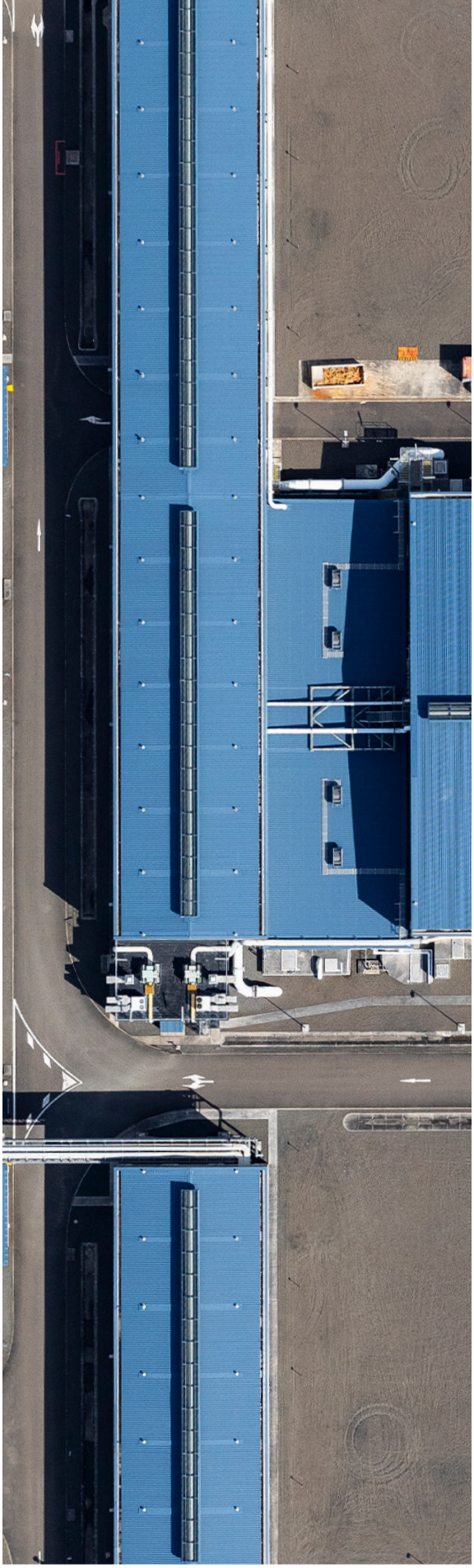
Airocle™

NATURAL VENTILATION, DEMYSTIFIED

A Guide for Designers, Engineers and Project Leads

Learn how natural ventilation systems are creating safer, greener and more productive buildings.



A fresh take on ventilation

Selecting the wrong ventilation could end up being a multimillion dollar mistake, so it pays to make an informed decision. Natural ventilation, also known as passive ventilation, is a popular and reliable method of effectively ventilating buildings. It plays a key role in creating safe, compliant, environmentally-friendly spaces that are enjoyable to work and live in. And it could play a role in your next project.

Although natural ventilation is often more effective and sustainable than mechanical ventilation, it remains relatively misunderstood. This guide aims to demystify natural ventilation — the advantages, how it works and why it surpasses mechanical alternatives. If you're already familiar with natural ventilation, you may find this guide useful in educating project stakeholders about its merits.

Read on to learn about the power of natural ventilation.

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Six advantages of natural ventilation

Before exploring the workings of natural ventilation, let's uncover why it enhances the design and usage of buildings. Natural solutions deliver on the diverse needs of project stakeholders, building owners and their end users in countless ways. But some of the benefits can be surprising:

Achieves compliance

Perhaps no other topic receives as much attention as compliance in a design project. Fortunately, natural ventilation systems are subject to the highest standards despite having no mechanical components. It is crucial ventilation products **comply with the National Construction Code (NCC)** and natural solutions are no exception.

Additionally, these solutions meet strict specifications set by Standards Australia. This means you can count on natural ventilation to meet codes concerning airflow, fire, rain and wind. You should easily be able to identify which products have been manufactured and tested to meet particular standards. In some cases, third party organisations, such as NATA and CSIRO, independently verify product performance.

Delivers high performance

It's worth highlighting that natural solutions aren't less hardworking than mechanical alternatives. By leveraging the natural forces of air, a building's internal environment continuously optimises without the need for secondary ventilation, like extraction fans. Think of natural ventilation as a dual purpose solution. It expels hot air and smoke (if it occurs) using one efficient system.

