



ATMO sphere



Where is the “R” in AIRAH?
Panel discussion | training

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ATMO sphere



Where is the "R" in AIRAH?

What did you say?



All I heard was 'Blah, Blah, Blah...'

Overview

- Why I'm here
- Training and you
- AIRAH training – current
- What's new?
- The future...
- What can you do...



- Why I'm here



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Сторона М. И. К.

Сторона В. А. Р.

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MATERIALS
**REFRIGERANT
MANAGEMENT**

Downtown Singapore, showing the ubiquity of air-conditioning units on Asian streets.

Every refrigerator and air conditioner contains chemical refrigerants that absorb and release heat to enable chilling. Refrigerants, specifically CFCs and HCFCs, were once culprits in depleting the ozone layer. Thanks to the 1987 Montreal Protocol, they have been phased out. HFCs, the primary replacement, spare the ozone layer, but have 1,000 to 9,000 times greater capacity to warm the

#1

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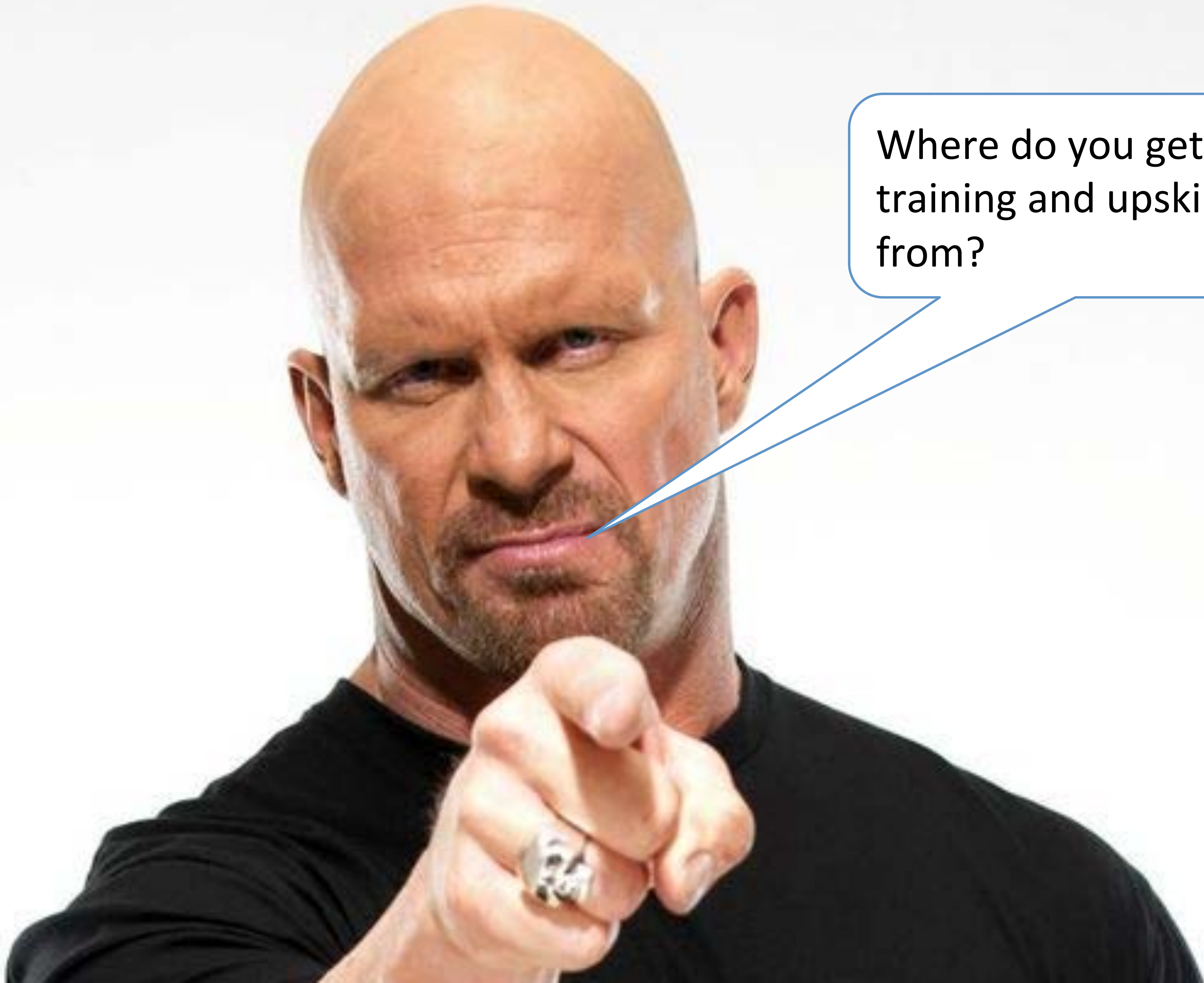
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02/05/17 - Sydney



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the industry:



Publications – Case studies, skills workshops, technical papers. 25,000 copies per month



IN DEVELOPMENT

The supermarket... is the company's first partly solar-powered store, boasting the ability to generate 100kW of solar power.

IN DEVELOPMENT

City Holdings provides facility management for Coles supermarkets, taking an "end-to-end, cradle-to-grave" approach to its support, from design through to project management, commissioning and the ongoing service and maintenance of the company's fleet of stores and assets.

So, when Coles first scoped the potential of the Coles City North development, it charged City Holdings with the task of looking for alternatives to synthetic refrigerants in its next step to the future-proofing of its stores.

"The design concept was adopted from a project that Brier Australia had started working on as a conceptual way, which the City engineering team adopted and customised in partnership with Brier to suit the project requirements," says Brian Towson, M.A.I.R.A.H. senior refrigeration engineer with City Holdings.

The design concept for Coles City North is much more complex than a standard cascade system. The challenge of commissioning it therefore required City Holdings to dedicate effort and time into developing its staff's skills to a required level.

The supermarket employs the use of other natural refrigerants such as hydrocarbons (HCs) and CO₂ in refrigeration cases, and is the company's first partly solar-powered store, boasting the ability to generate 100kW of solar power.

The site, on the corner of Giffney and Sussex Streets, was developed by the Coles Property Group. As well as the Coles supermarket, the development features 17 specialty stores and has been designed to meet a 4 star Green Star rating in keeping with local council requirements.

August 2017 • ECOLIBRIUM 27

THE SKILLS GAP

WHY ARE SKILLED HVAC&R APPRENTICES BECOMING HARDER TO FIND?

October 2016 / ISSUE 106 / 7 PAGES



HVAC&R Skills Workshop

AMMONIA SYSTEMS: TESTING, CHARGING AND SAFETY

This month's Skills Workshop looks at testing, commissioning and safe use of ammonia systems.

