REDUCE YOUR CARBON
REDUCE YOUR COSTS

A PPS Guide:

10 WAYS TO SAVE ENERGY & REDUCE THE CARBON FOOTPRINT OF YOUR COMPRESSED AIR SYSTEM

PPS Pennine Pneumatic Services Ltd
Compressed Air Specialists

NW NORMAN WALKER
Compressed Air Specialists
A Division of PPS Ltd

COMPCON
Compressor Consultants
A Division of PPS Ltd

Introduction

Typically compressed air accounts for **12% of the total energy** costs for industrial manufacturers – and may be as much as **40% in some cases**.

When a business is looking to reduce their carbon footprint and reduce their energy costs – optimising the compressed air system can make a huge difference.

This guide takes you through **10 areas** that can improve your bottom line and reduce your environmental impact.

1 Fix your air leaks

A major source of wasted energy and unnecessary cost in most factories, air leaks have various causes, from corrosion holes to damaged seals and poor pipe connections. Whatever the source, they will be costing you money.

One **3mm hole** in your compressed air pipework could cost you between **£500-£900** a year, depending on your compressed air system and the pressure it runs at.

You can stay on top of this with a regular program of leak detection and repairs.

PPS customer example

A plastic recycling firm spent **£809.35** to detect and repair 16 air leaks, this saved them **£15,356.97 per year** on their compressed air energy bill (based on a price of £0.12/kWh). Their application uses a lot of electricity to melt plastic and compressed air is critical to the manufacturing process.

2 Correctly size your equipment

Incorrectly sized equipment leads to headaches over wasted energy or problems with production.

When specifying compressed air equipment for your site don't be tempted to look at the kilowatt (kW) rating and buy 'like for like'. More importantly you should be assessing what flow (cfm) and pressure (psi) you need.

To avoid using more energy than is necessary over the lifetime of your compressor it is crucial to specify correctly.

A compressed air energy audit is an easy and non-intrusive way to assess the flow and pressure needed on your site. They are a free service and consist of data logging your existing compressor and equipment.

This gives accurate feedback on your compressed air demand, pressure and cycle over a set period, identifying energy costs and where savings can be made.

Data like this is crucial to help answer the question of what size compressor you need.

3 Lower your whole system pressure

For most compressors, a reduction of 1 bar in pressure (14.5 psi) could lead to a 7% saving in electricity consumption.

"A lot of mills in particular have traditionally run a 10-bar system, but 99 times out of 100 they can run at 7 bar," explains Jason Boyle, PPS Energy Control & Monitoring Manager."

