



**Australian Institute of Refrigeration Air conditioning and Heating
(AIRAH)**

Pre-Budget Submission 2017-18

RECOMMENDATIONS ON CLIMATE CONTROL INDUSTRY ISSUES FOR:

- **ENVIRONMENT AND ENERGY**
- **EDUCATION AND TRAINING**
- **EMPLOYMENT**
- **INDUSTRY, INNOVATION, SCIENCE, RESOURCES AND
NORTHERN AUSTRALIA**

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Introduction

AIRAH is the leading voice in the climate control industry in Australia. This is an industry that uses 22 per cent of all generated electricity, employs 170,000 people and provides comfort and cooling and heating services to the entire nation. More than \$26 Billion dollars is spent each year on cooling services in Australia alone. Climate control is a vital component of Australia's infrastructure – supporting all aspects of a productive, healthy, growing economy.

The submission recommendations address the following government departments and subject areas:

Department and Subject area	AIRAH recommendations in sections:
Environment and Energy	
Environmental policy and programs	Refrigerant transition (page 12)
Climate change	Resilience (page 6)
Energy policy	Sustainability (page 7)
Education and Training	
Tertiary education	Resilience (page 6), Sustainability (page 7) Compliance (page 10), Refrigerant transition (page 12)
Vocational and skills	Resilience (page 6), Sustainability (page 7) Compliance (page 10), Refrigerant transition (page 12)
Employment	
Workplace health and safety	Compliance (page 10)
Industry, Innovation, Science, Resources and Northern Australia	
Industry and Innovation	Resilience (page 6), Sustainability (page 7) Compliance (page 10), Refrigerant transition (page 12)
Research	Resilience (page 6), Sustainability (page 7), Refrigerant transition (page 12), Innovation and research (page 14)



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About AIRAH

The Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) is an industry-led organisation that represents the entire climate control industry value chain. This covers all aspects of the heating, ventilation, air conditioning and refrigeration (HVAC&R) sectors, from the tradesperson on site through to university-educated engineers and business leaders. This overarching perspective – and reach to more than 25,000 industry participants – positions AIRAH well to develop and promote the most efficient, productive and resilient climate control industry for Australia’s future.

The 21st century imperatives of emissions reduction and energy productivity present our nation with significant challenges and opportunities. It is important that all stakeholders from the built environment and refrigeration sector come together to meet these challenges. We all have a part to play in achieving low emissions and in ensuring that technical challenges are met and risks are mitigated.

AIRAH is keen to work with all levels of government to improve the environmental performance of existing and new climate control systems. We envisage a collaborative effort to get and keep positive action firmly on the agenda. It is important for all stakeholders to understand not only the vital role the climate control industry has in the wider economy, but also the role the industry can play in helping Australia achieve its environmental aspirations and international, national and local commitments.

AIRAH has been representing the climate control industry in Australia for almost a century, since 1920. This paper sets out AIRAH Budget recommendations on the five key strategic topic areas that the Institute is focussed on for 2017 – 2020 namely:

- Resilience
- Sustainability
- Compliance
- Refrigerant transition including PRIME
- Innovation and research

Note. See ***AIRAH Policy and Advocacy Positions 2017 – 2020*** for more detail on AIRAH’s strategic positions http://www.airah.org.au/Content_Files/Advocacy/2017-2020-AIRAH-Advocacy-positions.pdf

Why the Climate Control Industry?

As a signatory to the Paris Climate Change Agreement COP21, Australia has now committed to the global transition to net-zero emissions, and to reaching net-zero emissions nationally around 2050. Also, in Kigali, Rwanda, Australia and the other parties to the Montreal Protocol reached an agreement to a global 85 per cent phase-down of hydrofluorocarbons (HFCs) by 2050. Australia has committed to an 85 per cent phase down by 2036. These commitments have wide reaching implications for all Australian, State, Territory and Local governments, and all sectors of the Australian economy.

The Australian built environment and refrigeration sectors – and within that, the climate control industry – can make a major contribution to meeting this 2050 goal, as well as improving energy productivity, supporting innovation, and creating healthier, more liveable cities. AIRAH members will play a huge part in this transformation. Though working in a largely “hidden industry”, our members are part of a sector that includes more than 170,000 Australians. Their work impacts everything from keeping our food fresh, to enabling health and digital infrastructures, to the design and maintenance of high-performing buildings and the industrial and commercial refrigeration services used in manufacturing, production and agriculture.

Climate control is a vital component of Australia’s infrastructure – supporting all aspects of a productive, healthy, growing economy.

