

A Study of Energy Efficient Laboratory Freezers and Refrigerators Available on the Market

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Introduction

In a research intensive university like McGill where there is innovative research using a large number of DNA and/or RNA specimens, long term storage of such material can be extremely costly and damaging to the environment, especially if the storage requires the use of freezers. It is important to educate and inform members of the McGill community of more environmentally friendly and energy efficient methods of long term storage.

New technology is currently on the market that allows specimens to be stored at ambient temperature; however, until this technology is used on a wide scale and researchers learn to trust its ability to properly store the specimens, freezers will continue to be purchased for storage. This presentation provides important information on more energy efficient freezers and refrigerators that are on the market today, with an emphasis on Ultra Low Temperature (ULT) freezers due to their high energy demands.

Although the common concern among researchers is that energy efficient freezers carry an initial financial burden; this presentation demonstrates that energy efficient freezers are more financially sustainable in the long term.

Ideally, researchers at McGill will prioritize energy efficiency and turn to the information on brands and models presented here when choosing a model of freezer for purchase in the laboratory.

Methods

- Energy usage, freezer/refrigerator capacity, and freezer/refrigerator dimensions information were gathered from brochures supplied by the companies or those that were available online.
- Freezer pricing data was obtained from quotes provided by the companies.
- Energy consumption data was provided by McGill Building Services Utilities and Energy Management.

References

Domestic Medical Systems, (18 Feb., 2011). <<http://www.domestic.com/en/lu/Europe/Luxembourg/Medical-Systems/>> (visited 10, January, 2012).

New Brunswick Scientific, (2012). <<http://www.nbsc.com/home.aspx>> (visited 13, January, 2012).

Sanyo Biomedical, (2012). <<http://en.ca.sanyo.com/Biomedical/>> (visited 3, February, 2012).

Thermo Fisher Scientific, (2012). <<http://www.thermofisher.com/global/en/home.asp>> (visited 6, December, 2011).

VWR International, (2012). <<https://ca.vwr.com/>> (visited 14, January, 2012).

*Full page of references available upon request.

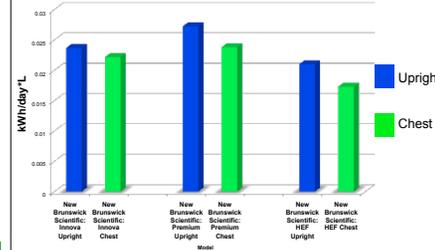
Findings

Ultra-Low Temperature Freezers

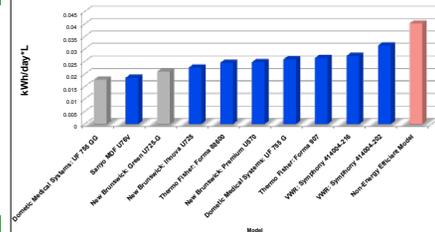
Model	Freezer Price (\$)(Approx.)	Cost to Run per Year (\$)(Approx.)	Total Cost after 15 Years (\$)(Approx.)	Total Cost in 15 Years per Litre (L)(Approx.)
VWR Symbphony ULT 22 Cu. Ft.	8 670.06	333.53	13 673.01	21.84
VWR Symbphony ULT 25 Cu. Ft.	9 903.26	333.53	14 906.21	20.65
Thermo Fisher Forma 907	11 000	355.54	16 333.10	20.60
Thermo Fisher Forma 88600	12 700	338.61	17 779.15	21.80
Sanyo MDP U76V	12 714.13	228.56	16 142.53	22.17
Non-Energy Efficient	8 095.00	483.54	15 348.10	21.6

*Note that freezer prices are approximated and subject to change based on order, and energy consumption data is estimated.

