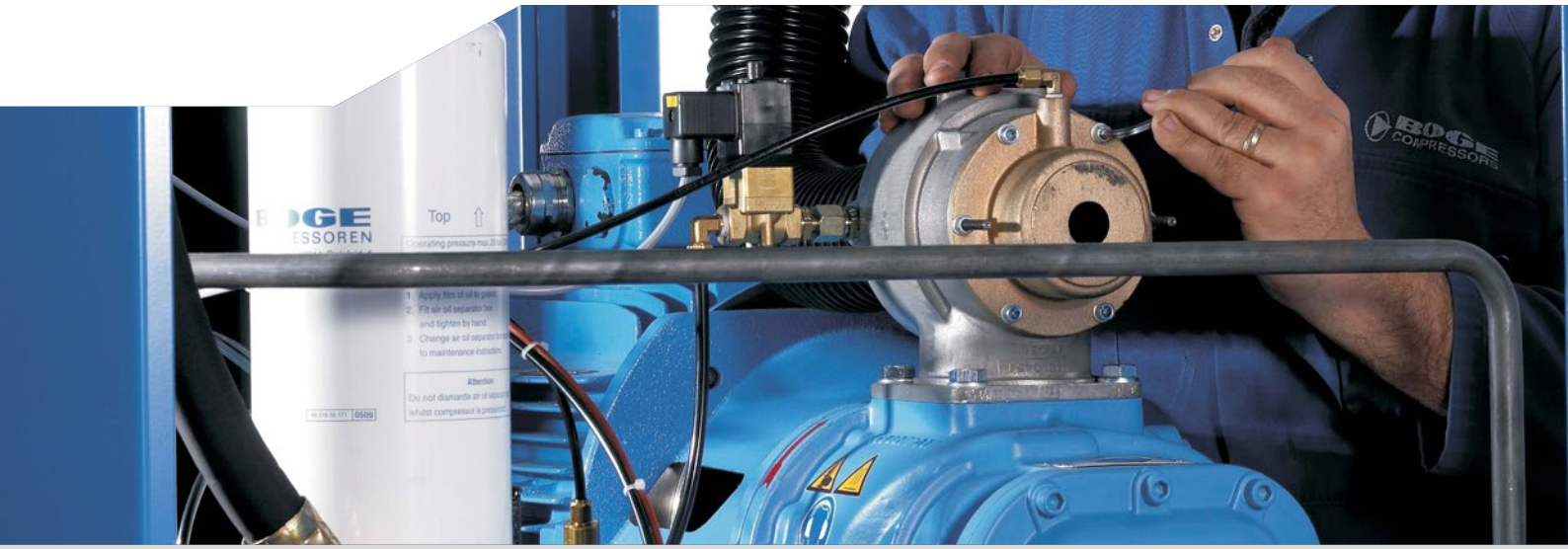
What does total cost of ownership mean?



When installing a new compressed air system, or updating an existing one, having a clear idea of all the costs involved from day one through to the moment it needs replacing will help to ensure that there are very few unexpected financial surprises throughout its lifespan.

The initial outlay for a compressed air system is only the first cost consideration. The true total cost of ownership (TCO) includes the expected cost projections for maintenance, parts and servicing. A further cost to avoid is if production halts due to system failure, so it's critical to possess the full picture and understand all the possible monetary implications that TCO involves.

Cost areas to consider with a compressed air system

- Capital cost: Initial consultation and design, pre-purchasing, pipeline, purchase and installation, repayment or rental cost.
- Energy efficiency: Electricity and fuel costs to run and heat or cool the compressor.
- Maintenance costs: Servicing and aftercare, parts, labour costs (i.e. fitter's and operators wages), lubrication, oil costs (cooling, oil filters, oil changes – not relevant with an with oil-free compressor).
- Oil disposal, storage and associated costs (again, not an issue with oil-free).
- Cost of downtime: Fixed maintenance breaks, unexpected failure or leaks which lead to production being halted and employees being left with very little work to do.
- Breakdown costs (non-contract parts & labour)
- System renewal and replacement: Even a properly maintained compressed air system doesn't last indefinitely, so the cost of an entirely new one needs to be considered.

The energy element

A primary expenditure throughout a compressed air system's lifespan, as well as an environmental factor, is the associated energy costs and output. This financial element can work out between 70 and 90 percent of total costs across life cycle, which could well add up to more than the original purchase price of the system.

