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**Response to discussion paper**

# **Advancing Climate Action in Queensland**

## **Making the transition to a low carbon future**

Submitted to: **Department of Environment and Heritage Protection**

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## About AIRAH

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AIRAH is the recognised voice of the Australian air conditioning, refrigeration and heating industry. We aim to minimise the environmental footprint of our vital sector through communication, education and encouraging best practice.

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## Executive Summary

Please find the following as AIRAH comments on the questions raised in the discussion paper prepared by the Department of Environment and Heritage Protection to make sure Queensland is on track to weather the impacts of both a changing climate and a changing global economy, and secure a fair share of the new industries and jobs that are rapidly emerging around Australia.

AIRAH has consulted with our membership base in the development of these comments. AIRAH's members work across all sectors of the built environment, from residential heating and cooling systems through to complex HVAC design and construction for larger buildings, through to the cold chain and industrial refrigeration.

The work of AIRAH's members not only impacts on construction industry productivity, it also has significant impact on the productive use of assets over their lifetime.

These comments are offered in good faith by AIRAH as a constructive submission in support of the Queensland Government's efforts to develop and support a meaningful emissions reduction and climate change adaptation and mitigation strategy.

In this submission AIRAH is recommending the Queensland Government:

- Develop a plan to deliver net zero buildings by 2050; including a pathway to highly efficient buildings serviced by highly efficient HVAC&R that is powered by low carbon renewable energy sources.
- Co-ordinate with Commonwealth and other states and territories for a national licencing approach for refrigeration and air conditioning trades, based on harmonised training and skills maintenance standards;
- Implement a national approach to the mandatory disclosure of the energy performance of all buildings at their point of sale or lease;
- Implement a harmonised state-based energy saving certificate scheme to incentivise energy efficiency interventions in a range of sectors;
- Assist refrigeration stakeholders to develop and apply benchmarking tools for the energy performance of refrigeration systems in a variety of economic sectors; retail, cold chain, health, IT.
- Support innovation and research in academia and industry.

Ultimately the Queensland Government needs to undertake a range of policy initiatives to become a leader in sustainability, low carbon energy and low-emission construction. The first step is for Government and its agencies to 'lead by example'.

## AIRAH

The Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) welcomes the opportunity to work with the Queensland Government to make the transition to a low-carbon future in practical and productive ways. AIRAH is an industry-led organisation that represents the entire value chain, from the tradesperson on site to university-educated engineers and business leaders. This overarching perspective – and reach to more than 25,000 industry participants – positions AIRAH to promote and develop the most efficient, productive and resilient heating, ventilation, air conditioning and refrigeration (HVAC&R) industry for Australia’s future.

The 21<sup>st</sup> century imperatives of emissions reductions and energy productivity present our nation with significant change, challenges and opportunities. It is important that all stakeholders from the built environment come together to meet these challenges, because all of us have a part to play in the move towards low emissions and in ensuring specific safety concerns and challenges are mitigated.

AIRAH is keen to work with the all levels of government to improve the environmental performance of existing and new HVAC&R (heating, ventilation, air conditioning and refrigeration) systems. We envisage a collaborative effort to get and keep action firmly on the agenda. AIRAH feels that it’s important for Queensland politicians from all parties to understand both the vital role the HVAC&R industry has in the Queensland economy, and also the part it can play in helping Queensland achieve its environmental aspirations and commitments.

## The role of HVAC&R

Australia, as a signatory to the Paris Climate Change Agreement, has now committed to the global transition to net-zero emissions, and to reaching net-zero emissions nationally around 2050. Obviously this has implications for all state and local governments including Queensland.

The Queensland Government should understand the Australian built environment sector – and within that, the HVAC&R 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 can play a huge part in this transformation. Vapour compression refrigeration systems as used in refrigerators, air conditioning systems, food processing and production, beverage industries and the like throughout the economy consume around 22% of all electricity generated in Australia. 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 the design and maintenance of high-performing buildings.

The Institute has been intimately involved with the development of ASBEC’s *Low Carbon High Performance* report, and we support its recommendations. And AIRAH is in fact the driving force behind PRIME, the HVAC&R industry’s blueprint for a successful transition to a low-emissions future through Professionalism, Regulation, Information, Measurement and Emission abatement. As Australia comes to grips 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, particularly for emission reductions. See PRIME website [www.primehvacr.com.au](http://www.primehvacr.com.au)

## AIRAH responses to the listed questions

### What should Queensland do?

#### 1. What should Queensland look like in 5, 10 or 30 years in a low carbon global economy?

Queensland is in a unique opportunity to lead Australia by example. Just as changes to land clearing enabled Australia to meet its Kyoto obligations, there is no reason why Queensland cannot again forge a leadership position. Following a transition over the next 5 years, 10 years and 30 years' time, Queensland can become a global leader in sustainability and carbon efficiency.