AIRAH works with a broad range of government and industry stakeholders. The Institute has been very involved with the development of the Australian Sustainability Built Environment Council (ASBEC) *Low Carbon High Performance* report, and supports its recommendations.

AIRAH is also the driving force and secretariat behind PRIME, the climate control industry’s blueprint for a successful transition to a low-emissions future through **P**rofessionalism, **R**egulation, **I**nformation, **M**easurement and **E**mission abatement - www.primehvacr.com.au

The climate control industry in Australia...

... operation of refrigeration and air conditioning systems consumes about 22 per cent of all the electricity generated in Australia ...

... responsible for more than 11 per cent of Australian total national emissions

...

... more than \$26 Billion dollars is spent each year on cooling services in Australia ...

Source: Cold Hard facts 2, 2013

Department of Sustainability, Environment, Water, Population and Communities

As Australia moves to meet the challenges associated with its national and international emission reduction commitments, it is becoming clearer that the built environment, including the refrigeration sector, is a critical point of focus for emission reductions and efficiency gains.

The four main sustainability impacts of climate control are energy consumption, water consumption indoor environment quality, and refrigerant-related atmospheric changes, all of which are inter-related. Before clean energy can be effectively used in the built environment, the systems using the energy have to be optimised and efficient.

The operation of refrigeration and air conditioning systems consumes about 22 per cent of all the electricity generated in Australia. It is responsible for more than 11 per cent of Australian total national emissions (*Cold Hard Facts 2*, 2013). To reduce these high levels of emissions AIRAH notes that:

1. Buildings and refrigeration infrastructure have to become more energy efficient and more energy productive. This includes higher standards for fabric thermal performance and building sealing, as well as performance benchmarks for ongoing operation and maintenance.
2. Climate control systems have to be designed, installed and maintained for high efficiency and low emissions. Measurement, monitoring and ongoing maintenance are the keys to improving energy efficiency and productivity of the existing climate control systems. The minimization and eventual elimination of direct emissions of high global warming potential (GWP) refrigerants must remain a significant focus.
3. The energy used to run high-efficiency climate control in highly efficient buildings and the cold chain has to be from a clean low-carbon source.

Through these three key activities: more efficient buildings, more efficient systems combined with cleaner low-carbon energy sources, the emissions associated with climate control can be dramatically reduced. Education and training of all supply chain participants in these three areas is key to successfully driving significant emission reductions in all of these sectors.

Resilience

Resilience in the built environment, and across all climate control applications, is a topic that is attracting an increasing focus in Australia and also around the world. In the current global physical, social and environmental situation, the ability of a building to deal with external and unusual impacts due to: climate change, extreme heat and cold, severe storm events, large bushfire events, earthquakes, social unrest, terrorist attack or criminal misadventure, is becoming more important and more valued.

Resilience in the context of the built environment means the capacity of a building and its associated systems (i.e., ventilation, heating/cooling, fire safety, lighting and sanitary facilities), to operate during and after a severe storm or some other unusual catastrophic event. The ability of a building to adapt, or be easily adapted, to a changing climate or a changing scenario is also an element of its resilience.

The resilience of Australian buildings, the cold chain, IT infrastructure, health services, manufacturing facilities and processing sectors all depend on the resilience of the climate control systems that support them. As a critical enabler in the Australian economy, it is clear that the resilience of climate control systems - in terms of their design, installation and operation - has to be addressed to safeguard the built environment and its occupants during extreme events.

Currently the resilience of climate control infrastructure is not being strategically addressed apart from in specific critical applications. While there is growing awareness in government and industry about resilience, most of the focus is on cities and buildings, with very little focus on climate control and the related building services issues.

The climate control industry and government need to develop a unified strategy for increasing the resilience of climate control, resulting in more resilient buildings and cities, more resilient cold chain and food supplies, and more resilient technical infrastructure in health, processing, education and information technology.

The 2017 Budget should:

1. **Commit the government to work with industry to develop and document the types of actions and solutions that can improve building and climate control industry resilience.**
2. **Commit the government to work with industry to collaborate and develop a clear and agreed framework to address resilience issues across the entire climate control supply chain.**
3. **Fund new research, particularly into the magnitude of impacts and change in future climate design data over the typical 10 to 20 year useful life of a climate control system.**
4. **Support and fund education and awareness raising around the challenges climate control resilience.**
5. **Commit to developing government policy and support to ensure that resilience is considered in all new infrastructure.**

Sustainability

The Australian government has committed to reducing national emissions by 5 per cent (below 2000 levels) by 2020 and reducing national emissions by 26 – 28 per cent (below 2005 levels) by 2030. Australia, as a signatory to the 2015 Paris Climate Change Agreement, has also now committed to the global transition to net-zero emissions, and to reaching net-zero emissions nationally around 2050.

