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# Ecolibrium



## Cooling the cloud



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# CELEBRATE GOOD TIMES

The finalists have been announced for this year's AIRAH Awards, with a host of the industry's top projects and individuals in contention, writes **Boon Mark Souphanh**.



Once again, the judging panel has meticulously sifted through the talent-rich nomination pool, and the finalists of the AIRAH Awards 2016 have been revealed.

2016 lifted the bar, putting forward an impressive array of nominations across all categories, and presented judges with the difficult task of picking the cream of the crop.

"The number of projects and individuals nominated for the AIRAH Awards this year really represents our growing industry," says AIRAH CEO Tony Gleeson, M.AIRAH. "Collectively they have set a brilliant standard when it comes to innovation, leadership, and performance. The awards recognise and praise their contributions,

and will hopefully work to encourage others to strive for excellence in years to come. It remains one of most significant events on the AIRAH calendar."

Winners of the AIRAH Awards 2016 will be announced at a presentation dinner held at Luna Park in Sydney on November 10.

## WR AHERN AWARD

Six papers are eligible for the WR Ahern Award, which is presented for the best technical paper by an AIRAH member.

- "Predictive control of refrigerated facilities for improved energy management, Parts I and 2," by Dr Josh Wall, M.AIRAH
- "Recent development of current climate data for load estimation and design optimisation, Parts 1 and 2," by Eric Peterson, M.AIRAH
- "Development of a novel axi-symmetric non-rotating roof-top ventilator," By Dr CB Allison, M.AIRAH
- "Sources of errors for indoor air CFD simulations, Parts 1 and 2," by Kemal Gungor, M.AIRAH
- "Using BMS maintenance contracts to achieve plant optimisation," by Vince Simpson, M.AIRAH
- "Mechanical services challenges in preloved buildings," by Ken Erbas, M.AIRAH

## FUTURE LEADER

Sponsor: A.G. Coombs

Each year, the AIRAH Future Leader Award sees tough competition, and this year is no exception. Among our six finalists are some of the industry's brightest emerging leaders.

### Amnon Holland, M.AIRAH, ESBS

Described as a "born engineer", Amnon Holland specialises in building services at ACT-based engineering firm ESBS.

Earlier this year, Holland took part in company-sponsored trip to attend a course on electrical engineering for building services in the UK. He visited London's Royal Botanic Gardens on a fact-finding mission on behalf of the Australian National Botanic Gardens (ANBG) in Canberra, where ESBS are providing consultancy advice for the proposed Ian Potter National Conservatory.

Holland subsequently visited the Eden Project in Cornwall to gain more knowledge. And upon his return, he reported his findings to ANBG staff.

In addition to training and mentoring junior staff, Holland is a member of the AIRAH ACT division committee.

### Brett Saunders, Affil.AIRAH, Hiflow Industries



To ensure his company Hiflow Industries is moving with the market, Brett Saunders started a fact-finding mission in the analytics space to understand

what is offered in the Australian market. He then visited the US to investigate the numerous systems available and what points of differences that they may offer.

Saunders has partnered with a leading US company to provide high-end building analytics with significant technological advances. The system claims to be the first in the commercial property market to offer wireless sensors to triangulate the data with existing BMSs.

### Carlos Flores, M.AIRAH, NSW Office of Environment & Heritage



Based in Sydney, Carlos Flores is the national program manager at NABERS – Australia's flagship sustainability program for existing buildings.

Flores' role includes managing a 20-person team, reporting to government stakeholders, implementing the program's strategic direction, and managing the NABERS brand.

He has designed and implemented a new planning and prioritisation process for innovation projects, using key industry feedback to focus on areas where NABERS can have the greatest impact.

Driving an innovation agenda, Flores has increased the resources of the development team while increasing their productivity through the implementation of agile development techniques and rapid prototyping. This resulted in the revision and relaunch of the NABERS Shopping Centre Tool, which has received a record uptake, as well as the revision and relaunch of the NABERS Indoor Environment Tool, which received international recognition.

### Jeremy Osborne, M.AIRAH, EnergyAE



Over the past six years, Jeremy Osborne has significantly contributed to the development of the solar industry in Australia and beyond.

In 2013, Osborne designed the AIRAH award-winning solar heating and cooling project at UTS, which established him as a key player in the Australian solar scene.

In 2014, he founded Sydney-based consultancy EnergyAE and started providing guidance to students and professionals through training. EnergyAE has now grown to a team of six and strives to enable innovation for a sustainable future.

