

“Right-Sizing” Your Laboratory Autoclave: A Two-Part Method for Selecting an Appropriate Lab Autoclave

Executive Summary

University of Alabama at Birmingham (UAB) is an internationally recognized R1 research university. It ranks among the best funded programs and faculty in the United States, and is noted for exceptional mentoring and training opportunities across the hundreds of labs in its 10 schools and 24 research centers. UAB is also a global leader in sustainability in academic science.

For years UAB has outfitted their research labs with jacketed steam autoclaves. In fall of 2023 Nick Ciancio (UAB Sustainability Coordinator) completed an in-depth metering study to determine and document the sustainability impacts of this long-standing preference. Specifically, Ciancio wanted to compare water consumption between UAB's existing jacketed autoclaves and non-jacketed autoclaves.

Ciancio and his team first surveyed the usage of a set of autoclaves shared among labs to determine the most common load and sterilization cycles used by their researchers. They then monitored water consumption on several autoclaves running UAB's most common cycle types and variations.

Based on these findings, Ciancio estimated that the water to operate UAB's jacketed autoclaves costs the university an additional \$74,000 each year, with no corresponding benefit. This ongoing expense is additional to the higher initial purchase cost: jacketed autoclaves cost UAB roughly 37% more than comparably featured non-jacketed equivalents. Ciancio also noted anecdotal reports of decreased maintenance outages and lowered electrical costs associated with using non-jacketed autoclaves (although these were not quantified in this study).

Given that jacketed autoclaves rely on house steam generated using natural gas, while non-jacketed autoclaves generate steam using in-chamber electric heaters, it is likely that decreased water consumption will further UAB's institutional decarbonization goals.

On average the jacketed autoclaves (which were fitted with water-saving features) used between 44 and 50 gallons of water per sterilization cycle, while the non-jacketed autoclave used less than 2 gallons per cycle. Similarly, while jacketed autoclaves consumed 25 to 41 pounds of house steam per cycle, the non-jacketed autoclave used no house steam (non-jacketed autoclaves generate their own steam).