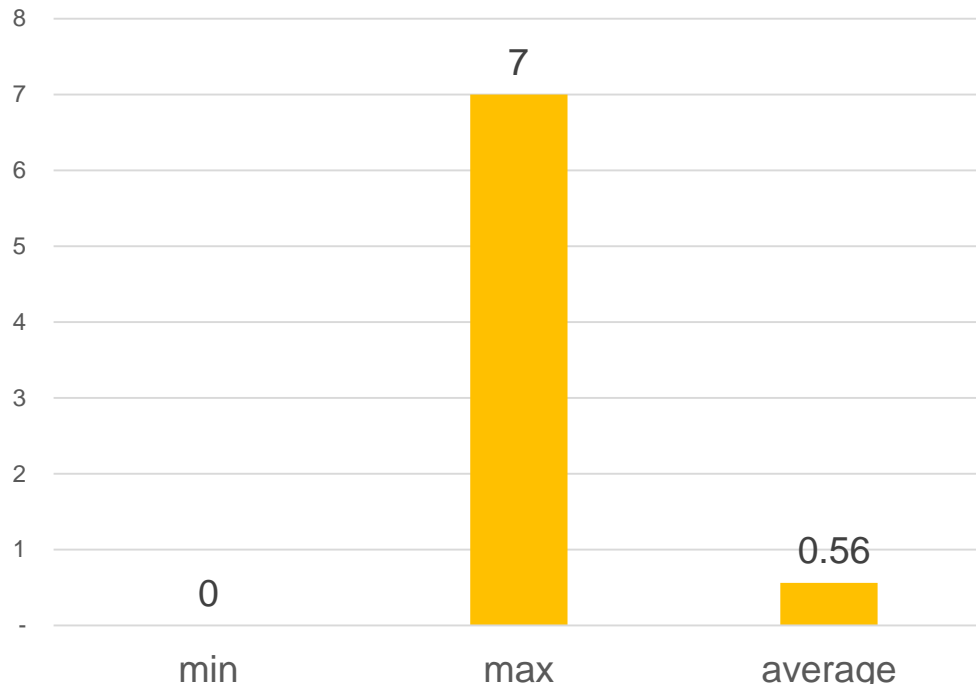
➤ No correlation between water use and number of runs

Building #2 : WATER – average per day

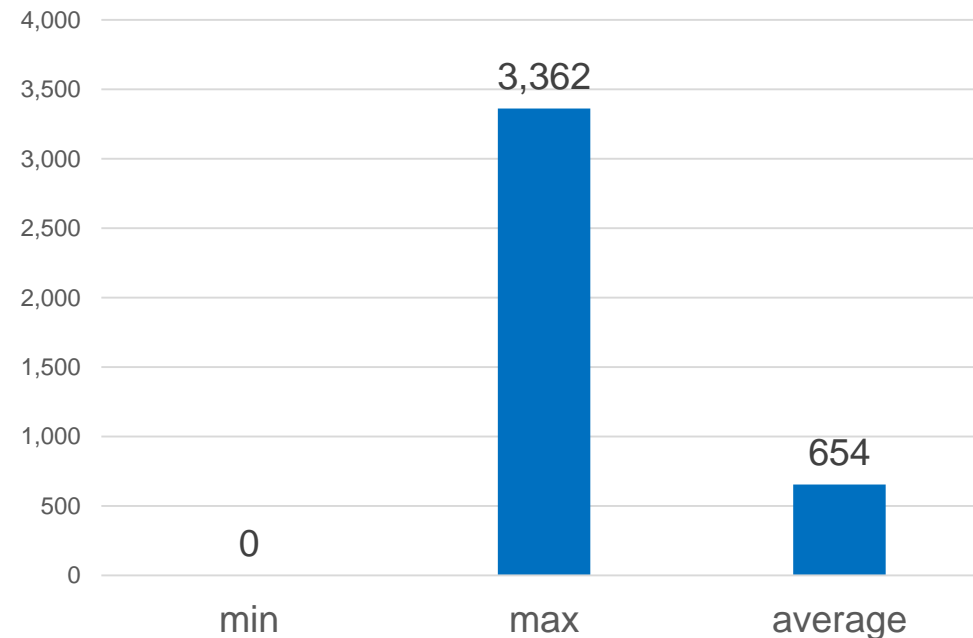
- ▶ Since monitoring began: Average of 654 gal/day or 239,000 gal/year
- ▶ Between 0 to 7 max runs per day