The Queensland Government is a large procurement agency for products, services and buildings. Leading by example and ensuring sustainability targets are incorporated in every policy and contract will drive significant carbon savings.

AIRAH and other leading organisations in the built environment have demonstrated that energy efficiency in buildings is achievable, effective and most importantly saves money. All Government buildings and offices should seek to maintain high NABERS ratings targets, working closely with AIRAH and its member network to identify, manage and deliver energy and carbon saving opportunities.

In the future Queensland should be a state with increasingly more resilient buildings and infrastructure and with growing investment and export niches in high-technology low-carbon manufacturing, construction services and HVAC&R sectors.

The Queensland building supply chain will be used to constructing Zero carbon buildings in sustainable development precincts. Providing and maintaining low emission HVAC&R would be business as usual for the Queensland HVAC&R sector.

Queensland should be a state with accessible training in new and innovative technologies that is easily accessible to the small and mediums sized companies operating in the HVAC&R industry. Innovation and technology uptake means changes to practices and procedures. These changes and innovations need to be supported in the traditionally risk averse construction and cold chain industries.

Refrigeration and air conditioning should be a licensed occupation in Queensland supported by a skills maintenance program.

In the tourism sector, which is of vital importance to Queensland more than any other state, resorts and hotels should be offered tax incentives to implement energy saving technologies.

**Case Study Example**

Implementation of the first Sea Water Air Conditioning system (SWAC) at the InterContinental Bora Bora Resort.

Running the hotel's air-conditioning system on water extracted from the depths of the sea is new technique in building air conditioning with the first practical applications of this constructed in Hawaii. This system eliminates the use of potentially hazardous refrigerants and is designed to save up to 90 % of the hotel's electricity consumption for air conditioning or 2.5 million litres of fuel oil each year. This system resulted in an annual saving of half a million dollars in operating costs for the resort.

Clean low-emission technologies like deep sea cooling systems like that used at the Intercontinental Hotel in Bora Bora should be explored, encouraged and promoted. <https://www.youtube.com/watch?v=rcquycxC5ig>

In a broader context Queensland is arguably one of the regions of Australia that is most at risk from climate change impacts with significant coastal regions within cyclone areas and major flood and fire events having threatened life and property. With major agricultural activities, the impact of poor land, resources and chemical management are immediately evident and worthy of significant attention.

Queensland has a major opportunity to create knowledge hubs of industry and academia within industry sectors to find collaborative solutions to Queensland challenges. By embracing the state's own resources and capabilities, the Government can take a key leadership role in congregating all the required skills to demonstrate sustainable and lasting strategies showcasing world leading energy, carbon and resource efficiency. If led effectively this will seed new industries, smarter technologies and world leading processes in every sector.

## **2. What do you think are the benefits and costs of taking action to address climate change in Queensland?**

Destination Q values the tourism expenditure currently at just under \$15 billion. It is conceivable that without the Great Barrier Reef, which is under major threat from climate change, the value derived from tourism would be significantly affected. In reality, the costs of not taking action to mitigate the impacts of climate change are almost incalculable. A 'no action' scenario will result in Queensland having an economy that cannot be competitive on a global stage.

The benefits of taking action will be the reduction and mitigation of the worst climate impacts and the introduction of climate resilience into Queensland buildings, precincts and cities. Queensland businesses and residents will benefit from growth and development of leading industry practice generating more jobs and long term employment opportunities. Businesses and industry that take action will be able to supply product or services into a more stringent global marketplace, and meet public demand for lower impact products and services.

The costs of taking action will depend largely on the types and coverage of the actions taken. The cost of taking action is insignificant in the long term, however all transitions within an economy result in increased costs to retool and redirect expenditure.

Increasing minimum energy performance standards for new and refurbished buildings, for all facets of the cold chain, and for new appliances and systems is a very low-cost high-benefit option. The minimum energy efficiency performance of HVAC Equipment and appliances has increased significantly over the last decade, which has resulted in considerable reduction in carbon footprint. Queensland plays an important role under the current national E3 framework to maintain momentum with this process.

Incentivising or mandating the energy performance of existing buildings and refrigeration systems is a bigger challenge but with huge benefits. It is almost universally agreed that energy efficiency interventions in the existing building stock is one of the lowest cost forms of emissions reduction. The existing stock of vapour compression systems comprises around 53 million systems nationwide and many of these systems are not optimised.

Introducing the mandatory disclosure of the energy performance of all residential, commercial and public/institutional/industrial buildings at the point of sale or lease would go some way to removing the barriers for change in the property sector. Implementing similar measurable/reportable efficiency standards for refrigeration systems would help to drive commercial and industrial refrigeration efficiency.

