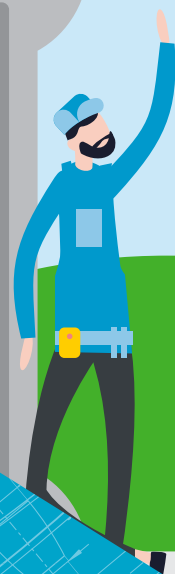
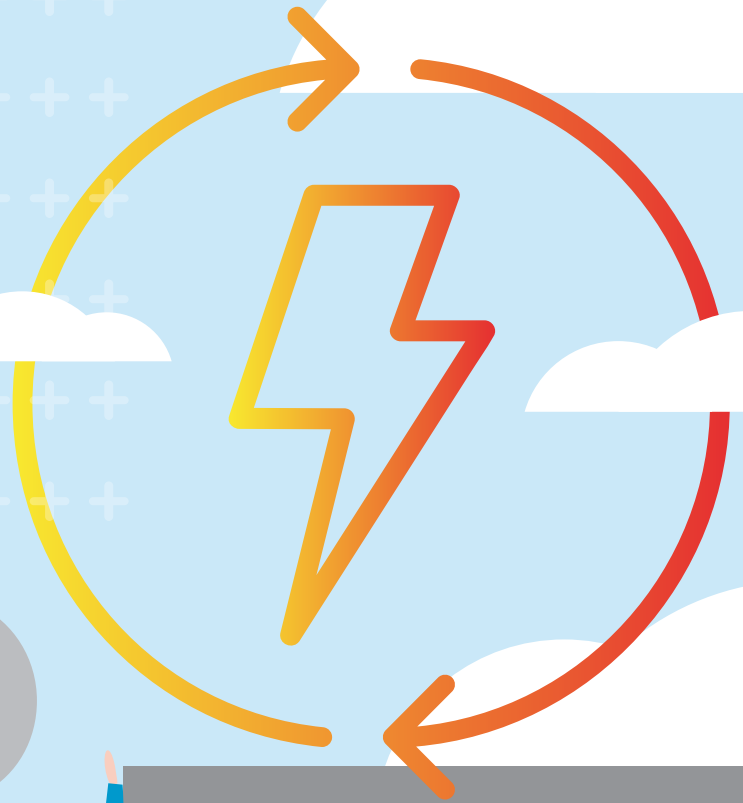


+ MORE THAN A COMPRESSOR

Atlas Copco



10 ways to make your compressor installation energy efficient

GUIDE

10

ways to make your compressor installation more energy efficient

Compressed air accounts for a significant part of total energy costs for industrial manufacturers - typically about 12% and maybe as high as 40% in some facilities. This means that any compressed air energy savings that you can achieve will have a big impact on your factory's total energy consumption and CO2 emissions. Our 10 best practice tips will help you reduce your running costs through making your compressor installation more energy efficient now and for the years to come.

1. Reduce unloaded running hours

Air demand in an industrial compressed air system typically fluctuates. Using these patterns to reduce unloaded running hours is a first step to optimising energy efficiency. Compressor controllers offer user-friendly ways to reduce unloaded running hours. If you have multiple compressors, then they should have been setup to do this automatically. But if there is no central controller, then the compressor pressure bands should have been set up in a cascade method, and the on-board controllers will stop the machines if they are not needed when the compressed air target pressure is achieved. Most Atlas Copco Elektronikon on-board machine controllers have the function of programmable start/stop timers. Our service sales teams are available to help guide you through this process.

If compressors are left running unloaded after working hours, they still use as much as 25% of the energy consumed at full load. What's more, if there are leaks in the system, the compressors may switch to loaded running occasionally, consuming even more energy.

The shorter the production time, the more you can save by switching off compressors instead of letting them run unloaded. If production is reduced but not stopped, a possibility would be to isolate areas of the factory that are not currently being used.