A little-known fact about natural ventilation — it's suitable for all environments, even the toughest. For example, buildings contending with hot humid climates, such as those in mining, manufacturing and agriculture, take advantage of hard-working natural ventilation solutions. This is because it effectively manages high temperatures, condensation and particulate matter, meeting important safety and operational requirements. By minimising heat and humidity, these building owners can increase the longevity of their assets.

Additionally, quality systems reduce the likelihood of warranty claims. Look for Australian made products designed for tough Australian conditions.

Supports sustainability

Tightening regulation around net-zero targets has been motivating environmentally conscious building design and operation to a greater extent than years gone by. In fact, natural ventilation increasingly features in green design.

The biggest benefit: it takes zero electricity to ventilate a space with natural ventilation — and what could be greener than not relying upon energy? A building can also reduce its reliance on air conditioning. These benefits enable owners to shrink their carbon footprints, benefiting the bottom line and community at large.

For many, using energy efficient natural ventilation goes far in minimising environmental impact. If that's not enough, **natural ventilation can contribute towards a coveted Green Star certification**. This is a simple yet effective way to enhance the green credentials of a building.

Minimises costs

Increased natural ventilation cuts a building's operating costs considerably. What's most attractive is that natural ventilation incurs no energy costs, unlike common powered fans. And there are no moving parts that may break at an inconvenient moment and require maintenance.

What's more, there's a significant saving on air conditioning. Case in point: a naturally ventilated commercial building is up to 4 degrees cooler on a summer's day. By reducing heat gain, occupants are much less likely to need air conditioning, lowering total energy consumption and costs.

Additionally, there are intangible cost savings. Well-ventilated buildings support workplace health, decreasing absenteeism and enabling productivity.

Promotes wellbeing

Adequate building ventilation enhances occupant wellbeing, promoting a safe, healthier and comfortable environment. How natural ventilation supports this is by replenishing stale air with fresh oxygenated air, while expelling heat, humidity, CO2, volatile oxidative compounds (VOCs) and particulate matter. Constant replenishment of air avoids 'sick building syndrome', a condition thought to be caused by poor indoor air quality.

Natural ventilation also maintains a space's thermal comfort. Comfort matters because it influences occupants' enjoyment of a space and productivity. Achieving thermal comfort is of particular importance in workplaces where high heat loads risk heat-related injury — and in an ever-warming climate. Heat build up passively reduces in buildings with natural systems installed.

Offers versatility

Natural ventilation systems have near unlimited applications. From windy coastal civic centres to hot, humid processing plants, there is an ideal solution for every climate, sector and project.

Key industries taking advantage of natural ventilation include:

- Agriculture
- Construction
- Education & Training
- Electricity, Gas, Water & Waste Services
- Government & Defence
- Manufacturing
- Mining
- Recreation & Sports
- Transportation & Warehousing

Often, you can choose from a vast range of products to meet the aesthetic and compliance requirements of any project, whether new construction or a refurbishment. Most popular are rotary roof vents, commonly known as 'whirlybirds', so are fire and smoke vents. Modern ridge and slope style vents provide lower profile, aesthetically pleasing solutions. Colours and materials abound. Other natural options include louvre doors and acoustic louvres suitable for various applications. But if off-the-shelf products don't meet your needs, a good manufacturer should be able to design a bespoke solution.

How natural ventilation works

So, what exactly is natural ventilation? In simple terms, natural ventilation is the process of supplying and removing air from a building without mechanical systems. It helps to think of a naturally ventilated building as living 'breathing architecture'. Let us explain:

Imagine a single-storey building, say, a primary school classroom. In this building, two opposing walls each have a small opening allowing air inflow and ventilation. Fresh air gets 'inhaled' through an opening on one side, flowing into the space and replenishing the stale air inside. The warmer stale rises upward, and flows toward and out the opposite opening. This occurrence is the 'exhale'. The room breathes in, air is replenished, the room breathes out and so on. (Though, in reality, this process happens simultaneously.)