The barriers to the uptake of low global warming potential (low GWP) refrigerants that are particular to Queensland also need to be addressed. Examples are the legislative limitations to the more widespread use of hydrocarbon refrigerant and the restrictions imposed by local councils to the more widespread application of ammonia refrigerant – particularly in CBD areas. The emphasis here needs to be on the risk management associated with the employment of such working fluids. With only two exceptions all future refrigerants whether natural or synthetic will be either flammable, toxic or operate under high pressures. The information and education requirements to ensure continued compliance with the current WHS Act are very challenging as the HVACR industry transitions towards new low GWP refrigerants. This challenge requires Government commitment and a dedication to the continued management of change.

The resiliency of systems, buildings and communities to climactic impacts also needs to be addressed.

The costs of measures need to be assessed correctly within a Life Cycle Assessment framework, and not the simple capital cost evaluations as often used by government agencies. Impact assessments of changes away from high GWP refrigerants should be assessed using holistic product lifetime metrics.

**Resilience in HVAC&R**

Resiliency in the built environment is a topic that is attracting an increasing focus, in Australia and also around the world. In the current physical, social and environmental global situation the ability of a building to deal with external and unusual impacts due to climate change, severe storm events, large bushfire events, 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 HVAC&R systems that support them. As a critical enabler in the Australian economy, it is clear that the resilience of HVAC&R systems, in terms of their design, installation and operation has to be addressed to safe-guard the built environment and its occupants during extreme events.

Currently the resilience of HVAC&R infrastructure is not being strategically addressed in the property sector. While there is growing awareness in Government and industry about resiliency most of the focus is on buildings with very little focus on HVAC&R and related building services issues. AIRAH has constituted a Resilience STG, a special technical group of building and services experts, who will develop an AIRAH Resilience HVAC&R Framework to deliver practical solutions across the entire HVAC&R supply chain.

**3. What part should Queensland play in meeting global and national climate change commitments?**

Queensland needs to step up and undertake a fair share of the work in helping Australia meet its international and national climate change and emission reduction commitments. In fact, Queensland should be a leader in this regard, which would give Queensland a financial and environmental advantage. By leading the way on climate change Queensland also stands the most to gain from reduced impacts in the tourism sector.

Queensland, along with all other Australian States and territories has obligations under the Paris CoP21 agreement, the Montreal protocol and future regional and international agreements under development.

Queensland innovation and business development opportunities are significant and Queensland should lead the way in HVAC&R development utilising the advantages we have of developing specific solutions that will suit the rapidly growing Asian economy. In addition, the climate change impacts to coastal Queensland, and farming will be significant, therefore development of resilience within those industries will help support the economic growth of Queensland.

Tax incentives and local government incentives for new low carbon innovative products and industry should be given significant support through the Queensland government.



#### 4. How should Queensland work with the Commonwealth, state and territory governments and local governments to reduce greenhouse gas emissions?

Queensland should work with the Commonwealth, state, territory and local governments to

- Create a national, uniform, **skills based licensing** and licensing retention system for refrigeration technicians and refrigeration system designers. The system must be subject to continuing professional development and rigorous skills testing.
- Create a **state-based white certificate/energy efficiency certificate** scheme to mirror similar schemes in other states; NSW ESS and Victorian VEET scheme, ACT scheme. These schemes are being opened up to energy savings derived from refrigeration system replacement, refrigeration system upgrades, building tuning, retrocommissioning and in particular HVAC&R optimisation, providing an incentive to owners to save energy. Queensland needs a similar scheme and all states and territories should collaborate with the Australian government to share tools and experiences to create a single harmonised white certificate/energy efficiency certificate scheme that can be applied to energy savings in HVAC&R and buildings/facilities.
- Instigate **mandatory disclosure of energy performance** for all buildings being rented or sold.
- Raise **minimum energy performance standards** for buildings and appliances, under a harmonised national approach.
- Implement national measurable/reportable **efficiency standards for refrigeration systems**, with efficiency not based on individual components that make up the system but on the overall system energy usage, with maximum usage based on application i.e. kW/m<sup>3</sup> for cold storage facilities, kW/m<sup>2</sup> for supermarkets. Adopting achievable energy efficiency standards for (non-air conditioning) refrigeration systems would remove a lot of poor energy performance in the sector. Commercial and residential buildings efficiency are regulated through the CBD/NABERS program and NCC regulations, however there are no national efficiency standards for refrigeration systems.
- Incentivise the switch from high GWP HFC refrigerants to low-GWP refrigerants.

#### 5. What kind of goals or targets should Queensland set in order to achieve this?

Goals and targets need to be ambitious and achievable, but also measurable and verifiable.

AIRAH support the net zero 2050 goal committed to by the Australian government.

Set the target, agree the trajectory and get to work measuring outcomes.

#### 6. What could the Queensland Government do to further stimulate innovation and commercialisation of low emissions and clean technologies?