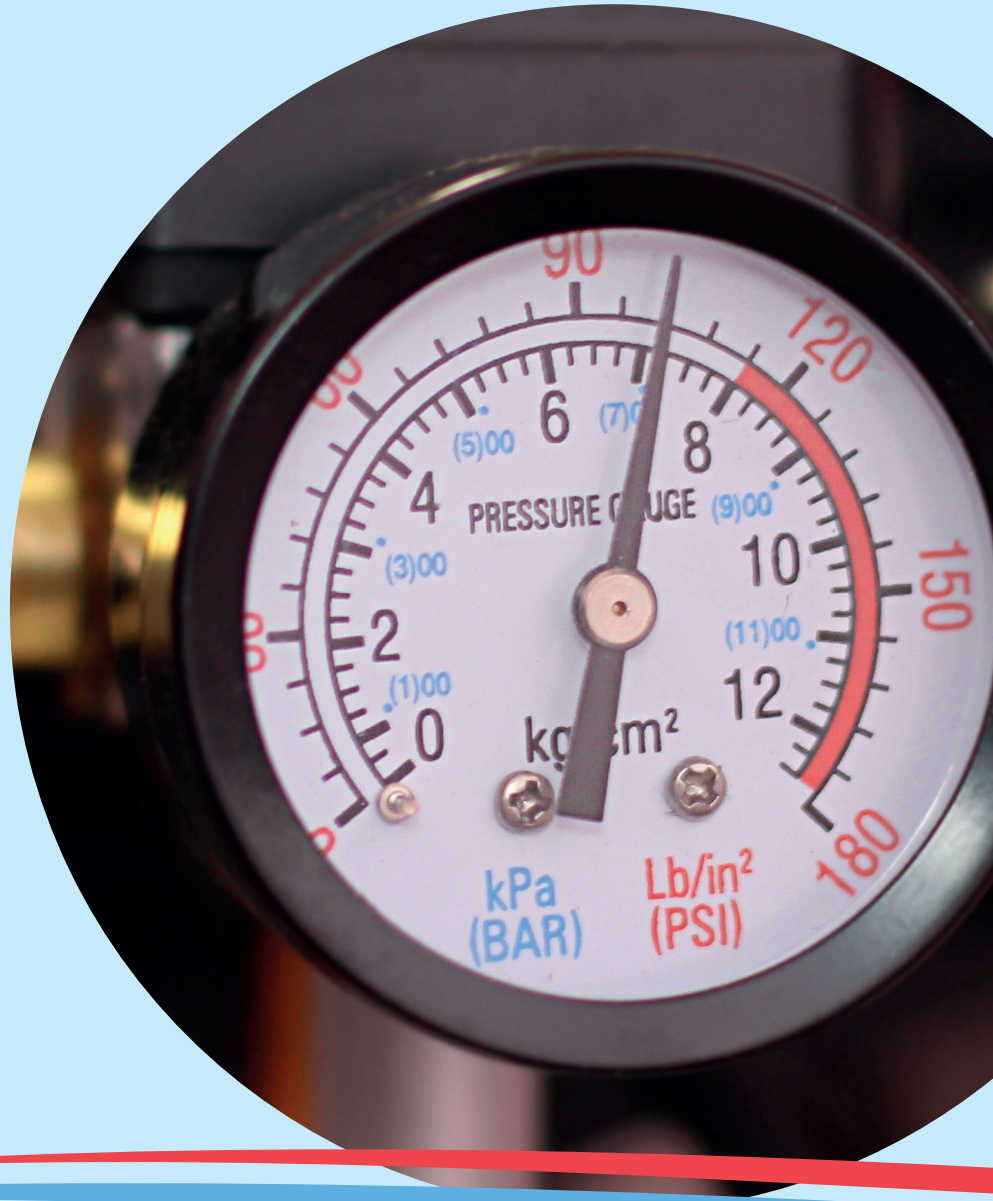
"Some customers are used to thinking they have to run a system at a particular pressure, so it's a surprise to them when we say they can reduce pressure without affecting production."

"Anyone can potentially benefit from lowering pressure, from engineering to manufacturing companies. It can save a lot of energy over the course of a year."

How low do you go?

A data log of your system will allow you to work this out. Mark Harris, Energy Audit Engineer explains:

"Using our software, we can simulate different outcomes depending on the level the pressure is set. This is usually incremental until we find the sweet spot. We won't drop the pressure by extreme amounts as we don't want to shut down the machinery by running it too low."



4 Consider a VSD compressor

Many industrial applications have fluctuating air demand. Using a fixed speed compressor for this results in wasted energy.

This is because fixed speed compressors run either “on load” where the motor is turning and producing air or “off load” where the motor is tuning and using energy, but no air is being produced.

Fixed speed compressors run like this to prevent electrical stress within the compressor.

A **variable speed drive air compressor** can deliver up to **60% energy savings** compared to a ixed speed compressor as it only produces compressed air when it is needed.

5 Modern equipment helps

Up to 80% of the total life-cycle cost of your compressor is the energy it uses, not the initial purchase price or the ongoing maintenance.

A typical site will run a compressor for **7-10 years**. At the end of that period upgrading to a modern air compressor with the latest controllers and energy efficient motors can decrease your energy costs, giving you a short payback time on the investment.