53%
when
idle

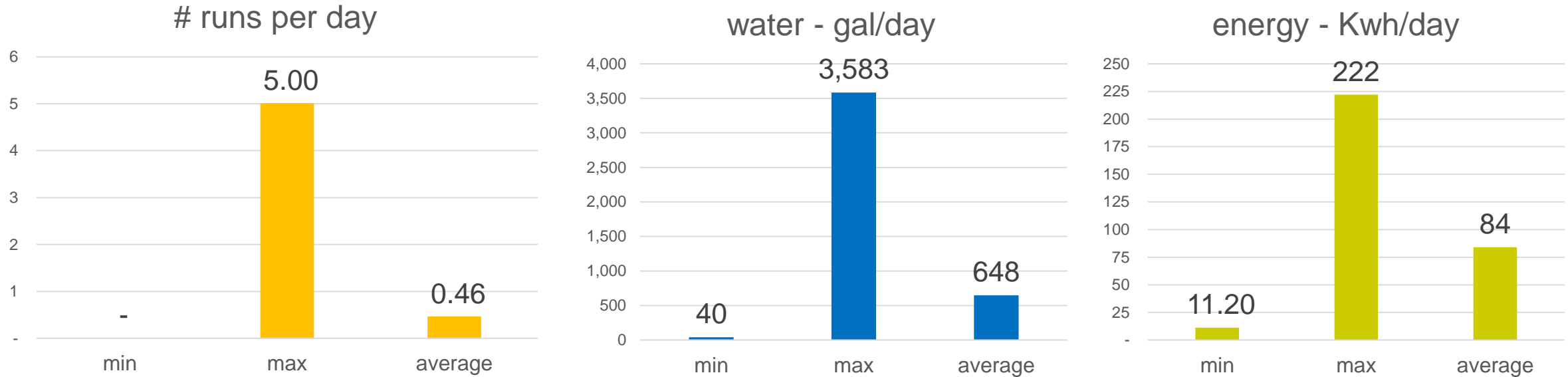
runs per day



water - gal/day



Building #1: WATER and ENERGY



- Between 0 to 5 max runs per day Low use
- On average, the unit uses 84kWh/day and 30,600 kWh for 1 year, as much as 4.2 ULT freezers – based on 20kWh/day Stand alone unit

Autoclave study conclusion

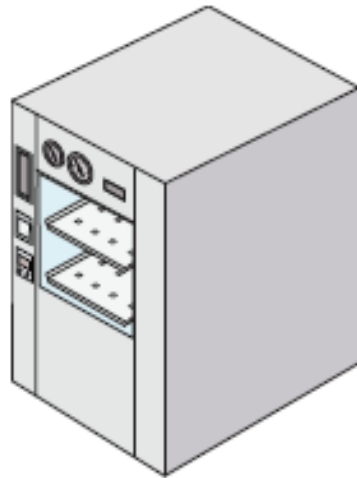
- › Energy intensive: 84kWh/day
- › Water intensive:
 - › Genomics: 654 gal/day
 - › Entomology: 648 gal/day
 - › Idle: 53% of water consumption

For 37 autoclaves :
8,800,000 gal/year
1,134 MWh/year

239,000
gal/year/autoclave

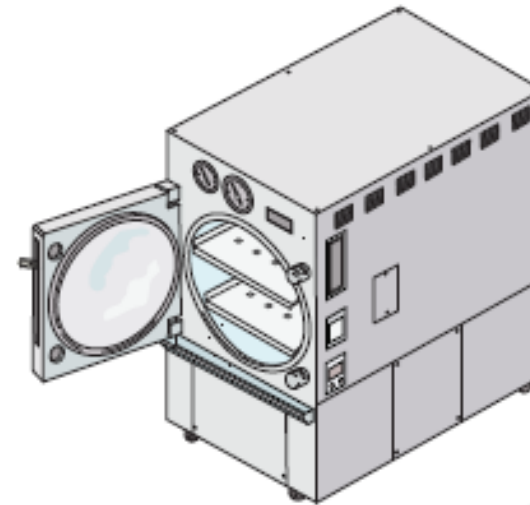
What are the other options on the market ?

Medical Grade



High-throughput
24 x 7 Operation
Square Chambers

Research Grade



Capacity up to: 500 Liters

< 5 cycles/day

Lowest Cost

Round Chambers

Need warm up
time
Cycles are longer

Use only 45 gal/cycle 18kW on-demand steam
No single pass cooling water 16,000 kWh/year for 5 cycle/day

New EHS Building – April 2016

- › Need low input: only for Bio-Hazard AND radioactive waste
- › Willing to try a different company, train potential users on site and use the unit as a demo
- › Willing to add metering and share the data
- › Metering equipment: \$1,200 , require collaboration with IT for internet connection