The Queensland Government can play an essential role in innovation and commercialisation of low emissions and clean technologies by supporting technology demonstration projects and facilitating the development and distribution of independently verified Case Studies of actual innovative HVAC&R solutions being delivered in Queensland, providing the industry with detailed benefit and cost analysis of real installations and construction methods.

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The Queensland Government could partner with Queensland research institutions and industry associations to provide the market with trusted and comprehensive information on these new technologies, and new design or construction tools, that will help the sector and the buildings it delivers, operate more efficiently.

The Queensland Government should be more active in procuring systems and solutions that are innovative and low emission for their own buildings and projects. Government can lead by example here and these projects can then be used to support demonstration of the technologies and processes to the wider construction industry. Technology examples include passive building, solar cooling, district cooling, low charge ammonia refrigeration systems, trans critical CO<sub>2</sub> based refrigeration systems for tropical climates, PV assisted air conditioning, thermal mass, phase change materials, ammonia based air conditioning systems for high rise air conditioning and many more.

### Innovation Example - Solar Heating

A Queensland company, Q Solar Pty Ltd, has developed an efficient and economical solar air heating technology with multiple applications for industry, agriculture and in the heating of buildings. This was achieved through the development of new solar radiation absorbers, of multiple solar air heaters, and of methods to optimally design the air heater for each application.

The users of Q Solar air heaters pay less for solar heat than for fossil fuel heat and also reduce their greenhouse gas emissions. Since these new devices can be retrofitted to most pre-existing industrial or agricultural systems that require heat, and to commercial or residential buildings, this technology can make a significant overall reduction in greenhouse gas emissions.

The Commonwealth Science for Industry Research Organisation (CSIRO) have assessed and tested the technical and economic performance of Q Solar air heaters and found that they are efficient, inexpensive, easy to install and can be retro-fitted to many different applications. The CSIRO has acknowledged that Q Solar air heaters can make a significant contribution towards replacing fossil fuels with clean energy.

About 10% of the global greenhouse gas emissions could be reduced by using solar air heating technology according to Q Solar while at the same time allowing users to halve their heating costs. By supporting the export of the Q Solar technology, Queensland could play an effective role in helping to meet global climate change commitments.

Government could facilitate the delivery of demonstration/training technology to TAFEs/VET and universities that provide training and education in the sector, so that incoming industry entrants are more technology and innovation aware. For example, every Queensland university that provides training in building engineering, architecture, building physics or construction management should have a state of the art building management and energy diagnostic system operating on their premises so that their students can become familiar with these technologies.

At present it is not possible to obtain tertiary qualifications in refrigeration technology anywhere in Australia. Queensland has an opportunity to be the first State to offer this at a M.Eng level.

The HVAC&R industry wants more recognition, engagement, promotion and support from the government. This could take the form of:

- Grants to support and promote the uptake of innovative technologies;

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- Alleviation of Government costs for building/HVAC&R energy related technology start-up firms;
- Government support through the use of technologies within the supply chains that the government controls;
- Facilitation and support of applied research in the HVAC&R field that can generate commercial and other benefits for the state;
- Facilitate the development of educational tools to support new technologies.

All participants and actors in the construction sector need better information about what is possible in today's construction industry including information about those innovative approaches that are currently being applied and working in Queensland. There are some great success stories about innovative approaches to the construction and installation of heating, ventilation, air conditioning and refrigeration (HVAC&R) services in buildings and the design and installation of refrigeration systems associated with the Cold Chain. The construction and refrigeration industries are risk averse, and awareness of how innovation has been successfully undertaken locally can reduce this perceived risk and encourage uptake.

These stories are being told by AIRAH and other industry associations but they need to be promulgated to a much wider audience of investors, developers, owners, operators and end users in Queensland. HVAC&R is a hidden and technical supply chain industry and investment decisions in it are often controlled by non-technical people. The Queensland Government can help by assisting the HVAC&R industry reach a much wider audience to promote increased awareness of the benefits of improved practices, innovative technologies and integrated approaches to HVAC&R.

### **HVAC&R Research**

There needs to be a greater effort made to help Queensland's construction materials and technology firms to engage with the academic and research sector. Currently co-ordination in HVAC&R research is very low.

R&D partnerships with research organisations need to be made affordable and accessible to small businesses. The SME sector has significant barriers to participating in formal research and Government could act to remove some of these barriers such as reducing cost and improving communication between research and SME sectors.

This could also be achieved through industry partnerships with TAFEs/VET/Universities to provide greater exposure of students to Queensland innovation and expertise. The concept of visiting or adjunct professors from industry deserves greater attention. As a result of the neglect of tertiary training in industrial refrigeration in Australia over at least three decades, the bulk of the knowledge exists within industry. Visiting professors can address this problem in part.