As the HVAC&R industry increasingly looks toward low global warming potential (GWP) refrigerants, technicians are more likely to come across natural refrigerant systems. Ammonia is one such refrigerant that has been successfully used in a range of applications in Australia. The testing, commissioning and safe use of these systems requires special attention to particular details.

Then extend the circuit being tested – say to the expansion valves. It is advisable to blow out each condenser coil separately if there is more than one.

Similarly, each expansion circuit should be treated separately.

After testing the system under pressure and blowing out the coils, the entire system should then be tested under a vacuum of at least 500µm for 12-18 hours as a final check for leaks. Even at this pressure, water will not boil at ambient temperature, so, 2°C the pressure needs to be reduced to around 2.8kPa for this to happen. However, this is normally acceptable with ammonia systems, which are generally more tolerant of moisture. As this internal test pressure – when subjected to external atmospheric pressure – small pin holes, which were closed by dirt or scale while under internal pressure, will often show up. Excessive atmospheric temperature changes during these hold over test periods may cause a marked change in pressure due only to the change in temperature.

TESTING AN AMMONIA SYSTEM

During construction, all care should be taken to prevent ingress of dirt and moisture before placing a new plant into service – or when putting an old one back into operation after making alterations – the entire piping system should be tested for leaks and the system thoroughly blown out by compressed air to remove all dirt and other foreign matter.

Note: Care should be taken, when testing the system above 1000kPa, that thermostatic expansion valves (if any) are isolated by means of shut-off.

DAIKIN

HVAC&R Skills Workshop

UPDATE ON NEW REFRIGERANTS DESIGNATIONS AND SAFETY CLASSIFICATIONS

Curated by ASHRAE and UN Environment, the purpose of this month's Skills Workshop is to provide an update on ASHRAE standards for refrigerants. The factsheet introduces the new refrigerants that have entered the international market and been awarded an «R» number over the past few years.

DAIKIN

Skills Workshop

SAFETY AND ENVIRONMENTAL REQUIREMENTS STANDARD AS/NZS 5149

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Skills summary

- What? A guide to the updated Standard AS/NZS 5149, which deals with safety and environmental requirements, installation and servicing of refrigerants and heat pump systems.
- Who? HVAC&R engineers, technicians, installers, contractors.

In 2016, Standards Australia adopted and published the new refrigeration safety and environmental standard AS/NZS 5149 Refrigerating systems and heat pumps – Safety and environmental requirements, replacing AS/NZS 1677.2:1998. The new AS/NZS 5149 standard is published in four parts comprising over 160 pages of technical safety and environmental requirements.

This Skills Workshop looks at the content of AS/NZS 5149.1:2016 Part 1 Definitions, classification and selection criteria and AS/NZS 5149.2:2016 Part 2 Design, construction, testing, marking and documentation. It complements Module 102, which can be found in HVAC&R Nation.

HVAC&R Skills Workshop

REFRIGERANT RECOVERY

Since the introduction of the Ozone Protection and Synthetic Greenhouse Gas Management Act, it has been illegal to vent ozone-depleting substances (ODS) and synthetic greenhouse gases (SGG) such as HFCs. Instead, they must be safely recovered.

The process of refrigerant recovery has evolved significantly since the introduction of the Ozone Protection and Synthetic Greenhouse Gas Management Act, and is now a regulated activity. Recovery units are available in a range of sizes, from small units for use on domestic air conditioning units to large units for use on industrial systems. The units are designed to safely recover refrigerant from a system and store it in a certified recovery cylinder. The units are also designed to safely recover refrigerant from a system and store it in a certified recovery cylinder.

Prü-Set

Skills Workshop

Ammonia safety Part 2 – Developing emergency plans, procedures for maintenance and personal protective equipment.

Developing emergency plans

There are many guidance documents available to assist in emergency planning, and in developing and writing an emergency plan.

In developing your emergency plan use the Notification of Dangerous Goods Storage and Handling form from WorkSafe Victoria's website, you will also be required to notify WorkSafe in writing that the premises contains quantities of dangerous goods including ammonia, that exceed the manifest quantity.

The description of ammonia is that it is a class 2.3 dangerous good, the manifest quantity on this basis is 300L. Once dangerous goods quantities

You may also be required to consult with other authorities responsible for the environment and planning as well as local government, to ensure consistency with legislation and emergency planning, for example, state emergency disaster plans.

There are several key elements to consider when preparing the emergency plan.

Consultation

Preparing an emergency plan requires an established consultation process and involving the appropriate personnel with the necessary expertise. These persons may range from operators, engineers, communications specialists and occupational health and safety advisors.

HVAC&R Skills Workshop

SAFETY CONSIDERATIONS WHEN USING FLAMMABLE REFRIGERANTS

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Prices	
AIRAH members	\$550.00
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Note: Early bird prices close on February 28, 2017.

www.airah.org.au/refrigeration2017



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2018 Industrial Ammonia Refrigeration courses
 May 21 - 23 & August 20 - 22

Industrial Ammonia Plant Operations (3 days)
 May 21 - 23 & August 20 - 22

This course is designed for plant operators who need to be aware of the potential hazards associated with ammonia and a sound knowledge of how an industrial ammonia plant is operated. This three day course includes both theoretical and practical components, with visits to a working industrial ammonia plant.

Who should attend? Plant operators, fitters and turners, electricians, boilermakers, mechanics and contractors who have not worked with ammonia.

Key Topics: Refrigeration systems, compressors, lubricants, condensers, cooling towers and auxiliary components, refrigerant control devices, liquid control systems, ammonia awareness, safety, service procedures and fault finding, leak measurements and legislation.

Ammonia Emergency Response (1 day)
 May 24 & August 23

This course enables participants with everything they need to know in order to handle ammonia in an emergency situation. Covered includes: how liquid and vapour leaks are identified and practical demonstration of a vapour leak to quench. This course is also available for anyone who has completed Industrial Ammonia Plant Operations and is in need of a refresher course.

Who should attend? Plant managers and operators, maintenance managers, OHS officers.

Key Topics: Ammonia and its properties, legislation/Australian standards, MSDS, vapour and cloud dispersal, manual find and emergency planning, safety, hazard response and handling, OHS measurements and practical demonstration.

Ammonia Safety Awareness (Half day)
 This course can be held at your facility, any time during the year. This course includes an introduction to ammonia refrigerant, legislation, Australian standards, safety and risk management. **Who should attend?** Staff who work around an ammonia plant, OHS and safety officers.

AIRAH can provide your company with customised ammonia training. All courses can be delivered at your workplace. Please contact AIRAH for a quotation.

