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The Hidden Cost of Compressed Air Leaks in Australian Industry (2026)

An independent analysis by Compressed Air Solutions.

By Byron Raal, CAS Founder-Editor · Published 4 June 2026
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Web version and interactive calculator: compressedairsolutions.com.au/resources/compressed-air-leak-cost-report-2026/

Key findings (quotable)

- Compressed air is roughly **16% of the electricity used at a typical Australian manufacturing site** (A2EP).
- Across a compressed air system, **80 to 90% of the energy put in is ultimately lost** as heat, friction and leakage (A2EP).
- **Leaks alone waste 20 to 30% of the energy a compressed air system consumes** in everyday, unaudited plants (US DOE).
- Put those together and **compressed air leaks waste on the order of 4% of all the electricity an Australian manufacturing plant buys**, money spent compressing air that never does a useful thing (16% x about 25%). That is an aggregate average across plants; an individual site varies with its motor-energy mix and maintenance state.
- Scaled to the national manufacturing electricity bill, that waste is on the order of **$220 to $330 million a year** across Australian factories on a deliberately conservative basis, and the equivalent of roughly **740 to 1,100 GWh of electricity** thrown away annually (about 0.5 to 0.7 million tonnes of CO2-e at the national grid factor).
- A **single 3 mm leak at 7 bar leaks about 7.3 litres of free air per second and costs roughly $3,500 to $6,900 a year** in wasted electricity. Most plants have dozens.
- Almost none of it shows up as a line item. It hides inside the power bill, which is why it survives for the life of the plant.

Why this is the cost nobody sees

When an Australian plant looks for energy savings, attention goes to lighting, HVAC and solar. Compressed air rarely gets named, yet it is one of the most expensive utilities on the floor and the least efficient. The reason it is overlooked is structural: there is no "compressed air" line on the electricity bill, leaks are inaudible over plant noise, and the waste is continuous rather than a single failure. It is a slow, invisible drain that operators pay for every hour the compressor runs.

The per-leak economics

A leak is just an orifice bleeding compressed air to atmosphere. Its cost is calculable from the orifice size and line pressure using choked-orifice (sonic) flow per ISO 6358, the same method behind the CAS leak-cost calculator.

- A **3 mm leak at 7 bar(g)** discharges about **7.3 L/s of free air**.
- Supplying that continuously needs roughly the output of a small dedicated compressor running around the clock.

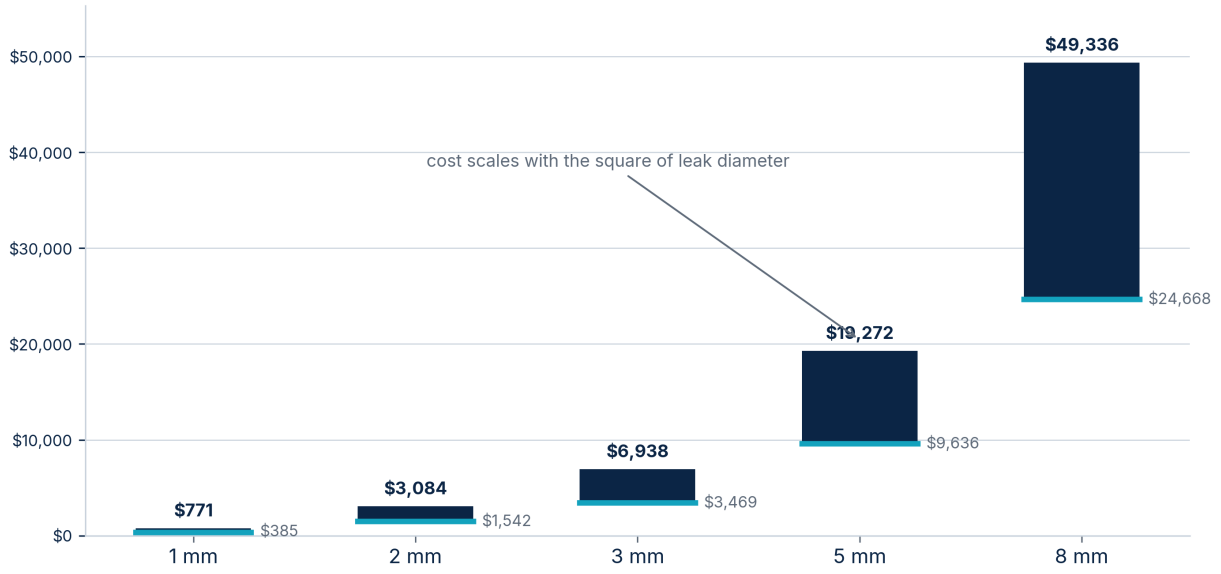
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- At a commercial and industrial tariff benchmark of **$0.30/kWh** (2025-26, indicative; actual rates vary by state, retailer and contract), that single leak costs about **$3,500 to $6,900 a year** depending on operating hours.