AIRAH has significant oversight and engagement with the industry's research activities. Government can help firstly with engagement and recognition, then with facilitation and forums, and finally with encouragement and funding. By and large research in the HVAC&R, building physics, thermal comfort and indoor air quality fields is 'applied research' that can be turned into commercial and other benefits for the state. Government does not need to make a great 'leap of

faith' investing in applied research as may be required with investment into pure or fundamental research.

There needs to be much stronger links between academic institutions and a bridge between academia and industry. Some of the activities proposed to help facilitate better collaboration include:

- A research roadmap for the HVAC&R/construction industry should be developed.
- The key HVAC&R/construction industry research needs should be identified and matched to institution research capacity.
- Findings from existing research projects should be disseminated more widely (beyond academia) while encouraging discussion and debate.
- Government/Industry could provide a platform for collaboration either through a research seminar/conference or through an Australian HVAC&R multi-institute research centre or foundation.
- Queensland Government could liaise with Federal Government to advocate for funding to be delivered for applied research and not just fundamental research.
- Queensland Government could advocate for a fair share of the ARC (Australian Research Council) funding allocations for Queensland.

Resources in small businesses are stretched, so it would be beneficial if the Queensland government advertised the R&D opportunities to businesses.

The Queensland Government could encourage and support new innovative processes by providing incentives in the form of financial tax breaks (including accelerated depreciation) and encouragement in the form of awards and showcase materials that are developed to support and promote new processes, materials, and innovations.

Small businesses often need incentives and government assistance to make the jump to some new technology or process. Firms can be encouraged and supported by government and industry sponsored programs to evaluate innovative HVAC&R technologies. For optimum effectiveness HVAC&R technology demonstration and evaluation projects should:

- Include direct approaches to property owners, to determine the level of interest and the window of opportunity for potential innovative technology projects;
- Work with property owners and HVAC&R consultants to decide which innovative solution(s) would be most suited to particular situations.
- Ensure that potential projects and their funding requirements are individually assessed by independent HVAC&R consultants, or by entities registered to carry out measurement and verification in accordance with internationally recognised standards.
- Ensure that the outcomes from the projects are individually verified and evaluated by independent HVAC&R consultants, and the information is shared with the wider industry (warts and all).

Under this approach, property owners would install the most appropriate technology, while clearly understanding the risks involved. Over time property owners and technical service providers would become comfortable with the new approaches, and be more open to

considering new technologies and practices. Demonstrating changes in attitude is often as important as demonstrating the technologies themselves, particularly in the risk averse construction industry. The measurement of costs and savings by independent consultants would generate the accuracy of information required.

In this context it is important to ensure the qualifications of assessors/verifiers fall within the same envelope as the assessment task(s). In view of the long history of educational neglect within the refrigeration sector and particularly within the industrial refrigeration sector, identification of appropriately qualified assessors/verifiers may pose a challenge.

Again, the Queensland Government could encourage and support firms that promote efficient buildings and processes by providing recognition, focus, vision, and support to the sector.

### **7. Should Queensland sign the 'Under 2 MOU?'**

Yes, AIRAH believe Queensland should sign the 'Under 2 MOU'.

## **Renewable Energy**

### **8. What are the opportunities for Queensland in transitioning to a clean energy future?**

Queensland is rich in renewable resources of sun, wind and wave.

There are significant skills gaps in the industry in regards to energy efficiency and low emission tools and processes including

- Designers and contractors with experience in the application of clean energy technology and low emission HVAC&R,
- Technicians with installation and diagnostic capabilities for building controls and management systems,
- Professionals with experience in building energy optimisation, and
- Technicians and designers with experience in the application of natural refrigerant technologies (e.g. NH<sub>3</sub>, hydrocarbons, air, water or CO<sub>2</sub>).
- Technicians and designers with experience in the application of low life cycle climate performance (LCCP) technologies such as energy recovery systems, high efficiency equipment and systems, or equipment/systems using low GWP refrigerant technologies.

Queensland's reputation as the Sunshine State could be used to attract the highly trained and competent individuals that are needed to help update and future proof Queensland's construction and HVAC&R sector.

It should be possible for strategic agreements and technology partnerships to be formed between architecture, planning and engineering firms and construction materials and construction technology firms in Queensland. This could be facilitated through a Queensland

government sponsored networking system to link manufacturing facilities and construction companies with designers and academics.

If the government could provide R&D support to businesses for developing innovative technologies, this would potentially pay off in time. This is particularly relevant for building energy management and energy diagnostic software/hardware systems.

### **9. What are the major barriers in adopting clean energy technologies in Queensland?**

The current government reliance on tax revenues and investment inputs based on coal mining and coal fired power generation are a significant barrier to change.

Skills gaps (see above) are set to become a major barrier.

Investor confidence in the clean energy sector is low. The Government should switch from incentivising fossil fuel resource development to incentivising renewable energy technologies.