2. Eliminate air leaks

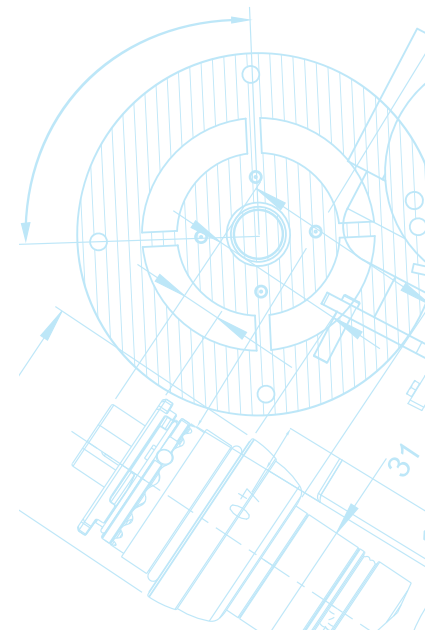
Leakages are the biggest source of energy waste in older compressed air systems, with a leakage point as small as 3mm costing an estimated £980/week in wasted energy. It is estimated that up to 20% of total compressed air consumption may be lost through leaks.

If you are still working on site and have some spare time, we recommend taking the opportunity to detect the leaks in your system. For example, you could run your air compressor with no production to check for leaks. Fixing air leaks will start to save you money immediately.

Annual cost of air leaks

Hole diameter (mm)	Air leakage At 7bar(g)		Power to air leaks ¹ (kW)	Cost of leak ² (£ year)	
	Litre/s	cfm		48hrs/week	120hrs/week
0.50	0.20	0.42	0.06	10	26
1.5	1.8	3.8	0.54	95	234
3.0	7.1	15	2.1	365	920
6.0	28	59	8.4	1460	3650

¹ Based upon 0.3kW/l ² Based upon 7.3p/kWh Source: The Carbon Trust



3. Reduce the pressure band

As a rule of thumb for most compressors, a reduction of 1 bar in pressure (14.5 psi) could lead to a 7% saving in electricity consumption. The pressure settings of the compressor should be adjusted until the lowest pressure can be reached and the pressure band reduced without affecting the applications.

For centralised systems utilising multiple compressors, by using a central controller, the network can be set to run within a narrow pressure band which ensures that the compressed air network matches your precise needs. The controller can also allow you to manually or automatically create two different pressure bands to optimise energy use within different periods, drastically reducing energy costs at low-use times.

Also, lowering the system pressure reduces the impact of leaks. A 1 bar pressure reduction decreases the impact of air leaks by 13%.

4. Turn compression heat into useful energy with heat recovery

One area that offers manufacturers a significant opportunity for savings is to recover the waste heat from air compressors. Without energy recovery, this heat is lost into the atmosphere via the cooling system and radiation. The amount of electrical energy that can be recovered depends on the size of the compressor and the running hours. Typical recoveries are between 70-94%. It is estimated that

