



# Greening Up The Lab: *CONSERVATION*

Everyone knows labs are big consumers of energy, which is why even modest conservation efforts can lead to significant environmental (and cost) benefits.

## Cold Storage

Freezers are often the biggest users of electricity in the lab. According to Lab Manager magazine, a single ultra-low temperature freezer draws as much energy as an average domestic household. Follow these tips to minimize energy consumption and to keep your cold storage units running their best.

- Change or clean filters and exposed refrigeration coils behind refrigerators/freezers and clean the door seal to improve contact on sealing surfaces
- Consolidate samples and reagents into a single fridge/freezer to reduce the number of fridges and freezers required - or share with neighboring labs
- Be sure to turn off/unplug units not in use



At Princeton, the Minus 80 freezer monitoring program tracks temperatures and sends alerts when a freezer gets too warm or too cold. Wireless probes check for doors left open and other energy-wasting practices, and data collected over time enables sustainability initiatives by allowing for monitoring and improvement of lab protocols, as



well as flagging of poorly performing units.

Labs at Princeton interested in adopting Minus 80 should contact EHS at [ehs@princeton.edu](mailto:ehs@princeton.edu)

## Up For a Challenge?

The **Laboratory Freezer Challenge**, launched in January 2017, encourages best practices in cold storage management, such as periodic defrosting, cleaning out of unneeded materials, temperature fine tuning, equipment upgrades and space sharing.

“Most cold storage units are ignored until they fail, and many of the samples stored in those

units remain there for years, or even decades,” says Allison Paradise, executive director at My Green Lab.

“The Freezer Challenge encourages people to take a more active role in managing their freezers/refrigerators and their samples.”

The Freezer Challenge is co-sponsored by My Green Lab and the International Institute for Sustainable Laboratories (I2SL). The annual contest pits individual labs against each other in friendly competition; score-

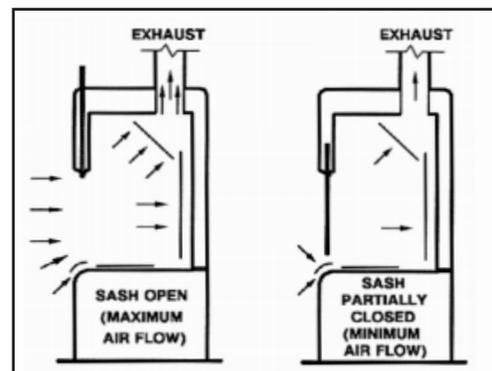
cards are submitted and labs ranked against peer institutions.

## Save Some Green

Good freezer management is not just environmentally friendly—it’s good for your pocketbook. Cleaning out freezers and sharing space with colleagues results in labs requiring fewer cold storage units, which can dramatically reduce costs, Paradise says. One CDC lab participating in the challenge slashed operating costs by \$10,000. A Harvard lab saved \$2500 a year, allowing it to spend money earmarked for a new freezer on other priorities.

## Fume Hoods

Another big consumer of electricity are fume hoods, which use high-power fans to ventilate the lab. Fume hoods must run constantly to maintain pressure and flow rates, which is



why a single fume hood can consume between 1 and 1.5 times the energy used by the average residential home,

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according to a study from American Auto Matrix.

The best way to reduce fume hood energy consumption is to **close hood sashes when not in use**. In a variable flow fume hood, this reduces fan speeds to a minimum, as less air displacement is needed. See the EHS website ([ehs.princeton.edu/conservation-fume-hoods](http://ehs.princeton.edu/conservation-fume-hoods)) for more information.

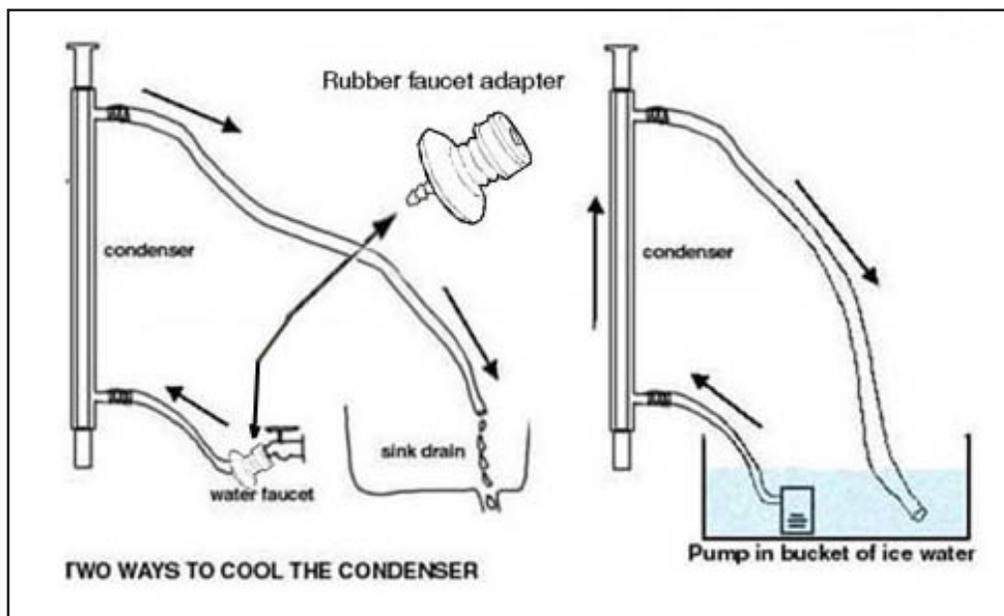
## Water

Flow control also matters when looking to reduce water consumption. **Flow reducing valves, timers and automatic shut-off mechanisms** can all be utilized to conserve water. When upgrading water-using equipment, such as autoclaves, x-rays and dishwashers, choose models specifically designed with water-conservation features.



Solenoid Valve

**Batch rinsing, reducing rinse cycles and running dishwashers only when they are full** are proven ways



A water-saving alternative when undergoing lab distillation is to use a pump and bucket of ice water, as illustrated on the right.

to save water. In some situations (e.g. vivariums), the final batch of water used to wash a piece of equipment can be re-used in preliminary rinses of other equipment. **Counter-current rinsing** utilizes multiple connected rinse tanks, with fresh water flowing from the final rinse tank to preliminary tanks. This allows preliminary rinses to be done in slightly used water, saving the fresh water for the final rinse.

### Distillation Solution

Significant water saving can be achieved in many labs by **changing distillation practices**. Distillation, a common lab procedure used to separate materials, involves running water through a condenser, sometimes for hours at a time.

Rather than running the tap continu-

ously and draining used water into a sink, a bucket of ice water along with a common fish pump can be used to re-circulate water through the apparatus, both saving water and preventing wide-scale flooding should the hose accidentally pop off.

## Other Methods

There are many other ways to conserve resources in the lab. Use of **efficient electric lighting, design choices** utilizing daylight and optimized placement of ventilation and HVAC systems, and **updating or rightsizing lab equipment** are all ways to save energy and cut costs in the laboratory.

For additional tips on conserving energy and resources in the lab, see the **Best Practice Guides** on the I2SL website: <http://www.i2sl.org/resources/toolkit/bpg.html>