

REFRIGERATION

– Keeping your cool as energy prices rise

Refrigerators and freezers account for 60% to 70% of supermarket electricity use. Improving the efficiency and reducing the load on your refrigeration plant in balance with your other equipment will not only save you money, it will also improve its reliability and reduce the likelihood of a breakdown.

If you wish to reduce the cost of running your refrigerators and freezers, it is important firstly to understand your energy use in the context of your whole store. All of your equipment is inter-related, so improving the efficiency of your refrigeration system will not save energy if it means another piece of equipment has to compensate. For example, switching off the cold air return on your refrigerators may mean that your air conditioning system has to work harder. Therefore, considering the system and interrelated impacts across your whole store is key to achieving and maintaining energy savings.

Common refrigeration and freezer inefficiencies

Controlling the amount of hot and cold air entering and escaping your premises is key to reducing your energy use and maintaining the quality of the products you sell. Reducing or preventing large temperature changes means that your low (freezer) and medium (chiller) temperature plant and equipment does not need to work as hard, saving you energy and money.

Common examples of practices that can lead to refrigerator and freezer inefficiencies include:

- Locating open fronted cabinets close to drafts where the movement and mixing of air can draw out the cold air (this increases energy use by up to 95%)
- Positioning cabinets in warm areas and/or in direct sunlight
- Over-stocking and over-filling, which can reduce cold airflow around products and impair the system's performance
- Blocking the grills in multi-deck cabinets, forcing cold air into the shopping aisles and making the plant and equipment work harder than necessary
- Leaving products to be loaded into refrigerator and freezer cabinets in a warmer environment prior to stocking. This introduces unnecessary heat into the cabinets (and potentially spoils the products)
- Taking a long time to load stock, meaning cabinet doors are left open and cool air escapes
- Pre-programming more defrosts than are needed for frozen food cabinets.



How to save money by increasing equipment efficiency

Here are 11 ways that you can cost-effectively improve the performance of your fridges and freezers:

1. Correctly stock display cabinets to maximum fill lines.
2. Seal all air leaks and check that all insulation is in good condition and free from damage.
3. Regularly maintain and clean equipment components (such as evaporators and condensers) to ensure maximum airflow.

4. Check for and seal all refrigerant gas leakages and maintain the optimum refrigerant charge for your equipment.
5. Investigate installing low rises, air curtains or doors to open fronted chilled display cases to reduce heated air infiltrating the system and/or cold air losses.
6. Install radiant heat reflectors to reduce heat gains in open top freezer cabinets.
7. Install and use night blinds on open fronted cabinets when the store is closed.
8. Reduce other heat gains into open cabinets by introducing dry, clean air into your store. This will also help reduce condensation and frost formation, reducing defrost cycles and improving the temperature stability of products.
9. Set compressor condensing temperatures as low as the system will allow.
10. Install a floating or variable head pressure control valve to align the condensing temperature with ambient or outside temperatures and set your compressors to run under summer conditions.
11. Replace thermostatic expansion valves (TEVs) with electronic expansion valves.

If your system is having to be regularly serviced and is at risk of frequent refrigeration leakage, you may wish to investigate installing a new system, that is more efficient and does not use high cost refrigerants.

Success story

Bottle King, Pascoe Vale

Bottle King, located in Pascoe Vale, Victoria installed a number of simple off-the-shelf plug-in timers to seven fridges as part of Zero Carbon Moreland's [Fridge Timer Assessment Project](#). The timers were set to turn the fridges off at 11.15pm and back on at 8.30am. Costing less than \$20 per fridge to install, Bottle King recouped their investment in the timers within two months and are saving \$950 per year (based on an average of \$135 per year for a single glass door fridge).

Cost	\$
Benefit	☺☺
Simplicity	✓✓✓

Would you like to know how to save energy and money running your non-perishable drinks fridges? Installing a simple manual timer can save you between \$140-\$200 per fridge, per year on your electricity bill and up to 2 tonnes of carbon pollution per fridge every year.

The business case – refrigeration set points

Different types of food need be stored at specific temperatures to meet certain food safety standards¹. You know that you cannot store perishable products at temperatures higher than those recommended, but did you know that overcooling food products above the required levels results in unnecessary electricity use? The recommended temperature for storage of different food types is given below:

- Meat: 2°C
- Dairy: 4°C
- Fresh produce: 8°C
- Freezer products: -18°C

Cost	\$
Benefit	☺☺
Simplicity	✓

Every 1°C rise in the set point temperature of your refrigeration system can save you up to 2.5% in refrigeration costs. As the use of correct storage temperatures for food is extremely important you should contact your refrigeration supplier or maintenance contractor to discuss what effect changing the temperature will have on your energy consumption.

¹ CSIRO Food Safety - <http://www.csiro.au/en/Outcomes/Food-and-Agriculture/Food-Safety.aspx>

Standard 3.2.2 Food Safety Practices and General Requirements,

http://www.pir.sa.gov.au/_data/assets/pdf_file/0009/163575/Standard_3_2_2_FS_Practices_and_Gen_Requirements_v1131.pdf

More information

For further information about how to improve the energy efficiency of your refrigeration and freezer plant and equipment, including an action planning checklist, refer to **Section 4.1** of the Handbook.

Cost	\$ = lowest cost (payback < 2 years), \$\$ = payback is between approximately 2 and 3 years, \$\$\$ = highest cost (payback > 3 years).
Benefit	☺ = lesser energy efficiency (< 10% overall savings), ☺☺ = between 10 and 15% energy savings, ☺☺☺ = greater energy efficiency (> 20% energy savings).
Simplicity	✓ = requires external/technical expertise, ✓✓ = can be undertaken in-house but may require some external expertise, ✓✓✓ = can be undertaken in-house.