All levels of government in Australia have also committed to improving the sustainability of buildings and cities and improving energy productivity more generally within the Australian economy. The issue of national energy use, national emissions and the sustainability outcomes of Australian buildings, cities, and the entire economy cannot be addressed without also addressing climate control sustainability.

Apart from embodied energy, the three main sustainability impacts of climate control systems are: energy consumption, water consumption and refrigerant-related atmospheric changes. Indoor environment quality issues such as thermal comfort and good indoor air quality (IAQ) are also important sustainability “considerations” as we deliver the healthy, productive and safe indoor environments essential to the functioning of the economy and the welfare of our future generations.

Low-emission climate control requires a much bigger focus on those building or process characteristics that drive cooling and heating loads.

Low emission climate control means:

- **The envelope of the building or container, its thermal performance and the air-sealing characteristics must all be optimised to ensure that the minimum amount of climate control energy is required.**
- **It must be accurately sized to meet documented realistic operating requirements.**
- **It has to be installed, controlled, commissioned, monitored, operated and fine-tuned to ensure optimised energy and water consumption rates.**
- **Systems that are designed to have a reduced environmental impact, measured over the entire life-cycle of the system.**
- **Low-energy high-productivity systems utilise energy recovery where practical, either within the system or within the building or facility.**
- **Low-GWP working fluids and tight system construction standards, minimising leaks and maintaining and optimum refrigerant charge.**
- **Real-time monitoring of electrical, water and refrigerant inputs and outputs, system self-diagnostics and alarms, free-running systems and free-running buildings or processes when outdoor conditions allow.**
- **In buildings - optimising ventilation, thermal comfort and indoor environment quality outcomes, with controls that are adaptive to external climate conditions and internal occupant needs.**
- **In processes and infrastructure applications - optimised systems that are designed, installed, monitored, benchmarked and controlled for emission performance.**
- **Costs more to procure than the current industry standard offering but costs a lot less to run and generates better long-term outcomes for businesses, for owners, and for the environment.**

The climate control industry has a significant role to play in addressing and improving the sustainability of the Australian building sector and the productivity of the wider economy.

The 2017 Budget should:

A. Climate control industry:

1. Commit to working with the climate control Industry on National Energy Productivity Plan (NEPP) work plan action 9b that relates to *“engagement with the climate control industry and its industry-led low emissions future initiative”* (PRIME).
2. Continue to improve and promote the uptake of the “Calculating Cool” building HVAC online rating tool, including an expansion of the tool to cover low-emission technologies.
www.calculatingcool.com.au/#/home
3. Develop an emissions or efficiency benchmarking tool for refrigeration systems, similar to Calculating Cool but addressing industrial and commercial cold room and cool room refrigeration systems.
4. Drive a renewed focus on the maintenance and performance of existing buildings.
5. Fund more research and training in climate control energy efficiency.
6. Develop climate-zone-specific energy policies requiring measurement, benchmarking and disclosure of energy use. These essential to drive change.
7. Commit to ongoing work with industry on energy efficiency improvements in existing mid-tier buildings including:
 - a. Support further research to better understand the number, location, size and performance of mid-tier buildings and understand behavioural aspects.
 - b. Develop a Building Retrofit Toolkit, to bring together existing resources and tools and create new ones based on confirmed gaps and needs, together with an informed communications plan for building owners and their trusted advisers and service providers.
 - c. Expand initiatives such as the Commercial Building Disclosure program to apply to smaller buildings and other non-office building types.
 - d. Promote innovative financing mechanisms and government incentives to encourage existing building upgrades and retrofits.
 - e. Support and engage in the start-up of the Sydney Forum – Mid tier building conversations.

B - ASBEC's Low Carbon High Performance report:

1. Government should include a commitment to continue the positive work with the Australian Sustainability Built Environment Council (ASBEC) on the implementation of the policy recommendations in *Low Carbon, High Performance* report.

<http://www.asbec.asn.au/wordpress/wp-content/uploads/2016/05/160509-ASBEC-Low-Carbon-High-Performance-Full-Report.pdf>

In particular:

- a. Commit to A "Towards net zero" buildings plan with supporting policy frameworks, governance arrangements, clear targets and ministerial responsibilities.
- b. Commit to strong mandatory minimum standards for new buildings, equipment and appliances, with the long-term goal of net zero emissions.
- c. Support targeted incentives and programs to accelerate action, motivate and support higher performance, including incentives and the use of government market power.
- d. Drive energy market reforms to ensure that the energy market supports roll-out of cost-effective energy efficiency and distributed energy improvements, including thermal energy storage and distribution.
- e. A range of supporting data, information, training and education measures to enable informed consumer choice, innovation, commercialisation and deployment of new technologies and business models.