EnergyAE has developed a cost-effective online education product called TRNSYS Guru for students and engineers.

A member of AIRAH's Solar Cooling Special Technical Group, Osborne is a past conference chair of AIRAH's Solar Heating and Cooling Workshop.

### Jesse Clarke, M.AIRAH, CSR Building Products



Jesse Clarke joined the Sydney office of CSR in 2010 to assist in developing a strong building science basis for the development of energy-efficient

building products. Since then, he has effectively achieved that objective and emerged as a leader in policy thinking across the industry.

After undertaking substantial analysis of findings from the CSR House research project, he initiated a range of new projects, four gained funding from the CRC for Low Carbon Living.

Through this process Clarke has been acknowledged across academic, industry, government and the CSIRO for his knowledge and commitment.

### Leon Wurfel, Affil.AIRAH, BUENO Systems



Leon Wurfel is the managing director and co-founder of BUENO, Australia's first property operations "big data" business.

As part of the creation of BUENO, Wurfel has worked to disrupt the standard service and maintenance models for BMSs and mechanical systems through implementing a data and analytics-driven prioritisation of maintenance activities as well as semi-automated diagnostics of service call issues.

Since inception in 2013, BUENO has grown to a staff of 25, and its products and services now cover more than 4.5 million m<sup>2</sup> of buildings under various forms of the BUENO-managed services.

Wurfel is a member of the AIRAH ESD Special Technical Group.

## Excellence in Sustainability

Sponsor: NABERS

Recognising Australian initiatives that have improved the sustainability of HVAC&R systems or the industry, AIRAH's Excellence in Sustainability celebrates a crucial area of our industry. Finalists for 2016 are:



Coles, Coburg North

## Floth Sustainable Building Consultants 69 Robertson Street, Fortitude Valley

69 Robertson Street is a new 1,000m<sup>2</sup> office building in Brisbane's Fortitude Valley. Independent Australian specialist engineering firm Floth Sustainable Building Consultants developed and occupy the three-level office building.

The building received the first 6 Star Green Star Design and As Built v1.1 certified rating in Australia, as well as the first 6 star NABERS Indoor Environment rating in Australia. It was also the first building that formally publicly adopted the ASBEC standard definition of a Zero Carbon Standard Building.

Indoor air quality initiatives including ideal outside-air intake locations, clean and maintainable air distribution ductwork, and outdoor air systems sized to provide 50 per cent improvement to outdoor air rates.

Energy-efficient mechanical systems include zoned heat-recovery VRF fan-coil units selected to provide maximum dehumidification performance, variable-speed electronically commutated (EC) ventilation fan motors, and a controlled carpark ventilation system.

## City Holdings Coles, Coburg North

The Coles Coburg North concept store in Melbourne represents a leap forward in both HVAC&R system design and application. It utilises carbon dioxide via a trans-critical process to service the store's refrigeration and air conditioning heat loads, plus hydrocarbon refrigerants via low-charge systems.

"The Coburg North project has achieved an energy profile showing a 17 per cent reduction over the recently enhanced modern base-fleet comparison stores," says City Holdings. "It has achieved energy consumption figures to better any store in the fleet, with the added benefit of negating the use of synthetic refrigerants."

The store is the first successful large-scale (610kW<sub>r</sub>) plant in a live Australian retail outlet to utilise natural refrigerants R744, R290 and R1270.

North Coburg was built to 4 Star (plus) Green Star standard and is company's first partly solar-powered store, with the ability to generate 100 kW of solar power.



69 Robertson Street,  
Fortitude Valley



Warship Pavilion,  
Australian National Maritime Museum

### Steensen Varming Warship Pavilion, Australian National Maritime Museum

The Warship Pavilion, Australian National Museum, was built to mark the centenary of World War I and commemorate 100 years of service by the Royal Australian Navy. Steensen Varming was engaged to provide the mechanical, electrical, sustainable and lighting design services for the construction.

“The Australian National Maritime Museum aspired for a sustainable and low-energy design solution,” says Steensen Varming associate Ben Jones.

In order to achieve this, a high-performance building envelope is complemented by a narrow-plan building design that minimises solar gain. Strategically positioned operable low and high-level openings throughout the pavilion promote cross/buoyancy-driven controlled natural ventilation. Large industrial ceiling fans assist with air movement on still days.