The comparatively low cost of energy is often a prohibitive factor in the acceptance of energy saving HVAC&R equipment. The drive for lowest 'first-cost' construction is also a barrier as good life-cycle solutions are not considered by developers or their designers. Also there is a split incentive between the developer or builder and the owner or operator because the entity that pays for the innovation is not the same as the entity that benefits from its installation.

Whilst the construction industry is evolving, there is still a significant divide between high end premium buildings and low cost developments. The mainstream of the construction industry on the whole does not like change. There is a preference to deliver tried and tested solutions rather than adopt innovative solutions and a general tendency to "do it the same way as we did it for the last project". This can be attributed to economic and time related budget pressures as well as a general tendency for the industry to be risk averse and time poor. Change needs to be incentivised and the Queensland Government has a role to play in this.

### **10. What programs would you like to see put in place to encourage greater uptake of energy efficiency and clean energy?**

In terms of greater uptake of clean energy, AIRAH advocate for a strong renewable energy target for the State, with a defined pathway to 50 per cent renewable energy by 2030 and as close to 100 per cent as practicable by 2050.

For greater uptake of energy efficiency AIRAH advocate for the following type of programs:

- A Queensland energy saving certificate scheme that incentivises HVAC&R energy efficiency interventions;
- Mandatory disclosure of building energy performance;
- Increase in the stringency of the minimum energy performance standards for buildings;
- Play a proactive role within the national framework for increasing minimum energy efficiency standards of equipment and appliances;
- Provide better information to the property industry regarding life-cycle costing and life cycle cost/benefit analysis;



- Require a developer/builder to provide a performance guarantee for every new building
- Provide a performance measure similar to vehicle L/100km, such as a base building maximum w/m<sup>2</sup> energy performance for all new buildings. Queensland should collaborate within the ABCB structure to implement this nationally through the NCC.
- Energy performance benchmarking for a wide range of refrigeration applications based on a universally applicable energy performance benchmarking tool.

Before clean energy can be effectively used in the built environment, the systems using the energy have to be optimised and efficient. Apart from the energy embodied in their materials of manufacture, HVAC&R systems have three main sustainability impacts; energy consumption, water consumption and refrigerant related environmental damage.

The electricity consumption of HVAC typically accounts for around 40 to 60 per cent of total building energy consumption, and 24 per cent of all the electricity generated in Australia is used by Australian buildings. HVAC&R is responsible for the consumption of about 22 per cent of all the electricity produced in Australia and causes more than 11 per cent of the total Australian national emissions. It is clear from these numbers that the energy consumption of HVAC&R and the resulting direct and indirect emissions have a significant sustainability impact.

To reduce these levels of emissions AIRAH notes that:

- Buildings (and processes) have to become more energy efficient and more energy productive, this includes higher standards for envelope thermal performance and building sealing.
- HVAC&R systems have to be designed, installed and maintained for high energy efficiency. Measurement, monitoring and ongoing maintenance is the key to improving and maintaining the energy efficiency and energy productivity of existing HVAC&R systems.
- Electrical energy used to run high efficiency HVAC&R in highly efficient buildings (and processes) has to be low carbon energy.

These three fundamental steps need to be followed to maximise the energy productivity of HVAC&R in all sectors and applications.

## **Built Environment**

### **11. What steps should Queensland take to improve energy efficiency in the built environment sector?**

Commercial and residential buildings are a major source of greenhouse gas emissions, creating around 23 per cent of Australia's national emissions through electricity consumption. This is split approximately 50:50 between residential and non-residential buildings. The Australian Bureau of Statistics estimates that around 60% of Class 1 residential buildings in Australia are air conditioned to some extent. This percentage is likely to be far higher in Queensland. For commercial buildings the number is more likely to be close to 95%. Refrigeration, space heating and cooling, mechanical ventilation and hot water delivery are all significant energy demands generated in buildings, typically 40 to 60 per cent of a building's total energy use, which has a direct and marked effect on Australia's energy performance and emissions targets.

Improving building energy efficiency is a way for households, occupants, commercial building owners, and small businesses to reduce energy bills.

AIRAH have collaborated with other members of the Australian Sustainable Built Environment Council (ASBEC) to deliver the *Low Carbon High Performance* report which shows that cost-effective action across the property sector could deliver a 23 per cent reduction in emissions by 2030 and 55 per cent by 2050 in Australian buildings. AIRAH encourages the Queensland Government to advocate for and support the delivery of the recommendations of this report. AIRAH recommend that the Queensland government advocate for the following policies in regards to energy efficient buildings

- **A 'towards net zero' buildings plan** that will provide a roadmap for the property sector to a carbon neutral future
- **Strong minimum standards** including construction standards, appliance standards and verification standards
- **Accelerate action with targeted incentives**, to accelerate the transition, incentivise key areas. Recognition and adoption by Government is essential.
- **Reform of energy markets** to be ready to facilitate building and vehicles as mini power stations, recognise and apply innovative thermal energy storage applications
- **Innovate with better data and smart technology**, data for knowledge and planning, measurement and verification ensure optimised outcomes.

