# Using Breezway Altair® Powerlouvre® Windows in Commercial Buildings

## Breezway Technical Bulletin



Altair Powerlouvre Windows are a sound option for specifiers wishing to use natural ventilation in commercial buildings as they maximise ventilation at any window size (compared to awning windows, for example, which offer relatively low ventilation, particularly tall, narrow awning windows)

### Reduced Running Costs and Green House Gas Emissions

HVAC systems are major consumers of electricity. The most effective way to reduce energy consumed by HVAC systems is to design buildings that do not require the HVAC systems to run continuously. This can only be achieved by opening the building up to take advantage of natural ventilation. Louvre windows are a great option to achieve this as they maximise the ventilation possible through the window openings. Furthermore Altair Powerlouvre Windows can be easily controlled by building management systems to allow the automatic opening and closing of the windows in response to the climatic conditions.

Louvre Windows are also recommended for night purging which lets cool air into the building to replace the warm air that has built up during the day or to cool the high thermal mass building elements which have absorbed heat through the day thereby reducing the HVAC cooling load. Night purging is also used to improve the air quality within buildings.

A common concern with the use of Altair Powerlouvre Windows is the increased air leakage compared to fixed lite windows used in buildings with continuously running HVAC systems. A simplistic analysis shows though that a reduction in the operating hours of an HVAC system can outweigh the decreased running efficiency due to increased air leakage. (See Appendix 1 for more details) Reducing the energy required to run HVAC systems reduces the electricity consumed by a building and therefore also reduces the greenhouse gasses emitted to generate electricity. For example:

- A 1996 study by D. Rowe (Mixed mode climate control AIRAH Vol 50, Issue 12) showed a 25%-33% reduction in energy use in a mixed-mode cooling building in Sydney with high occupant comfort satisfaction scores.

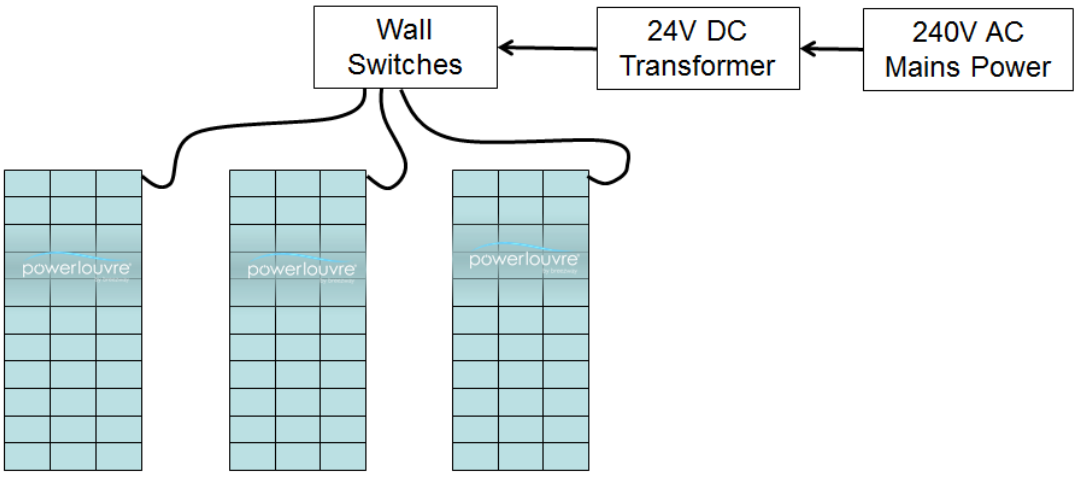
### Increased Productivity of Building Occupants

There is little doubt that natural light and ventilation create spaces that are more pleasant to live and work in, but direct business benefits in the form of increased worker productivity and decreased sick leave have also been shown in various studies. For example:

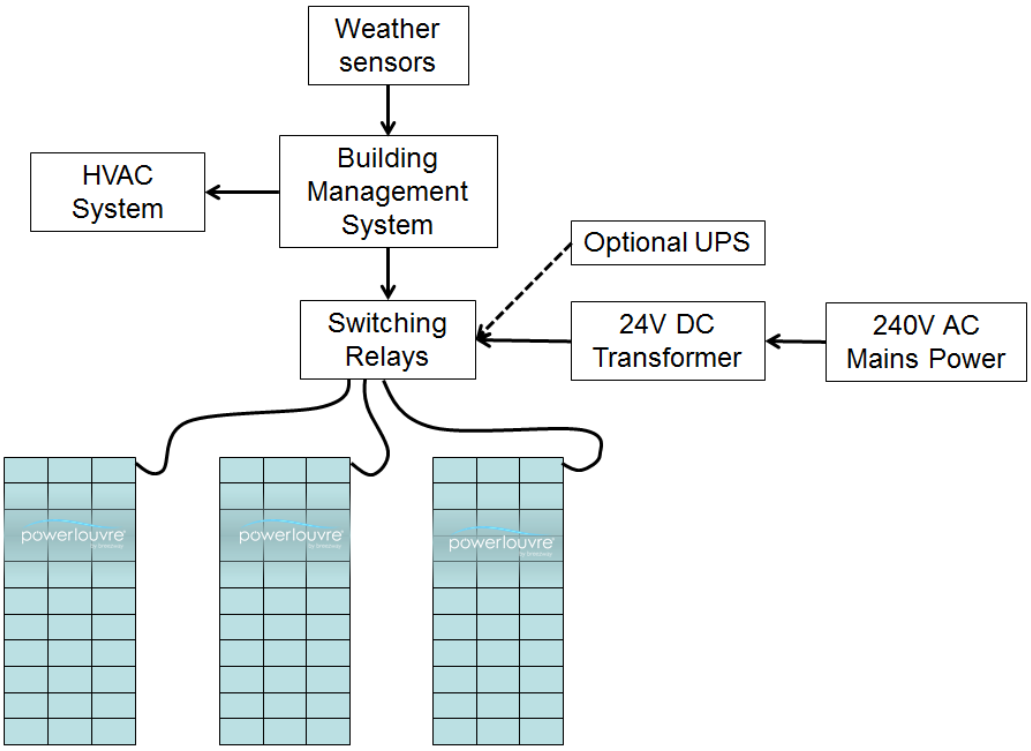
- In a 2003 Carnegie Mellon University study, Professor Vivian Loftness showed a 0.4%-7.5% gain in worker productivity in building environments with natural ventilation and/or access to the outdoors.
- In a 2000 study of Swedish schools by Smedje & Norback, a 69% reduction in the 2-year incidence of asthma amongst students in schools that received new ventilation systems with increased fresh air supply as compared to schools that did not receive a new ventilation system.

Breezway Altair Powerlouvre Windows can be configured and controlled in a wide variety of ways, from simple wall switches right through to Building Management Systems which operate the windows and HVAC systems in response to climatic conditions.

Example 1: Controlling Powerlouvre Windows with wall switches.

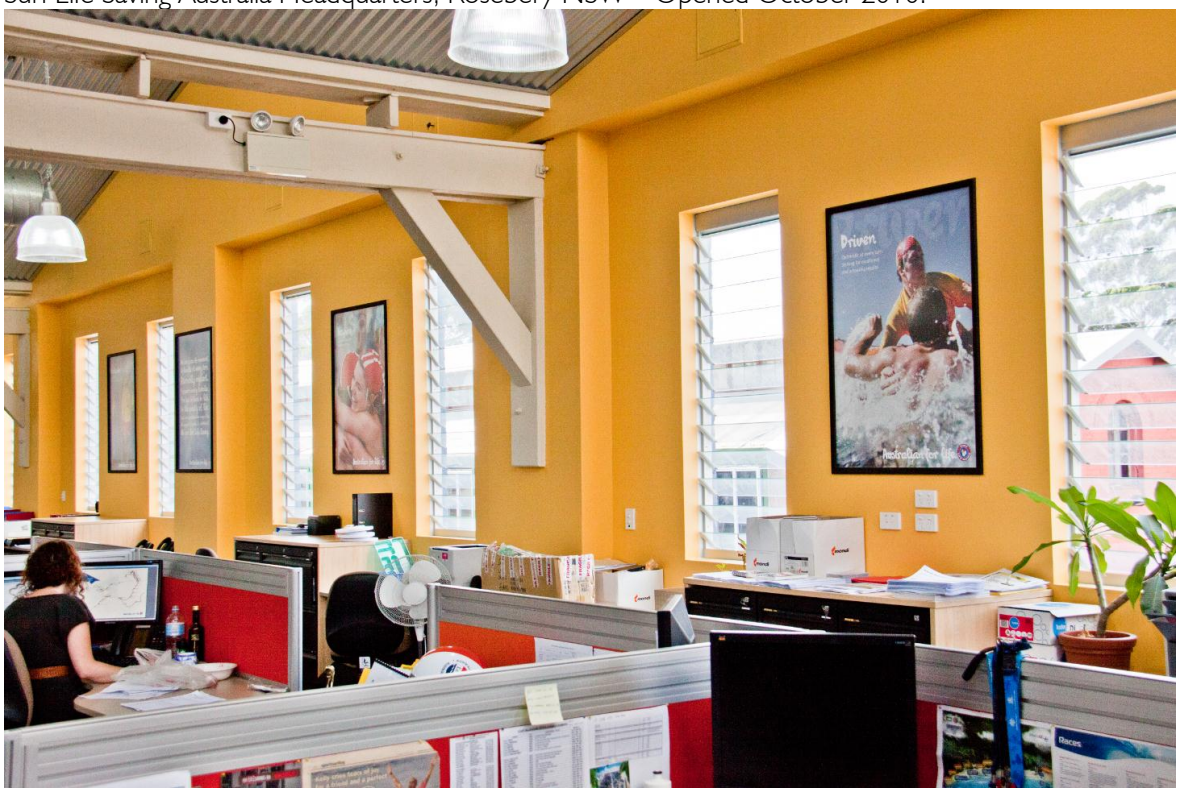



Example 2: Integrating Powerlouvre Windows into a Building Management System.

