

Bring quiet, advanced power and space saving refrigeration closer to your cabinets with stylish compact Emerson ZX condensing units

Save big on energy, space and installation costs!

That's the idea behind Emerson's ZX refrigeration condensing units

Now you don't need a specialised refrigeration plant room, or to chop up your floor to get the world's most efficient compressor and full electronic energy management controls driving your refrigeration.

The ZX range of compact condensers is designed to mount easily on exterior walls or on suitable roofs. They can be clustered together or mounted close to the cabinets they drive. No space wasted on plant rooms. Placing them close to the cabinets can eliminate expensive trenching and the extensive piping required to get the refrigeration to the cabinets.

This makes ZX condensers especially useful for convenience stores and small to medium sized supermarkets that are tight on space and want the maximum reduction in their electricity bills.

The ZX range of condenser units is compact, slim and elegant and designed to be mounted on walls.



Refrigeration plant room on a wall! ZX units save valuable space. Here they are seen clustered neatly together.

Copeland scroll compressors under the hood

The secret at the heart of the ZX's power saving ability is the Copeland scroll compressor inside.

Fitted with liquid and vapour injection technology, these Copeland scrolls have a much better refrigeration cycle resulting in shorter running times. They are also less affected by high ambient temperatures with a much flatter performance curve than piston compressors. This enables smaller capacity, less power hungry units to be employed than would piston compressors.

Ask your refrigeration contractor about the benefits of using Emerson ZX condensers in your store. Or call your local branch, or Rodney Taylor or Jaco Steyl at Metraclark, Emerson's agents for Southern Africa.

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Adding to the ZX's efficiency is the latest electronic technology. This continuously monitors the system and controls functions such as fan speed, liquid / vapour injection and faults. And ensures it operates at its most efficient at all times. It also transmits an alarm if the unit has a fault such as a clogged condenser coil before it shuts down enabling a technician to be called. Error codes enable the technician to immediately identify the problem and start fixing it.

The smooth rotary action of the Copeland scroll compressors results in a very quiet operation and less noise on start-up. This, together with a sound proof jacket, makes the ZX unit extremely quiet and ideal for use in built-up areas, eliminating complaints from neighbouring residents and institutions.

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Save energy and reduce costs before it's too late

