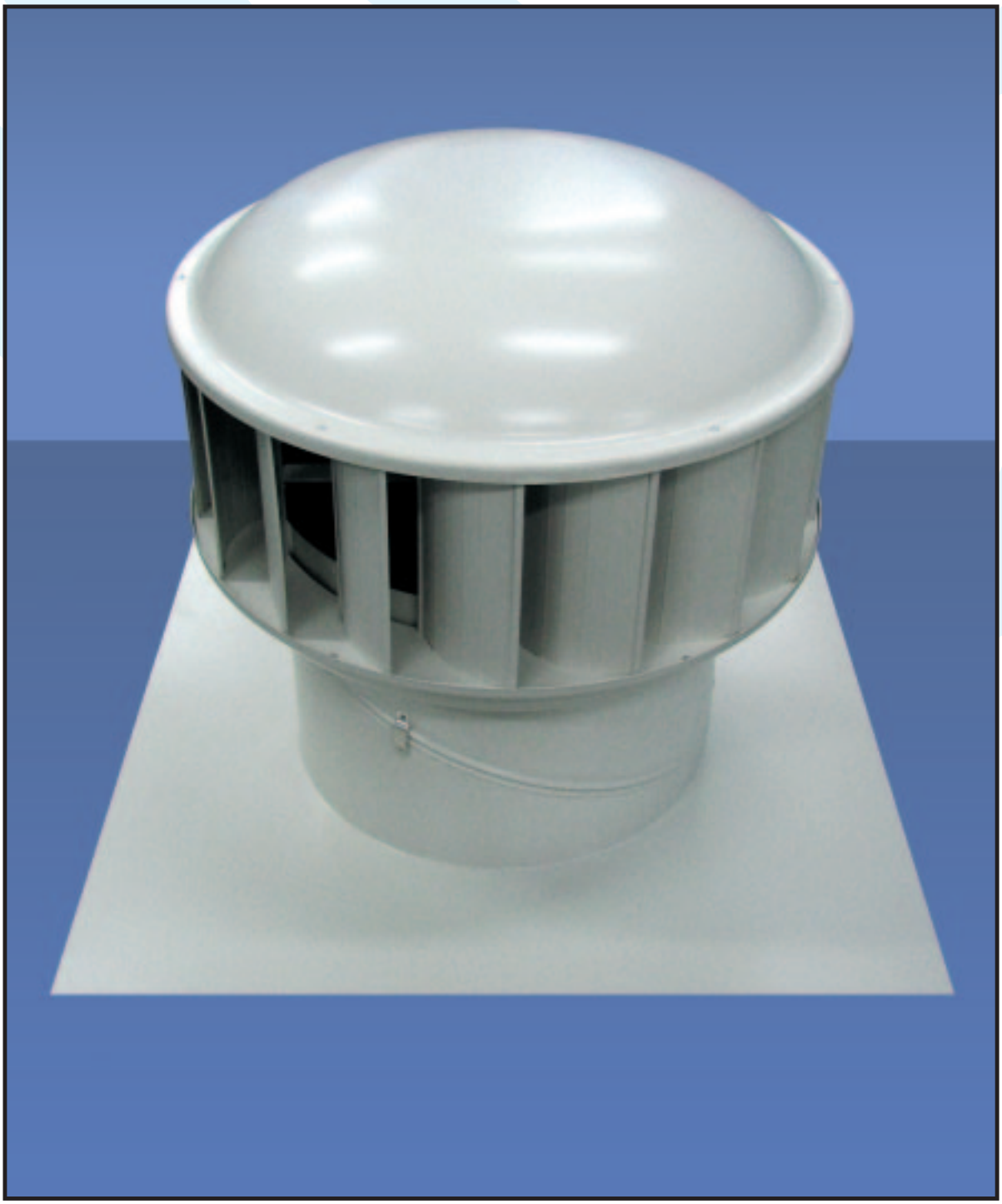
ecopower®

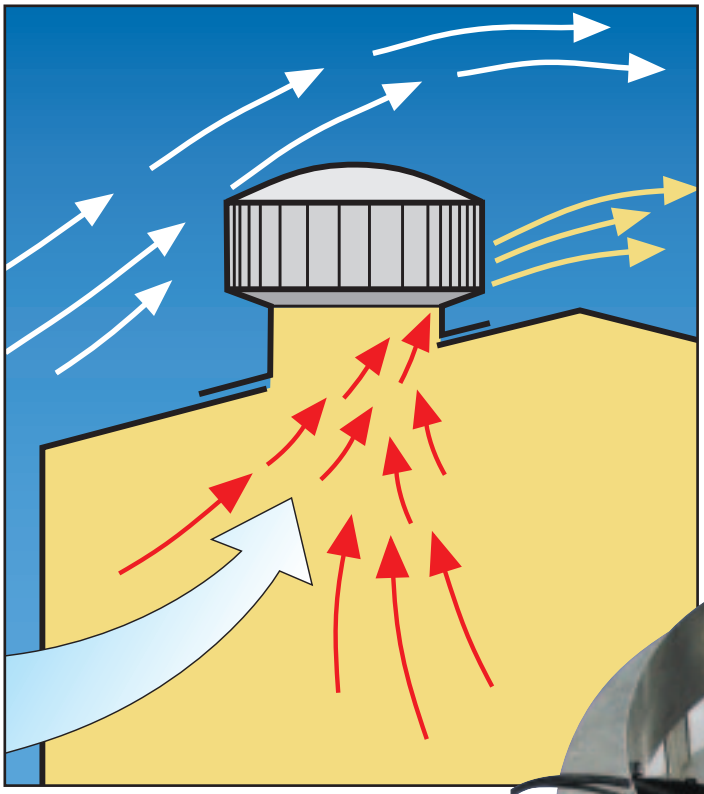
energy efficient ventilator technology

EDMONDS

The world's first, true hybrid ventilator. Combining reliability and performance.



CSR



THE IMPORTANCE OF DEPENDABLE VENTILATION

Ample research is available to show that adequate fresh air exchange is crucial for workers, students and home occupants to perform at their best. A well designed ventilation scheme can:

(1) lower temperatures in homes and buildings during summer by cooling roof spaces and even removing trapped ceiling heat through ceiling grilles,

(2) improve air quality by lowering impurity levels caused by human respiration and chemical emissions – mainly volatile organic compounds (VOCs) – from carpets, furniture, paints, cleaning products and the like.

Long-term exposure to VOCs causes sick building syndrome, where by building occupants experience rising levels of eye, nose and throat irritation, headache and allergic reactions.

Under requirements to maintain a safe working environment, many factories now need adequate fresh air exchange to remove gaseous, process emissions and/or heat build up.

