

COMMERCIAL REFRIGERATION

Many small businesses are finding their niche in the growing food service industry. Refrigeration is a critical component of these businesses. Perishable product must be stored and served at safe temperatures while cold food and drinks are good sale items.

The energy component of your total operating costs may be small (typically 3–8%) but a significant proportion of this cost — perhaps more than half — can be used by refrigeration. The energy management practices outlined in this brochure can help you reduce this energy consumption and save you money.

Efficient energy use will also help reduce greenhouse gas emissions and conserve Australia's resources.

ENERGY MANAGEMENT : KEY TO EFFICIENCY

For small business to be competitive, it has to extract value from every dollar. Your energy bill may not be large compared to labour and product but worthwhile savings can be made if you purchase the right equipment and operate it efficiently. The basic principles of energy management can be applied to the refrigeration needs of any small business:

- **Determine exactly what your refrigeration requirements are**

These are usually defined in terms of quantities and type of product, required storage temperatures, and the speed at which product needs to be cooled. It's also important to distinguish between product which must be stored under refrigeration (perishables) and items which are simply sold cold as a convenience for customers (eg, canned drinks).

- **Select the most energy efficient option to deliver the required performance**

Take into account running costs when making your decision — if a more efficient unit has a higher purchase price, energy savings will usually pay for it.

- **Operate and maintain the equipment to ensure optimum performance**

Manage stocking so that the refrigeration system is not overloaded. Pay particular attention to cleaning and maintenance to ensure that the heat transfer capacity of your equipment is not reduced.

Defining Requirements The refrigerator's job is to remove heat from the product and release it into the surroundings.

- The warmer the product, the harder the refrigerator has to work to get it to the desired temperature
- The warmer the surroundings, the harder there refrigerator has to work to get rid of heat from inside

To define the refrigerator's job you need to know:

- how much product you'll have
- what temperature it will be when you put it in
- what temperature it has to be cooled to
- how quickly it has to be cooled
- how often you'll put in new product

You also need to be aware of new food safety standards being adopted by the Australia New Zealand Food Standards Council. This sets out requirements for general food safety programs in any food business. This information will enable a refrigeration specialist to work out the size and capacity of your refrigeration system. This, in turn, will determine

how much energy you'll use and therefore how much you'll pay. Should you switch off the lights? Many businesses use the lights in their glass-door fridges as security lighting.



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However, this can be more effectively provided by compact fluorescent lamps. But before you switch off the fridge lights to save energy, make sure you can switch them back on again — many fluorescent fittings won't restart at low temperatures and special fittings are expensive.

COOL ROOMS

Cool rooms are usually purpose-built by a refrigeration specialist. Many incorporate glass doors so that customers can see and select products for themselves.

Managing Cool Rooms

- Minimise the work the cool room has to do. Ensure that product is promptly transferred to the cool room after delivery. If stocks of non-perishable product are stored outside, keep them as cool as possible and certainly out of direct sunlight.
- Plan the use of the cool room. Keep it closed for as long as possible after stocking to allow the temperature to stabilise. Take cold product out in batches rather than constantly open and close the door for one or two items. Consider a smaller holding refrigerator for product you need through the day.

Energy Saving Tips

- Close the doors when you enter and leave the cool room. Hinged doors are usually self-closing but sliding doors may have to be closed by hand. If there's a lot of traffic in and out of the cold room, plastic strip curtains or swinging doors are essential.
- Lighting adds to the heat load. Ensure that lights are only used when necessary and switched off automatically by sensors or timers.
- Keep the finned coil unit inside the room clean. If dirt collects between the fins, the unit will need to be cleaned by a refrigeration mechanic who has special tools and cleaning agents. The unit sometimes has to be disconnected and taken outside for total cleaning.



REFRIGERATORS

When buying a refrigeration unit, make sure it is suitable for Australian conditions. Some units are designed for Northern Hemisphere ambient temperatures or for use inside air conditioned supermarkets — not 30°C plus! Solid doors are better insulators than glass doors and are a better choice if product doesn't have to be displayed. Every time the door is opened, cold air is lost and the storage temperature starts to rise. Minimise door openings by planning product usage. The outside air that enters also contains moisture which collects on the evaporator coils as frost, reducing the effectiveness of heat transfer ... hence the need to defrost regularly. Refrigerators should not be overstocked. Cold air needs to circulate freely around each container or item. This is especially important when warm product is first put into the fridge so that its temperature can be reduced quickly. Restocking at night is usually a good idea because the fridge can work without interruption to cool the product.

Should you switch off overnight?

If you're storing hazardous or perishable foods, this is obviously not a good idea. However, products such as canned drinks aren't at risk. A simple timer can turn off the fridge at closing time and switch it on a few hours before you open so that you have cold drinks to sell. Whether this will reduce energy consumption depends on the balance between what you save not maintaining the low temperature overnight and the energy you need to cool the product down again. Whether or not you save money also depends on the tariff you're on — off-peak electricity (over night or at weekends) is cheaper.

Managing Refrigeration

- Ensure your refrigerator is earning its keep. Position it where customers can see your stock and easily take what they want. Only stock the products that sell. Your weekly turnover will tell you how much refrigeration space you really need — one fridge with a good turnover makes more sense than two which are half full of slow-moving items.
- Look at shelf spacing to maximise storage space and place fast selling items at eye level.