By LAURA DURHAM

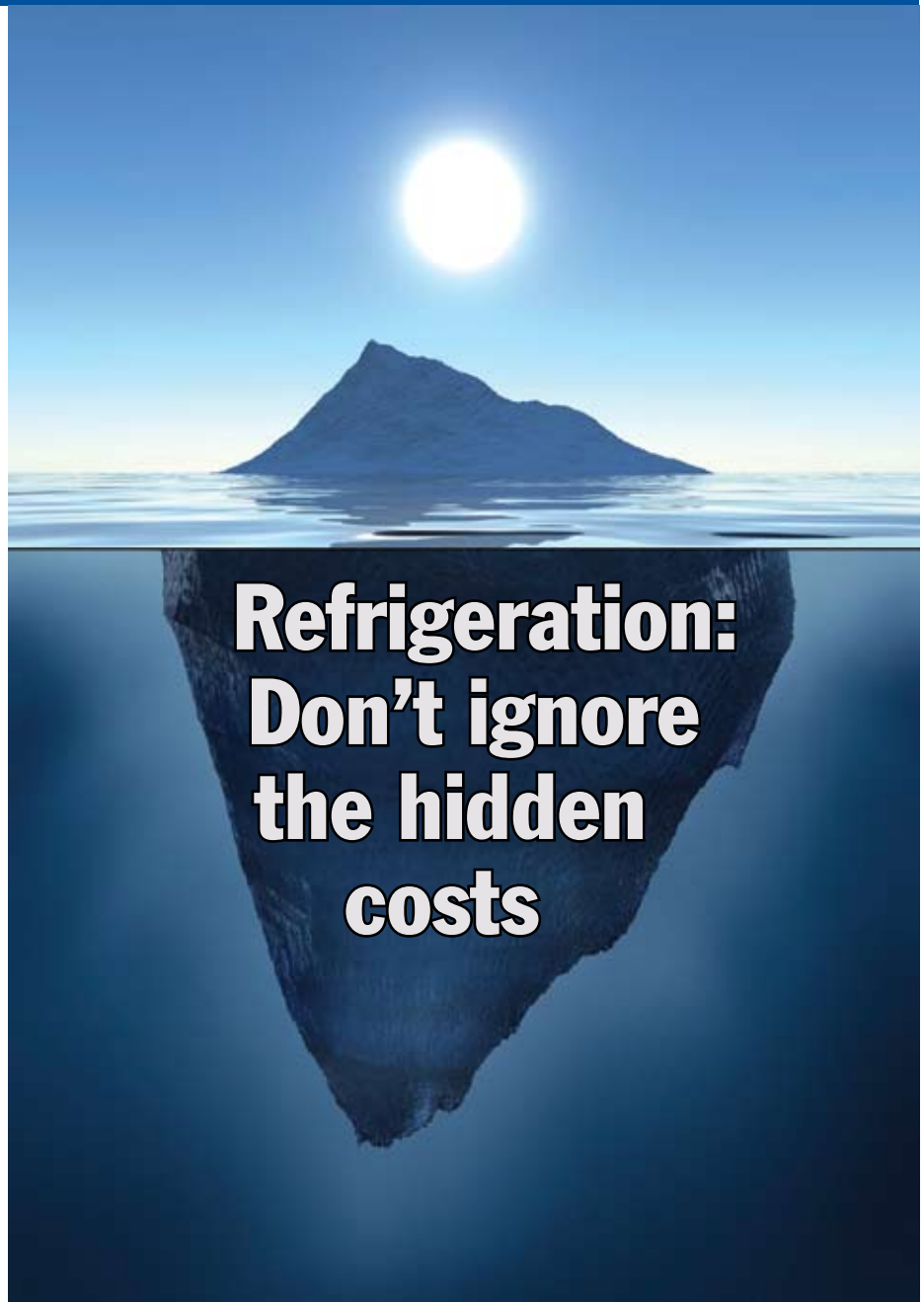
The costs of running a store may seem to be spiralling out of control, what with staff regularly demanding higher wages, fuel and food increases and, of course, Eskom's price hikes (set to rise again in July). Reducing energy costs, particularly in refrigeration – the highest contribution to the bill – is no longer just a good idea, it's vital for a store's survival in an increasingly competitive trading environment. *Supermarket & Retailer* spoke to a number of experts about how retailers can start reducing their refrigeration cost today.

It's time to cut costs

The tough economic climate has forced many retail groups to re-evaluate the way they do business, with a particular focus on cutting costs, especially when it comes to electricity use. "However, many companies make the mistake to think that once they've installed a solar geyser or switched to energy efficient light bulbs, they've done as much as they can," says Asanda Makanda, MD of energy saving consultancy, MaNoa.

But this couldn't be further from the truth – conservative estimates show that most businesses are paying between 10%-30% too much for their electricity, money that's literally being poured away when it could add to their bottom line," she adds.

There is a number of power saving interventions available on the market for retailers to consider. Most can be used in conjunction with existing equipment to improve efficiency and reduce energy demand, while others require some serious Capex. But while the initial capital outlay of these may seem daunting, the resulting



savings and efficiencies are well worth it in the long run.

Existing units

One way to reduce energy consumption on an existing refrigeration unit is to introduce electronic control systems, says Rodney Taylor, marketing manager at Metraclark. This involves fitting electronic expansion valves to cabinets, rack controllers to multiplex units and installing a monitoring unit or store controller. Cost restrictions might mean that retailers have to make their current equipment more efficient, such as fitting an electronic control system but most new equipment comes standard with such a system.

An energy management system could save up to 20% of energy costs, says Roy Singh, technical and development director

at The Fridge Factory. This automatically monitors and adjusts the temperature a few hours after the door has not been opened to save electricity and the day-mode temperature is re-activated when the door is opened. Additional benefits of the system include: shutting down the lights at night; slowing the speed of variable speed drive compressors when demand is low; optimising the defrost cycle duration and reducing the amount of heat required for defrost in the cycle.