IMPORTANCE OF ENERGY EFFICIENT SOLUTIONS

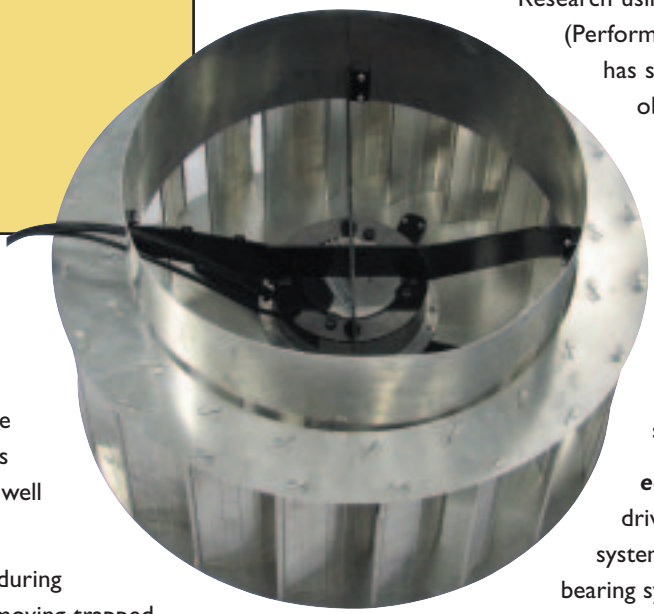
Growing environmental concerns demand that ventilation requirements be met by the most energy efficient means available. Wind turbine ventilators can perform this function well, however for reliability they depend on favourable wind conditions, which are not always present when temperatures are extreme. They are, in effect, 'slaves to the vagaries of wind'.

CSR Edmonds has developed and secured intellectual property rights for the world's first true hybrid ventilator. The ***ecopower***® is both a wind driven and motorised ventilator with the capacity to operate by wind alone or by both wind and electric power simultaneously.

ecopower® – TRUE HYBRID VENTILATION

ecopower® utilises an electronic commutating (EC) motor installed in the head of the ventilator to enable motorised boost during periods of low wind speed or special ventilation needs. The motor can be activated by any digital measure, such as temperature, humidity gas concentration level etc. The standard product is controlled manually by a switch (not included).