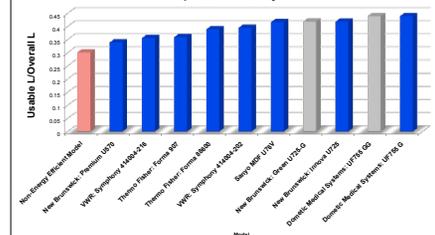
Energy Consumption: Upright Vs Chest Freezers



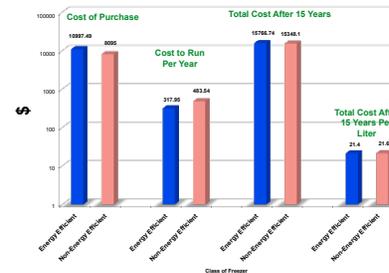
Energy Consumption



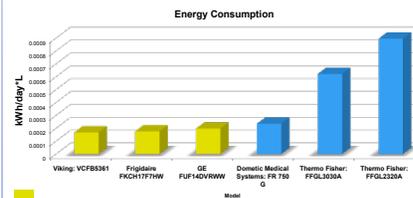
Space Efficiency



Costs: Energy Efficient Freezers vs. Non-Energy Efficient ULT Freezers

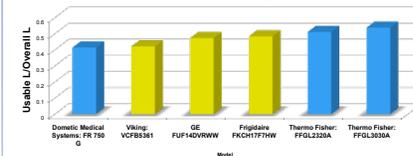


Higher Temperature Freezers (-40°C - -20°C)



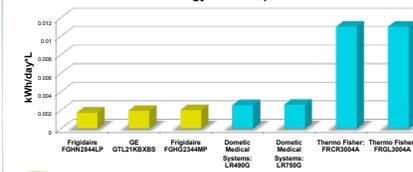
Energy Star Certified

Space Efficiency



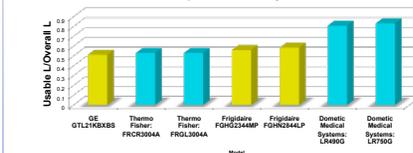
Refrigerators

Energy Consumption



Energy Star Certified

Space Efficiency



Conclusions

• When ordering ULT freezers, it is recommended that labs choose energy efficient models offered by Sanyo (now Panasonic), New Brunswick Scientific (Eppendorf), Thermo Fisher Scientific, and VWR. The companies mentioned offer lines of ULT models that are considerably more energy efficient than others on the market.

• Though energy efficient models of ULT's are initially more expensive on average, an energy efficient freezer is cheaper after 15 years of use; studies show that some freezers being used at McGill today are over 20 years old.

• Domestic Medical Systems offers a wide array of energy efficient and space efficient models in every category, however, it would not be environmentally friendly to order from this company until they have a North American distributor. The substantial costs of airfare for shipment and need to have the units properly installed, there are much more environmentally energy efficient model of freezer for the lab. With a North American distributor, this company would be the most competitive on the market in terms of energy efficiency.

• When the choice is available, it is recommended that labs purchase a chest freezer rather than an upright freezer. It is shown here, using New Brunswick Scientific freezers as a model, that using a chest freezer can cut energy consumption by anywhere from 6.3 to 17.6 percent, which can save up to \$110/year in energy costs. Similar results can be expected with other brands.

• If every lab in McGill started storing their biological specimens in energy efficient units today, McGill could save up to an estimated \$200 in energy costs per freezer by May, 2013.

• If every lab in McGill started storing their biological specimens in ambient temperature storage today, McGill could save up to an estimated \$500 in energy costs per freezer by May, 2013.

• A recent survey showed that many McGill labs use Frigidaire or GE appliances. When purchasing a -20°C freezer or refrigerator, labs should choose those that have been Energy Star certified. Though they were not the most space efficient, the most energy efficient models shown here were Energy Star certified.

Acknowledgments

I would like to thank the McGill University Faculty of Medicine for the opportunity of being involved with this project, the Sustainability Projects Fund of McGill University for funding the project, all companies mentioned here for their cooperation, McGill Procurement, McGill Building Services Utilities and Energy Management, and Dr. Marianna Newkirk and Dr. Christian Iantzis for their help and guidance.