There are significant regulatory and attitudinal barriers to the uptake of Natural Refrigerants. More technical information, application materials and training programs need to be developed and delivered to assist industry meet the needs of the State's construction industry and the needs of the end-users of refrigeration systems.

Local government and state government planning rules need to be revisited with regard to mixed commercial/residential developments in high density areas.

## **Maintenance**

The HVAC&R sector is responsible for using 22 per cent of all generated electricity, and employs between 170,000 and 200,000 people. In 2012 alone \$26.2 billion was spent on refrigeration and air conditioning services in Australia.

Reducing direct emissions from HVAC&R through better maintenance and improved system design and operation also improves energy efficiency, delivering a range of other benefits, including increases in asset values, improvements in worker productivity, process productivity, occupant health benefits, and importantly, improved building resilience, as buildings and industrial facilities become less reliant on energy and HVAC&R.

Without further targeted action, however, emissions from the HVAC&R sector are expected to increase, as this industry grows and the focus on efficiency is sacrificed in return for reductions in initial capital costs.



AIRAH and the HVAC&R industry have ideas and expertise that can generate tangible solutions for the future. We have already been an effective participant in this space.

### **Education and skills**

Education and skills are critical if Australia is to have safe, sustainable, healthy and comfortable built environments in a low-carbon economy.

A significant focus for AIRAH is the 20,000 VET-trained technicians who design, install, maintain, repair, and decommission refrigeration and air conditioning plant and components every day. The switch in refrigerant technology to low-GWP gasses, through the HFC phase-down, demands new knowledge and skills to operate safely.

Australia's success in limiting ozone-depleting substances can be replicated with carbon. These technicians are the key to realising targets as we move to a low carbon economy.

These targets can only be achieved if technical services workers are equipped with the appropriate knowledge and tools to implement new technologies. AIRAH is keen to collaborate with the Queensland government and the VET sector to enable this outcome.

We will continue to advocate for and collaborate on initiatives that support the resilience of our industry and its valuable contributions.

### **Product regulatory approvals**

There is a significant issue in the industry with non-compliant products and with copies and fakes of compliant products. This has occurred in many product lines in the construction industry including electrical wiring, so called 'green' HVAC&R retail products, flexible ductwork, thermal insulation and air filters. These low quality copies and fake products undermine the economic viability of Queensland's manufacturing sector as compliant products are undermined. Refer to the work by the Australian Industry Group on this topic.

### **Planning regulatory approvals**

AIRAH have noticed the increasing development of apartment buildings that have a retail space allocated to them on the ground floor. The developers make no allowance for the installation of refrigeration systems into these very noise sensitive sites.

AIRAH would like to see some regulation introduced that a suitable space must be allocated if there is to be a food retailer installed in that building, it is no use having noise complaints after the store opens, despite installing plant with all of the noise reductions available.

## Regulations and innovation for HFC phase-down

The Australian Government will implement a statutory phase-down of HFC imports, commencing January 2018 and will reduce HFC emissions by 85 per cent by 2036.

One of the biggest changes and challenges facing the refrigeration and air conditioning industry is the move from high global warming potential (GWP) refrigerant technology to next generation low GWP refrigerants and associated technologies. Many low GWP refrigerants are flammable, some are toxic, some produce toxic combustion by-products and some operate at very high pressures. AIRAH promotes the safe and responsible use of refrigerants and supports the efforts to advance technologies that minimise impact on the environment while enhancing performance, cost effectiveness, and safety.

AIRAH is technology neutral and is supportive of all low GWP refrigerant technologies.

The transition towards low GWP refrigerant technology is a reality and this means:

- Low GWP refrigerants bringing new training and risk management challenges for the industry technical service providers;
- High GWP refrigerant based systems, which are still being designed and installed, will have a defined limited lifetime. Clients and procurement departments need to be made aware, as well as technical services providers.
- Increased demands for energy efficiency within HVAC&R means that refrigerant cycle efficiency, refrigeration system efficiency and refrigeration technology or component efficiency (compressors, coils, fans) will need to continue to improve.
- Increased demands for greater energy productivity from HVAC&R infrastructure, means that controls, technology, and energy efficiency maintenance all need to be addressed as does operator awareness and behaviours.

The Queensland Government should actively engage with representatives of the refrigeration industry, either at local authority level and/or state level, to work together with some constructive ideas for ensuring the transition to low GWP-refrigerant based systems is made as smoothly as the industry transitioned from CFC to HFC refrigerants. Governments should recognise that the transition towards low GWP systems brings a totally new and different set of technical challenges with it as a result of the flammability and toxicity properties that are a feature of most low GWP refrigerants.