The life cycle of a refrigeration plant is based on quality of equipment, maintenance and proper use, "but if it is looked after properly, you could probably get 10 years out," says Taylor. Of course, outside factors such as the moisture at the coast that leads to rust, will also play a big part in the expected life cycle. ►

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New equipment options

■ Scroll compressor

The latest compressor technology is the scroll compressor, which uses a different technology altogether. "This results in a much more efficient compression process," explains Taylor.

■ Variable speed fans and compressors

You can also fit variable speed fans and variable speed compressors, which effectively matches capacity to demand. There is therefore no power surge from 0 to 100% as in a stop-start process, resulting in huge power savings.

■ Electronic expansion valves

You should also fit electronic expansion valves, which provides greater efficiency than older types of thermostatic expansion valves. Electronic expansion valves react instantly and precisely to changes in cabinet demand for cooling.

■ Floating suction pressure

The suction pressure set point varies according to the demand from the refrigeration showcases. "The algorithm identifies the critical units that require higher performance from the compressor rack and control is adjusted accordingly," explains Maurice Robinson, sales manager at Carel Controls SA. In this way, the compressor rack consumes no more than necessary at any given time, completely automatically.

■ Anti-sweat heaters with self-adaptive algorithm

The anti-sweat heaters are controlled with a variable duty cycle. Output is carefully adjusted according to room temperature and humidity and the unit glass and frame temperature. In addition, says Robinson, a special algorithm is available to estimate the glass temperature and the dew point: this means heater operation can be adapted to current conditions without having to install other probes on the refrigerated showcases.

■ Multiplex plant

Replacing a simplex, one cabinet / one compressor refrigeration plant with a multiplex plant is a no-brainer. With a multiplex plant, you are able to accurately

match capacity to demand, and should one compressor be out of order, the cabinets can still rely on the rest of the compressors in the plant. The cost reduction in switching from simplex to multiplex would depend on the size of the plant.

■ Skip defrost

Unnecessary defrosts can be avoided based on the duration of previous defrosts. The duration of a defrost depends on the amount of ice formed on the coil, and based on the previous durations and other fine-tuning parameters, up to a maximum of three consecutive defrosts can be skipped.

■ Night curtains

Night curtains are placed on the refrigeration cabinets and the retailer pulls them ►



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down or over the fridges at night in order to reduce the amount of energy the refrigeration needs to expend in order to keep the temperature at the required degree. If no cold air is escaping, then the refrigeration unit doesn't need excessive power wattage to keep operating.

■ Digital scrolls

Digital scrolls are an emerging technology in Europe (not in SA yet) that is far more efficient than any other compressor when using to match capacity and demand as there is no need to vary speed (which becomes an issue of lubrication and vibration). The compressor runs at a constant speed and capacity is reduced by simply opening and closing the scroll set. Before, a variable speed drive was necessary – a costly addition and a further source of possible inefficiency – but digital scrolls yields this unnecessary.

■ EVI technology

There are a number of energy saving initiatives taking place around pre-cooling either the condenser or the liquid line. Electronic Vapour Injection (EVI) pre-cools the refrigerant before it goes into the

cabinet, effectively gaining more capacity from the same cabinet. This greatly improves the Coefficient of Performance (COP) of the refrigeration plant. A cooler refrigerant has a much bigger cooling effect in the fridges and that means the fridges require less refrigerant to get the same

cooling effect. Needing less refrigerant also means that smaller diameter pipes in the fridges are required – another cost saving. EVI technology enables a smaller capacity compressor to achieve the same result as a larger capacity compressor, due to the efficiency of the compression process.



Traditionally, self-contained or plug-in cabinets were limited to smaller displays, such as ice cream at the check out. However, plug-ins are now a real option for regular cabinets in the rest of the store. Ultimately the decision is based on cost, capacity and efficiency.

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The power from the top (sealing to cabinet) with a flexible power pole allows the retailer to move the self-contained units at any time to a new location without having to open existing trenches in the floor to remove the drains and the copper piping that is used to feed the gas to the cabinet from the outside plant room.

"Switching to EVI does call for a slight increase in capital cost but this is offset by the reduction in the cost of compressors," Taylor explains. EVI is not yet the standard *modus operandi*, but it is certainly gaining ground as people realise the benefits.