Natural ventilation systems continuously **harness the natural forces of air**, using techniques such as:

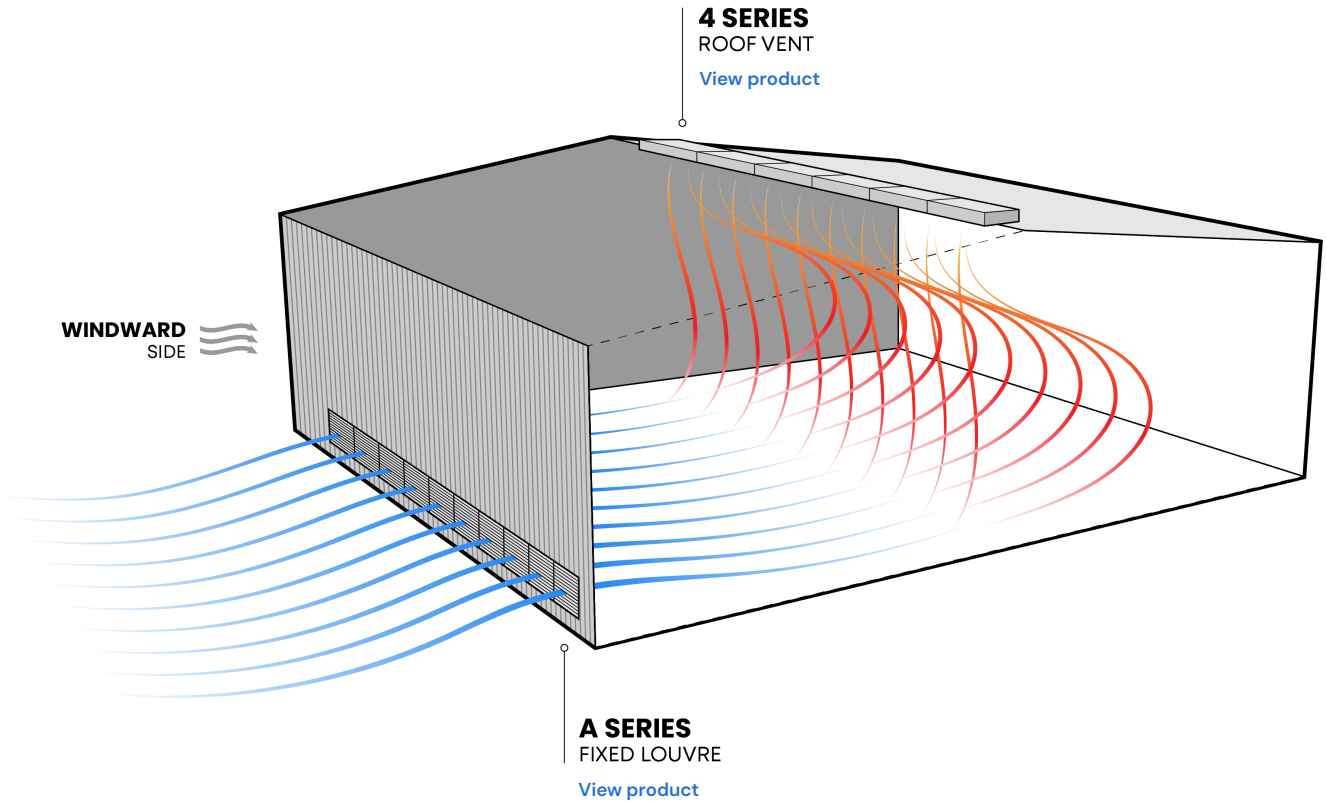
Wind-driven ventilation

This involves strategically-placing openings, such as louvres or vents, to promote air circulation through inflow and ventilation. Openings on opposite sides of a building — like in our classroom example — use a form of ventilation called cross-ventilation. Indoor air quality and comfort drastically improve.

Buoyancy-driven ventilation

Buoyancy-driven ventilation is otherwise known as the 'stack effect'. It takes advantage of temperature differences between the indoor and outdoor environments. Because warm air is less dense than cool air, it rises and creates a pressure differential. This pulls in cooler outside air while expelling warm air, lowering a space's internal temperature. The stack effect is also at play in our fictional building.

Together, wind-driven and buoyancy-driven ventilation work in harmony to naturally ventilate a space.



