

# ENERGY EFFICIENCY

## Saving power adds up

# 07

Straightforward advice to help vehicle repairers get ahead in today's business environment

Are you paying good money to pump 20–50% of your compressor output into thin air?

Did you know that every 100 kPa reduction in operating pressure saves you 8% on energy costs?

You can reduce your energy bills by looking at your:

- air compressors
- fans, motors and electrical equipment
- heating, ventilation, air conditioning
- lighting
- equipment purchasing policy
- electricity supply contract

A reciprocating air compressor is probably the best match for the needs of an automotive workshop



### AIR COMPRESSORS

Air compression is a big energy demand that firms often overlook: safe, reliable and versatile air compressors – and their costs – are often taken for granted. But a well-designed and maintained compressed air system is more energy efficient and can save businesses thousands of dollars a year, as well as reducing greenhouse gas emissions.

#### Smart choices

- **reciprocating compressors** can be a good choice for automotive workshops: their piston design makes them ideal for intermittent use throughout the day. Although they are usually the most expensive to buy and install, they are the most energy-efficient air compressor, especially where they need to operate at part loads
- **screw compressors** are usually the cheapest to buy and install if you need a bigger air compressor, but they lose efficiency rapidly at part load unless they have variable output: they can use up to 60% of their full load power demand when idling

- variable output compressors can match power and drive speed to varying air demands, reducing energy consumption under part load and making big savings
- choose a compressor that is the right size for your needs, to keep it running as close as possible to full load. Don't install an oversized compressor to meet anticipated future demand: it is nearly always more economical and efficient to install an additional compressor later, when you actually need it
- also consider other factors like noise and heat dissipation in making your final choice – some compressors can be noisier than others and this can affect staff

#### Smart maintenance

Air leaks from hoses, joints and tools can account for 20–50% wasted output from your air compressor – but you can easily fix this:

- look for leaks:
  - shut off equipment and radios, then listen for hissing sounds
  - spray air pipes with soapy water and look for bubbles!
  - if there are no leaks, your air compressor should not need to run once it has reached the specified pressure
- your staff will be the first to know if a leak has developed or system pressure is inadequate, so keep management and shop floor talking to each other
- train and educate staff in the importance of leak detection and repair
- put in place a monthly maintenance programme for detecting and repairing leaks
- fixing leaks can be as simple as tightening connections or replacing faulty pipes and fittings

Every 100 kPa reduction in operating pressure saves you 8% on energy costs\*. Once you have repaired all leaks, you may find you can reduce your air compressor pressure, as it no longer has to compensate for pressure drops across the system. Properly matching the pressure supplied to the system requirements in this way will save more power and money.



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### Smart tips

Other quick fixes to save energy and money on your compressed air system:

- if the temperature of your air intake is too high then you may be wasting energy. Every 3°C reduction in inlet temperature will reduce your energy use by 1%, so duct your fresh air from outside, preferably from a cool, shady area
- install a control system on your air compressor to match supply to demand. Use the controls to turn compressors on and off as needed rather than leaving them running; or if you have several air compressors, to choose the most efficient one for a given job. As well as saving on energy costs, switching equipment off when not needed will cut back on maintenance and servicing costs
- don't use compressed air for tasks like drying, which a fan can do more cheaply
- educate staff about the costs of compressed air: encourage them to turn equipment off, and provide alternative systems for other tasks
- regularly blow down air receivers and drain condensate and oil from the system (remember to shut off the blowdown valve)
- put air compressors as close as possible to the end use, to minimise energy losses from the distribution system

### FANS, MOTORS AND ELECTRICAL EQUIPMENT

Lack of maintenance may be wasting energy in areas you hadn't thought of. Set up a regular inspection and maintenance system for all your workshop equipment, for example:

- clean pumps and fans to ensure maximum efficiency
- keep drive belts in good condition and correctly aligned
- if the bag filter in your spray booth has holes, your fan will be working harder than it needs to. Replacing the filter(s) will not only prevent air pollution but will reduce your energy costs as well
- noisy or vibrating fans or pumps may be inefficient – fixing them up will save you money – and your employees' sanity too!
- electric motors are power-hungry, so only buy motors that meet your needs
- when buying a motor, consider its operating costs: the ongoing savings from an efficient motor will rapidly pay back the initial capital cost over its operating life

- rewinding motors is common practice, but every time a motor is rewound its efficiency is reduced by about 3%. For a 30 KW motor, this equates to an additional \$150 on your running costs each year, so after a while it may be better to buy a new high-efficiency motor instead of rewinding the old one
- turn off equipment when not in use. Simple!

### HEATING, VENTILATION AND AIR CONDITIONING

- reduce heat losses and gains by insulating pipes, ducts, roof spaces and walls
- keep excessive sunlight out of your workspace with awnings or blinds, or by double glazing or tinting windows
- think before you turn on the air conditioner – open a window or door instead
- buy the right-sized conditioning unit for the area and activities
- regularly clean or replace filters on all air conditioning units
- put air conditioner thermostats away from sources of heat like direct sunlight or photocopiers to avoid false readings – these are common in offices where people are constantly complaining about being cold
- get expert advice on the right mix of outside to inside air, to avoid the need for excessive heating or cooling