Government can also help by ensuring that retailers are aware of the refrigeration industry solutions, and by offering incentives to conserve energy, thereby making the changeover process more of a carrot than a stick. By providing refrigeration dependant industries trusted cost benefit explanations that highlight the monetary and business benefits of refrigerant conversions, the traditional capital cost focus of retailers and other investors in refrigeration may be transformed into a holistic investment approach.

## **12. What are the main challenges to achieving successful, sustainable communities in Queensland? What types of innovations might address these challenges?**

Designers and builders and more importantly building codes and building procurement entities need to consider the full life-cycle costs of the decisions that they take.

Buildings, precincts and communities need to be developed and delivered with a holistic and integrated approach to sustainability. There needs to be more emphasis on the whole of life costs of building, rather than the build cost, as this would shift the focus to green initiatives and technologies that reduce the energy consumption of buildings.

The promotion of GBCA 'Green Star' green star type requirements for the planning/approval of new communities would also help.

The Government could partner with the Green Building Council of Australia to showcase Green Building successes in Queensland cities and communities. Again the story of these successes needs to be told and the Queensland Government is well placed to facilitate and support this narrative.

Smart buildings have great energy productivity potential, however if any innovation or technology initiative is going to gain acceptance in the mainstream industry, it needs to make commercial sense to main-stream development. There needs to be trusted information made available to end-users with regards to the potential costs and benefits. Presently there is a tendency for sporadic but notable energy efficiency achievements in the refrigeration sector to remain hidden from mainstream industry.

Proper scientific assessment combined with realistic economic analysis are necessary to provide the input data for any study/recommendation/measure. The Queensland government could provide funds to support these studies which have to be undertaken by independent specialists/organisations.

Identifying and maintaining appropriate levels of expertise and professionalism in the construction industry to ensure targeted performance of buildings is achieved is a significant challenge. The key aspect of a building performance measure is "is it measurable". The building regulations must enforce a measurable set of performance criteria that can be used whether the building is 12 months or 30 years old.

## Transport

### **13. What would an efficient, affordable, low emission transport system look like in 10 or 20 years?**

Efficient transport systems will be 100 per cent electric and powered by clean renewable energy. Earlier this year Prime Minister Modi of India announced a target of 100% electric vehicles by 2030. India and China, driven largely by critical air pollution problems, are driving the development of electric cars and mass transit solutions at an unprecedented scale. As 200 million people in China and 190 million people in India move into the middle class the demand for efficient transport will be exponentially greater than it is now. Australia must realise that the world is moving to a renewable electricity future far faster than we are.

### **14. What are the major barriers in shifting to lower carbon transport options in Queensland?**

A lack of real action transitioning public transport to a low carbon basis resulting from a lack of political will from major parties in government to commit the long term expenditure needed to realise large scale greening of public transport infrastructure.

### **15. What strategies would you like to see put in place to encourage greater uptake of low emission transport options?**

No comments.

### **16. What strategies would be effective in encouraging greater patronage on public transport and fewer private vehicles on the road?**

No comments.

### **17. What could the Queensland Government do to support greater uptake of EVs?**

Incentivise the installation of charging stations for EVs.

Work with the built environment regulators for these to be included in all new developments.

Engage with organisations like Tesla, BYD, etc. to see what is required.

Change consumer behaviour – internal combustion engines should have the highest cost of registration and insurance, followed by hybrids and then EVs but link this to an even lower registration cost where the consumer elects to use Green Power.

### **18. How could the Queensland Government maximise the carbon reduction potential of EVs?**

Powering transport on clean low carbon electricity has to become the new standard transport mechanism. Start with transitioning the Government fleet and public transport to EV.

## Waste

19. What do you think the key waste priorities are in Queensland?

No comments.

## Land use

**20. What are the key issues the Queensland Government should address with respect to land use and land use planning?**

No comments.

**21. How can we provide some stability in the livelihood of our farmers, and support the potential for transition to new industries such as carbon farming?**

One of the biggest issues in remote and rural Queensland is the reliability of the grid. Provide incentives for farms to implement solar panels and battery systems long term. In the immediate term, develop and fund some case studies doing this. Work with the engineering faculties at University of Queensland and other tertiary institutions to crowd source the intellect, supported by organisations like AIRAH.

**22. What role do you think the Commonwealth, State and Territory Governments should play in securing terrestrial and marine blue carbon storage areas?**

One approach could be to create a Government bond that is partly standard government bond and partly bio protection credit to pay for these areas.

## Resources

**23. What strategies should Queensland pursue to support industry to reduce emissions generated in the process of mining and production?**

No comments.

**End of submission**