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Be compliant
Be cost effective

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 Training is conducted by industry experts currently working in the industrial refrigeration sector. All trainers have skills, knowledge and qualifications appropriate to the courses being delivered.

Visit www.airah.org.au for more info.
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Refrigeration
 AIRAH offers a variety of courses in refrigeration.

Course	More information	Study mode
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Ammonia Safety Awareness	Click here	In-house
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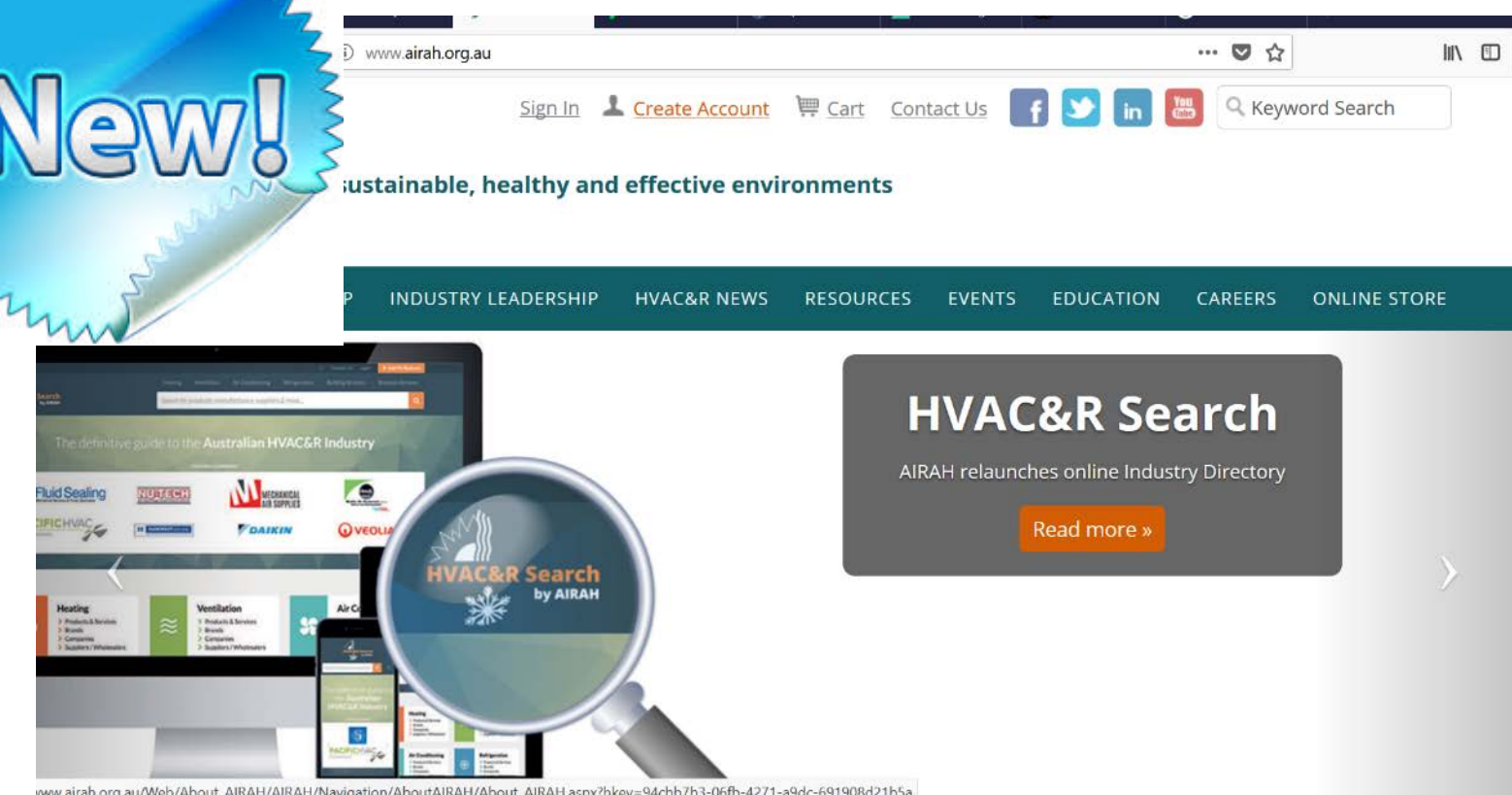
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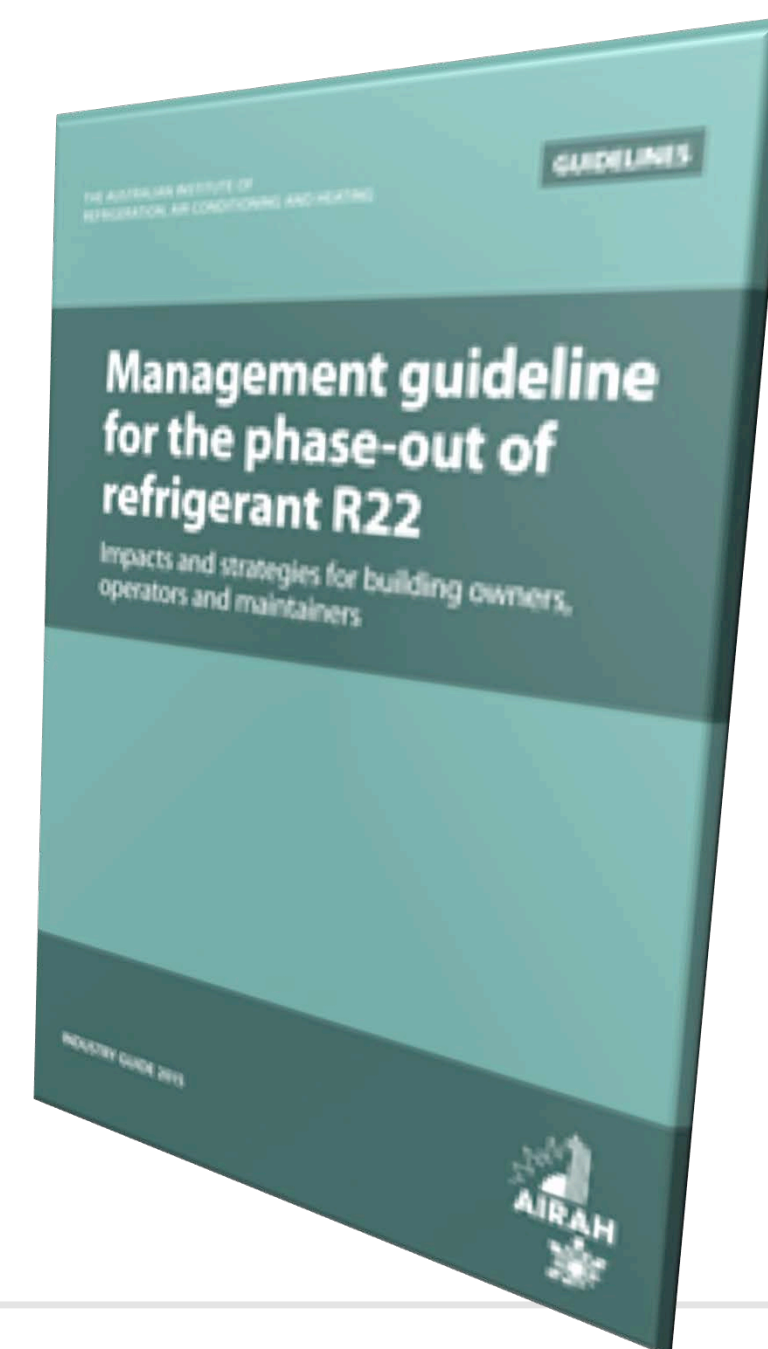
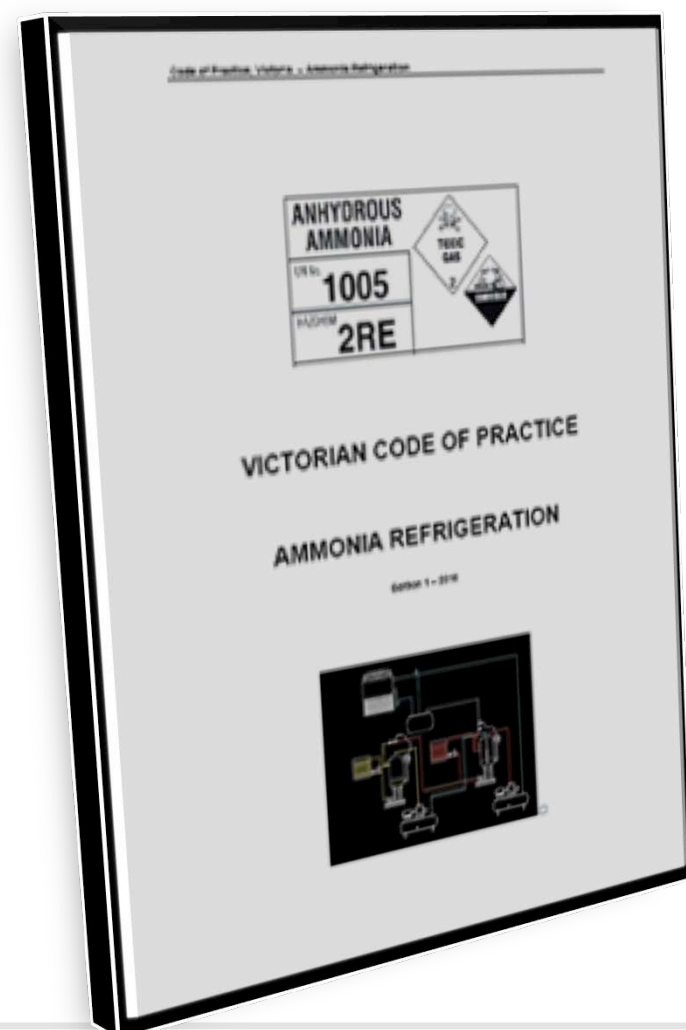
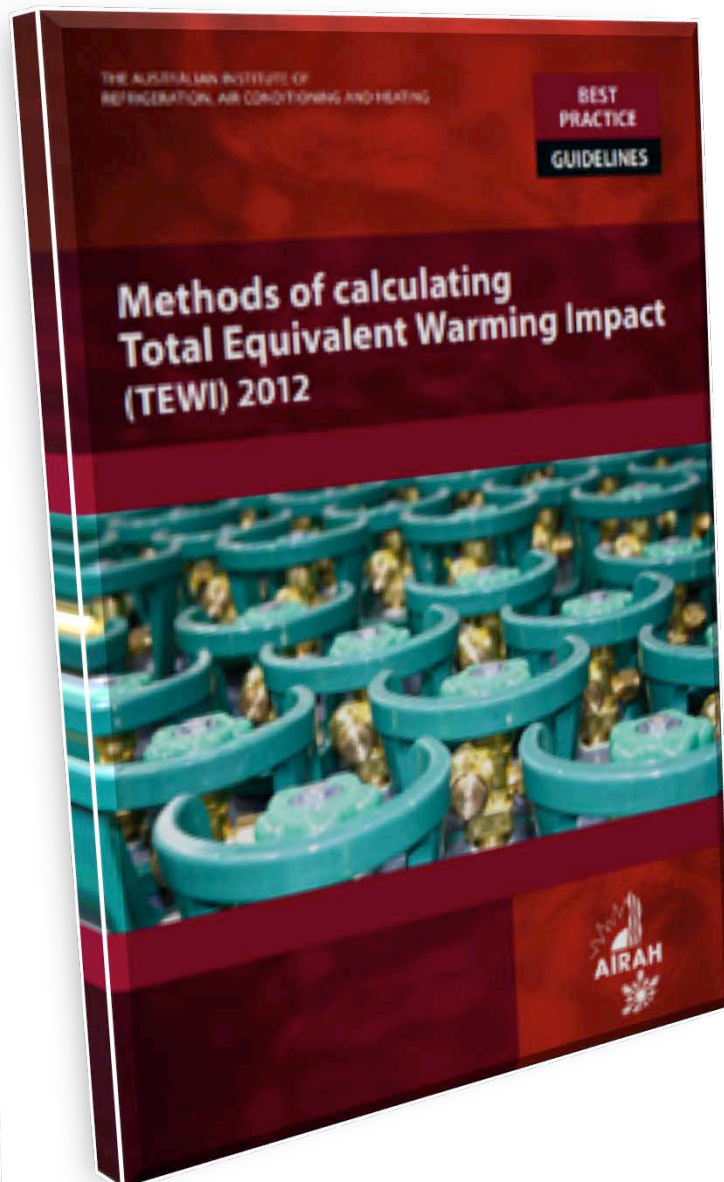