In one of the more left-field solutions, tempered relief air from

the air conditioned “ICE” immersive attraction in the museum was designed to spill into adjacent passively conditioned zones. This effectively provides free secondary air conditioning to those areas. Where air conditioning was required, this was achieved via chilled water, which was fed directly from the existing museum seawater heat-exchange system.



School of Design,  
University of Melbourne

### Umow Lai School of Design, University of Melbourne

The School of Design at Melbourne University implements advanced construction technologies in an innovative and highly sustainable space.

In keeping with the university’s sustainability aspirations, the \$100 million project has achieved a 6 Star Green Star Rating, including all 10 points for innovation from the GBCA.

“The building’s facade has been designed to be highly energy-efficient, with external shading used extensively to reduce thermal loads,” says Umow Lai director Shane Esmore. “Parametrically designed perforated zinc solar-shading systems are wrapped around the north, east and western facades.”

High levels of indoor environment quality were also achieved through the ability to use either natural ventilation or mechanical ventilation systems.

“Much of the building utilises highly efficient localised fan-coil systems that integrate seamlessly with natural ventilation flows,” says Umow Lai. “Measurement of building performance is achieved by an extensive system of meters and sensors.”

An ongoing two-year building tuning program is being undertaken where each specific initiative is being evaluated and tuned for optimal performance.

## Excellence in Innovation

Sponsor: Standards Australia

AIRAH's Excellence in Innovation award shines the spotlight on substantial Australian improvements in HVAC&R achieved through innovation. Finalists for 2016 are:



District Cooling Plant, Barangaroo South.

The DCP plant provided 100,000+ kL of annual potable water savings (equates to over 40 Olympic swimming pools), over 20 per cent improvement in plant efficiency compared to modern water-cooled building plants in Sydney, and 10–15 per cent lower peak demand compared to conventional plant.

### Lommers Engineering DownUnder GeoSolutions high-performance computer cooling systems

The DownUnder GeoSolutions (DUG) High Performance Cluster (HPC) is one of the largest privately owned computers in the world, with centres in Perth, Houston, London and Kuala Lumpur. A computer of this size requires significant cooling systems to operate.

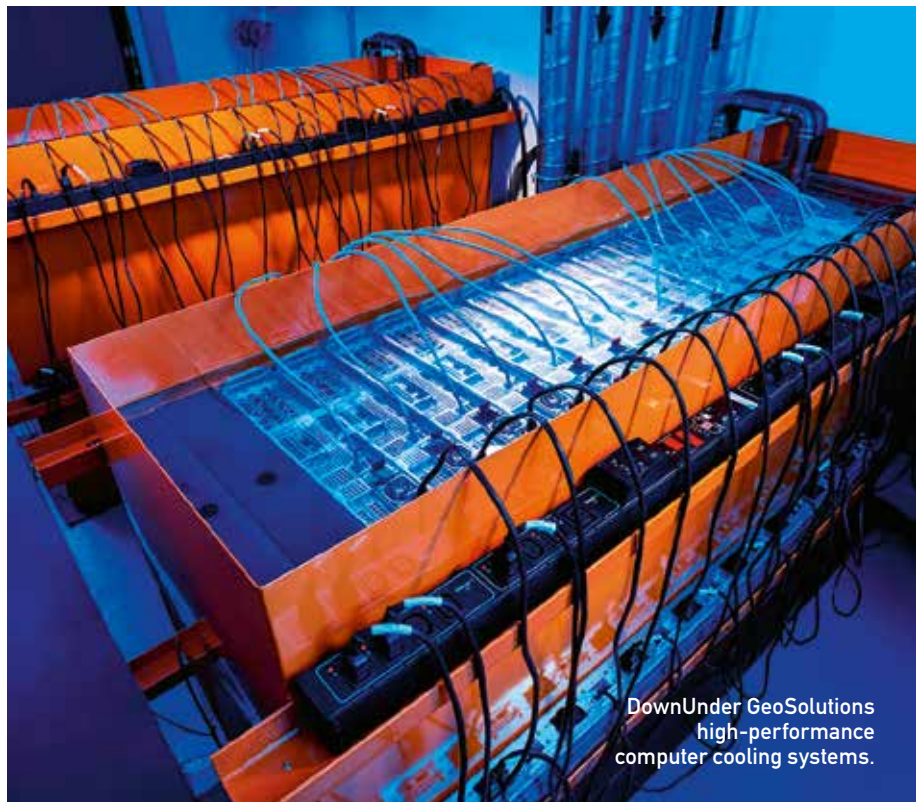
By reducing wasted energy through removal of air-circulating fans within computers and within the data centre space, the immersion-based cooling system immediately saves 20 per cent of computer equipment energy consumption. Coupled together with utilising “condenser water” temperature cooling water and conventional cooling tower heat rejection, total power requirements attributable to cooling systems are reduced by over 85 per cent compared to high-efficiency DX-based cooling systems.