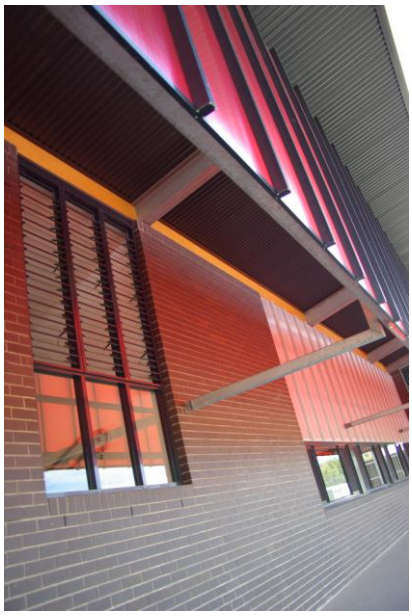


Manea Tafe College, Bunbury WA – 2009 Australian Institute of Architects Award for Public Architecture.

Surf Life Saving Australia Headquarters, Rosebery NSW – Opened October 2010.



Parkhurst State School, Parkhurst QLD – Queensland Regional Architecture Award Winner for 'Building of the Year' 2011



St Margaret Mary's School, Townsville QLD

Breezway Head Office – 2011 Finalist UDIA QLD 'Small Retail/Commercial' and 'Excellence in Environmentally Sustainable Development – Land Based'

## Appendix 1 – Reduced HVAC Running Cost Analysis, Breezway Easyscreen Altair Powerlouvre Windows vs Breezway Easyscreen Fixed Lite Windows

Assumptions:

1. SHGC and U-values are identical for both window types. (Any type of 6mm thick monolithic glass can be used in Altair Louvres, including tinted and low e coated options which allow a range of SHGC and U-values to be achieved.)
2. Window sizes and orientations are identical for both window types.
3. HVAC systems are designed to achieve 2 complete air exchanges every hour.
4. When climatic conditions are favourable the HVAC system will not be required to achieve 2 complete air exchanges every hour in a building using louvre windows.
5. Glazing area as a % of floor area = 15%
6. Ceiling heights = 3m
7. HVAC system running hours per day in building with fixed lite windows = 12 hours
8. HVAC system running hours per day in building with louvre windows = 7 hours

Data:

- Breezway SL2 Altair Louvre Window air infiltration has been tested to AS2047 and is equal to 2.56 l/m$^2$/sec = 9.22 m$^3$/m$^2$/hour at a 75Pa pressure difference.
- Capral 400 Series Fixed Lite Window air infiltration has been tested to AS2047 and is equal to 0.04 l/m$^2$/sec = 0.14 m$^3$/m$^2$/hour at a 75Pa pressure difference.

Result:
A simple analysis shows that reducing the average daily HVAC running hours from 12 hours/day to 7 hours/day more than compensates for the increased air volume that the HVAC systems must process due to increased air infiltration/air leakage rates.

Analysis:

| | Building with Fixed Lite Windows | Building with Louvre Windows |
|---|---|---|
| Air volume to be processed by HVAC system per hour if the building is perfectly sealed.[1] | 6m$^3$/m$^2$of floor space/hour | 6 m$^3$/m$^2$of floor space/hour |
| Additional air volume to be processed by HVAC system per hour due to air leakage or air infiltration.[2] | 0.02 m$^3$/m$^2$of floor space/hour | 1.4 m$^3$/m$^2$of floor space/hour |
| Total air volume to be processed by HVAC system per hour | 6.02 m$^3$/m$^2$of floor space/hour | 7.4 m$^3$/m$^2$of floor space/hour |
| HVAC running hours per day | 12 hours/day | 7 hours/day |
| **Air volume to be processed by HVAC system per day.[3]** | **72.3 m$^3$/m$^2$of floor space/day** | **51.7 m$^3$/m$^2$of floor space/day** |

Analysis notes:

1. [1m$^2$ of floor space] x [3m ceiling height] x [air exchanges per hour]
2. [Air leakage per m$^2$ of glazing] x [glazing area as a % of floor area]
3. [Total air volume to be processed by the HVAC system per hour] x [HVAC running hours per day]