Because flow through a leak scales with the orifice area, cost scales with the **square of the leak diameter**. A 6 mm leak costs roughly four times a 3 mm one. Modelled across common leak sizes (anchored to the validated 3 mm figure, scaled by orifice area, $0.30/kWh, 7 bar; the range reflects 4,000 to 8,000 operating hours a year):

What a single compressed-air leak costs per year

Annual electricity cost per leak at 7 bar(g), $0.30/kWh. Bar spans 4,000 h/yr (cyan line, single shift) to 8,000 h/yr (top of bar, continuous operation). ISO 6358 choked-orifice flow, 0.11 kWh per m3 free air.



Sources: DCCEEW Australian Energy Statistics 2025 Table F; ABS Counts of Australian Businesses 2025; US DOE; A2EP. Model: leak_cost_distribution_model.py
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Leak diameter	Free-air flow	Annual cost, per leak
1 mm	~0.8 L/s	$385 to $770
2 mm	~3.2 L/s	$1,540 to $3,080
3 mm	~7.3 L/s	$3,470 to $6,940
5 mm	~20 L/s	$9,640 to $19,270
8 mm	~52 L/s	$24,670 to $49,340

A plant that has never run a leak survey typically has dozens of leaks across this range, which is how the system-level 20 to 30% waste figure accumulates. The model is reproducible: free-air flow is choked-orifice (sonic) flow per ISO 6358, and cost is flow x operating hours x specific power (about 0.11 kWh per m³ of free air) x tariff.

The per-plant picture

Applying the sourced ratios (16% compressed-air share of site electricity; 20 to 30% of compressed-air energy lost to leaks) to representative Australian plants:

Representative plant	Annual electricity spend*	Compressed-air share (16%)	Wasted on leaks (20-30%)
Small site	$60,000	$9,600	$1,900 to $2,900 / yr
Mid-size site	$300,000	$48,000	$9,600 to $14,400 / yr
Large site	$1,200,000	$192,000	$38,400 to $57,600 / yr

*Electricity spend figures are representative archetypes for illustration, not survey data; the percentages applied to them are sourced. A leak survey and fix programme typically pays for itself in months, not years, because the wasted energy stops the day the leak is sealed.

The national picture (original modelled estimate)



Independent CAS analysis. National figures modelled from DCCEEW Australian Energy Statistics 2025 and ABS business counts; per-leak figures from ISO 6358 choked-orifice flow.

The defensible national finding does not depend on a contested total. **Leaks waste roughly 4% of every kilowatt-hour Australian manufacturing buys** (16% compressed-air share x about 25% leak fraction). That ratio holds whatever the absolute electricity figure turns out to be.

Put a confirmed primary figure behind it and a dollar total follows. Australian manufacturing (ANZSIC Division C) consumed **194.2 PJ of electricity in 2023-24**, which is **53,950 GWh** (DCCEEW, Australian Energy Statistics 2025, Table F). About 57% of that, **111 PJ**, is the basic non-ferrous metals

subdivision, dominated by aluminium smelting, where electricity goes into electrolysis rather than into the kind of motor and compressed-air loads the 16% rule of thumb describes. So the conservative national model **excludes smelting** and works from the remaining **82.9 PJ (about 23,000 GWh)** of manufacturing electricity:

Leak fraction	Electricity wasted (GWh/yr)	Cost at $0.30/kWh
20% (low)	740	$220M
25% (central)	920	$280M
30% (high)	1,100	$330M

So on the conservative basis, Australian factories spend on the order of **$220 to $330 million a year compressing air that leaks straight back out**, wasting **740 to 1,100 GWh** of electricity. At the national grid Scope 2 factor of 0.62 kg CO2-e per kWh (DCCEEW National Greenhouse Accounts Factors 2025), that is roughly **0.5 to 0.7 million tonnes of CO2-e a year** (about 460,000 to 680,000 tonnes), emissions with zero production attached to them.