### Lendlease District Cooling Plant, Barangaroo South

The environmental targets set for Barangaroo in Sydney challenged the team at Lendlease to design a world's best-practice district cooling plant (DCP), incorporating a harbour water heat-rejection system (HHR). This key piece of infrastructure forms one of the cornerstone elements in achieving carbon-neutral and water-positive outcomes in operation for Barangaroo South.

“The DCP design incorporates many features in a unique manner to achieve world-leading efficiency, providing a reliable CHW supply for diversified uses,” Lendlease says.

“An industrial controls system using uniquely written ... control strategies maintains operation at optimal efficiencies by monitoring fouling, water leakage, and building interfaces to control the distribution of cooling to the buildings during normal, emergency and other modes of operation.”



DownUnder GeoSolutions  
high-performance  
computer cooling systems.

The Australian Federal Police  
Forensic data centre, Majura.



The immersion-based cooling system is able to be cooled using flexible cooling water sources as available on site, ranging from conventional chilled water to warm-water-based systems such as cooling towers, ground loops, or even seawater heat rejection.

“Due to the comparatively high specific heat content of the dielectric fluid, brief interruptions in cooling to the tank are able to be “ridden out” during production for over 20 minutes, with only minimal increase in equipment temperature,” says company director Mark Lommers, M.AIRAH.

### Norman Disney & Young The Australian Federal Police Forensic data centre, Majura

The HVAC&R system the new Australian Federal Police Forensic data centre was designed to significantly improve staff effectiveness, evidence integrity, and energy efficiency.

“A unique blend of office, data centre, administrative centre, and laboratory space, the facility also incorporates a live firing range,” says NDY senior associate Christopher Ward, M.AIRAH. “With that in mind, a focus on innovation was crucial to the facility meeting the requirements of the AFP, especially in the HVAC&R portions of the project.”

The building required several sensitive rooms to be located in close proximity, without contamination, vibration, sound or air moving between zones.

This strict requirement meant that the HVAC&R system had to draw 90–100 per cent of air from outside of the facility, flush the volume of the room frequently, create positive pressure in clean room areas, negative pressure in the adjacent zones, and ensure that the air circulation was isolated between areas.

For energy efficiency, heat is recaptured from the exhaust, and all climate controls have variable settings for each room.

### The Frame Group Displacement ventilation and ultra-quiet adiabatic free-cooling chillers

The modernisation of the data centre reinvigorated an ageing but important structure into a state-of-the-art critical infrastructure facility.

“The Sydney Data Centre is 28-years-old, and now has another 40–50 years of useful and productive life, underpinning the availability of the client’s services to customers,” says Greg Jackson from the Frame Group.

Approximately 22,000 m<sup>2</sup> in size, over 3.6MW of cooling capacity has been installed using external adiabatic hybrid air-cooled chillers.

Displacement cooling is used in the data halls, where low-velocity air allows mixed racks capacities and has no impact on cooling effectiveness or efficiency. The air flows across the surface of the floor from large grilles in the front of a specially designed low-velocity fan units.

Reduced noise levels, cooling power usage and improved efficiency is also achieved with the use of bespoke and purposed-built high-ambient-temperature hybrid chillers (with free cooling).

Displacement ventilation and ultra-quiet  
adiabatic free-cooling chillers.



## Best HVAC and Refrigeration Retrofit or Upgrade

Sponsor: ActronAir

This award recognises excellence in the retrofit or upgrade of an HVAC and/or refrigeration system, and can address the complete delivery of projects. Finalists for 2016 are:



Burwood campus thermal upgrade project, Deakin University.

### Cundall Burwood campus thermal upgrade project, Deakin University

During each third trimester of its academic year, Deakin University was receiving a large number of complaints from both students and teaching staff regarding the thermal comfort of various buildings within the Burwood Campus in Melbourne.

Through a carefully planned installation program, air conditioning was installed into five buildings, within a tight program and with minimum disruption to the students and staff. Strategically located centralised plant systems were installed to service these buildings while providing the infrastructure to extend the air conditioning facilities to other buildings at the campus.