Viewed another way, 45 percent of the total energy used for compressed air system goes into satisfying

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the actual amount of air demanded; which means that up to 55 percent of the energy is typically wasted.

This can be managed better with an intelligent energy management system, which can bring about potential energy savings of 30 to 50 percent. This provides a transparent and current picture of how efficiently the compressor is performing, helping to control costs.

The high percentage of energy which is converted into heat during air compression does not need to go unused. Up to 94 percent of heat generated in an air compressor can be recovered and used in a different part of the plant for another purpose, such as hot water.

A heat recovery system such as the BOGE DUOTHERM for example, can recover up to 75 percent of the electrical power, thus reducing utility bills as well as environmental impact.

The need for maintenance: Fixed vs status based maintenance

A compressed air system cannot take care of itself, and sufficient maintenance and aftercare will reduce the chance of expensive problems down the line. Without proper management, depending on whether the system is oil free or not, there can be both oil and air leaks which can be expensive.

Regular maintenance ensures that the system is being as cost and energy efficient as possible, although there is more than one option when selecting a maintenance schedule.

A fixed maintenance is pre-set, meaning many components would be fixed, serviced or replaced after a certain amount of time, whether this was required or not. The main disadvantage would be the replacement of parts which are still in good working order, or parts that at the time of fixed maintenance were problem-free, but failed before the next check.

Status-based maintenance is all about continuous monitoring through the use of diagnostic tools, in partnership with a robust aftercare programme. While this has proven to be more cost-effective and reliable across the lifespan of a compressed air system, it's key that these tools are used in an efficient manner, and data gathered is correctly analysed.

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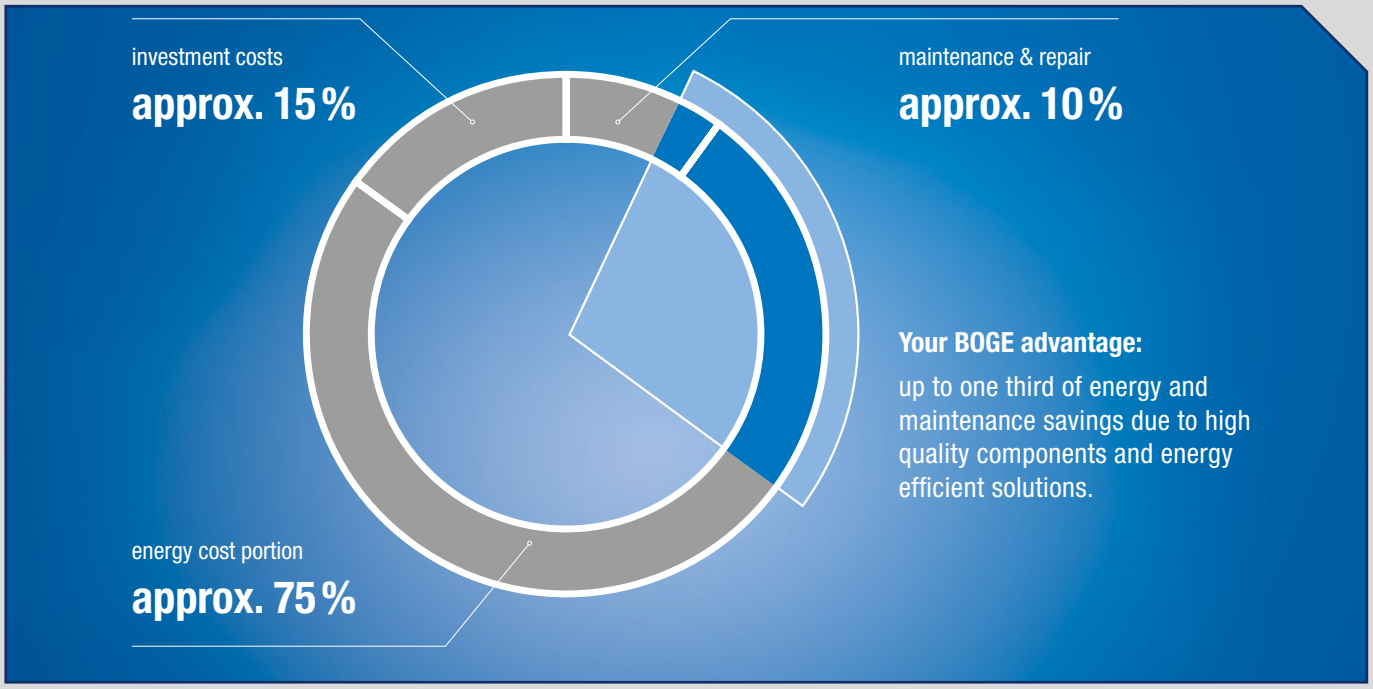

The role of diagnostic tools

Diagnostic data can provide the most accurate indication of what state of repair parts are in, and if there is any evidence of damage that can cause failure, such as air leaks, water leaks or corrosion. This can be gathered on site by a mobile service technician or remote monitoring, which can oversee and track a number of compressors simultaneously.

