



RESILIENT HVAC:

PREPARING AUSTRALIA'S BUILDING SERVICES
FOR A CHANGING CLIMATE

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About AIRAH



Vision

Safe, sustainable, healthy and comfortable built environments.

Mission

To provide leadership, promotion, representation and support to the air conditioning, refrigeration, heating and related services industry and membership.



Strategic aims



1. Promote and develop tomorrow's efficient, productive and resilient industry
2. Grow industry skills and capability for the future
3. Inform regulation and policy processes
4. Build member value and engage members



AIRAH – industry leadership



1. HVAC&R Resilience
2. HVAC&R Sustainability
3. HVAC&R Compliance
4. Innovation and Research
5. Transition to low gwp refrigerants including PRIME

AIRAH today...

- **specialist organisation for air conditioning, refrigeration, heating and ventilation professionals**
- 2500 members
- 25,000 publications distributed monthly
- Professional development
- Industry accreditation schemes
- National / International conferences
- Technical publications
- Government collaboration
- Membership activities / trade nights
- Highly regarded objective technical experts working with government
- **Members from whole HVAC&R supply chain**

Why does resilience matter to building services?

- Australia's built environment will need to become more resilient
 - Heatwaves, cold snaps, floods, storms, bushfire
 - Other emergency events resulting in utility outages
- The changing face of the built environment
 - Places of refuge – Stockland Cairns in Cyclone Yasi
 - Public services – hospitals
- The HVAC&R Industry plays an important role
 - Safeguarding building occupants during extreme conditions
 - Providing a clean and healthy indoor environment until outdoor conditions are safe



How does this impact building services?

- Heat

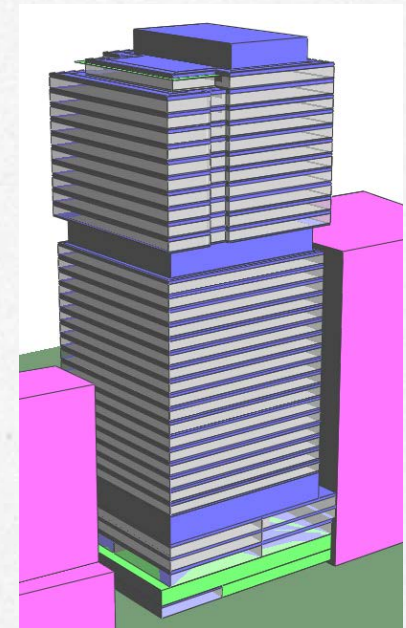
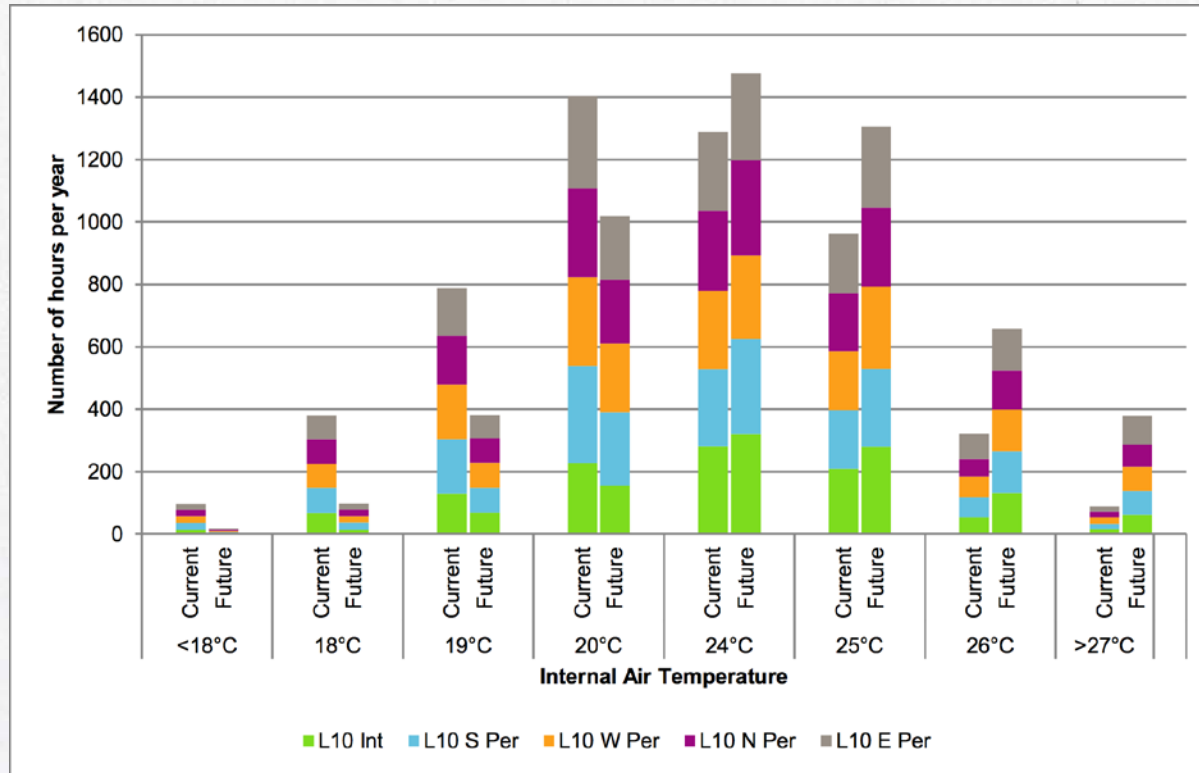
- Building overheating – increased requirements for cooling
- Increased energy and water demand
- Impact on thermal performance and comfort
- Impact on external surfaces/cladding
- Increase in maintenance
- Increased requirements for cooling and areas of respite
- Increased heat stress events amongst building users
- Demands on network – increase in blackouts disrupting operations
- Reduced productivity and business continuity