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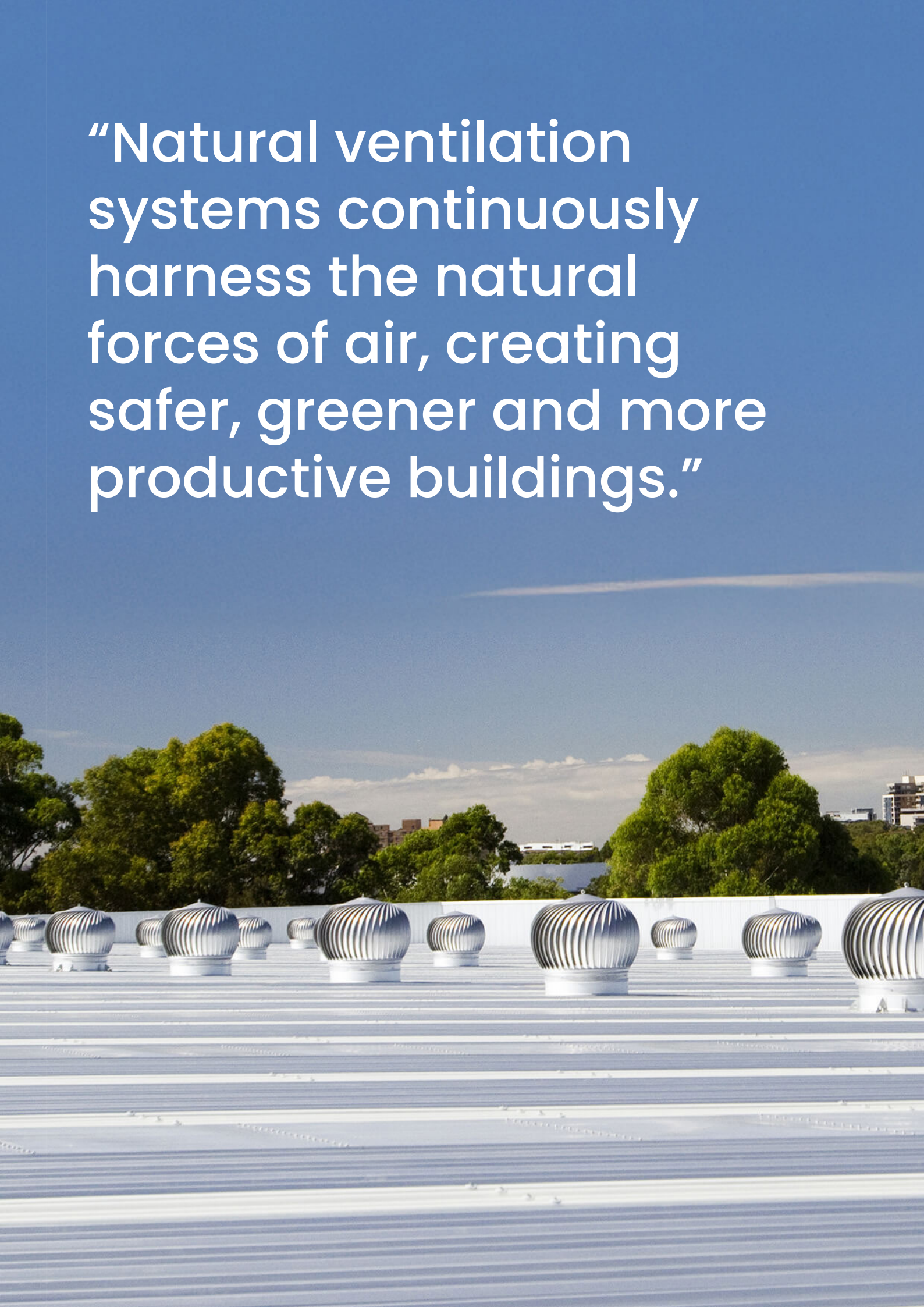

Natural ventilation versus mechanical ventilation

A prevailing myth is that mechanical ventilation is always better. The truth is, natural systems offer numerous advantages — energy efficiency, cost reduction and emissions reduction, to name a few. Here's more on why natural ventilation rises above mechanical:

1 Natural ventilation is reliable

Natural ventilation does everything mechanical systems do, only quieter, more efficiently and effectively. Importantly, natural systems address two important compliance considerations at once — heat ventilation and smoke extraction. While smoke spill fans tend to be used for both, they are not dual purpose. They aren't built for ventilation, making them inefficient, noisy and costly to run.