The $0.30/kWh benchmark is a blended, indicative commercial and industrial rate; very large sites on negotiated contracts pay less per kilowatt-hour. The finding is robust to that assumption: even at a heavy-industry tariff of $0.18/kWh, the central conservative estimate is still about $166 million a year of pure waste.

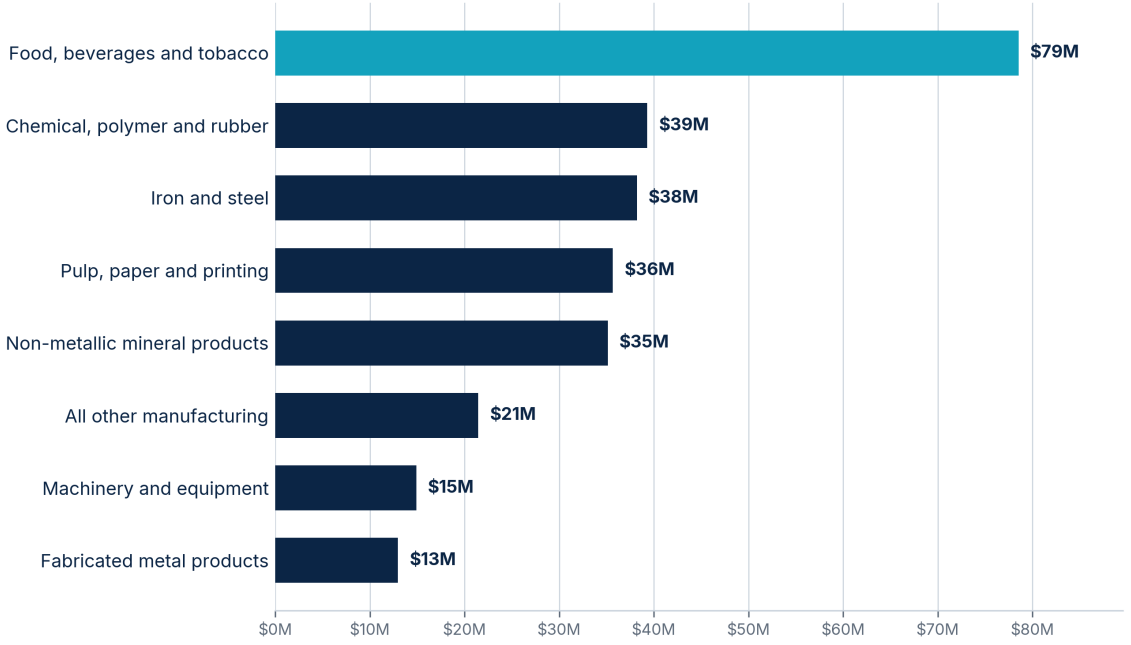
Two independent builds point the same way. A **bottom-up cross-check**, multiplying the ABS count of operating manufacturing businesses by employment size (15,478 sites of 5 to 19 employees, 6,616 of 20 to 199, and 538 of 200-plus, at 30 June 2025) by the per-plant waste figures above, lands at **$114 to $171 million a year** while deliberately ignoring the 68,031 micro and non-employing businesses that have little or no compressed-air plant. That the narrower bottom-up build sits just under the top-down range is the expected direction and supports the headline.

Where the waste sits, by sector

The same conservative model, distributed across manufacturing subdivisions (16% share x 25% leak fraction x $0.30/kWh; aluminium smelting excluded):

Where compressed-air leak waste sits in Australian manufacturing

Modelled annual cost of leaks by sector, central case: 16% compressed-air share x 25% leak fraction x $0.30/kWh. Aluminium smelting excluded (electrolysis load). Total $276M a year.