- Water

- Increased flood events limiting access and egress
- Greater intensity of runoff results in drainage capacity issues
- Inundation of building and car park
- Increase in maintenance
- Changes to environment suitable for water borne diseases and pest species distribution
- Impacts to potable water supply
- Reduced productivity and business continuity

How will this temperature increase affect buildings in Melbourne?

- Typical office building in Melbourne – internal temperature

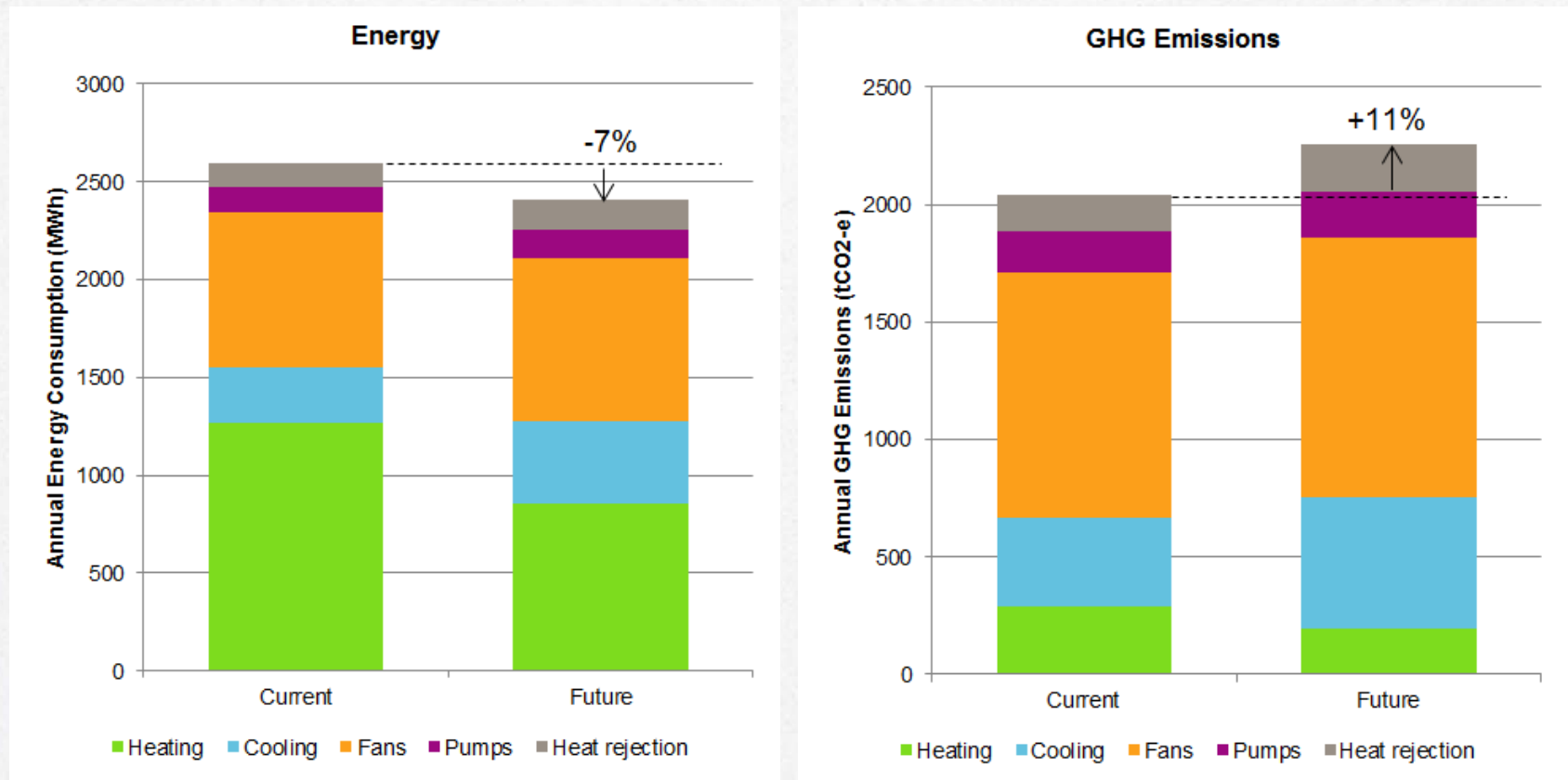


AECOM

How will this temperature increase affect buildings in Melbourne?

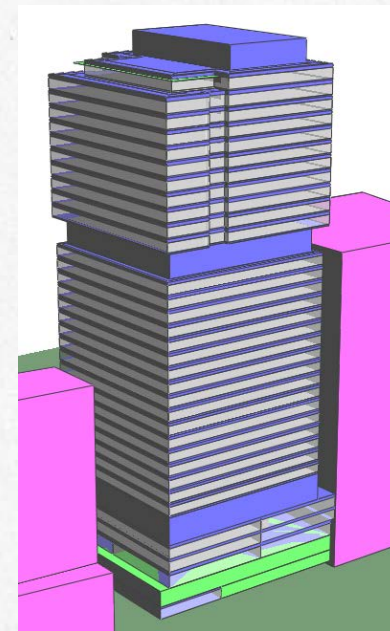
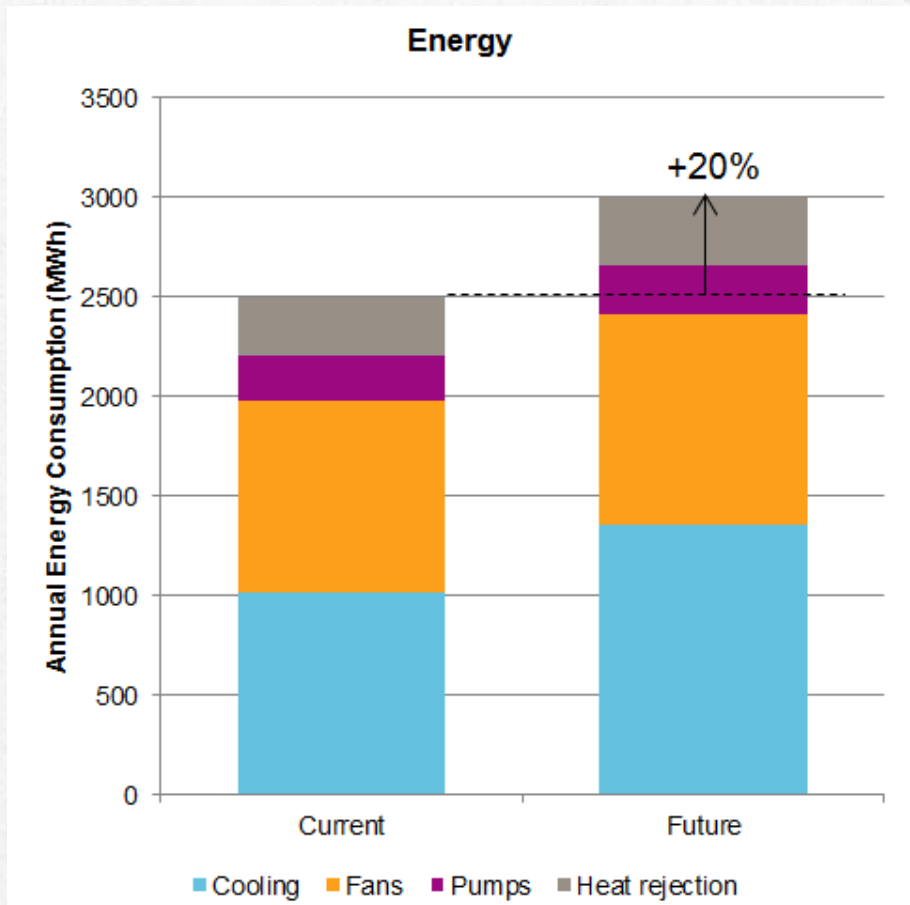


