**Chilling Up Freezers**

**LAB CONSCIOUS ARTICLE**

[**5 QUICK WAYS TO SAVE FREEZER ENERGY IN YOUR SCIENCE LAB!**](https://www.labconscious.com/blog/2015/6/25/5-quick-ways-to-save-freezer-energy-in-your-lab)

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In my last article on energy management in the lab, I gave an overview of why labs use so much energy. In this article we will look a little deeper at one of the most energy intensive pieces of equipment in your lab and learn tips on how to reduce that energy load.

Laboratory Cold Storage

That buzzing, that awful, loud, constant sound that seems to pervade every lab space on the face of the earth. You hear it when you walk into the lab in the morning and luckily it seems to fade away as you settle into your day.  Know what I am talking about? That is the sound of many refrigerators and freezer laboring away to maintain their specific temperatures and just because the sound of them may fade away, does not mean they are not still consuming energy. In fact you can probably hear one right now as you read this article.

The cold storage box is really a complex piece of machinery; there are a lot of moving parts (one of the reasons they break down so often). You have the insulated storage box, compressor(s), condenser coils, evaporator, refrigerant and the list goes on. Freezers and refrigerators maintain their temperatures by evacuating warm air out of the insulated box. Refrigerant vapor is compressed, heating it up and raising its pressure. That hot, high-pressure refrigerant travels through condenser coils where it meets with room temperature air, cooling it and becoming a liquid, while still maintaining its high pressure. This high-pressure liquid then circulates through the insulated box absorbing much of the heat inside, effectively lowering its temperature. The refrigerant returns to a vapor and circulates back to the compressor to start the process again.  Every time, your refrigerator of freezer falls outside the parameters it is set to, this process happens.

To avoid spending additional resources on energy consumption from cold storage, try following these tips:

1)      Dr. Gornish, identifies one method in her “[3 Easy Tips to Green Your Lab](http://www.labconscious.com/blog/2015/6/8/3-easy-tips-to-green-your-lab)” article. She says that by **raising your Ultra-Low Temperature freezer’s set point from -80°C to -70°C** you can reduce their consumption by 2-4 Kwh a day.  This is a great start to reducing your energy use from cold storage; it is what we call a low hanging fruit or an action you can take for little effort or cost. Make sure to have an argument prepared on how this will not endanger the contents of your freezer, as it is not uncommon to find opposition to this method.

2)      **Know what you want in your refrigerator or freezer before opening it.** For every minute the door of the cold storage box is open, it takes approximately 10 minutes to cool it down again. The longer the door is open, the longer the compressor will have to run to cool it down again.

3)      Have your facilities department regularly clean the backside of your refrigerators and freezers. **Dust will build up on the condenser coils**, insulating them and making the compressor work harder, increasing its energy use by up to 25%. In addition to lowering the efficiency of the compressor, the increased workload will shorten the lifespan of the freezer or refrigerator.

4)      Listen to your refrigerators and freezers; **if you hear a compressor that is on for an extended period of time, have the maintenance department check it out**. This could be a sign of an aging piece of equipment. Over time the wear and tear on a compressor can decrease the efficiency of that freezer/refrigerator by up to 35%, increasing your costs.

5)      **When purchasing freezers instead of looking at just the upfront cost include operating cost of the freezer.** This takes energy use into consideration and can save you money over the lifetime of the freezer.

For instance, Ultra-Low Temperature (ULT) freezers or Freezers that operated at -80°C use an average of 9-22 Kwh/per day. In the course of a year a freezer that uses 22 Kwh a day will cost about $1,200 a year vs the more efficient 9 kwh/ day freezer that only costs $500. If the more efficient freezer has a price premium of $3,000 it will only take 4.3 years to recoup that cost. Considering the average lifespan of a ULT freezer is 17-20 years, you could end up saving more than $10,000 over the lifetime of that piece of equipment.

While freezers are not the most energy intensive equipment in your lab, they still do use a considerable amount of energy. By following these simple tips you can help to reduce your energy load, lower carbon emissions and save your company or institution money.

