OUT PERFORMERS
Energy Measurement & Verification Specialists

HOW TO REDUCE THE ENERGY COSTS AND OPERATIONAL RISKS OF YOUR COMPRESSED AIR SYSTEM AND SAVE $1,000,000s OVER A 10 YEAR LIFECYCLE

Compressed air is critical to large manufacturing plants – you can't operate without it.

A manufacturing site that spends $2m a year on electricity will pay approximately 11% or $220,000 a year on electricity to run their compressed air system. This cost can be reduced by 20% to 50% with paybacks of less than 2 years, saving $100,000s while increasing redundancy and reducing operational risk.

But over 95% of Compressed Air upgrades fail to deliver significant savings or maximise operational benefits. Out Performers implements a rigorous, 5-step process to ensure you minimise the operational risks and operating costs of your compressed air system.

Lifecycle costs

The ten year lifecycle costs of a compressed air system show that 76% is spent on energy alone, so if you are not seriously evaluating the energy performance of your system then you are potentially pouring money down the drain. The bonus is that improving energy performance also improves operational performance.

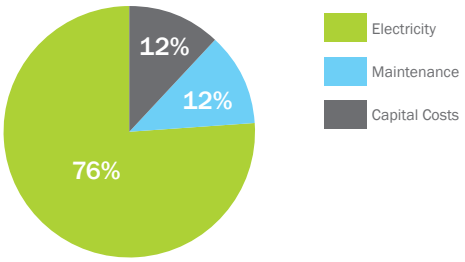


Figure 1. Compressor Lifecycle Costs over 10 years (Source: US Dept of Energy, Compressed Air Tip Sheet #1, 2004)

Leaks

Large manufacturing sites lose anywhere from 20% to 50% of their compressed air from leaks[1]. If you are spending over $2m per year on electricity, this means you are paying between $44,000 and $110,000 per annum for air you aren't even using. Fixing leaks can save up to 50% of your total compressed air energy costs, and will significantly improve capacity and extend plant life.

Out Performers: Australia's leading independent compressed air solution provider.

[1] *Energy Efficiency Best Practice Guide Compressed Air Systems,* Sustainability Victoria, 2009, p 10.

WHAT MAKES UP A COMPRESSED AIR SYSTEM?

Compressed air is not just about your compressors. Compressors are expensive - typically just under $1m each - but the rest of your system combined - the piping, the driers, air receivers, site reticulation system - is worth even more: around several million dollars. In total, your compressed air system is a multi-million dollar asset, so it's worth looking after.

We take a wholistic approach to your entire compressed air system over its entire lifecycle.

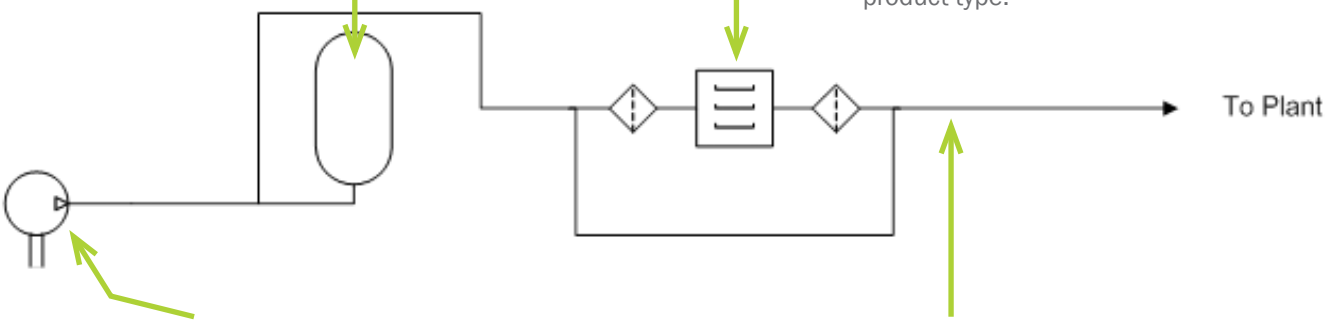
Typical components of a Compressed Air System & the energy efficiency opportunities they present

Air Receiver Opportunities:

- Undersized
- Sub-optimal installation (piping connections)
- Sub-optimal positioning
- Lack of WorkCover certification
- Insufficient drainage.