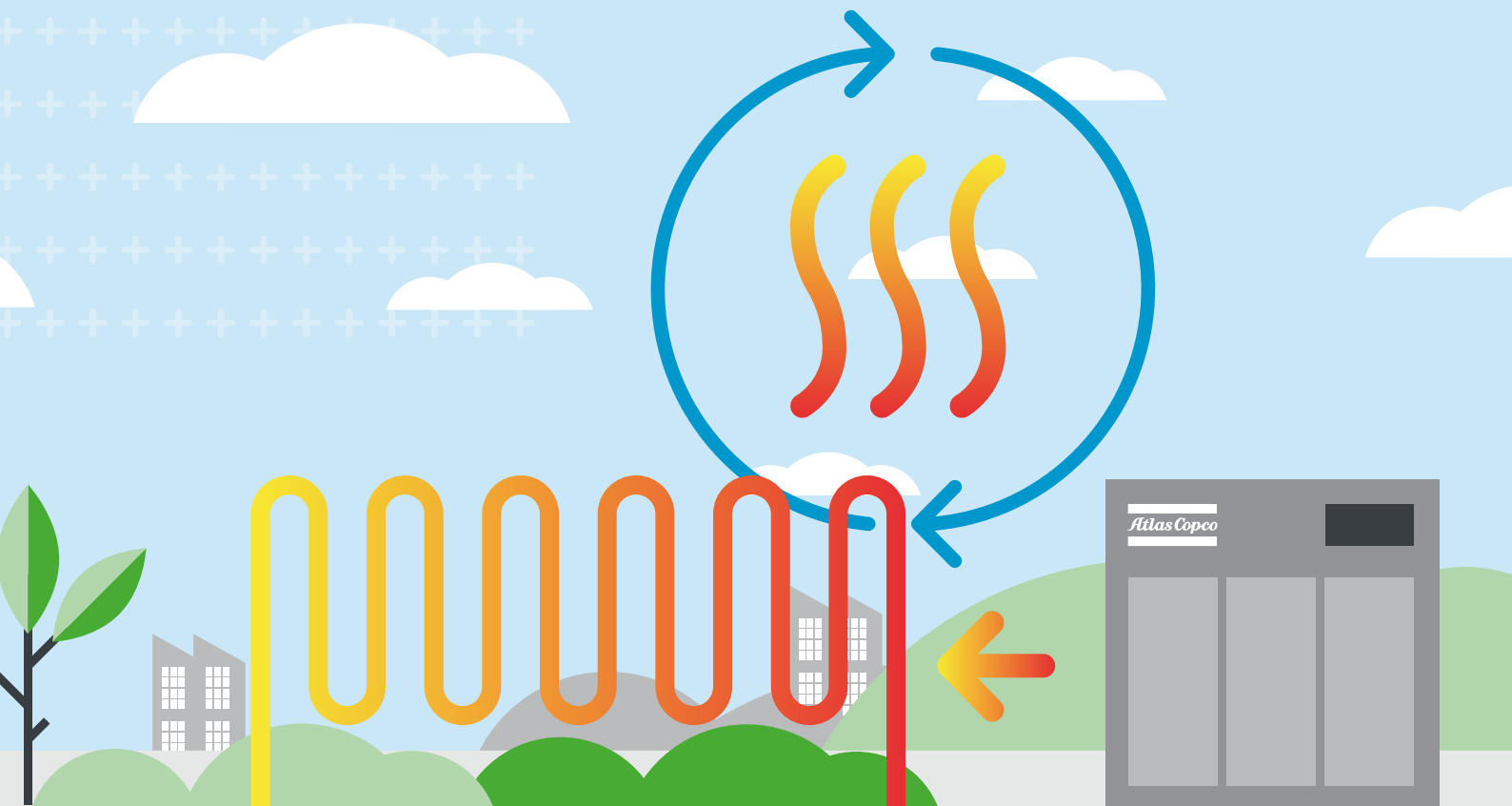
90% of all industrial air compressors used in the UK could be equipped with heat recovery systems.

Recovering heat from compressed air reduces the need for purchasing energy, for example to heat hot water or using exhausted cooling air for space heating. It is this reduction that results in lower operating costs and CO2 emissions, also reducing your carbon footprint.

To illustrate the vast untapped potential of compressed air heat recovery, it is calculated that compressor heat recovery technology could save 1.99% of the total industrial electricity consumption in the UK. If that statistic isn't compelling enough, it is the equivalent of removing the emissions from 913,000 diesel/petrol cars per year, or recovering the energy required to power 1.544 million households' electricity consumption per year. Now, if that isn't a compelling case for you to look into the possibility of compressed air heat recovery, it's difficult to say what is!

*Calculations are based on total industrial electricity consumption in the UK, and an average of 10% of industrial electricity consumption being used by compressors.

*Approximately 70% of energy is recoverable from oil-injected screw compressors, and up to 94% from oil-free water-cooled screw compressors.



5. Ensure the correct size of compressor is installed

Choosing the wrong size air compressor for your facility can lead to problems with production and or increased costs due to wasted energy. When choosing the right type of compressor, you should ask yourself these questions:

- What is the application
- How much air flow does my facility/workshop use
- What is the minimum pressure needed within the facility
- Do I need clean/dry air (use of dryer and filters)
- How many hours per year does my compressor operate
- How many shifts do I run per day
- Is there fluctuation in flow demand between shifts (if so, a VSD compressor could be a good option and offer great savings)
- Are there any plans for future expansion

Once you have answered those questions, select your compressor not based solely on the initial purchase price, but based on the one with the lowest total lifecycle costs. Since 70% of the total LCC of a compressor is spent on energy, the right choice will add up to a significantly reduced bottom line for you and your factory.

6. Ensure the correct type of compressor technology is installed

Many applications in the food and beverage, electronics, automotive, textile and pharmaceutical industries will require oil-free air to guarantee product integrity and quality (often specified as Class 0). Oil-free compressed air technology will help to avoid expensive filter replacements, cut the cost of oil condensate treatment and reduce energy loss from pressure drop in filters and, in food & beverage applications, the use of expensive food grade lubricants.