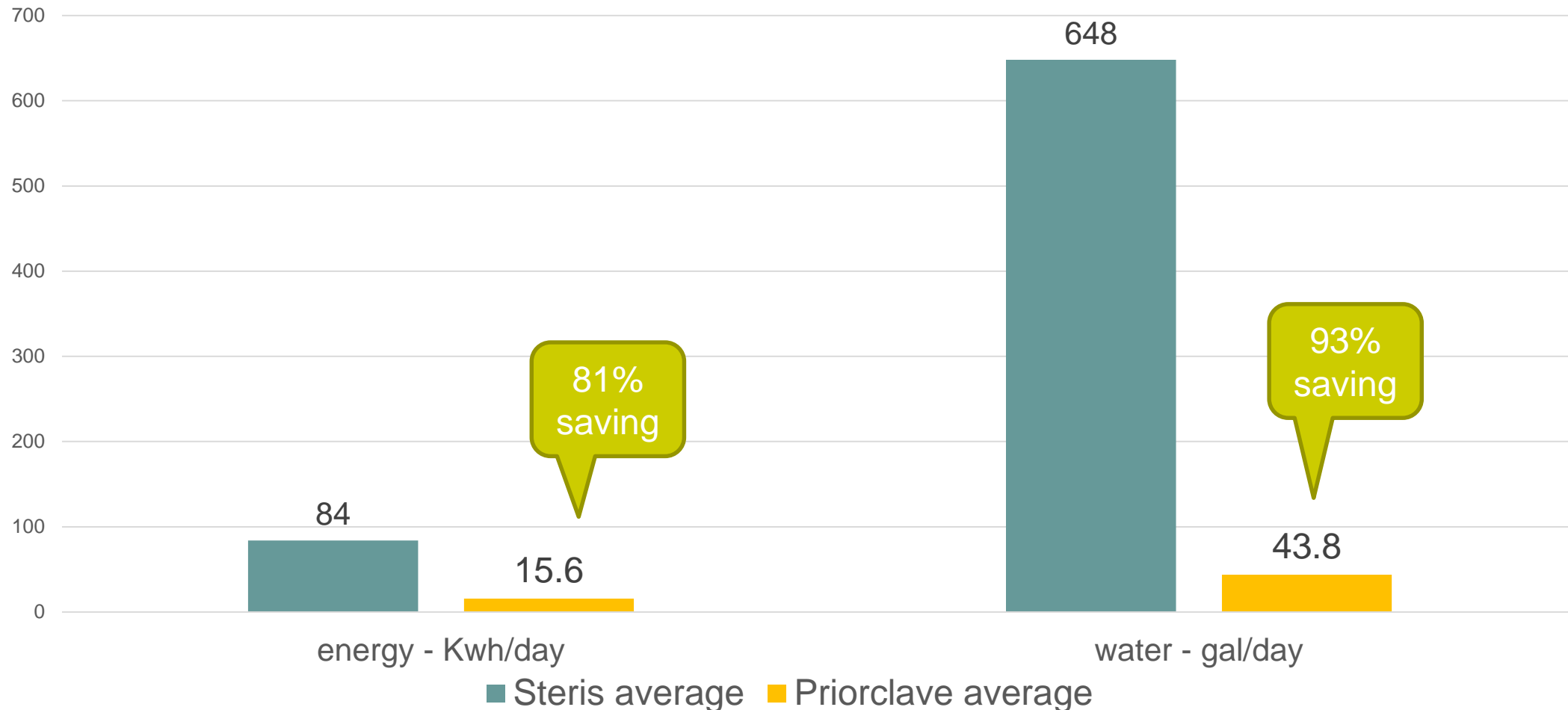


With energy and water meters

Priorclave: Comparison with autoclave in Entomology

⇒ Based on the average of 1 cycle per day

Energy and water use: Steris - Priorclave comparison for 1 run per day



New EHS building – case study

Cost analysis:

Cost of a new unit:

- Steris: \$52,110 + maintenance :~ \$3,000/year
- Priorclave: \$39,865 + maintenance : based on usage + metering equipment \$1,200

Operational costs saved for 1 autoclave:

- Energy saving: 25,000 kWh per year saved or a minimum of **\$2,500/year** @ \$0.1/kWh
- Water saving : **220,000 gal/year**

SAVING	1 years	15 years	20 years	25 years
Energy - \$	\$2,500	\$37,500	\$50,000	\$ 62,500
Carbon - M Ton CO2	17.6	264	352	440
Water –M gallons	0.22 M	3.3 M	4.4 M	5.5 M

Choose the right autoclave

More than 1
run every 2
hours
Every day

“MEDICAL” Grade	“RESEARCH” Grade
Vacuum pumps / steam jacket → Constant maintenance expense	No vacuum pump / No steam jacket → Maintenance only relative to usage
“High-throughput” – designed for 24/7 hospital use, over a dozen cycles per day	“Light duty” – less than 5 cycles per day
24/7 Independent steam generator	On-demand in chamber steam generator

Less than
1,000
cycles per
year

Stakeholders for the study

- › Building managers
 - › Autoclave users
 - › Facilities for installation

 - › EHS employees - autoclave users targeted
 - › Architects and Engineers Department
 - › Planning Department for future project/new building
 - › Scientific Procurement Department for replacement
- ➔ Develop a Procurement Guide for efficient scientific equipment₁₅