Choosing the right refrigerant

In a cascade system, one refrigeration system is used to cool a second system.

This is useful when the second system utilises a refrigerant that cannot operate under normal ambient conditions. An example is the use of one system on R134a and the second system on CO2.

The Fridge Factory's Roy Singh says that when replacing units, hydrocarbon models should be substituted for the electricity guzzling HCFC refrigerators. "Hydrocarbon refrigerants can give electricity savings of

up to 15%," he says. Hydrocarbon refrigerants R290 or R600a are far more efficient than R124a and R404 because the refrigerant begins working at a lower temperature, so the components do not have to work as long or as hard to achieve and maintain the required requirements. Additional benefits include reduced maintenance costs – "as a direct result of the increased efficiency of the refrigerant, the compressor and other components have an extended lifespan adding long-term cost savings on maintenance," explains Singh. Also, less refrigerant is needed to do the same job, such as only needing 150g of hydrocarbon refrigerant as opposed to 420g of R137a in a standard 720l bottle cooler. Hydrocarbon refrigerants are also biodegradable.

Cabinet and display decisions

The fourth level of choosing energy smart refrigeration solutions is cabinet choice. David Earle, national marketing and sales manager at Just Refrigeration says that there are a number of factors that retailers should consider. Apart from the aesthetic appeal, functionality is very important. Are you able to fill the cabinet from the back ▶

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Semi-automatic appliance defrosting – a perfect system!

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The block of flats principle forces retailers to replenish with fresh product more often without compromising variety of product

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(e.g. cold beverages)? Is its capacity adequate for your needs (do your suppliers expect numerous product facings)? And, ultimately, how visible is the merchandised product?

Opting for a glass door cabinet is much more efficient than an open display, from which huge amounts of energy disappears. This waste of energy is also a waste of money for the retailer. "An open cabinet acts as an air-conditioner in a store as the chilled air is directly expelled into the atmosphere, while a closed cabinet does not allow the ingress of warm air, and therefore saves a huge quantity of electricity," explains The Fridge Factory's Roy Singh. An open cabinet also absorbs moisture, which creates ice-build up, which reduces efficiency of the working components.

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Apart from the aesthetic appeal of a cabinet, functionality is very important. Are you able to fill the cabinet from the back (e.g. cold beverages)? Is its capacity adequate for your needs (do your suppliers expect numerous product facings)? And, ultimately, how visible is the merchandised product?



The first step to reducing energy costs is to identify which equipment are your big energy users. By making a small improvement in an area that consumes a lot of energy, like heating/cooling/ventilation, lighting or refrigeration, you will achieve a larger impact on the bottom line than a small improvement in an area that doesn't consume much energy.

"Many retailers are looking for compact narrow displays that optimise the expensive retail space and reduce rentals," explains Ian McSweeney, owner of Catercare. Compact displays reduce the amount of display space but this helps to reduce wastage of food product not sold. "The block of flats principle forces retailers to replenish with fresh product more often without compromising variety of product. Stainless steel is definitely the contemporary look today and often come standard with LED lighting, which reduces energy consumption, as well as lights up the food with a more natural light than grey fluorescent standard lighting," he says.

Another factor to consider when choosing cabinets is humidity. "Humidity in hot or cold units allow the retailer to hold food longer without drying out," explains McSweeney. In cold units, fan speed and humidity are critical to the product quality. For example, a cake would dry out in a day in the wrong environment. The health regulators in South Africa are on a mission to enforce temperature control at a minimum of 68°C for hot units and a maximum of 18°C for cold units.

Self-contained versus remote refrigeration cabinets

Debates between remote and self-contained (or plug-in) cabinets have raged for decades but the decision is ultimately based on cost, capacity and efficiency.

Nic Visser, MD of AHT Africa says the benefits of plug-in cabinets are numerous. Firstly, there is the capital cost saving, as well as building cost savings in landlord costs because no drains or trenches, or even a plant room are required. Plug-in cabinets also have flexibility on their side as they can be moved any time in-store. "There is also reduced installation time on site, resulting in earlier opening dates so the turnover is realised sooner against investment," he says.