Filter & Dryer/Air Quality Opportunities:

- Not matched to plant supply (oversized/ undersized)
- Lack of monitoring (pressure differential, air quality)
- Incorrect installation (causing restrictions)
- Incorrect type to achieve air quality for product type.



Compressor Opportunities:

- Not matched to plant demand (oversized/ undersized/wrong control system)
- Incorrect compression type (lubricated, oil free, centrifugal, piston)
- Incorrect installation
- Poor ventilation
- Hours of operation.

Piping Opportunities:

- Not matched to plant supply (undersized)
- Incorrect installation (causing restrictions, excess pressure drop)
- Incorrect type to achieve air quality for product type
- Inappropriate bypasses.
- Chance to improve fittings, valves, drains, gauges etc.

Optimising results from your system

If executed correctly, a Compressed Air Optimisation Project can reduce your operating costs by 20% to 50% while increasing operational reliability and providing considerable improvements to redundancy and air quality. These savings can often mean the project pays for itself in less than 2 years.

HOW MUCH DO YOU KNOW ABOUT YOUR COMPRESSED AIR SYSTEM?

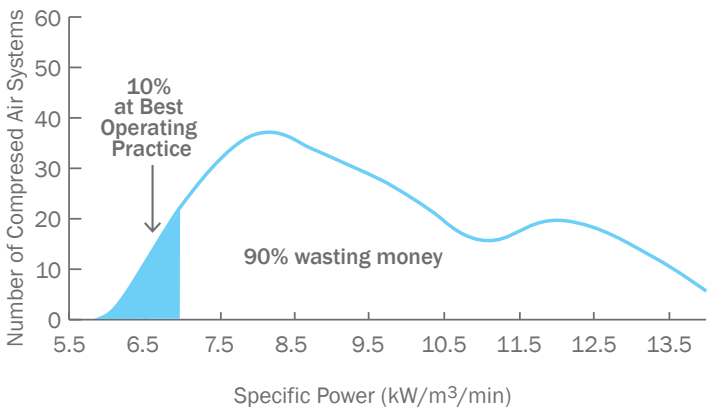
Here's a quick test to see if you know the basics about your Compressed Air System:

- What is your current specific power consumption, in kW/m3/min, and how does this compare to Best Operating Practice?
- What is the risk of compressed air supply failure and what would this mean to production?
- How much redundancy do you currently have? What is your peak demand for compressed air, and if your main compressor went off-line, do you have sufficient back-up compressors to provide this? What is your average air demand?
- How well does your current system meet your manufacturing processes' demands for compressed air? Are you achieving the required pressure and flow at points of use?
- What is your current loss from air leaks, and what is this costing you, in terms of flow, dollar costs, and percentage of capacity?
- How much do you spend on maintenance and can this be reduced?
- What is the current life-cycle cost of your Compressed Air System?
- What is your System's current air quality? Does it meet ISO8573.1 standards, or, if you are a food manufacturer, BRC standards or HACCP methodology?
- What payback would you expect from implementing a major compressed air project?

How efficient is your compressed air system?

The Out Performers team have completed over 400 detailed compressed air surveys on large industrial and manufacturing plants[2]. A summary of our findings[2], shown in the figure below, shows that, most compressed air systems cost more to run than they should. We know this can be cost-effectively fixed. **Where does your system sit on this graph?**

Compressor Efficiency Distribution



[2]. based on Compressed Air Flow and Energy Demand surveys conducted on 60 compressed air systems with oil-lubricated, screw-type compressors.




COMPRESSED AIR OPTIMISATION PROCESS

Out Performers has developed a rigorous, 5-step process for determining the energy savings available from optimising compressed air systems. We have applied this process to over 400 large industrial plants.

1 Baseline Measurements

We conduct detailed measurements of your system to understand operational costs and risks, and to quantitatively determine the value that could be obtained from system optimisation. We do this by measuring baseline energy use and air volume with a Flow and Energy Demand Survey, and can suggest a variety of improvement projects such as an Ultrasonic Leak Survey to identify Compressed Air leaks, if our baseline assessment indicates this would be of value.