### Irwinconsult GlaxoSmithKline blow-fill seal facility HVAC upgrade

The project involved the upgrade of major air-handling plant serving good manufacturing practice (GMP)



GlaxoSmithKline blow-fill seal facility HVAC upgrade.

critical areas within blow-fill seal (BFS) production areas of the GlaxoSmithKline Australia (GSK) Boronia in Victoria.

Irwinconsult had the challenge of installing and commissioning state-of-the-art close control air-handling equipment to replace existing units, while maintaining full operation of the existing facility. This included close control conditions, room pressure regimes, and certified cleanroom conditions.

High levels of detailed 3D Revit coordination were required, along with close client collaboration. Forward planning of commissioning tasks and detailed pharmaceutical design understanding was needed to ensure that the extremely tight timeframe for cut-over period was successful. This ensured no loss of production for GSK.

### Norman Disney & Young Westpac Kogarah refurbishment

The St. George Headquarters in Kogarah is a 26-year-old 31,000m<sup>2</sup> building, which was operating at a NABERS Office Base Building Energy Rating of 0 Stars. NDY helped Westpac modernise this building to target a best-practice NABERS 4.5 Star Energy rating.

The existing infrastructure in Westpac Kogarah was challenging. It was built as an owner-occupied building and the metering, HVAC, lighting and majority of the services were served by a common system. A major upgrade on the metering system was instigated to demarcate the base building and tenant energy.

The new BMS and trim-and-respond controls strategy formed a key part of the NABERS upgrade works, implementing an advanced climate-control system, which maintains occupant comfort and optimises energy efficiency.





Westpac Kogarah refurbishment.

As a result of all the technologies employed, initial estimates indicate the owners will achieve savings in the region of 20–30 per cent.

### Westside Group Uni SA Playford and Bonython Jubilee Building upgrade

The Playford building is a seven-storey active research study facility, which also joins the BJ building on the North Terrace/CBD precinct of Uni SA.

The mechanical services refit/relocation of the building included the removal of the aged chillers, and the relocation of the main thermal plant from Level 7 to Level 2, which would take over the space formerly used as a gymnasium.

Draw-through cooling towers were then installed on the Level 7 thermal plant where the chillers once resided, and all CHW/CW pipework was installed external to the building.

The significant energy savings were obtained by replacing the original primary CHW and HHW system. The performance of the new system has exceeded all expectations on energy consumption and stability of plant performance.



IGA Boccaccio Cellars.

### Refrigeration Innovations P/L IGA Boccaccio Cellars

Located in Balwyn, Melbourne, the IGA Boccaccio Cellars project consisted of a multi-million-dollar refurbishment, including an enlarged supermarket and liquor area, refurbished and enlarged wine cellar, delicatessen, butcher, green grocer, basement carpark and above-ground apartments.

With energy-saving and carbon-reduction objectives, the project team adopted a holistic approach, which included a hybrid CO<sub>2</sub>/R134a parallel rack system to deliver heating and cooling, scroll compressors, variable-speed drives, EC fans, an advanced control system, enclosed refrigeration cases, LED lighting, and rooftop solar panels.

Uni SA Playford and Bonython  
Jubilee Building upgrade.

## STUDENT OF THE YEAR

Sponsor: Grosvenor Engineering Group

This award recognises outstanding scholarship at any level in the HVAC&R industry. Nominations can only be made by a third party, and are restricted to AIRAH members only. Finalists for 2016 are:

**Michael Snook, Affil.AIRAH,  
Centigrade**


Michael Snook,  
Affil.AIRAH

During his apprenticeship, Michael Snook trained through Polytechnic West in WA, and soon excelled in his training.

In 2013, Snook entered the Worldskills Perth Regional competition for R&AC and won the Gold Medal. He also won the Airefrig Supplies Student Scholarship Award the same year.

He took out the AMCA Apprentice of the Year Award in WA for 2014, and was also recognised as an outstanding student by Polytechnic West after being awarded the Apprentice of the Year out of a cohort of over 8,000. He's also a recipient of the Geoff Gale medal – the overall top student at Polytechnic West – which was contested by more than 30,000 students.

**Aaron Hoare, Stud.AIRAH,  
A.G. Coombs**


Aaron Hoare,  
Stud.AIRAH

Victoria's Aaron Hoare has twice been nominated for the Allan Coombs Training Award, which recognises outstanding commitment to the workplace, community, built environment, trade school, and study during your apprenticeship.