The advantage of remote analysis is that it can flag up early warnings of failure and also carries the benefit of being able to read information when the compressed air system is located in a hard to reach location.

Providing the diagnostic data is correctly analysed, the compressor can continue operating at an optimal level of efficiency. Which in turn reduces service costs and guarantees the best possible return on investment. A problem that can be detected by regular diagnostics is sudden air pressure changes and air leaks, which when undetected and unmanaged can equate to around 40 percent of output (or wasted air).

A small leaking hole of 3mm can cost a business more than £700 in wasted energy per year (Carbon Trust)[1]; an expense that can be easily prevented by an onsite operator recording the pressure on the air receiver at an allotted time every day. This measurement captures pressure drops in the receiver and determines the current rate of air leakage in the compressed air system.

An intelligent energy management system such as the BOGE airtelligence provis can be a worthwhile investment. With the capability to remotely optimise and control up to sixteen compressors at once, the data from this can provide a reliable picture of how efficiently each compressor is performing.

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Unwanted elements in the system and the consequences

- Solid matter particles in the compressed air can cause wear on pneumatic systems.
- Dust, dirt and other particles can cause scuffing. Many of these particles are not visible to the naked eye - this detrimental effect can increase when particles combine with lubricating oil or grease to form a harmful grinding paste.
- Water in the compressed air can cause corrosion, leading to rust in the pipelines and operating elements, causing leaks.
- Gaps in lubricant films, which can lead to mechanical defects. A synthetic lubricant can deliver up to five percent in energy savings, while providing protection from corrosion.
- Ice in the pneumatic network, which can happen in low temperatures, causing water to freeze, resulting in frost damage, reduced pipe diameter and blocked pipes.

The oil-free compressed air system:

Oil-free compressed air systems are not only essential for a number of sensitive applications such as the food & beverage, pharmaceutical, electronics sectors, where high air purity and exemplary efficiency are critical, but they can also offer a number of savings in relation to other compressed air systems.

Oil changes, filters, removal and storage all add to the expenses of air compression as well as the time taken to complete these tasks, but an oil-free screw or piston compressor means that this potentially expensive item is removed. With no oil to get into the system, then machine failure due to oil leaks can't happen. Within the food & beverage sector, the absence of oil also removes even the remotest possibility of oil coming into contact with the product or packaging, which can lead to contamination. A further costly issue that can be avoided with an oil-free compressor is oil in the pipework which can cause a blockage and increase flow resistance.

The latest oil-free compressed air options available from BOGE are driven by a permanent magnet motor, which puts less pressure on parts, and creates less degradation on the impeller compared to screw compressors. With fewer components, they are smaller in size and much easier to maintain. The result is compressed air of the highest purity Class standard, which can also be used for low pressure requirements, between 2.0 and 5.5 bar.

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Guaranteeing a longer life for your compressed air system: Top aftercare tips

In summary, the checklist for ensuring a longer, more economical lifespan for a compressed air system should encompass:

- A robust service programme which includes access and availability of service kits and service engineers, as well as a care warranty. This guarantees continued success and prolonged productivity.
- Status-based monitoring, leading to extended breaks between servicing and replacing parts when needed.
- Effective use of diagnostics; not just the right tools, but ensuring the data is interpreted correctly.
- Using the right kind and correct amount of lubricant. A synthetic product such as BOGE SYPREM 8000 S can yield energy savings of up to 5 percent. This product creates virtually no residual carbon or lacquer deposits, has a stable viscosity, low oil carryover with corrosion as well as wear protection.

Finally, admit and understand that when maintenance and energy costs are outweighing any profit, and there is as much downtime as production time, it might be time for a total system overhaul or replacement.

To find out more about BOGE Compressors and specialist gas generators, please contact us or visit our website:

www.boge.com/uk

References

1 - Carbon Trust, Compressed Air: http://www.carbontrust.com/resources/guides/energy-efficiency/compressed-air

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