- Typical office building in Melbourne – energy and GHG emissions



How will this temperature increase affect buildings in Brisbane?

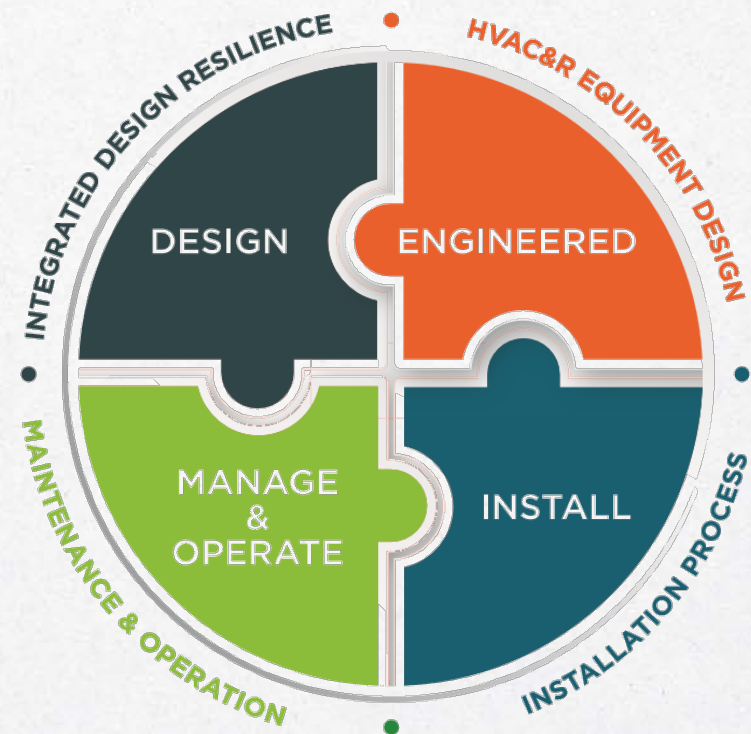
- What about in a Brisbane climate?



AECOM

What are AIRAH doing to address this?

- Preparing Australia's building services for a changing climate
- AIRAH Resilience Framework
- Whole of Supply Chain approach to tackling resilience
 - Integrated Building Design
 - HVAC&R Equipment
 - HVAC&R Installation
 - Facilities and Operations



How will we change the way that things are done?