2 Analysis and Design

We design and develop solutions based on findings in baseline measurements. We present you with a report containing a range of options, supported by business case data for each, including detailed equipment specifications. This is done completely independently of compressor supplier options. to ensure you get the best solution.

3 Implement the Solution

Implement the energy efficiency measures – compressor replacements, controls upgrades, leak rectification, and so on. Usually the client undertakes this work, but Out Performers can also manage the implementation, if required, under an Energy Savings Guarantee where costs and energy savings are guaranteed.

4 Verify

We re-measure energy use and air volume after the improvements have been installed, to ensure that the implemented solutions have resulted in the energy savings and operational improvements we predicted.

5 Income from Energy Efficiency Credits (ESCs, VEECs)

Out Performers will determine the energy savings resulting from the project and create the appropriate Energy Efficiency Credits on your behalf. We then register and sell them to create income for you to offset the cost of the project and improve paybacks. Out Performers is the largest creator of ESCs in NSW and our costs are often completely offset by any ESC income you receive at the end of the project, making our services effectively free. Money from government grants, like CTIP, is also available for energy efficiency projects.

We can also create ESCs regardless of our involvement in scoping or implementing the project.

BENEFITS TO YOUR BUSINESS

Operational

Reduced Operational Risk

- Know exactly how the performance of your compressed air system compares to over 400 other similar large-scale systems to clearly understand the benefits available, based on independent, quantitative analysis.
- Reduce the risk of interruption to production by having sufficient compressor redundancy to meet average and peak demands if your main compressor goes offline, without having to use or hire emergency compressors.

Improved Operational Performance

- More redundancy available, due to improved compressor controls and sequencing.
- Longer life-span of your compressor, as leak rectification and improved compressor controls mean reduced loads overall, and less down-time for maintenance.
- Increased production efficiency due to optimised pressure and flow at points of use, and reduced interruption to supply.

Improved air quality

- Reduce acidic erosion of your system's fittings and fixtures by improving the air quality.
- Reduce contamination of your manufactured goods by direct or indirect exposure to the compressed air supply.
- Ensure compliance with ISO 8573.1 or BRC standards, or HACCP methodology.

Maintaining relationships

- We work in conjunction with your maintenance department or preferred contractor, provider, or supplier to get the best outcome for your entire compressed air system.

Independent advice

- We provide recommendations on equipment and upgrades independently of any supplier options and based on objective, quantified data. We give you a wider range of solutions to choose from and the data to make decisions based on lifecycle and long term benefits.

Save money

Save on electricity bills

- Save between 20% and 50% of your compressed air system's electricity costs (kWh).
- Save money on fixed electrical demand charges (kVA/PF) by reducing peak demand through better controls on your compressor or other system improvements.

Save on maintenance costs

- Save on compressor maintenance due to improved compressor controls and sequencing.
- Save on leak maintenance by using recommended longer-lasting fittings and by repairing leaks in a timely fashion.

Defer capex and hiring costs

- Defer the capital costs of compressor upgrades or replacements by extending the life of your existing plant through more efficient operation.
- Reduce the expense of hiring emergency compressors, due to improved redundancy.

Offset Project Costs

- Use income from the White Paper Certificates created by the energy savings to offset the cost of the project, resulting in reduced paybacks and improved ROI.

Reduce carbon liabilities

- Reduce carbon costs by the emissions reductions achieved by these energy savings.

We make sure you get the best possible solution to maximize both operational performance and energy reductions from your Compressed Air System.

OUT PERFORMERS WORKS WITH AUSTRALIA'S BIGGEST ENERGY USERS

We work with large industrial and commercial energy users spending more than $1m on electricity annually to reduce their energy costs while improving plant performance. Our core competency is energy measurement and verification ('M&V') which ensures we improve financial returns and reduce the risks associated with implementing energy projects.