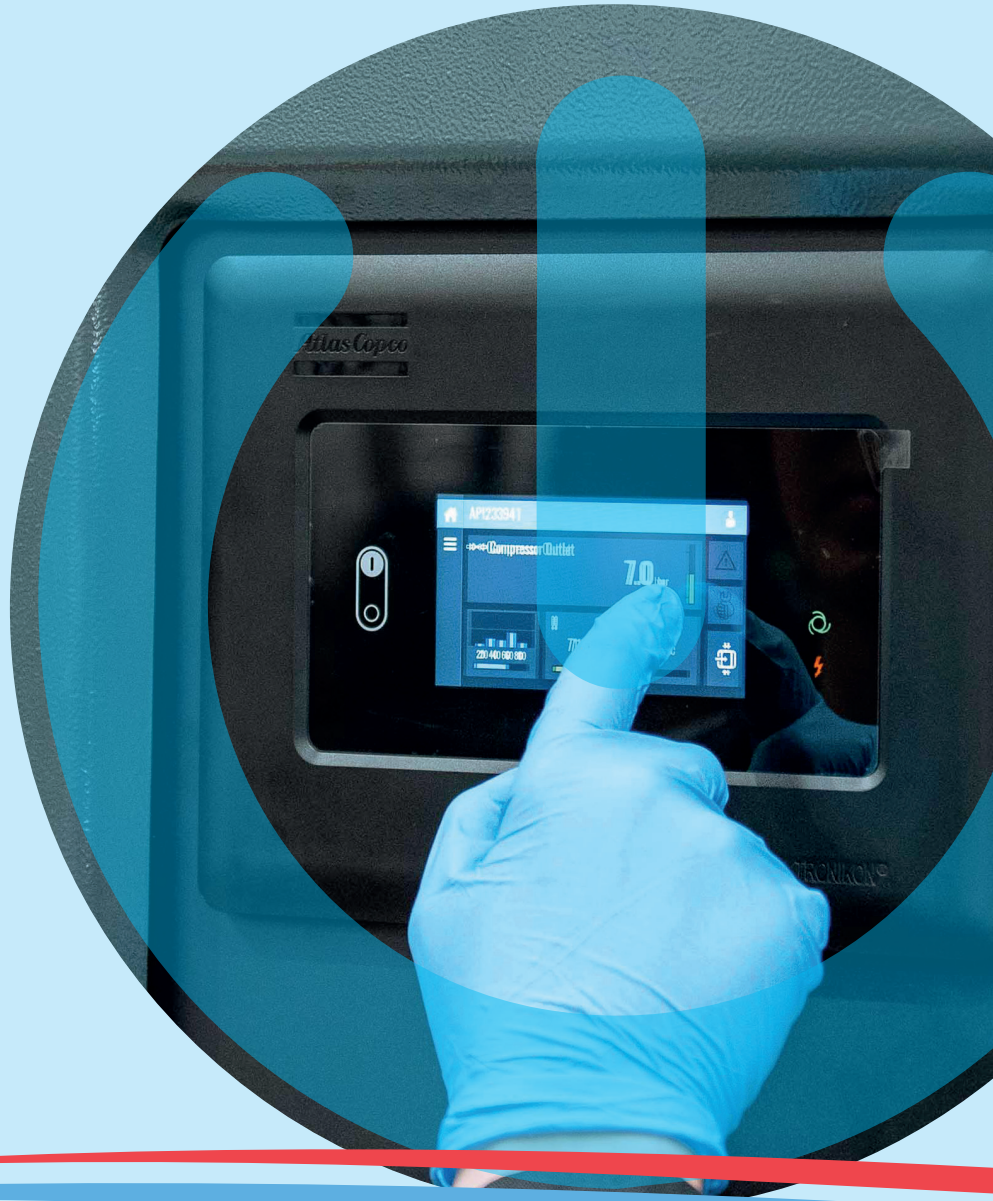
6 Focus on control

Is your compressor left running when air is not needed? A 30kW compressor can consume approximately 11kW of electricity when off load, so taking measures will save you energy – and money. There are two possible ways to save energy if this is happening:

- Delegate a member of staff to start and stop the compressor. The downside is that you have to rely on them to remember to do this.
- Install a controller, a more reliable and automatic method.

Jason explains; "If a factory has multiple machines, without a central controller, you have to 'cascade' them. This means that you must keep the overall pressure artificially higher, as the last machine in the system has to have pressure at a usable level for the process. With a central controller, it will run the system on the smallest amount of pressure required, keeping the overall pressure at the smallest level possible and reducing energy costs."

Jason adds: "There are a few different versions of controllers. With the more basic ones, you can set the order and the system will rotate the machines in sequence, regardless of size. The more advanced intelligent controllers will measure use and configure the sequence accordingly. For bigger customers with a large number of machines, it's getting more cost effective to install these."