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Energy Saving Tips

- Do not place your fridge in a hot area (eg, near cooking equipment or other sources of heat such as electric motors). Avoid placing it near a window in direct sunlight or against a north-facing external wall.
- Open-front cabinets rely on an air curtain to stop cold air escaping. Don't place them in drafty areas or near air conditioning outlets which will disturb the curtain.
- Make sure exposed condenser coils are clear of walls (10 – 15 cm of space) so that air can circulate freely. Avoid stacking cartons or anything around the refrigerator that will impede air flow.
- Keep condenser coils clean — layers of dirt, dust, cobwebs, etc, reduce the amount of heat that can be transferred to the surroundings.
- Check that the door seal is adequate. When the door is closed, it should be able to grip a piece of paper. If the paper slides easily the seal is worn or damaged and needs to be replaced. Make sure you check all the way around the perimeter of the door.
- Make sure your fridge remains frost-free. Ice is an insulator and build-ups greater than 4 or 5 mm will reduce efficiency.
- If your fridge is running continuously (or starts making a different noise), it's probably not operating efficiently and needs to be looked at by a refrigeration mechanic.

Food Safety

Product is stored under refrigeration for three reasons:

- to keep potentially hazardous foods safe for consumption (eg, meats, dairy products)
- to extend the storage life of perishable goods (eg, fresh fruit and vegetables)
- to enhance sales (eg, drinks and confectionary) South Australian Food Hygiene Regulations require that food be stored at temperatures which will "preserve it from deterioration".

New ANZFA Food Safety Standards will include strict conditions for the storage and display of food which is defined as "potentially hazardous". This type of food must be stored under "temperature control" to minimise the growth of micro-organisms and prevent the formation of toxins. Temperature control usually means keeping food at or below 5°C or at or above 60°C unless you can prove that storage at temperatures between these limits will not adversely affect the microbiological safety of the food. The storage life of perishable goods (fruit, vegetables, and flowers) can be extended by refrigeration. The recommended temperatures range from 6–10°C for beans and potatoes to 0–5°C for fruits and flowers. Many canned and bottled items can be safely



stored at room temperature and are only refrigerated to be sold as cold food and drinks.

The important point for the business is how much you sell. Don't waste energy and money by refrigerating product that doesn't sell.

Temperature

Check cabinet temperatures and make sure the thermostat is operating correctly. Typical operating temperature for a refrigerator is 3 to 4°C and -18 to -20°C for a freezer. Check this with a thermometer. Too high a temperature compromises food safety; too low wastes energy — every degree below the temperature you really need adds 2 or 3% to your energy bill.

FREEZER

A freezer, of course, is just a special type of refrigerator which can reach lower temperatures. Along with the product, any moisture in the air will also be frozen. Ice can then build up on the evaporator coils and reduce efficiency. Freezers therefore incorporate automatic defrost features.

Managing freezers

- Ensure cold air can circulate freely around products when they are first frozen. When they are completely frozen, they can then be stacked closer together for longer term storage.

Energy Saving Tips

- Watch for ice build-up on evaporator coils. If this occurs, the defrost function needs to be adjusted by a refrigeration mechanic.

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SMALL FRIDGES

Many businesses have a need for small refrigerators and the obvious solution is to go out and buy a domestic unit. Here, the best advice is do what you should do at home — buy the one with the best Star Rating. Refrigerators are tested under standard conditions to establish their typical energy efficiency and consumption. The results are published on a label which must be clearly displayed on each unit. The Star Rating labels shows:

- The relative efficiency of the appliance in terms of the number of stars with five currently being the highest
- The expected annual energy consumption of the appliance when used according to a standard pattern.

Many small bar fridges have low Star Ratings: a four star fridge might cost \$50 more than a two star fridge but it would only use 270 kWh a year compared to 380 (a saving of 30% in running costs each year).

Larger models of domestic refrigerator are unlikely to be suitable for commercial use. They don't have the capacity to regularly cool large quantities of product or maintain holding temperatures with frequent door openings.

COMMERCIAL COOKING

Commercial Cooking and cooling are the two complementary processes of the food service industry. Cooking applies heat; refrigeration removes it. Coordination of these processes is an important feature of energy management. Refrigerators which store product should be located close to where it is cooked for the sensible management of work flow. However, hot conditions will affect the performance of the fridge and you need to take this into account when deciding on a position. In some operations, a smaller "working" fridge which holds enough product for one cooking session might be appropriate. Cook/chill is a process suitable for large scale food preparation and storage. Food is prepared in the same standard Gastronorm trays and pans which can be taken from the oven to the refrigerator or freezer for storage and back again to the oven for reheating. Look for the Commercial Cooking brochure in the Business Energy Saver series.

FOR FURTHER INFORMATION AND ASSISTANCE

Please note that the information in this brochure provides general guidance only. Energy and therefore cost savings very much depend on the particular appliance and how it is used and maintained. Actual data and expected savings should be sought from your equipment supplier.

For more information about Food Safety Standards, contact the Australia New Zealand Food Authority (ANZFA) in Canberra: phone (02) 6271 2222, fax (02) 6271 2276, or visit www.anzfa.gov.au.



Where can I get further **energy efficiency** advice?

Log on to the *Energy Division* website for information and advice through the 'Advisory - Residential' links @ www.energy.sa.gov.au

Call our **Energy SA Advisory Service** on 8204 1888 (Freecall™ for country callers 1800 671 907)

email us at energy.sa@saugov.sa.gov.au



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