Compliance

The climate control industry operates under a wide range of legislation and regulatory requirements and regimes from all levels of government. The main areas of regulation encountered by our industry includes:

- Building regulations – *National Construction Code (NCC)* requirements and various state-based variations and differing building administration systems.
- Planning regulations – Including specific local requirements imposed through local government-based planning or development consent conditions.
- Local council regulations – Special local planning conditions, food services regulations, environmental noise enforcement.
- Environmental regulations – *Ozone Protection and Synthetic Greenhouse Gas Management Act* and associated regulations, environmental noise regulations, and air pollution regulations.
- Energy regulations – Including Commercial Building Disclosure (incorporating NABERS), Greenhouse and Energy Minimum Standards (GEMS) and minimum energy performance standards (MEPS).
- Electrical regulations – AS/NZS 3000 wiring rules, electrical safety for refrigeration and heating appliances, hazardous area standards.
- Plumbing regulations – Including *NCC Volume 3, AS 3500* series, backflow prevention trade waste regulations, and sewage.
- Gas regulations – Flammable fuel gas regulations, hydrocarbon refrigerants.
- Licensing regulations – For synthetic refrigerants handling through the Australian Refrigeration Council, for refrigeration and air conditioning contracting businesses through the state regulator, for hydrocarbon refrigerants through the state regulator.
- Occupational safety regulations – Model WHS Act and regulations in most states, or state-based OH&S Act and regulations (Victoria and WA), safety in design, national occupational exposure standards, hazardous atmospheres, confined spaces, design registration, plant registration.
- Public health regulations – State-based Legionnaire's disease regulations, microbial control inspection testing and maintenance, indoor air quality.
- Fire safety regulations – Essential services inspection testing and maintenance.

All of these regulations require a level of compliance. Issues in relation to non-compliance can arise at various points in the climate control supply chain. These include:

- Product compliance – Products that do not comply with the regulated requirements, e.g., flexible duct R value, electrical cable rating, fire rating system FRL, MEPS efficiency.
- Specification compliance – Products or entire systems that are not designed or specified correctly and in accordance with the regulation, e.g., fire sprinklers in kitchen exhaust systems.
- Installation compliance – Products and systems that are not installed correctly and so fail to achieve the required compliance, e.g., fire damper installation.
- Operation and maintenance compliance – Products and systems that are not operated and maintained correctly to achieve the required compliance, e.g., cooling tower management.

Not all of these regulated requirements are well understood by the various stakeholders in the climate control sector or in the client and procurement chain, particularly where regulations vary significantly from state to state, e.g., refrigeration and air conditioning contractor licencing, Legionnaire's disease regulations. In many situations actual responsibilities are not clear to many duty holders.

Many regulations impose a self-certification scheme that is backed by a dispute-driven reactive audit/investigation program. Compliance issues are often only inspected and examined after an incident has occurred and has been reported, or a dispute has arisen, leaving a lot of undiscovered non-compliance.

AIRAH's focus on compliance is on the extent, causes, impacts and solutions for regulatory non-compliance within the climate control sector.

The 2017 Budget should:

Commit to work with all regulators and the climate control Industry to help bring a climate control industry voice to the development of the environmental, energy, building, WHS, plumbing, electrical and health regulations that impact the climate control industry:

- 1. Include an explicit requirement and mandatory high-level process for whole-building commissioning within the NCC.**
- 2. Include quantified building envelope sealing requirements in the NCC.**
- 3. Implement clear technical standards and compliance pathways that industry can work with. Regulations should be written in plain English in a manner and format that can be readily understood by industry participants.**
- 4. Focus on harmonisation of regulation rather than solely on deregulation. AIRAH would like to see a lot more effort from the State and Commonwealth governments through COAG or ministers' forums to harmonise state-based regulations in the following areas:**
 - a. National licence schemes for refrigerant occupational licence;**
 - b. Minimum standards of competency for building services designers and associated practitioners;**
 - c. Standardised regulatory requirements for maintenance and inspections of both essential services maintenance (fire dampers, smoke control systems) and Legionnaire's disease/microbial control of water and air-handling systems (cooling towers);**
 - d. Standardised energy certificate incentive scheme requirements for climate control-related energy efficiency interventions;**
 - e. National building (NCC) and WHS regulations should move to reference the new updated refrigeration safety standards AS/NZS 5149 as a minimum safety requirement or benchmark;**
 - f. Government and industry need to work together to develop and deliver more training to all industry participants.**

Refrigerant Transition and PRIME

Australia and the other parties to the Montreal Protocol reached an agreement to a global 85 per cent phase-down of hydrofluorocarbons (HFCs) by 2050, during a series of talks in Kigali, Rwanda in October 2016. Australia has committed to an 85 per cent phase-down of HFCs by 2036.