Unlike previous attempts to produce a hybrid mechanical/wind vent, ***ecopower***® has **no motor and fan blade in the throat** of the vent. This is **extremely** important. Research using AS4740:2000 (Performance of Natural Ventilators) has shown clearly that any obstruction in the throat of a wind ventilator will greatly decrease vent performance under wind load. The level of flow reduction can be 40% or greater. Also, axial fans located in the throat of wind vents can produce significant noise levels.



ecopower® is one large direct drive centrifugal fan. The bearing system of the motor becomes the bearing system of the ventilator. This means that the vent can be free spinning under wind load or power activated as conditions require. The use of an EC motor ensures that the best energy efficiency features available are factored into the product design.

PRODUCT RANGE

ecopower® is presently available as standard product in four sizes, viz. 100mm, 150mm, 400mm and 600mm throat sizes. Further sizes including a tailored domestic product will follow. For the most up to date information, please check with our website www.hybridvent.com.au

Table 1.

ecopower® model	Power source	Weight of head	Noise dB(A) @ 3m	RPM
EP100	6VDC	2.1kg	N/A	424
EP150	9VDC	2.5kg	N/A	410
EP400	240V AC	10.7kg	38.5	313
EP600	240V AC	14.4kg	40	235

EXTRAORDINARY PERFORMANCE

The ***ecopower***® concept has demonstrated extraordinary energy efficiency under power load (Table 2). Exhaust rates per unit of energy are well above that achieved by comparable sized axial fans while noise levels are significantly lower.

Table 2.

ecopower® model	Optimal Exhaust Rate m^3/hr	Power (W)	Specific Flow Rate m^3/hr.W
EP100	99	3.6	27.5
EP150	198	10.0	19.8
EP400	2020	39.6	51
EP600	3910	88.0	45.3

Full specifications are available in techinical data sheets.

PERFORMANCE UNDER WIND POWER ALONE

How does ***ecopower***® perform under wind power alone compared with the standard Hurricane wind turbine? The results in Table 3 show the performance of both ***ecopower***® and standard Hurricane when tested to AS4740:2000 – Australian and New Zealand standard for Natural Ventilators. The results show clearly that ***ecopower***® provides exhaust rates about 10% greater than standard Hurricane due to less throat blockage.

Also shown in Table 3 is a comparison of flow rates from AS4740:2000 with the traditional approximations derived from a modified formula for estimating discharge from an open cavity. The latter has been widely used in many product brochures but lacks any scientific basis. It will be noted that the results measured under AS4740:2000 are about 40% of that reported using the traditional approximation. This subject is discussed more fully at www.hurricanevent.com.au

Table 3.

Model		Flow Rate AS4740:2000 m^3/hr	Flow Rate Traditional Approximation m^3/hr
100	***ecopower***®	41.4	113
	Hurricane	N/A	113
150	***ecopower***®	N/A	255
	Hurricane	106	255
400	***ecopower***®	864.6	1812
	Hurricane	778.8	1812
600	***ecopower***®	1435.4	4077
	Hurricane	1246	4077

SUPPORTED BY THE LATEST RESEARCH

CSR Edmonds has been the first entity in Australia, and indeed the world, to establish test facilities in accordance with AS4740:2000 requirements. This initiative has enabled CSR Edmonds to fully evaluate vent performance across a wide spectrum of designs and materials.

The results to-date have shown:

- The Hurricane vertical vane design has flow coefficients up to 97.5% higher than comparable spherical shaped ventilators.
- The performance of any ventilator is highly dependant on minimising blockages in the throat of the ventilator. Therefore the use of motor and fan blades in the throat will reduce the performance of any ventilator significantly.

The CSR Edmonds test rig.

BENEFITS OF *ecopower*®

ecopower® offers customers the following unique benefits:

- Optional powered ventilation without reducing the performance of wind exhaust levels (which occurs when motor and fan blades are installed in the throat).
- High levels of energy efficiency.
- Much lower operational noise levels compared with similar capacity axial fan products.
- Dependable ventilation that performs when required.
- Advanced German motor technology.
- CSR Edmonds' vertical vane vent technology, which outperforms traditional spherical shape metal vents of the same throat diameter*.
- Lighter weight than comparable axial fans.
- Single phase (EP400 & EP600) and low voltage (EP100 & EP150) power, allows simpler electrical installation.

** Flow coefficient tests performed under AS4740:2000 by CSR Edmonds.*

APPLICATIONS OF *ecopower*®

The likely range of potential applications for ***ecopower***® are **unlimited** but include:

Remote Toilet Systems

Removal of gaseous by-products from hybrid, composting and chemical toilet systems. Already Gough Plastics, a very successful North Queensland manufacturer of remote toilet systems is using the ***ecopower***® EP100 to reliably remove odours from their highly successful solar powered, hybrid toilet systems due to its (1) dependable flow rate (2) long life (3) low maintenance (4) high corrosion resistance and, (5) high energy efficiency (crucial when relying on solar power).