## THE INSTITUTE INVITES YOU . . .

**What:** AIRAH Awards Presentation Dinner 2016

**When:** 7pm, Thursday, November 10, 2016

**Where:** Crystal Palace, Luna Park, Sydney

**Cost:** \$180 per ticket

**For more information or  
to book, email [alison@airah.org.au](mailto:alison@airah.org.au)**

He was also nominated for the Industry Training Award in refrigeration and air conditioning by the Air Conditioning and Mechanical Contractors Association (AMCA).

Hoare has demonstrated his commitment to improved knowledge and learning by first researching, understanding the requirements, and then enrolling in a mechanical engineering degree. This involved discussion with industry professionals, his peers and supervisors on the best way to achieve the study while remaining in the workforce.

**Xiaolin Wang, Stud.AIRAH,  
Australian National University**


Xiaolin Wang,  
Stud.AIRAH

Based in Canberra, Xiaolin (Shannon) Wang is a PhD candidate with a growing list of HVAC&R-relevant achievements.

These include a swag of patents, numerous features in publications, active participation in conferences, and an impressive list of awards.

Her major contribution to the HVAC&R industry is through the development of a novel energy- storage media for air conditioning. Known as "Warm Ice", this technology is expected to disrupt the field of air conditioning by enabling practical and cost-effective access to off-peak and renewable energy sources for chillers.

She has twice presented at the AIRAH Solar Heating and Cooling Workshop (2014, 2016). Feedback on her presentations has been overwhelmingly positive.

## PRODUCT OF THE YEAR

Debuting at last year's awards, this category honours the top Australian-developed, designed and manufactured products. Assessed for features such as innovation, energy efficiency, sustainability, originality and industry need, the finalists for 2016 are:

### Air Change – PoolPac Plus



The PoolPac Plus is a complete packaged direct-expansion (DX) heat-pump system designed for indoor pools to reduce energy consumption, improve indoor air quality, and minimise condensation and corrosion. The system exhausts humid, chlorinated air and replaces it with up to 100 per cent fresh outside air. The sensible and latent heat from the exhaust air is recovered via the patented air-air heat exchanger and evaporator heat pump coil to efficiently control pool water temperature, indoor air temperature, and a combination of both depending on the heating demand.

### Fast Works – X-Operative TAB



X-Operative TAB is a productivity tool made up of an ecosystem of devices, which are designed to help testing and balancing (TAB) technicians conduct their field technical work faster, smarter and easier.

Rather than using the traditional pen, paper and spreadsheets commonly used for this process, the complete system comprises of an iPad app, web application and cloud storage. User data can be shared across the company's technical staff devices.

"Supervisors now have a new way to manage their TAB projects more efficiently," says Fast Works, "as well as the technical staff that work on them."

### Hux Connect – Hux

Using detailed monitoring systems, Hux Connect tracks in real-time all of the variations occurring throughout a building simultaneously. Automatically diagnosing problem areas and providing detailed data, the monitoring system lets users optimise building performance.

Hux has played an important part in Sustainability Victoria's recent Energy Efficient Office Buildings program.

### Innotech – Omni BEMS Controller



Innotech's Omni is a BEMS platform that aims to reduce costs from engineering, installation, programming and integration, as well as ongoing operating and maintenance costs.

"Omni is compact, flexible and feature-rich, reducing hardware and software requirements, which provides ongoing savings, making Omni scalable and competitive for all project sizes," says Innotech. "Up to 10 networked Omni controllers can become a complete BEMS for smaller projects, without a dedicated computer or client software."

### Temperzone – ECO HWP



Temperzone's new range of ECO water-cooled package units or HWP are designed to provide contractors and consultants with a more cost-effective alternative to VRF or chilled-water projects.

"Not just being an assembler, we design and manufacture all our own coils and electronics," says Temperzone. "This allows us to react to market changes and deliver competitive product solutions for almost every application, whether that be air or water-cooled product solutions."

Temperzone ECO HWP delivers sustainable solutions through enhanced economy and precise comfort control.

The units have been used in a number of large-scale international projects including the Shan Li Tun Complex in China (1,363 units), and the Kota Kasablanka in Indonesia (1,070 units).

## AIRAH Awards 2016 sponsors

**Event sponsor:** Mitsubishi Electric

**Dinner sponsor:** ActronAir

**After-dinner speaker sponsor:** Daikin

**Student of the Year:** Grosvenor Engineering Group

**Future Leader Awards:** A.G. Coombs

**Excellence in Innovation:** Standards Australia

**Excellence in Sustainability:** NABERS

**Best HVAC&R Retrofit or Upgrade:** ActronAir