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 is **HVAC&R**

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Total AIRAH website views **545,000**

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HVAC&R Nation - copies pa
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In pictures



Trusted advisor - Awareness raising and educating key stakeholders

The Australian Building Regulation Bulletin Issue 18 | August 2016

FLAMMABLE REFRIGERANTS AND THE NCC

Written by Phil Wilkinson, Executive Manager, Government relations and technical services and Vince Ahrens, Technical Manager, AIRAH

The HVAC&R industry is preparing for the widespread use of flammable refrigerants in a number of applications, including building air conditioning. AIRAH is considering whether the building supply chain is ready for this change and is asking the question, "Should the NCC cover the safety of refrigeration systems within buildings, and if not why not?"

CURRENT SITUATION

The Australian government, in June 2016, announced a domestic hydrofluorocarbon (HFC) phase-down which will reduce HFC emissions by 85 per cent by 2036. These actions are forcing a refrigerant transition. The industry must learn how to use a new set of low-Global Warming Potential (GWP) refrigerants with a new set of flammability, toxicity or pressure-related safety characteristics. They also have new design and installation requirements.

The reality, however, is that low-GWP refrigerants – with the exception of CO₂, air and water – are, to some extent, flammable due to their chemical reactivity. It is for this reason that the refrigerant manufacturing industry is responding to the introduction of reduced-GWP HFC refrigerants and blends by developing a new type of low-GWP refrigerant: hydrofluoroolefins (HFOs).

WHAT DOES ALL THIS MEAN FOR BUILDINGS?

An AIRAH driven initiative, DIME (Professionalism, Regulation, Measurement and Emission abatement), maps out a series of actions to aid the transition to low-GWP refrigerants and low-emission HVAC&R. One of these actions is to raise the building industry's awareness of the likely changes driven by the move to low-GWP flammable refrigerants.

The introduction of flammable refrigerants into common use in Australian buildings requires designers and builders to address these issues, including the general duty-of-care in relation to the design and delivery of a residential building, or indeed building of any type.

There are many questions to be answered here. It is expected that the ISO 5149 refrigeration safety standards should have the answers to many – if not all – of these questions.

International Standards Organisation 5149 Standards series: Refrigeration systems and heat pumps – safety and environment requirements

CHANGES AND NEW SKILLS

The transition to low-GWP refrigerants will result in a variety of changes to the construction sector. Flammability, toxicity and pressure hazards will change in the sector, and occupational risks will likely increase. The transition to low-emission HVAC&R may also start to change the way air conditioning systems and their plantrooms are designed and configured.

IS THERE A ROLE FOR BUILDING REGULATIONS?

The increased use of flammable refrigerants in commercial and residential air conditioning may have exposed a gap in Australian building regulations. As regulation of refrigeration and air conditioning safety, to date, has been considered a Work, Health and Safety issue to prevent poor practices, an option is to refer to the proposed new AS/NZS ISO 5149 refrigeration safety standard in the DTIS Provisions of the NCC. Compliance with AS/NZS ISO 5149 ensures a minimum safety baseline for all new systems. This could be applied to all volumes of the NCC to cover all Australian buildings. The regulatory impacts are likely to be minimal.

NEXT STEPS

To fully address the potential safety issues in relation to the use of flammable refrigerants within buildings, it will take a collaborative effort. AIRAH is ready to collaborate with stakeholders and regulatory bodies to deliver regulatory solutions that help to ensure a continued safe built environment.

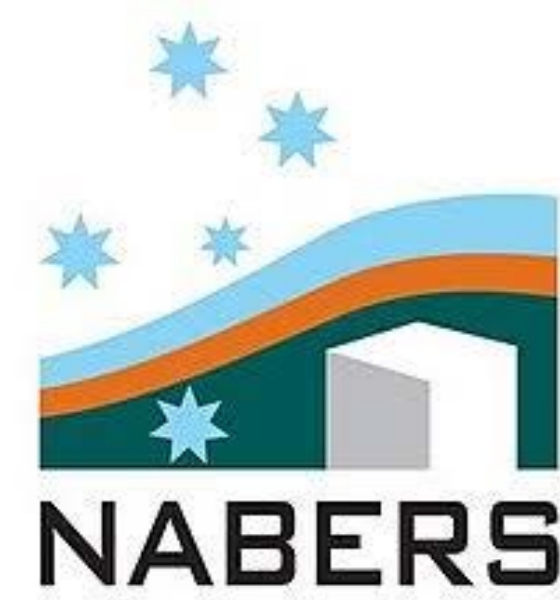
The first step is to start the conversation. Should the NCC cover the safety of refrigeration systems within buildings? And if not why not?

If you wish to know more about this matter, please see the full report or contact AIRAH on 03 8623 3000.