7 Regular servicing maintains efficiency

As stated by BCAS (British Compressed Air Society), compressor output will deteriorate by more than 10% without proper maintenance. This takes into account things like:

- Changing inlet filters when necessary. Blocked filters restrict the air flow into a compressor, increasing power used by 4% and reducing efficiency (Carbon Trust data).
- Keeping coolers, radiators and ventilation grills clean and clear. A dusty site will require more frequent maintenance.
- Using OEM recommended lubricants and genuine spare parts to ensure energy efficiency and reliability.

The PPS Service team are able to advise and guide your site on the correct level of servicing needed to maintain efficiency and avoid downtime.

8 Use the energy more than once

According to BCAS only 10% of the electrical energy input to an air compressor is converted into compressed air energy. The other 90% is wasted as heat.

Approximately **70% of energy is recoverable** from oil-injected screw compressors – this comes from research done by Atlas Copco. Atlas Copco have also calculated that compressor heat recovery could **save 1.99%** of the total industrial electricity consumption in the UK.

What many of our customers have been doing is simply modifying their outlet ducting. They can discharge hot air externally during summer but then change this to a workshop or warehouse during the winter.

A tip from the Carbon Trust is that by placing a compressor in a warehouse it may provide enough heat to prevent product and packing materials (e.g. cardboard boxes) becoming damp.

A more intricate system we installed for a customer in the automotive sector involved recovering the heat from the air compressor oil system so they could pre-heat the water on the return to the boilers and shorten their burn time. It also meant they no longer had to use their immersion heater during the summer months.

9 No part too small to make a difference

It really is a whole system approach for energy saving and optimum efficiency. From the plant room to point of use there are always steps you can take, no matter how small they may seem.

Tips to improve:

- Pressure regulators are often forgotten.
  Most pneumatic equipment has two ratings; a maximum operating pressure and an optimum operating pressure, where performance is at its best. For example, installing a two-bar fixed regulator in a blowgun feed will reduce output pressure and save energy.

- Treat air locally.
  If only a few pieces of equipment require high-quality air, treat at the point of use rather than treating the whole supply.

- The type of valve.
  The type of valve you choose can affect your pressure drop and efficiency. The best option is a ball valve which has almost zero pressure drop when fully open, whereas a diaphragm or globe valve cause the highest pressure drop.

10 Don't overlook the pipework

When it comes to pipework energy savings it is more than just fixing leaks. Things you need to consider:

- **The design of your pipework system.**
  Ring main systems are your best option for minimising pressure drops. One PPS customer was experiencing pressure drop that would disrupt production in one area when another department were using large amounts of air. Introducing link lines to create ring mains throughout the system combated this effectively making their system much more efficient.

- **What is the best type of pipework for your factory?**
  Smooth bore aluminium pipe is the best from an energy saving perspective – it benefits from leakage free install, it doesn't corrode over time and it has a low friction co-efficient. It delivers the lowest pressure drop between the compressor and point of use.

- **Have you zoned your system?**
  Zoning valves are easy to install, especially on smooth bore aluminium pipework, and can drastically improve compressed air efficiency. In the following example they choose to control it via a key switch to help to protect their system.

PPS customer example
A kitchen manufacturer's full production ran on an Atlas Copco GA90 FF and two Atlas Copco GA55+ FF air compressors. While production was 7 days a week, only one process ran at the weekend. The installation of remotely controlled zoning valves meant they could run their weekend work on just one Atlas Copco GA55+ FF. This made the system much more efficient – they are only producing the compressed air they need.

Isolation valves are also useful when it comes to maintenance, as you can shut off selected sections without affecting the rest of the system.

- **Is your pipework the correct size?**
  One size does not fit all. When it comes to pipework, one size does not fit all. You may save on the initial outlay by installing smaller pipework, but this is often a false economy as it will cause a greater drop in pressure across your compressed air system.

The result will be increased energy use and higher energy bills, outweighing the cost savings of the purchase price of the pipework.

A good rule of thumb is to calculate the diameter of pipe required in the main supply line based on a maximum air velocity of 6m/s. If you have branch lines shorter than 15m, then velocities up to 15m/s can be used.

For support and advice on your compressed air energy usage, please contact:

Email: sales@pps-ltd.co.uk
Tel: 01422 321 772

www.pps.co.com/energy-saving/

Printed on recycled paper,
please recycle after use