

**AIR CHANGE**  
THE STARS IN GREEN HVAC

**Air Change Energy Recovery Range**

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**Designing Plant Rooms for Energy Efficiency**

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## Presentation - Overview

- Air Change – The Company and the Technology
- Energy Recovery Product Range
- Air Change Product Range
- Pre-conditioners vs ERV-AHU's
- Energy Recovery Alternatives
- Design Considerations
- AHU Plant Space Comparison
- ERV-IC and ACDHUM Application
- 324 Queen Street – Case Study
- Closing Comments and Questions

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## Air Change Australia Pty Ltd


- Registered in October 2000 – began manufacturing HVAC systems with Integrated plate Heat Exchangers
- Up to 2005 – made steady inroads into the market boosted by Pubs and Clubs in NSW which required 100% Fresh Air AC Units
- 2005- Present continued strong growth spurred on by
  - the drive for energy efficiency (BCA, NABERS, GreenStar)
  - increased cost of electricity and
  - Awareness regarding the benefits of better indoor air quality

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## Energy Recovery Process

Cooling Example



Hot Exhaust Air to Atmosphere

Hot Humid Outside Air  
32°DB/25°WB

Pre-conditioned Supply Air  
26°DB/19.3°WB

Cool Dry Return Air  
24°DB/17°WB

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## Counter-flow Heat Exchanger

Transfer Media

Return Air to Exhaust

Outside Air to Supply

Return Air to Exhaust

- Sensible Plate Type – 80% nominal efficiency – Mylar film
- Enthalpy Plate Type – 75% nominal efficiency – Cellulose media

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## Air Change Product Range

- Energy Recovery Ventilators
  - Energy Recovery AHU's
  - Packaged Conditioners
  - Dehumidification Units

Energy Recovery Ventilators

Energy Recovery AHU's

Packaged Conditioners

Dehumidification Units

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## Pre-conditioners vs ERV-AHU's

- Typical Queensland "20th Century" Outside Air Pre-conditioner includes 8 row coil with face velocity of less than 1.8 m/s
- Through the use of an Air Change Enthalpy Heat Exchanger we can precondition outside air down to approx 26CDB/19CWB – generally only requires a 4 row coil
- Where return air can't be obtained – utilize an Air Change Dehumidification unit as an outside air pre-conditioner

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## Energy Recovery Alternatives

- Enthalpy Wheels – considerations
  - Efficiency on par initially – deteriorating efficiency over life of unit due to Hysteresis
  - Moving parts add maintenance cost and reliability concerns
  - Lower face velocity to achieve high efficiency – results in larger unit size
  - Common air path – higher cross contamination
- Cross Flow Heat Exchangers – imported from Asia or Europe
  - Typically 45-65% efficiency
  - Be mindful of low efficiency – can turn a 2 year payback into a 4-5 year payback

## Heat Exchanger Life, Reliability and Performance

- Project Services Performance Certification  
The pressure drop and efficiencies shall be certified against either Eurovent or ARI standards at both summer and winter rating conditions. The operating temperature range shall be from -40 to + 90 degC
- Enthalpy and Sensible Only Heat Exchangers tested in accordance with ASHRAE 84-1991
- No Moving Parts – requires no maintenance with adequate filtration
- Accelerated life cycle tests have shown no loss in efficiency over a test period equivalent to 15 years under normal operating conditions

## BCA Section J, NABERS, Greenstar, MEPS

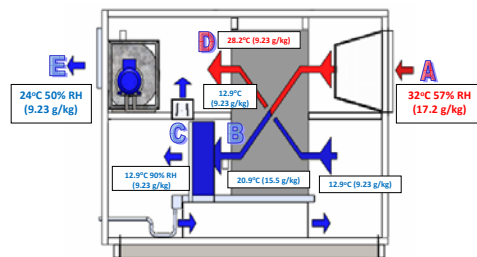
- Greenstar
- Energy ENE-1 and ENE-5 – Greenhouse Gas Emission and Peak Demand Reduction
  - oIEQ-1 – Outside Air Ventilation Rates – up to 3 points available for improvements over AS1668.2-1991 – 50%, 100% and 150%
- BCA Section J5 and MEPS
- oEconomy Cycle > 50kW – Climate Zone 2 and 3
  - oTable J5.2 for fan power limits (W/m2) – excludes power for an energy reclaiming system
  - oSystems which utilize outside air pre-conditioning will generally require a lower supply air quantity to meet sensible load
  - oPackaged units must have an EER greater than 2.7 (greater than 65 kW) – with Concession for Heat Exchanger EER's for Air Change RTP's are between 4.9-5.2
- AS1668.2-1991 Considerations
- oOutside Air rates generally between 7.5-20 l/s/person AS1668.2-1991 Considerations

## In Ceiling ERV's


- In ceiling ERV's have been used extensively for office fit outs – particularly to serve meeting rooms
- Be careful when nominating a unit manufacturer as performance varies significantly significantly

Manufacturer	Air Change ERV-IC 400	Competitor 1	Competitor 2	Competitor 3
Nominal Airflow	400	417	416	420
Total Efficiency	75%	73%	66%	50%
Energy Recovered Brisbane	9.6	9	8.3	6.2
Absorbed Fan Power	480	830	920	500
COP	20	10.8	9	12.4

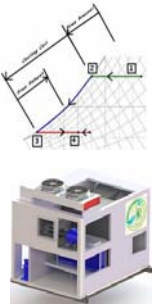
## ACDHUM Dehumidification Units



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## ACDHUM - Applications



- Pre-condition Outside Air to Room Conditions (18-24 degrees)
- Commercial Buildings - connected to tenant outside air dropper
- DOAS for Hospitals, Apartment Buildings etc
- Humidity Control System for Supermarkets and Laboratories
- Operate in Recirculation mode after hours to control humidity within space

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## AHU Plant Space Comparison


	Horizontal FCU 2000 lps	Enthalpy Wheel AHU 2000 lps	Air Change ERV-AHU 2000 lps	Horizontal FCU 4000 lps	Enthalpy Wheel AHU 4000 lps	Air Change ERV-AHU 4000 lps
Length	2100	2700	2000	2400	3000	2000
Width <small>(including duct access)</small>	2600	3300	3200	3300	4000	4100
Height	1100	2100	1800	1365	2700	1800
Footprint (m <sup>2</sup> )	5.5	8.9	6.4	7.9	12	8.2
Footprint Premium	N/A	60%	15%	N/A	50%	5%

All sizes exclude filter plenums/mixing boxes

HORIZONTAL SANDWICH PANEL FCU

HORIZONTAL SANDWICH PANEL FCU

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## 324 Queen Street – Case Study

- 27 Storey Commercial Tower in the CBD
- In mid 2010 - Cardno ITC were commissioned to undertake the Mechanical Design for the Energy Efficiency Upgrade
- Existing Outside Air System consisted of 4 off Muller McQuay CHW AHU's

Proposal.....  
Replace units with **Air Change GB-AHU's**

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## Airflow Schematic

