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DRYING CABINETS, OLD VERSUS NEW

DEPARTMENT OF CHEMISTRY, UNIVERSITY OF CAMBRIDGE

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INTRODUCTION

Drying cabinets are an essential item of equipment across the chemical and life sciences. However, what was overlooked until recently was the design of these units and how much energy they consume.

This report will highlight the savings that can be made by replacing the older design drying cabinets with a more energy efficient, modern unit.

THE TRADIONAL DRYING CABINET

The design of the drying cabinet commonly used over the last 30 years hasn't really changed. Units tend to consist of a metal box, a hinged or sliding glass door, a heating element and dial to set the temperature from 1 to 10. With zero insulation these units become very hot and consume a lot of energy.

Figure 1. The older design of drying cabinet.

The energy consumed by a drying cabinet is remarkably high. In fact 'pound for pound' or to be more precise 'litre for litre' a drying cabinet at 70C will use up to ten times the energy of an Ultra Low Temperature (ULT) freezer set at -80C! The Chemistry Department at the University of Cambridge had 36 of these units.

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The 36 drying cabinets in the Department of Chemistry were heavily used and left on 24/7. After measuring their energy consumption it was calculated that these units were using 137,041 kWh/Year

and generating close to 49 tonnes in carbon emissions annually. At 10p per kWh and at £18 per tonne of CO2 that's an annual cost of **£14,565**. To reduce these running costs a new range of units was developed by Genlab.

OLD VERSUS NEW DRYING CABINETS

The new range of drying cabinets developed by Genlab were named the 'E3' range and they aimed to correct the old design drying cabinets, producing a more energy efficient unit which was safer and easier to use (Figure 2).

Design Feature/Range	'Old' Design Drying Cabinets	'New' E3 Drying Cabinets
Insulation	**None** – Surfaces become very hot, unsafe to tough. High energy consumption. Higher HVAC costs.	**Insulated** – Both the control panel and chamber are insulated with natural materials. The doors of the larger units are also double glazed. Safe to touch and energy efficient. Lower HVAC costs
Temperature Setting	**Dial** – Numerical dial 1-10 made setting the exact temperature challenging, internal conditions could be too hot for contents (plasticware and tips).	**Digital** – Temperature can be precisely set to 0.1C to suit the contents being dried.
Temperature Control System	**Simmerstat** – Basic controller with poor temperature accuracy and variability at set point.	**Microprocessor** – Heating element is finely controlled, temperature is held accurately. Improves energy efficiency
Temperature Display	**None** – External monitoring is required to know what tm	**L.E.D.** – Temperature is clearly displayed.
Programmability	**None** - Units must be switched off manually or an external timer must be used.	**7 Day Timer** – Unit will only be on when it's required.

Figure 2. Old drying cabinet design features versus the new E3 models.

REPLACING THE OLD UNITS

The 36 old units were replaced with 33 of the new E3 units. By utilizing the programmability of the E3's, replacement units were only on 12 hours a day, off on weekends and public holidays. By combining the unit programmability and energy efficiency the electricity consumed was reduced by over 80%. It must also be noted that further savings would also be made as calculations on energy

savings employed the E3's being used at the 75C set point which was a higher temperature compared to what the older units were being used at.

When including the cost of the new units and the removal of the old units the payback of this project was under **3 years and 3 months**. Given that the average life expectancy of a drying cabinet is 15 years, 12+ years following the payback period the department will have saved over £130k in electricity. With regards to carbon emissions the current annual savings would be over **38.6 tonnes.**

Figure 3. The E3 drying cabinet (200L model).