There are some extremely energy efficient oil-free compressors on the market. For example, Atlas Copco's ZR 90-160 VSD+ oil-free rotary screw air compressors offer up to 10% more output and 15% lower energy consumption compared to previous models. They even have the optional benefit of having an integrated, guaranteed -40°C pressure dew-point dryer that offers almost zero energy consumption.

If you have a very large-scale application, consider a centrifugal compressor, since these offer unbeatable energy efficiency in process air or bulk air applications presenting a flat load, or when providing a baseline flow in mixed installations with VSD screw compressors.

If oil-injected compressed air technology is your choice, the GA VSD and GA VSD+ rotary screw compressors offer an extremely energy efficient solution.

7. Consider a Variable Speed Drive compressor

Most production processes require different levels of demand in different periods, which may mean that the compressor is running off-load or idle (not producing any compressed air) for long periods of time. Great savings can be made if a fixed speed compressor can be replaced by a variable speed drive unit as it only produces compressed air as and when required. This also minimises offload running of the compressor, which is known to waste energy. A VSD compressor saves an average 35% energy and a VSD+ unit can save as much as 50% compared to a fixed speed unit, even at full load.

As a fixed speed compressor has a fixed amount of motor starts an hour, the compressor runs offload for a set time which limits the number of motor starts to ensure overheating of the motor does not occur. As a VSD unit ramps up and down in a controlled fashion, the maximum number of starts and stops per hour may be increased, and it also avoids peaks in current when starting.



8. Get an air audit

Compressed air consumption should never rely on guess work. In order to find out how to increase efficiency, the system needs an assessment or an audit.

Cost is normally the biggest difference between the two, as a simple compressed air assessment can be a complementary walk-the-line visual inspection, while an in-depth audit based on data logging can cost £1000s and take weeks or months to complete, depending on the size of the facility and the desired outcome.

Companies may be reluctant to perform a full air audit due to costs associated with such services, but the final outcomes can far outweigh the initial investment. It is important to understand that the benefits from assessments and audits do not end only with lowering energy costs, but also improving the overall efficiency of your production, therefore positively affecting the bottom line.

Not every facility needs to do a full compressed air audit or air scan, as sometimes a simple walk-the-line assessment can satisfy the needs and result in substantial energy savings.

Switching or updating your compressed air installation to the latest technology can reduce energy consumption by up to a quarter. If you have an old or inefficient compressor, the cost to replace it with a new compressor is often less than the current running costs. A modern air compressor with the latest controllers and energy efficient motors will contribute to your bottom line from day one, meaning a short payback time.

A complete compressor replacement is not the only route however. Exchange programmes offer you the possibility of replacing major components of your compressor with new, more efficient components. For example, upgrading your compressor with the latest type of electronic controller will allow you to take advantage of the most advanced compressor control management, reduced unloaded running and higher efficiency. And if you replace an old, lower efficiency motor with a new, high efficiency one, you are guaranteed energy savings.

If you think you've got the wrong machine for your needs, then there is no need to feel that you have to live with it. A compressed air assessment or audit will give you real-life data on which to make a decision.

9. Reap the benefits of modern compressed air equipment

Air compressors are long term investments that will play a significant part of your business for years to come. The average factory changes air compressors every 7-10 years, meaning that the initial capital expenditure is only a fraction of how much your compressor will cost you in total. 70% or more of your air compressor's lifecycle cost will come down to its energy usage.