Sources: DCCEEW Australian Energy Statistics 2025 Table F; ABS Counts of Australian Businesses 2025; US DOE; A2EP. Model: leak_cost_distribution_model.py
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Manufacturing sector (ANZSIC)	Electricity 2023-24 (GWh)	Leak waste (GWh/yr)	Cost ($/yr)
Food, beverages and tobacco (11-12)	6,545	262	$79M
Chemical, polymer and rubber products (18-19)	3,276	131	$39M
Iron and steel (211-212)	3,185	127	$38M
Pulp, paper and printing (15-16)	2,974	119	$36M
Non-metallic mineral products (20)	2,928	117	$35M
Machinery and equipment (23-24)	1,242	50	$15M
Fabricated metal products (22)	1,081	43	$13M
All other manufacturing	1,789	72	$21M
Total (conservative base, excl. smelting)	**23,020**	**920**	**$276M**

Food and beverage alone, the sector with the densest compressed-air use, carries close to **$80 million a year** of leak waste on this model. (Including aluminium smelting in the base, which the share assumption does not really fit, would roughly double the national total to about $650 million; the report leads with the conservative figure and flags the upper bound rather than the reverse.)

What operators can do

1. **Measure before you spend.** A walk-through ultrasonic leak survey finds and tags leaks in a day. The CAS leak-cost calculator puts a dollar, kWh and CO2 figure on each one so the fix is prioritised by payback.
2. **Fix the biggest first.** Leak cost scales with orifice area, so a handful of large leaks usually carry most of the loss.
3. **Lower the pressure band.** Every 1 bar of unnecessary system pressure adds roughly 7% to energy use and makes every leak worse.
4. **Make it routine.** Leaks regenerate. A quarterly survey holds the saving; a one-off does not.

This is demand-side electricity reduction that needs no new generation, qualifies for several Australian energy-efficiency grant and incentive programs, and pays back faster than almost any supply-side measure.

Methodology and sources

Figures are reproducible from the stated inputs, and the national model is published as a runnable script (leak_cost_distribution_model.py). Leak flow is choked-orifice (sonic) flow per ISO 6358 at the stated orifice diameter and gauge pressure. Energy cost uses the $0.30/kWh 2025-26 commercial and industrial benchmark (indicative and blended; rates vary, large industrial sites on negotiated contracts pay less, and the national section states the $0.18/kWh sensitivity). Compressed-air share of site electricity (about 16%) and system energy loss (80 to 90%) are from the Australian Alliance for Energy Productivity (A2EP). The 20 to 30% leak fraction of compressed-air energy is the US Department of Energy figure for unaudited systems. National manufacturing electricity is the DCCEEW Australian Energy Statistics 2025 Table F figure for ANZSIC Division C, 2023-24; the business count and size distribution are from the ABS Counts of Australian Businesses, July 2021 to June 2025, at 30 June 2025; the grid emission factor is the DCCEEW National Greenhouse Accounts Factors 2025. The national model is deliberately conservative: it excludes aluminium smelting from the electricity base, and the bottom-up cross-check excludes all businesses below 5 employees.

About Compressed Air Solutions

Compressed Air Solutions is Australia's independent reference for specifying, sourcing and maintaining industrial compressed air. It carries no stock, installs no equipment and runs no service contracts. The analysis here is vendor-neutral and built on Australian standards. compressedairsolutions.com.au

Sources

- A2EP, Australian Alliance for Energy Productivity, compressed air efficiency (16% of manufacturing-site electricity; 80 to 90% of compressed-air energy wasted): a2ep.org.au/compressedair
- US Department of Energy, Compressed Air Systems Sourcebook, leak losses (20 to 30% of system energy in unaudited plants).
- DCCEEW, Australian Energy Statistics 2025, Table F (Australian energy consumption by state and territory, by industry and fuel type), Division C Manufacturing electricity 2023-24 = 194.219 PJ; published 22 August 2025: energy.gov.au/publications/australian-energy-update-2025
- ABS, Counts of Australian Businesses, including Entries and Exits, July 2021 to June 2025 (released 26 August 2025), Division C Manufacturing = 90,663 operating businesses at 30 June 2025, with employment-size split: abs.gov.au/statistics/economy/business-indicators/counts-australian-businesses-including-entries-and-exits/latest-release
- DCCEEW, National Greenhouse Accounts Factors 2025, national Scope 2 electricity factor 0.62 kg CO2-e/kWh (August 2025): dcceew.gov.au/climate-change/publications/national-greenhouse-accounts-factors-2025
- CAS leak-cost calculator, choked-orifice methodology (ISO 6358): compressedairsolutions.com.au/tools/leak-cost-calculator/
- Reproducible national model: leak_cost_distribution_model.py (CAS, 2026).