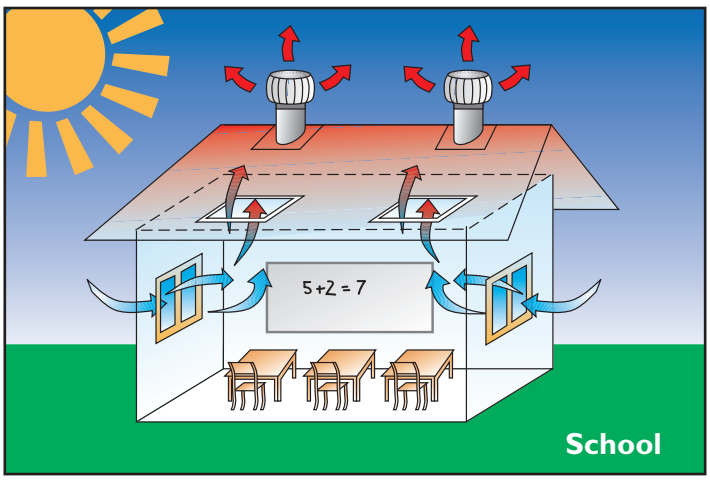
School Classrooms

In many states of Australia it is Government policy to use various means of ventilation to improve classroom conditions during summer rather than rely on energy intensive air conditioning. However the performance of wind turbine ventilators is always subject to wind conditions. The use of wind turbines with fan power assist has been used but these products have lower wind turbine extract rates due to throat blockage and are significant power users. ***ecopower***® will provide unimpeded wind performance with low energy power boost option.

When used in conjunction with EC Damper Grilles, ***ecopower***® provides a means of efficiently ventilating individual classrooms directly to freshen air and remove trapped heat.

Alexandra Hills State High School, Brisbane, QLD

The ***ecopower***® EP600 has been used on Alexandra State High School to replace the existing spherical shaped wind driven ventilators as the system was not performing to desired standards.



Electronic Control Cabinets

Rail authorities have trialed the use of ***ecopower***® for cooling of electronics in signaling control cabinets to improve system reliability. Results to-date have been impressive with low energy usage a feature of ***ecopower***®.

A Substitute for Powered Ventilation

Powered ventilators have been used for ventilation purposes in many factory and commercial applications. Although they may adequately achieve air movement requirements, they do so with;

1. High energy consumption and often the need to use 3 phase power
2. High noise levels often exceeding 60dB(A) @ 3m

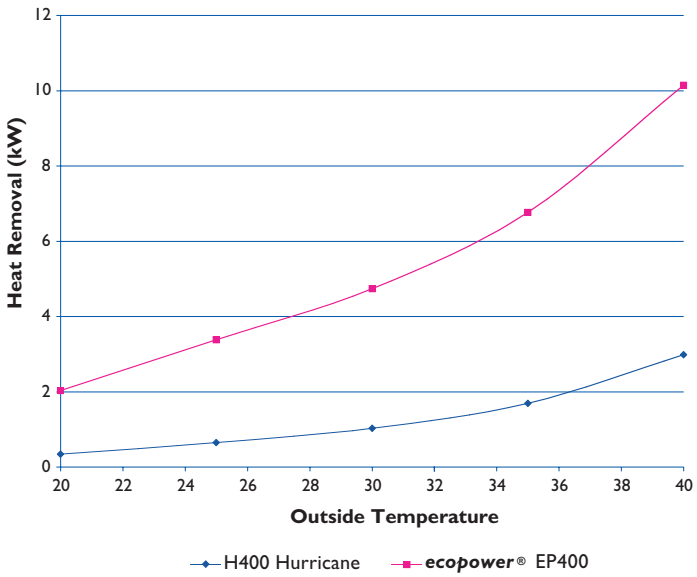
The ***ecopower***® overcomes these limitations significantly by employing low speed, high energy efficient hybrid technology.

Homes

Trials conducted by CSR Edmonds have shown very promising results for use of ***ecopower***® technology in homes to remove heat. In conjunction with proper insulation levels, this technology could significantly reduce energy usage for cooling in homes.

The following figure is an example of the heat removal rates of the Hurricane H400 & the ***ecopower***® EP400 for varying ambient conditions. It shows the greater capacity of the ***ecopower***® EP400 to remove heat compared with equivalent sized wind driven ventilators.

HEAT REMOVAL RATES OF VENTILATORS



Conditions indicated by the follow parameters:

- *Stack height = 3m*
- *Wind Speed = 10.8km/h*
- *Flow rates calculated according to AS4740:2000*
- *Varying temperature difference (range 3 – 15°)*

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