One of the biggest changes and challenges facing the refrigeration and air conditioning industry is the move from high-GWP refrigerant technology to low-GWP refrigerants and associated technologies. Refrigeration and air conditioning provide many benefits to society, but these benefits carry environmental and societal consequences. In order to mitigate these consequences, the industry is moving towards greater use of low-GWP refrigerants.

Choosing a refrigerant has also become more complex. Contemporary low-GWP refrigerants include natural refrigerants, synthetic refrigerants and blends of refrigerants.

Synthetic low-GWP refrigerants include single species and blends of HFCs and HFOs. Natural low-GWP refrigerants include ammonia, carbon dioxide, hydrocarbons, water, and air. Some low-GWP natural refrigerants have been used in the Australian market in specific applications for many decades. Although more environmentally favourable, low-GWP refrigerants are not free of the traditional refrigerant safety concerns, which include flammability, toxicity, high pressures, or simple asphyxiation.

These characteristics, combined with a lack of industry familiarity and training, present a series of safety challenges for the industry, and society as a whole. Most of the refrigerants that licensed technicians have been trained on will be replaced in the near future, resulting in a significant technical re-training requirement for all practitioners in the field.

Skills crisis

The transition in refrigerant technologies towards a low-emission refrigeration and air conditioning industry is the biggest single challenge facing the climate control industry.

The climate control industry is facing an upcoming skills crisis due to the low level of enrolments in vocational education training and apprenticeships, and a lack of targeted university degree courses for building services or refrigeration engineers. The industry needs to lift its profile and attract high-quality passionate students. A skills-based licensing system is a key enabler to creating a demand for more education and pride in qualifications achieved. The industry needs a more dynamic TAFE/VET system with industry at its centre, government apprenticeship incentives, and the development and introduction of graduate courses specifically for climate control.

The 2017 Budget should:

Support the transition to low-emission (direct and indirect emissions) high-efficiency climate control, which includes an industry transition to low-GWP refrigerants.

1. Commit to developing and disseminating Information initiatives to support the HFC phase-down.
2. Support training and education.
3. Work with industry to develop a national licencing and registration scheme.
4. Fund the development of updates of industry Codes of Practice and guides – The industry will require new information and design tools to help inform their technical decisions.
5. Collaborate with industry to focus on flammable refrigerants.
6. Fund more climate control research –The development of a climate control Research Roadmap should be the first step.
7. Fund the development of online training for flammable refrigerants safety.

Innovation and Research

There is increasing demand for improved energy performance in buildings and industrial processes. Climate control must continue to improve in energy efficiency and energy productivity outcomes to meet this demand. Continuous improvement in this highly technical field requires innovation and a strong research impetus in a range of areas such as:

- New refrigerants and associated technology
- New applications for existing well-known low-GWP refrigerants
- New building design and delivery methods
- Emerging technologies for HVAC
- Higher performance standards for buildings and appliances
- New controls and building monitoring and metering, incorporating fault and energy diagnosis
- Thermal energy storage and distribution systems
- Reliable energy-estimating software that can be used across a range of skill levels
- New energy sources to drive climate control systems
- Behaviour change.

One of the main issues that has been discovered in the climate control research space is the disconnect that is evident between academia and industry. In many cases industry is not aware of ongoing climate control research projects and academic research is poorly connected to the needs of industry. The results of academic research are not well disseminated within the industry. Researchers and industry appear to be largely working in silos, with some notable exceptions.

The 2017 Budget should:

- 1. Support an industry-government research forum to facilitate three key aspects that are central to generating value and supporting innovation for the Australian climate control and wider building industry.**
 - a. Establishing key climate control research needs and developing a climate control Research Roadmap for Australia;**
 - b. Engaging industry in climate control research nationally and internationally; and**
 - c. Effectively communicating findings from national and international research that are relevant to Australian climate control issues.**
- 2. Support low-emission demonstration projects - government can support innovation and commercialisation of low emission climate control technologies.**
- 3. Support low-emission technology learning.**
- 4. Provide incentives to reward innovation.**

End of Submission



www.airah.org.au

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