<https://www.labconscious.com/blog/2015/6/25/5-quick-ways-to-save-freezer-energy-in-your-lab>

# BIOCOMPARE ARTICLE

# Five Tips to Extend the Life of a ULT Freezer

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Used to store precious, often irreplaceable samples, ultralow-temperature (ULT) freezers are an essential workhorse of laboratories worldwide. When used and maintained properly these specialist units typically provide 10–12 years of highly reliable service, but to get the best out of them it is important that they are treated with respect. This includes locating them wisely, ensuring they are provided with a power supply of the correct voltage, and performing essential preventive maintenance functions to keep them running optimally. We spoke with Adam Christensen, technical support/service trainer at NuAire, who shared with us his expertise in ULT freezer preventive maintenance.

“For maximum performance and efficiency, it’s recommended that a ULT freezer is checked and calibrated periodically by a qualified service technician,” he says. “However, regular cleaning and maintenance is relatively straightforward and can easily be performed by the end users. We suggest adopting a number of simple practices to extend freezer life. By making these routine it’s possible to detect and correct any potential sources of failure in timely and efficient manner.”

## Minimize frost or ice build-up

“Although gradual formation of frost or ice within the inner chamber is inevitable, this can be kept to a minimum,” explains Christensen. “The room in which the unit is situated should have an ambient temperature no higher than 32oC, while exposure to direct sunlight and drafts or heating/cooling vents should be avoided. It’s also important to provide suitable spacing around the unit for effective ventilation.”

Further steps to lessen frost or ice build-up include minimizing the number and duration of door openings and checking that the door latches securely upon closure. “Periodic removal of frost or ice build-up from the door gaskets and inner chamber can be achieved by scraping,” notes Christensen. “The vacuum relief port should also be cleared regularly.”

## Defrost the chamber regularly

“We recommend fully defrosting the chamber at least twice a year depending on usage and environmental conditions,” says Christensen. “This involves transferring all contents to another ULT freezer, switching off the unit, then wiping it out with a non‐chloride detergent once it has defrosted. This can be a good time to inspect door gaskets and make sure they seal properly, to clear out old stock, and to re-organize existing samples to maintain correct airflow and afford better accessibility. The unit should then be allowed to operate empty overnight before being reloaded.”

## Keep the condenser clean

By transferring heat from inside the ULT freezer to outside, the condenser has one of the most important roles to play in ULT storage. Christensen explains that dust accumulation on the condenser filter can compromise its performance, adding that the condenser coil also requires regular preventive maintenance. “We suggest cleaning the condenser filter every two to three months, more frequently if the environment is particularly dusty, and the condenser coil at least once a year,” he notes.

## Wipe down the door gaskets

“If frost and ice build-up isn’t removed from the inner and outer door gaskets, they can tear,” says Christensen. “This compromises the performance of the unit. Leaks are usually indicated by a streak of frost at the point of gasket failure, but by wiping down the gaskets with a soft cloth at least once a month, tearing can be avoided. Furthermore, frost and ice build-up around gasketing can wear out the outer door latch since it makes it hard to close the door.”

## Understand freezer alarms

ULT freezers are often fitted with alarms to indicate a variety of sub-optimal operating conditions. These can include high temperature, power failure, low battery life, prolonged door opening, and system monitoring failure. According to Christensen, knowing what the different alarms mean facilitates swift remedial action. “It is imperative that alarms are not ignored and that a plan of action is in place for situations that require operator input. This includes labeling each freezer clearly with the details of a point of contact and back-up contact and having spare ULT freezer space available should there be a need to transfer samples to an alternative unit.”

Freezer alarms will still occur during a power outage since the display and buzzer are powered by a battery. Christensen says this should be replaced by a certified technician every 2.5 years, when the battery timer will also be reset. “The battery life of NuAire freezer alarms can be checked by entering the function code menu, however it is sufficient to simply have the battery replaced once the 2.5 years expires and the light is illuminated,” he adds. “Checking the battery timer in the function menu can be incorporated into routine cleaning and maintenance schedules to provide end users with additional peace of mind.”

A wide range of ULT freezers are available, yet they all have one thing in common—they require care and attention to keep them performing at their best. Just a few simple preventive maintenance steps will ensure the longevity of sample material while maximizing the lifetime of these vital pieces of equipment.

<https://www.biocompare.com/Bench-Tips/354215-Five-Tips-to-Extend-the-Life-of-an-Ultralow-Temperature-Freezer/>