HVAC&R Resilience Overview

DESIGN





BUILDING DESIGN

-  Orientation and heat island
-  Fabric Insulation
-  Thermal performance
-  Cooling roofs
-  Sealing and infiltration
-  Servicing refuges






WINDOWS AND GLAZING

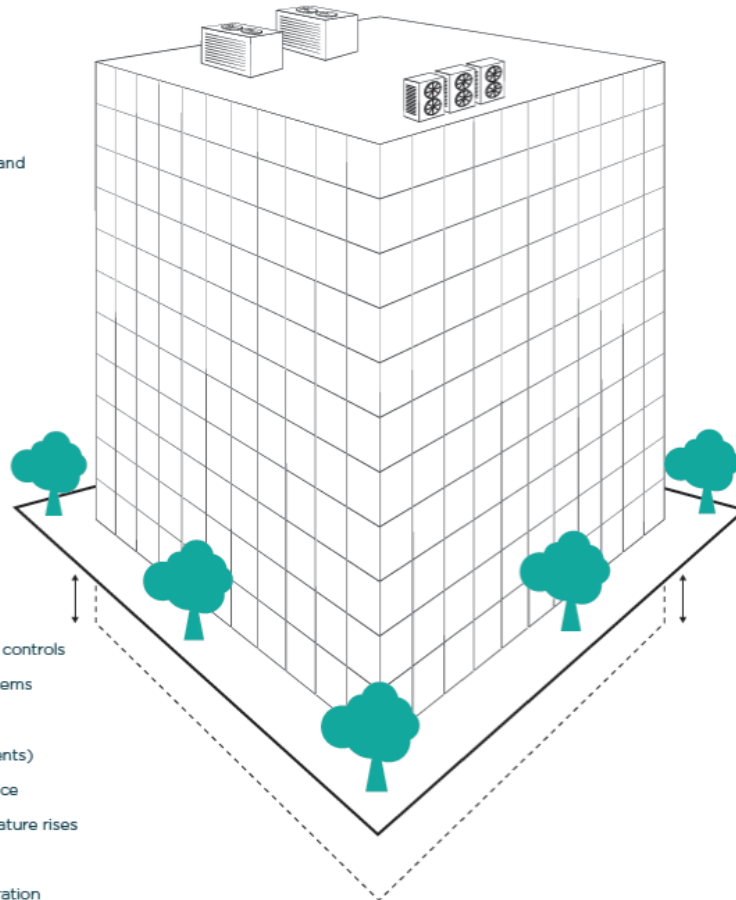
-  Daylighting
-  Shading
-  Internal blinds
-  Openings

VENTILATION







-  Infiltration
-  Natural Ventilation
-  Mechanical ventilation - controls
-  Closing and sealing systems

PLANT








-  Location (roofs/basements)
-  Specification for resilience
-  Sized for future temperature rises
-  Redundancy in systems
-  Water - storage and filtration






INSTALL

-  Elevate equipment above flood lines or flood protection
-  Protect or relocate equipment on roofs
-  Location to minimise heat island effect
-  Secure external plant and ducts
-  Harden external wiring and controls
-  Access space/route to maintain and replace equipment

ENGINEERED

-  Maximum operating temperatures
-  Minimum operating temperatures
-  Managing plant for extreme heat/cold
-  Hail protection
-  In-built system redundancy
-  Corrosion protection
-  Maintenance access/service facilitation