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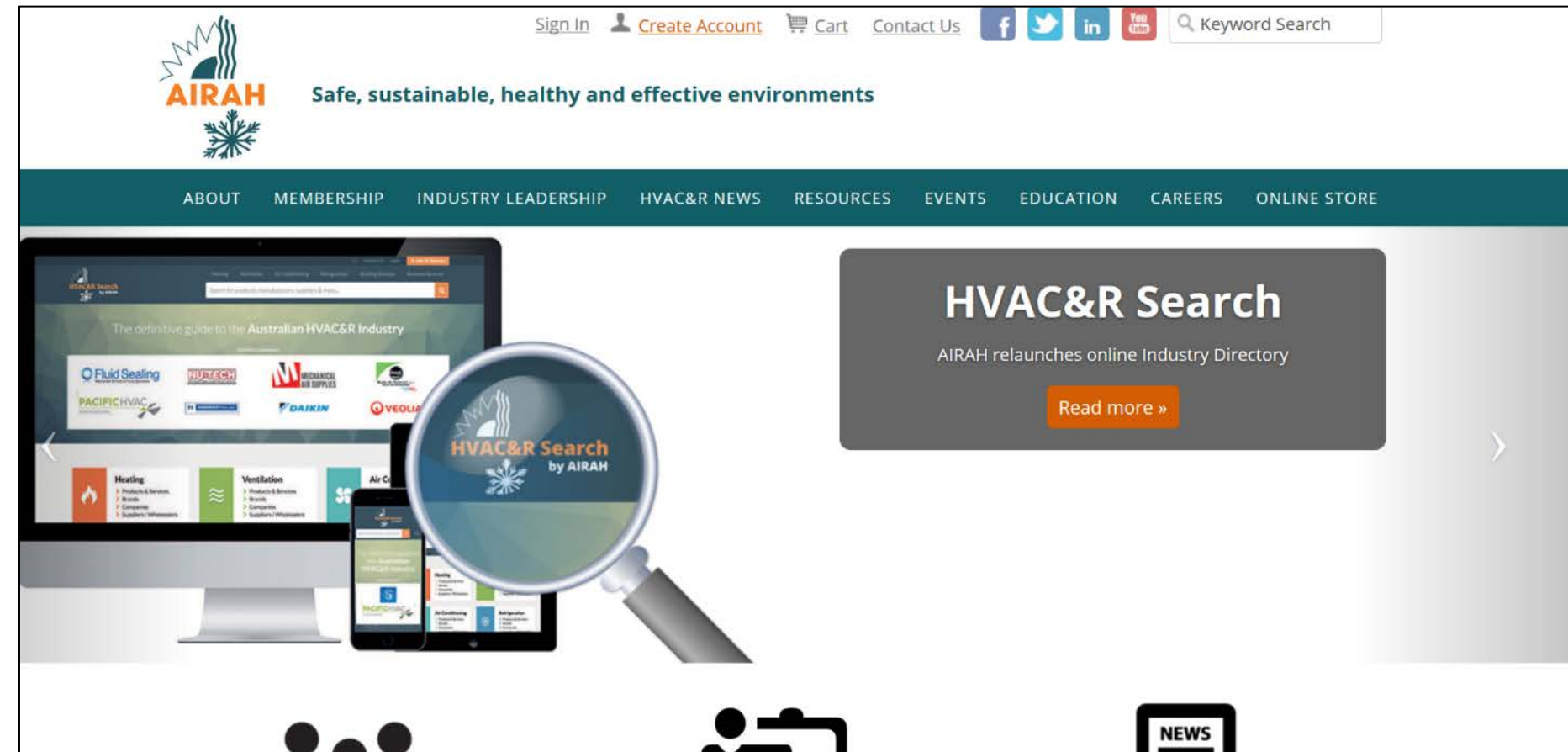
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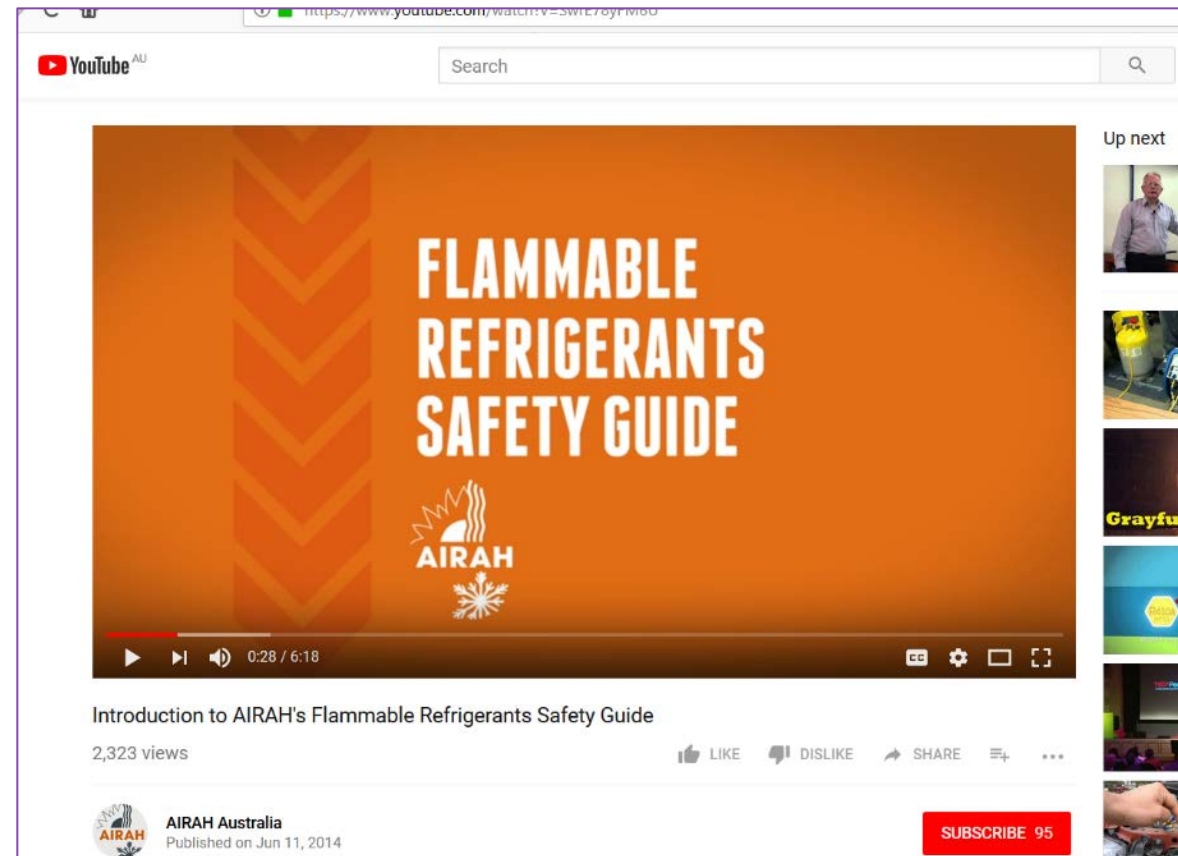
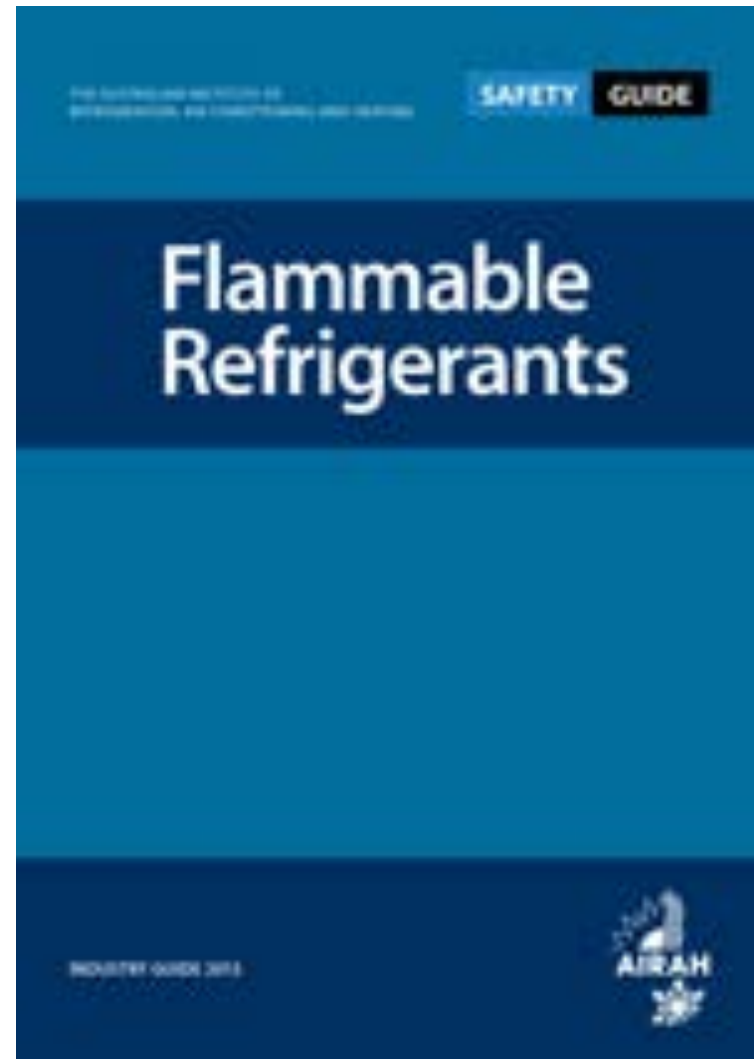