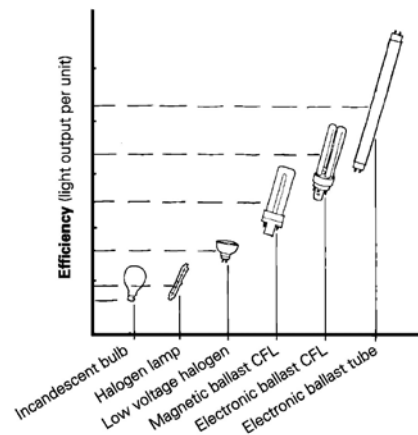


## LIGHTING

Lighting is an easy place to save money and make a real contribution to the environment: many homes and workplaces use more lighting than they need. You can make some big savings in your power bills and capital costs without compromising performance by upgrading the design of your lighting system:

- use natural light where you can – for example, by installing translucent roofing panels that reduce lighting needs during daylight hours – you can avoid over-heating of workspaces by buying panels that reflect most infra-red radiation while admitting a large proportion of the visible light (white and cream opaque panels give the lowest heat transmission to light transmission ratio – temperatures under white or cream fact sheets are much lower than under clear ones)
- light-coloured ceilings, walls and floor coverings will also reflect light, further reducing the number of artificial lights you need
- well-designed north-facing windows, skylights and light tubes reduce the amount of artificial lighting required, without adding to summer heat and winter cold
- where you need higher light levels for detailed work, illuminate it with a separate light or lamp rather than lighting the whole workshop
- install a lux meter as a control system in your lighting circuit: it measures light intensity and automatically turns lights on or off as needed over the day
- clean light fittings regularly so they give out maximum light
- install timer switches or sensor controls in areas such as lunchrooms or storerooms so that lights automatically turn off when not needed
- use energy-efficient lights in workshop areas, like metal halide or high-pressure sodium lamps: they put out more light than standard mercury vapour lamps of the same wattage, so you will need fewer of them (be aware, however, that high-pressure sodium lamps will produce a yellower light than metal halide lamps, so don't use them in areas where colour identification is important)

Use the graph below to assess the energy efficiency of various types of lighting for offices and amenities.



Source: [www.yourhome.gov.au/technical/fs45\\_2.htm](http://www.yourhome.gov.au/technical/fs45_2.htm)

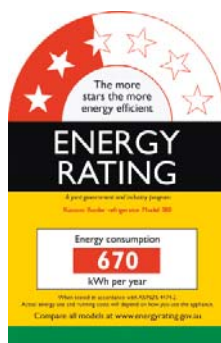
Incandescent bulbs are the least energy efficient type of lighting, while fluorescent lamps are the most energy efficient for applications where lighting is required for long periods of time.

Compact fluorescent lamps (CFLs) can replace incandescent light bulbs as they are usually designed to fit into conventional bayonet or screw fittings:

- installing reflectors behind fluorescent tubes improves lighting, with typically a 2 to 2.5 year payback because of the reduced number of tubes you will then need. Several different fluorescent lights are available: newer ones are generally lower wattage and therefore more energy efficient, but may need different fixtures than the older styles, so factor this capital cost into your calculations
- all fluorescent lamps, both older magnetic and the newer electronic versions, need a ballast to start them. Electronic ballasts are more expensive but are much more energy efficient: they start the lamp more quickly, produce less flicker and last longer. The fittings are the same, so you can replace your old magnetic ballasts with new electronic ones

## YOUR EQUIPMENT PURCHASING POLICY

- when you are buying workshop or office equipment or kitchen /lunchroom appliances, look at the energy rating to give you an idea of its future running costs: the model with the cheapest purchase price may not necessarily be the cheapest model over a 10-year running period
- consider not only how much energy a piece of equipment uses when it's operational, but also how much it uses in standby or 'sleep' mode
- buy 'Energy Star' equipment like computers, printers and photocopiers. They automatically enter a low power mode after a period of inactivity and can save \$30–\$50 a year per computer on your power bill



## YOUR ELECTRICITY SUPPLY CONTRACT

Ask your energy provider to:

- examine your existing consumption and determine which tariff is best for you
- work out your power factor and determine the cost/benefit of installing correction equipment: if your power factor is poor, the payback on the correction equipment can be less than 3 years. The power factor (usually expressed as a percentage) is a measure of how effectively a customer utilises electricity. The closer a power factor is to 100% the better, since more of the supplied electricity will be used to perform useful work
- check your power distribution boards for excessive heat load: many factory fires have been started though excessive heat build-up

Encourage your energy provider to maintain and expand their use of renewable energy sources.



## FIND OUT MORE FROM

- your local sustainable business network [www.sustainable.org.nz/](http://www.sustainable.org.nz/)
- Christchurch City Council's Target Zero programme [www.ccc.govt.nz/targetzero/](http://www.ccc.govt.nz/targetzero/)
- EECA, the Energy Efficiency and Conservation Authority [www.eeca.govt.nz](http://www.eeca.govt.nz)
- Emprove, EECA's business energy management programme [www.emprove.org.nz/](http://www.emprove.org.nz/)
- the Enviro-mark™ certification programme [www.landcareresearch.co.nz/research/sustain\\_business/enviromark/](http://www.landcareresearch.co.nz/research/sustain_business/enviromark/)
- The Natural Step [www.naturalstep.org.nz](http://www.naturalstep.org.nz)

### Reference

- \* SEDA, Energy Savings Manual – Your Profitable Business Strategy, 2000 (SEDA is now part of the New South Wales Department of Energy, Utilities and Sustainability (DEUS))

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