

The Replacement Scheme

The University's Estate Support Service (ESS) sees laboratory cold storage as a key target for energy savings. Older -80°C freezers can consume more than 20,000 kWh – and cost over £2,000 a year to run. Near the end of the 2008/9 financial year, the University's Pro-Vice-Chancellor and Executive Board Portfolio Holder for Sustainable Development, Professor Tony Stevenson, was able to allocate £180,000 to a replacement programme. Cara Tabaku, the Assistant Energy Manager, Steven Hogg, a Purchasing Officer, and technical managers from the Medical Sciences Faculty worked together – within very short timescales - to plan and deliver the project. Although energy savings were the main aim, additional considerations included easing floor space constraints (by replacing chest freezers with upright models) and improving reliability.

Departments were asked to 'bid' for replacements via a simple online form which asked for the type, size and age of their current fridges and freezers. 1219 units were proposed, 512 of which were over 10 years old. Based on this initial survey, the team assessed the energy consumption, initial purchase cost, space requirements and technical suitability of replacement options, and obtained quotes from a range of suppliers. 12 suitable, energy efficient, models were selected from two preferred manufacturers: Biocold for fridges and -20°C freezers and New Brunswick Scientific for -80°C freezers. Bulk purchasing reduced the cost premia over less efficient models.

Sample energy consumption data was gathered by metering a range of existing fridges and freezers. The metering was generally done by technicians, with support from Estates. The results suggested that -80°C freezers would have the best payback, so project funding was focused on replacing 36 of these which were more than 10 years old. In most cases this was with a New Brunswick U725-G model, which costs £527 a year to run at the University's then rate of 9.5p per kWh. The result was a reduction from an average annual consumption of 9,349kWh to 5,548kWh, producing a cost saving of £361 per annum per unit.



Clare Rogers, Director - ESS

Key Points

- Newcastle University's -80°C freezers cost up to £2,000 a year to run, with an average of £1,100
- £180,000 was used to replace 36 -80°C freezers over 10 years old, saving 136,836 kWh of energy and creating additional space and reliability benefits
- Old -80°C freezers may have three times or greater energy consumption than current, efficient, models, which cost £525 a year to run
- Replacing older units with 50% greater consumption than energy efficient models gave a payback of 7 years, even at 9.5p per kWh
- Further savings are achievable by consolidating smaller units and replacing fridge-freezers (which are generally less energy efficient than single purpose units)

S-Lab Case 5 – Energy Efficient Cold Storage

Key Benefits

Carbon and cost savings – The University reduced annual electricity consumption by 136,836 kWh, saving £12,999 of expenditure and CO₂ emissions of over 70 tonnes. If the programme had been purely focused on energy efficiency, and replaced freezers with 50% or higher consumption than replacement models, the payback would have been 7 years, even at Newcastle’s relatively low rate of 9.5p per kWh.

Reduced space requirements – chest freezers are intrinsically more energy efficient than upright ones because cold air is relatively dense and does not escape so quickly when a door is opened. However, they do require up to twice the floor space and so replacement by very energy efficient uprights is beneficial when space is constrained (as in several Medical Sciences labs).

Medical Science benefits – the school would eventually have to replace aging freezers and fridges, and so has avoided a future cost. The risks of losing invaluable stored materials through breakdown rise as equipment age. Users now have brand new equipment, produced to modern laboratory standards (e.g. spark proof), and with valid warranties in case any problems do occur.

Additional saving possibilities

A project to replace the 370 fridges and -20°C freezers which are over 10 years old is now under consideration as part of the University’s Carbon Management Plan. Estimates suggest that a further 30,000kWh of energy, almost £14,000 of cost savings, and space benefits could be obtained by consolidation of existing – 80 freezers into fewer, larger and more energy efficient, models. The potential is even greater with -20 freezers and fridges. (Equipment with under 200 litres capacity, and dual temperature fridge-freezers, use significantly more electricity per litre capacity than larger, single temperature units).



Bob Nicholson, Technical Manager,
Institute for Ageing and Health

Views

“This was an excellent opportunity for the University to make immediate financial and carbon savings. This programme was relatively simple to administer, provided a range of benefits, and was popular with research teams.”
Clare Rogers, ESS Director

“This was a fantastic initiative that benefited all, with a reduction in overall long term costs to the University, and a number of new reliable freezers for the Institute that are environmentally friendly with lowered running costs. It has also set an important benchmark for all future freezer purchases within the University.”

Bob Nicholson

“The exercise showed just how much energy is used in older freezers and fridges compared to new ones – a threefold difference in the worst case! There’s also a big difference in energy efficiency between the best and worst models available today.”

Cara Tabaku

Further Information – www.goodcampus.org; saveit@newcastle.ac.uk

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