Best Practice to Minimise Lab Freezer Running Costs

Common sense and best practice should prevail when looking to minimise lab costs and environmental impact. Scientific Laboratory Supplies (SLS) have commissioned a number of independant case studies by Green light Laboratories. This particular case study was conducted at the Department of Chemistry, University of Warwick using Liebherr freezers.

Introduction

Best practice is widely accepted to be the most cost effective way to minimise lab costs. When applying best practice to cold storage one of the most simple ways to save energy is to set the freezer temperature to the appropriate set point, typically -20˚C. Many freezers found in laboratories do not have the ability to accurately set and display their temperature. Such units tend to employ a basic, arbitrary dial (Figure1) to control temperature.



Such dials are simply numbered with the numbers not corresponding to any temperature. Having temperature monitored dial controlled unit it has been observed that the internal temperatures may be as cold as -38˚C. This case study aimed to highlight the energy which could be easily saved by using a laboratory freezer at -20˚C.

Testing freezers

The data was collected over a one week period at the Department of Chemistry, University of Warwick. The Liebherr freezers tested were supplied for the study by Scientific Laboratory Supplies Ltd. The units were tested in an air conditioned laboratory where the ambient temperature was recorded at 19˚C (+/-1˚C). Each freezer had a temperature logger placed at the centre point on its middle shelf. This temperature logger recorded the internal temperature every minute, accurate to 0.1˚C. The energy monitors used had a kWh reading variance of +/-

1%. Units were empty had their energy consumption measured with no door openings. To standardize the energy consumption data the energy consumption has been divided by the net capacity to give a watts per litre per day figure (W/L/Day).

Data	Liebherr LGuex1500	Liebherr LGUex3410
A. Published Net Capacity	**129 Litres**	**284 Litres**
B. Energy and Temperature Performance at -20˚C set point	0.75 kWh/day (5.81 W/L/Day) Av. Temperature -23.1˚C (+/- 1.6)	0.76 kWh/day (2.68 W/L/Day) Av. Temperature -19.9˚C (+/- 0.7)
C. Energy and Temperature Performance at -24˚C set point	0.92 kWh/day (7.13 W/L/Day) **22.67% more energy than at the -20˚C set point** Av. Temperature -27.9˚C (+/- 1.4)	0.91 kWh/day (3.20 W/L/Day) **19.74% more energy than at the -20C set point** Av. Temperature -24.2˚C (+/- 0.6)
D. Energy and Temperature Performance at -26˚C set point	1.00 kWh/day (7.75 W/L/Day) **33.33 % more energy than at the -20˚C set point** Av. Temperature -30.1˚C (+/- 1.4)	
E. Energy and Temperature Performance at -28˚C set point		1.12 kWh/day (3.94 W/L/Day) **47.37% more energy than at the -20C set point** Av. Temperature -28.6˚C (+/- 0.6)

Figure 2. Freezer performance at different set temperatures.

Discussion

Compared to their larger ultra low temperature (ULT) cousins, lab freezers do not use high amounts of electricity. However, lab freezers vastly outnumber ULTs. Therefore, the ability to set the freezer to a ‘warmer’ -20˚C will have a significant effect on energy consumption across an organisation. Furthermore, it must also be highlighted the energy saving from warming up any lab freezer will also reduce its heat output. In turn, this would reduce air conditioning costs. These savings in energy will result in a reduction in their associated carbon emissions and the associated tax (currently at £18 per tonne).

Therefore, although simple, just by procuring a freezer where you can easily set and control the temperature is a wise choice. Such a choice allows the laboratory to implement better practice and to take another step in the sustainable direction.

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For further information on this study, paybacks for your specific usage or lab sustainability in general please contact office@greenlightlabs.co.uk, 07833 494727

For more information on the range of freezers featured in this study please visit

www.scientificlabs.co.uk