

High Efficiency Ultra-Low Temperature Freezer Policy

Introduction to Ultra Low Temperature Freezers

Ultra-Low Temperature Freezers (ULTs) can reach temperatures as low as -85°C. They are a critical piece of equipment in research labs and are designed to protect valuable samples. As of 1/1/18, Washington University's asset inventory includes 903 ULTs across our campuses¹, with 836 located at the School of Medicine, 54 on the Danforth Campus, 6 at Cortex One, and 7 at satellite locations. On average, the University purchases 63 ULTs per year, many of which replace older units.

Why Adopt a ULT Freezer Policy?

ULT freezers use a significant amount of energy and are, therefore, responsible for a considerable amount of carbon emissions. Our most standard ULT freezer (≥ 5 years old) uses nearly as much electricity each year as an average US home. The entire WU fleet of ULTs uses an estimated 10,500,000 kilowatt-hours each year, constituting 3.4% of total annual electric usage and resulting in an estimated 8,000 metric tons of carbon emissions, which is equivalent to the emissions from 1,700 cars. In addition, standard ULT freezers use refrigerants with extremely high global warming potentials (GWP) that are as much as 14,800 times as potent as carbon dioxide. If this refrigerant leaks during operation or is not properly disposed of, it will have an outsized impact on global warming.

In the last 3 years, manufacturers have begun releasing high efficiency ULTs that consume up to 50% less energy and utilize natural refrigerants that do not contribute to global warming. Models are now offered by Thermo Fisher, Panasonic, Eppendorf, Haier, and Z-SC1. With the increased competition in the market, the price gap between standard and high-efficiency models has narrowed to as little as a few hundred dollars. Many high-efficiency units pay for themselves through energy savings in 0 - 2 years.

By purchasing high efficiency ULTs in lieu of standard efficiency units at the current rate of ULT replacement (63 units per year), Washington University can reduce its annual emissions of CO₂ by 2,000 MT over the next few years. This reduction would significantly contribute to the University's commitment to reduce greenhouse gas emissions to 1990 levels by 2020.

Policy Content

All new ULT freezer purchases must be high efficiency units that use low-GWP natural refrigerants. The University's definition of *high-efficiency* is aligned with Energy Star's requirements, whereas actual $(\text{kWh}/\text{day}/\text{cu.Ft}) \leq \text{Unit Volume (cu.Ft)} \times 0.55$, with a -75 °C set point. *Natural refrigerants* are defined as refrigerants that are compliant with the EPA's Significant New Alternatives Policy (SNAP).

Monitoring Progress

Annual audits will be completed by reviewing freezer asset reports requested from Asset Management. Savings will be calculated based on the number of HE units x 19.4 kWh per day (7081 kWh per year). The savings estimates are cumulative, so as the total number of HE units increases year over year, previous year purchases will still be counted in the savings report.

¹This asset list only includes units purchased while the researchers have been located at Washington University in St. Louis and only freezers that are valued over \$5,000; therefore, older units transferred from other institutions and units of very low value are not represented.

Selecting a Policy Compliant ULT Freezer

The following units have been validated as high efficiency and SNAP compliant:

Manufacturer	Models	Supplier Contacts
Thermo Fisher Scientific	TLE Series, TSX Series, Revco/RLE Series	Joe Ahearn, joe.ahearn@thermofisher.com, 314-456-9594 Katie Kraft, katie.kraft@thermofisher.com, 314-341-5028
Panasonic	VIP ECO (#MDF-DU702VH-PA)	Bryan Lampe with DAI, bryan.lampe@daiscientific.com, 314-308-2745
Eppendorf	CryoCube® F740i and F740	Keith Proctor, proctor.k@eppendorf.com, 618-530-0676
Z-SC1 Biomedical	IKKII (DF8520K, DF8524K, DF8530K), DF8520J, DF8524J, DF8530J)	Charlene Laughlin with MidSci, charlene.laughlin@midsci.com, 636-225-9997
Haier	NU-99578JG, NU-99728JG	Scott Gianino with APEX/NuAire, scott@apexlec.com, 314-750-3427

Please contact Angela Lochmann in Resource Management (alochmann@wustl.edu; 314-935-5621) for the following:

- To consider the additional specifications of these units in a side-by-side manner, please request the current “Validated ULT Freezer Specification Comparison” file from Resource Management.
- As there are new units being released to the market, it is possible there are compliant models that have not yet been validated. If you need assistance validating a new model, please contact Resource Management.
- To formally request a one-time exception to this policy, please submit an exception request to Resource Management for review.