HVAC&R NEWS

The screenshot shows the HVAC&R News website homepage. At the top, there is a navigation bar with 'Latest news' and a featured article 'Free webinar: Energy management for manufacturers'. Below this is a dark header with the date 'Monday, April 30, 2018' and social media icons for Facebook, Twitter, LinkedIn, and YouTube. The main title 'HVAC&R News' is prominently displayed, with the AIRAH logo and the text 'Proudly brought to you by AIRAH' to the right. A secondary navigation bar includes links for 'NEWS', 'PUBLIC COMMENT', 'LEGISLATION UPDATES', 'EVENTS', 'TRAINING', 'PRODUCTS', 'FEATURES', 'ABOUT', and 'CONTACT'. The main content area features three large article cards: 'The April issue is online' (dated April 5, 2018, by Laura Timberlake), 'A trade cooler than the rest' (dated April 26, 2018, by Mark Vender), and 'Premier's Sustainability Awards 2018' (dated April 23, 2018, by Laura Timberlake). At the bottom, there are two banners: 'The definitive guide to the Australian HVAC&R Industry' and 'EVENTS AND CONFERENCES' with a sub-link for 'Premier's Sustainability Awards 2018'.

Flammable refrigerant safety guide



FACT SHEET 1

Designing for flammable refrigerants

Refrigerant classification: Flammable refrigerants include A2 and A3 classes from AS/NZS 1672.1. Flammability group classification is based on the lower explosive limit (LEL). Different design rules apply to each type. Refrigerants classified as A2L should be treated as an A2. Unknown refrigerants should be treated as A3. See Section 3 of the guide.

System suitability: If the system is not specifically designed or converted for use with flammable refrigerants, the area is not well ventilated, or there are ignition sources in or close to the system, the application would be unsuitable for flammable refrigerants. If systems located below-ground, additional limitations apply. The overall safety objective is for any potential release of flammable refrigerant to be contained to a safe concentration. Risks are reduced by applying refrigerant charge limitations.

System conversions: Flammable A2 or A3 refrigerants are a suitable "drop-in" replacement for non-flammable A1 refrigerant system conversion is usually required. When converting an existing refrigerant-based system to use an A2 or A3 refrigerant:

- the designer must be competent in the design rules (including recognise when additional engineering controls are necessary)
- the converted system must comply with all applicable standards and regulations
- both the equipment and flammable refrigerant manufacturer should be contacted for their advice on the application, including warranties. See Section 1 of the guide.

Applicable Standards: include the AS/NZS 60335 series electrical product compliance, AS 4343 for pressure equipment compliance, AS/NZS 16722 for system design safety compliance and AS/NZS 600 for explosive atmospheres compliance. See Section 2 of the guide.

Refrigerant charge limitations: are the maximum amount of flammable refrigerant allowed in a product or system. AS/NZS 600 standards contain charge limitations for particular products and AS/NZS 16722 contains charge limitations for systems. Refrigerant charges are restricted according to the level of risk posed to the people in the area surrounding the equipment. There are two basic criteria described in AS/NZS 16722 to determine permissible refrigerant charge limitations:

- The first is "allowable" charge size (in kg), which is based on the net volume (in m³) multiplied by the practical limit (in kg/m³) for a refrigerant. Practical limits for both A2 and A3 refrigerants are based on 20 per cent of the LEL and are listed in AS/NZS 16722.

Significant consequences may arise if you, as a designer, can be found on all of these topics in the Flammable Refrigerants Safety Guide, available for free download from www.airah.org.au

FACT SHEET 2

Installing systems with flammable refrigerants

System conversions
Flammable A2 or A3 refrigerants are not a suitable "drop-in" replacement for non-flammable A1 refrigerants, system conversion is usually required. When converting an existing A1 refrigerant-based system to use an A2 or A3 refrigerant:

- the converted system must comply with all applicable standards and regulations
- the technician must be trained to safely handle the refrigerant
- and both the equipment manufacturer and flammable refrigerant manufacturer should be contacted for their advice on the application, including on warranties.

Any conversion that is not implemented in the correct way is unsafe.

Installation checklists
Installers should use the checklists in Appendix A of the guide, which outline the steps and issues that need to be addressed by installers for conversion or new installation of high wall split systems, cool room systems and plantroom-based systems. Installation work should always be in compliance with AS/NZS 16722.

Temporary flammable zones
Can arise during system installation and maintenance activities. A "temporary flammable zone" is an area where at least some emission of refrigerant is anticipated to occur during the normal working procedures, e.g. refrigerant charging and recovery, typically where hoses may be connected or disconnected. The requirements for Zone 2 in AS/NZS 6009:14 apply. Prevention of ignition sources and provision of adequate ventilation to disperse any gas leaks are critical safety factors.

Ventilation
Ventilation is a key consideration in the assessment of risk posed by a flammable refrigerant application. Ventilation should safely disperse any released refrigerant, preferably to the outside. Note that where there is a "jet" release, the use of ventilation will not eliminate a hazardous area close to the source of the jet.

Sources of Ignition
There must be no potential sources of ignition associated with, or in the vicinity of, the equipment. Systems should not be installed or located in areas that have naked flames present, e.g. areas with gas cook-tops and ranges, gas water heaters and gas or wood-fired room or space heaters.

Significant consequences may arise if you, as an installer, fail to properly address safety considerations. Further information can be found on all of these topics in the Flammable Refrigerants Safety Guide, available for free download from www.airah.org.au

FACT SHEET 3

Operating flammable-refrigerant-based systems

Managing occupant risks
The charge limits for flammable refrigerants are restricted according to the level of risk they pose to those using the equipment or occupying the surrounding area. Risks increase when occupants:

- Are unskilled or untrained on the safety aspects of the equipment
- Are sleeping or are incapacitated
- Might introduce an ignition source (e.g. a room heater) into an area that potentially contains leaked flammable refrigerant.