Our engineers implement a comprehensive process to develop rigorous investment grade business cases for energy efficiency opportunities, and then follow them through the implementation phase to ensure energy savings are realised with the best possible payback. Our independence from manufacturers and suppliers means we offer unbiased advice based on objective criteria. Working with over 80 of Australia's top 200 energy users, we have reviewed more than 700 energy efficiency projects and we've learnt what works and what doesn't. We are confident about the energy savings we can achieve for you. Ask us about our **Energy Savings Guarantee.**

CASE STUDY 1
MARINE MAINTENANCE

SITUATION:

The client didn't fully understand the impact from compressor operations across a complex industrial site and wanted to know if improvements were possible. One side of the site had two 500kW compressors, while two 450kW compressors were on the opposite side.
The client had thought it best to operate just one of the compressors from each set, in order to maximise air pressure across the whole site.

SOLUTION:

→ We conducted a Compressed Air Flow and Energy Demand Survey which showed that sufficient air pressure across the site could be supplied by only using one of the 450kW compressors.
→ The client introduced new policies and procedures to:
- only operate the compressor when there was a demand for compressed air.
- to eliminate or minimise the operation of the 500kW compressors, as these were shown to be the most energy intensive.

BENEFITS:

→ Energy saved per year: 1,700 MWh
→ Saving $120,000 per year
→ CO_2 saved = 1,826 Tonnes p.a.
→ Energy Savings Certificates = $121,000 (4,931 ESCS)
→ Project cost = $30,000
→ Payback = 2 months

OPERATIONAL BENEFITS:

→ Reduced the annual hours of operation from 8,342 to 6,640, a 21% reduction.
→ Life expectancy of the current compressors was estimated to be in excess of 5 years, provided regular maintenance was performed. Therefore the savings would continue over this timespan.

CASE STUDY 2
MANUFACTURER

SITUATION:

The client had purchased a new compressor but was concerned as the compressor was operating at or near 100% capacity.
The client wanted to know if this was due to a commissioning issue (e.g. compressor wrongly sized for the plant), incorrect equipment selection, or some other problem.

SOLUTION:

→ We conducted a Comprehensive Site Review which showed a significant pressure drop was preventing air entering the main production area. Further investigation revealed this to be due to major piping restrictions. Significant leak losses were also identified.
→ Bridging piping was installed to overcome the restriction, and a leak rectification program was implemented. A post-implementation pressure verification study showed increased air pressure over the entire site, and a significant reduction in leaks.

BENEFITS:

→ Energy saved per year: 837 MWh
→ Saving $69,000 per year
→ CO_2 saved = 888 Tonnes p.a.
→ Energy Savings Certificates = $17,018 (799 ESCs)
→ Project cost = $23,376
→ Payback = 6 months

OPERATIONAL BENEFITS:

→ The pressure drop was improved by 69% and no longer restricted flows to the production area.
→ Overall air pressure across the site was increased by 4.8%, leading to increased efficiency of production.
→ The new compressor was identified as wrongly-sized – it was in fact too big for the plant, and the client could have purchased an even smaller-capacity machine. The client had over-capitalised on plant, so would have saved on capital as well as energy, and created more ESCs if they had conducted an iindependent review prior to purchase.

CASE STUDY 3
MAJOR PRINTING COMPANY

SITUATION:

The client's Printing Plant had three 160kW, compressors that were operating at partial loads. All compressors were short-cycling for much of the time, resulting in increased energy consumption, and increasing the risk of compressor failure.

SOLUTION:

→ We conducted a Compressed Air Flow and Energy Demand Survey which identified average and peak demand flows of compressed air, and recommended that compressor controls be fitted to the machines so only the required quantities of air had to be generated.
→ The client installed compressor controls to sequence the operation of all three compressors.
→ A third compressor was identified as redundant and taken off-line.
→ No additional modifications to the system were required.

BENEFITS:

→ Energy saved per year: 244 MWh and 74.5kVA (Demand)
→ Saving $26,131 per year
→ CO_2 saved = 217 Tonnes p.a.
→ Energy Savings Certificates = $14,504 (699 ESCs)
→ Project cost = $30,000
→ Payback = 9 months

OPERATIONAL BENEFITS:

→ Avoided Capex costs by delaying the need to buy a new compressor for a further two to three years.
→ Controls were installed without taking the compressors off-line.
→ Third compressor taken off-line now provides redundancy where before there was none.
→ Increased life expectancy of compressors due to less short-cycling and reduced operational times.

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