However, there are also disadvantages with plug-in cabinets. The cabinets tend to consume more energy than remote ones, increasing the in-store heating and as a result, air-conditioning requirements increase too. Plug-in cabinets also emit more noise pollution and volume capacity for merchandise is generally lower than remote cabinets. Although Visser does point out the AHT cabinets have a lower energy consumption rate than most, as well as a greater capacity than most remote ones.



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The right light

Introducing LED lighting can offer up to 15% in electrical savings, according to The Fridge Factory's Roy Singh. "LEDs emit less harmful UV light so products last longer and the lighting is 50% brighter than a standard fluorescent tube," he says. Fluorescent tubes also contain mercury, the environmental harm of which is permanent, which means that the glass cannot be recycled.

"LED's use significantly less power than traditional light sources, has a low power consumption and heat emission, as well as a low maintenance cost," explains Just Refrigeration's David Earle. He adds that there is a direct correlation between the LED product's ability to dissipate heat and the lifespan of the LED. Also, a high quality LED product still needs to be fitted correctly.

Exceeding maximum draw

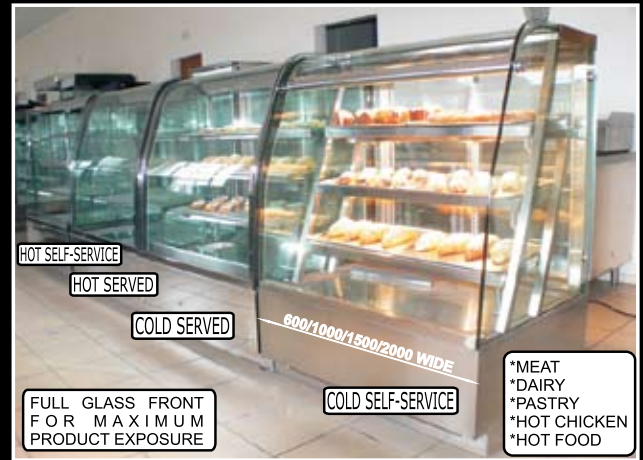
No retailer wants to exceed maximum draw at any time as this results in heavy penalties to be paid to the local municipality. There are various ways to ensure that this does not happen. Firstly, the ►

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One way to reduce energy consumption on an existing refrigeration unit is to introduce electronic control systems. This involves fitting electronic expansion valves to cabinets, rack controllers to multiplex units and installing a monitoring unit or store controller.

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retailer must assess the store's peak time of day (e.g. 8am). He must then make sure that nothing goes on defrost at this time as this is one of the most power hungry processes in refrigeration. Switching off unnecessary lights and utilising a sequence start are also good measures to put in place.

Identifying on what and how much you are spending on electricity is the first step to cutting your energy costs. Any cost-cutting drive takes planning and commitment and MaNoa's Asanda Makanda, offers the following guidelines of a cost-cutting project:

- **Build a team** with representatives from across your business. Their varied input will help you decide which energy saving measures are most important and secure their buy-in.
- **Know** what equipment are your big energy users. By making a small improvement in an area that consumes a lot of energy, like heating/cooling/ventilation, refrigeration, or lighting, you will achieve a larger impact on the bottom line than a small improvement in an area that doesn't consume much energy.
- **Audit** your energy costs. You can do a walk-through audit or call in the experts for a computerised analysis.
- **Equipment** – It's quite possible that you'll be able to save 10% or more by ensuring your heating, ventilation and air-conditioning (HVAC) equipment is working efficiently. Think about switching off equipment when you're not using it, changing temperature settings or upgrading to a more efficient system.

- **Building** – The building you're in has a major influence on the efficient working of your HVAC system. When it operates effectively, limiting heat losses and gains, you'll use less energy.
- **Hot water** - Lower temperature settings, fixing hot water leaks and using heat recovery systems are all ways to control energy.
- **Tariff** – Check with your electricity provider to make sure your company is on the correct tariff for your area and the type of business you're in. Call in the experts to help negotiate on your behalf.
- **Examine** your store's energy use and costs. A supermarket, for example, spends quite a portion of its total operating expense on electricity. A well thought out plan can help cut energy costs by up to 20%. 



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