Airocle's natural ventilation systems comply with two main components of NCC Volume One:

1. Part F6 Light and ventilation. Installation of Airocle products on a building provides weatherproof openings to encourage natural ventilation and its benefits.

2. Part E2 Smoke hazard management. Including Airocle vents on a building provides roof-level openings to expel hazardous smoke in the event of a fire.

By harnessing physics, and with thoughtful design, Airocle's natural ventilation performs where mechanical ventilation may struggle. For example, Airocle's natural systems offset the high heat, humidity and air contamination prevalent in industrial settings. Choosing the right solution for the application ensures optimal performance. **Refer to the tip adjacent for more information.**

Secondly, since natural ventilation does not rely on power, this makes it reliable in the event of an emergency, for example, a fire outbreak. Fire engineers and building occupants have complete peace of mind — which is priceless.

EXPERT INSIGHT

Optimal ventilation performance

In the design phase of a new build, it's crucial to know which way the wind is likely to blow around a building, as it affects ventilation performance. Architects should carefully consider the ideal placement and quantity of natural ventilation on a building to maximise air inflow and ventilation. There may also be particular project specifications to factor in.

Get the design right, and the results can be remarkable. If in doubt, a natural ventilation designer can provide guidance on the optimal design. Retrofits should also take wind direction and ventilation placement into account, and can benefit from a specialised ventilation consultant.

2 Natural ventilation is cost-effective

Unlike mechanical ventilation, you can count on long-term savings with natural systems. Fans and other forms of mechanical ventilation are not only costly to run, but they require expensive electrical installation and frequent maintenance.

However, a high-quality natural ventilation system maximises efficiency and minimises maintenance. Starting with natural ventilation can reduce building structure and operational costs. But preexisting builds can also benefit from cost savings by simply switching mechanical ventilation for natural.

3 Natural ventilation is greener, healthier

In making the natural choice, a naturally ventilated building will do a world of good for people and the environment. Constant replenishment of the optimum amount of fresh air decreases temperature, humidity and VOCs, which puts occupants at less risk of headaches and other illnesses. Only natural ventilation is able to create the ideal internal environment while ventilating effectively.

If we take an environmental perspective, natural ventilation systems play a role in a building achieving green accolades, namely Green Star Certification. Zero energy consumption offers a significant long-term advantage, both in reducing emissions and costs. This gives both designers and their clients something to be proud of.

4 Natural ventilation is easy to install

Innovative natural ventilation products are an excellent choice for simple installation. And it doesn't matter whether the install involves a new or existing build. Take Airocle's 4 Series ridge- and slope-mounted roof vents. The 4 Series comes fully preassembled, so once hoisted, installation gets done in a few quick steps. Some Airocle products like the 10 Series take just four steps to have the vent ready for use — no modifications required. The simplicity of installation makes Airocle roofers' preferred product as it saves labour, time and money.

While every Airocle product comes complete with an installation guide, our highly qualified and experienced technicals can install your ventilation if desired.

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End-to-end natural ventilation solutions

So, now you know why natural ventilation is advantageous if you want to deliver a safe, sustainable, productive building. Thoughtful design sees natural solutions leading the way in a multitude of applications. They're creating greener spaces and supporting healthier workplaces. They help keep people safer in a fire. Its cost-effectiveness is a boon not only for builders, but for the owners who will ultimately bear the costs of operation. Natural ventilation offers a win-win for project collaborators and their end users. And the advantages are nothing short of exceptional.

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BESTPRACTICE CERTIFICATION ISO9001 QUALITY MANAGEMENT SYSTEM

BESTPRACTICE CERTIFICATION ISO45001 OH&S MANAGEMENT SYSTEM

ABOUT US

Airocle is Australia's leader in natural ventilation

We have over 100 years of industry experience helping the world breathe naturally. Our experts design, manufacture, install and service bespoke and turnkey natural ventilation systems for some of the biggest organisations in Australia. We also consult on natural ventilation and passive smoke hazard management design, working with you to find best-fit solutions. If you're looking for innovative and environmentally sustainable ventilation, then look no further. Our team is ready to assist.

Get in touch with Airocle to find out how we can support your next project.

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Airocle™

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Think Smarter.™

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