10. Don't forget the impact of regular maintenance

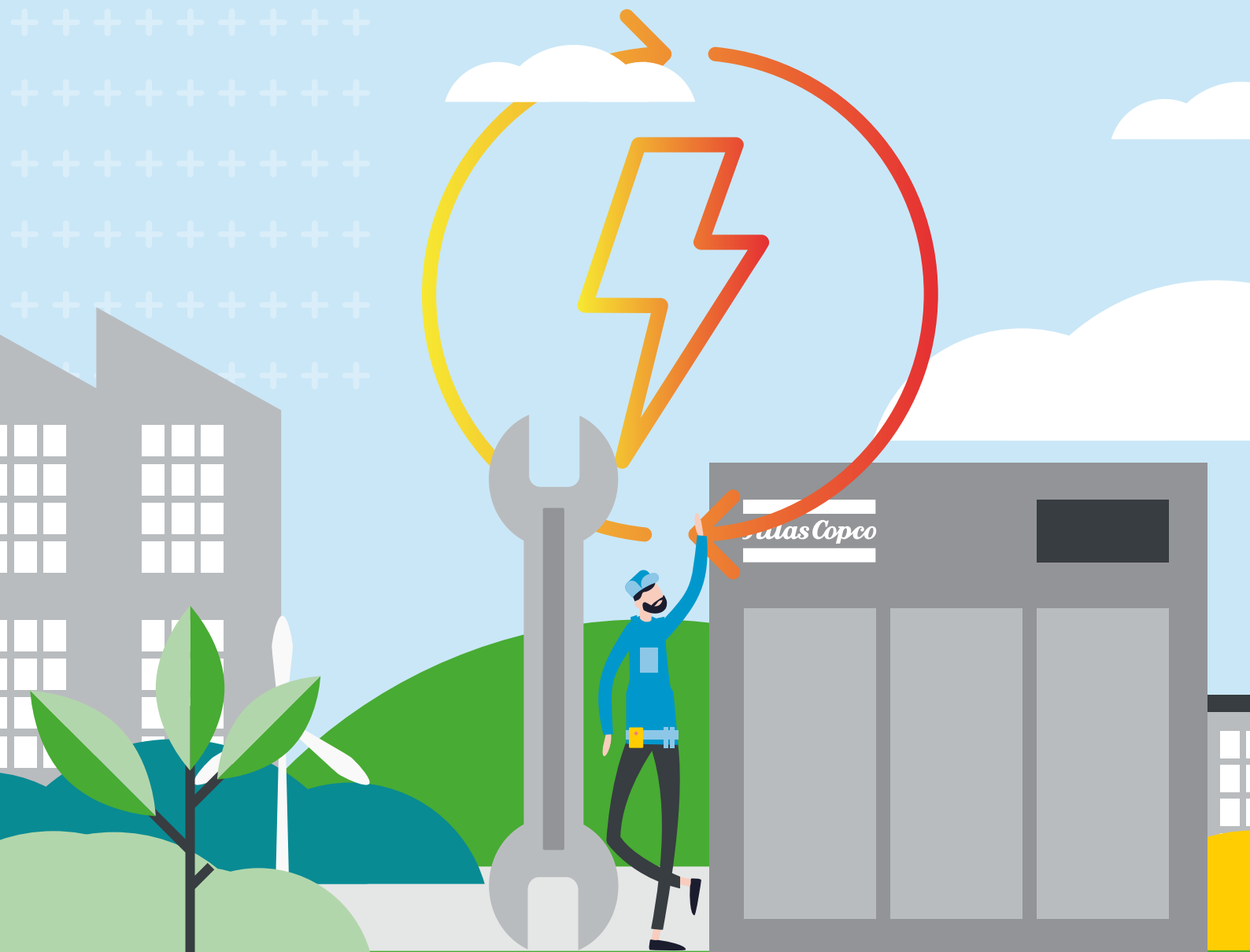
The best way of taking care of your compressed air availability is by taking the best care of your compressed air equipment. This means investing in regular preventative maintenance, which will sustain the efficiency that you have gained by purchasing a new compressor, or improve the performance of an older unit.

Whether you prefer to purchase spare parts only and perform maintenance in-house, sign up to a planned maintenance programme at pre-determined intervals from the manufacturer or approved distributor, or choose a total responsibility package that covers breakdowns and leaves no room for surprises, the main thing to remember is that reduced compressor

performance is not inevitable as the machine gets older. Regular servicing, using OEM genuine parts, will improve your equipment uptime and energy efficiency: the opposite could lead to more downtime, increased energy consumption and potentially a costly breakdown.

Lastly, gather some data! Most Atlas Copco compressors come fitted with a Smartlink data box which can provide live information on the compressor status, can also map the compressor's operating hours, with off load / on load hours and, of course, warning information.

Atlas Copco has the largest compressor service team in the UK and our engineers are trained to service and repair compressors of any brand.





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