MANAGE AND OPERATE

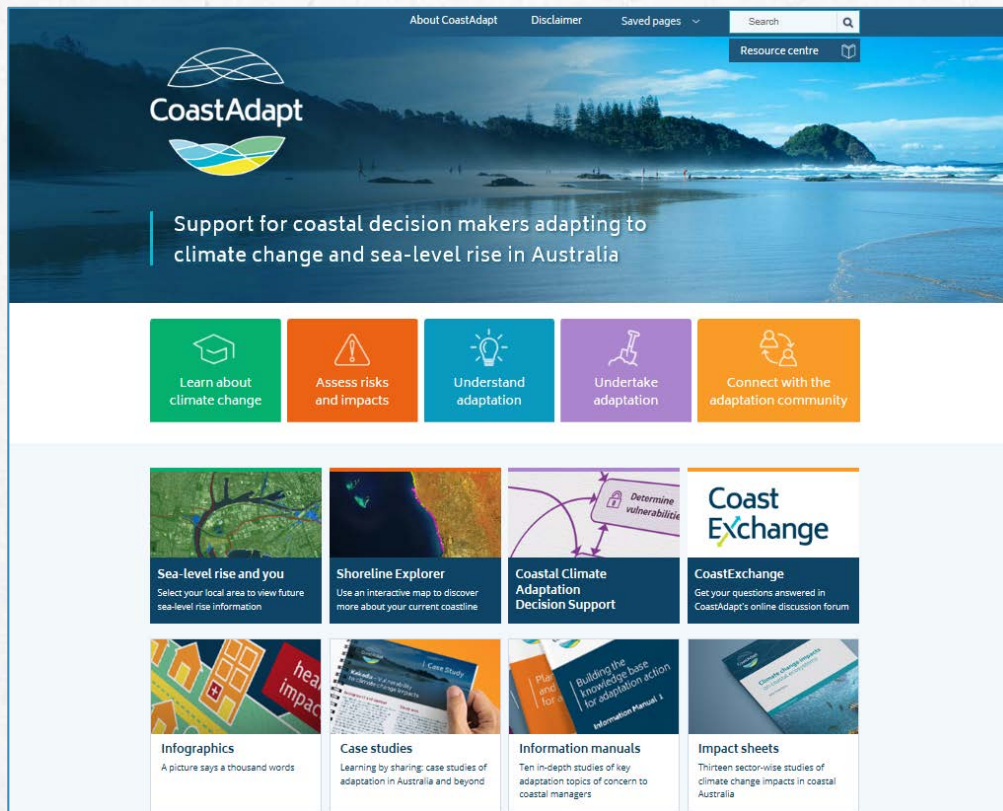
-  Knowledge and documentation
-  Inspection and maintenance
-  Vulnerability and risk assessment
-  Plug and play systems
-  Quick connects for temporary services
-  Back-up power
-  HVAC Shutdown/Start up procedures
-  HVAC emergency mode(s)
-  Legionella/Microbial control

■ What to take away...

- AIRAH are thought leaders in resilience for the building services industry
- Life cycle philosophy: Design, Engineer, Install, Operate
- Stakeholder engagement is critical to the success

NCCARF CoastAdapt Tool

- Beta-testing website www.coastadapt.com.au



Why should we adapt to climate change?

1 Because climate change is inevitable.

Our options to tackle climate change:

> Geoengineering

Large scale projects to change the radiation balance by using solar reflectors to scatter or to remove up to 1% of CO₂ by ocean iron fertilisation

But

The technology is unproven and it may have unexpected results. It doesn't address the cause of climate change. It does not address the direct effects of CO₂, such as ocean acidification.

> Mitigation

Making our production of greenhouse gases to limit climate change (eg by shifting to renewable energy, or through reforestation)

But

Despite ongoing global efforts - changing climate is already happening.

2.7°C predicted increase in global temperature

Why is sea level rise important?

Sea levels are rising because of climate change

Thermal expansion
Warmer water expands, therefore global warming is causing the water in our oceans to expand

+ Melting ice
Global warming is melting our glaciers and the Greenland and Antarctic land-based ice sheets

= Higher sea levels

The amount of sea level rise depends on the amount of climate change

Sea levels are now 19 cm higher than they were at the beginning of the 20th century

and will continue to rise over the next centuries

But a metre or more by the end of the century, around 6 m if the Greenland ice sheet melts completely

however if we limit our emissions, sea level rise could be reduced

But not for many decades, even contained because oceans respond very slowly to change

Sea level rise creates risks for our coasts

Higher water levels
Floods

+ Higher wave heights
Storm surges

= Threats
to land, roads, railways, hospitals, schools, houses

A rule of thumb

A 1 cm rise in sea level... will bring the water 1 m further landward

Sea level rise is a key consideration for future planning for our coasts. Further information and planning tools are available at www.coastadapt.com.au