AS/NZS 16721 requires all A3 refrigerants to be odourised. But, not all flammable refrigerants may have odourant added, or the odourant may fade over time. If there is a leak the flammable refrigerant may not be detected (smelt) by people in the space. Maximum refrigerant charge limits are applied to reduce the risks according to the application.

Assuring compliance
Safety risks are minimised by applying the correct design, installation and maintenance practices. Owners and operators should use the audit tool provided in Section 13 of the guide to assess the compliance of any flammable refrigerant-based installation or service provider against the requirements outlined in the guide.

Sources of Ignition
There must be no potential sources of ignition, in or near the equipment, which could ignite any refrigerant that leaks from the system. Flammable materials should not be stored near or around a system containing flammable refrigerants.

Ventilation
Any ventilation provided for the system must remain operable for the life of the system. Keep fans on and vents open as designed/intended.

Fire service notification
The local fire service should be notified of any system that holds 5kg or more of a flammable refrigerant. A notification form, see Appendix C of the guide, should be sent to the appropriate fire service on installation.

Notification should also be provided when the system is changed, decommissioned or removed.

Gas detection
It is the workplace's obligation to ensure any gas detection equipment is working. Any level of flammable gas detection (including odour) should be taken as an indicator of dangerous conditions or situations that could quickly escalate to dangerous. Any alarm should be taken seriously and responded to.

Emergency planning
Alarm response – including the systems shut-down procedure and the occupant evacuation procedure – should be explicitly detailed in the site's emergency plan, the written document detailing how a workplace and its occupants deal with or manage an emergency. See Section 7 of the guide.

After a fire
In the event of a fire, burnt fluorinated A2 flammable refrigerants can release highly toxic gases, including hydrofluoric acid and carbonyl halides, resulting in high local concentrations during and immediately after a fire. Avoid any area where decomposition products may be present, consult Safety Data Sheets (SDS), which should be available at a site where flammable refrigerants are used.

Maintenance imperative
Regular service and maintenance is essential to the safe and reliable operation of a flammable-refrigerant-based refrigeration or air conditioning system. All detection systems require regular servicing and operator training to ensure correct operation into the future.

Training
Someone who oversees the day-to-day operations of a business should be aware of the safety risks involved with the operation of any equipment containing a flammable refrigerant. Installed on their premises. Service providers maintaining systems must also be trained in their correct handling and use. See Section 2 of the guide.

An ARCTick licence is required for anyone to work with HCFC or HFC refrigerants.

Significant consequences may arise if you, as a service provider, fail to properly address safety considerations. Further information can be found on all of these topics in the Flammable Refrigerants Safety Guide, available for free download from www.airah.org.au



ARBS – soft launch of Flammable refrigeration safety guide online tool.
Taking the training to the fridgy...



Research – barriers to energy efficiency in walk-in coolrooms



Pending – research and training – maintenance interventions

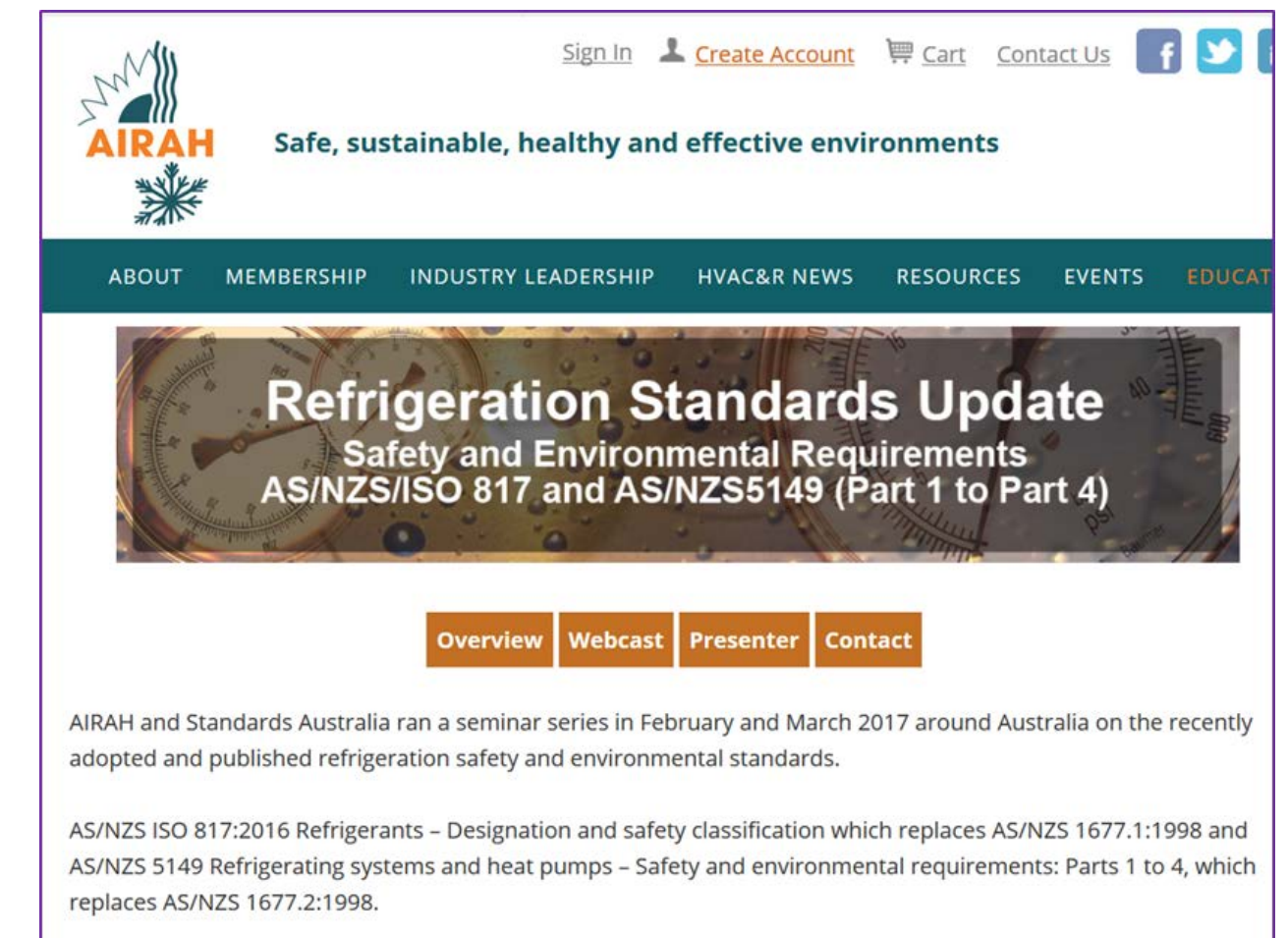


WE SPEAK FOR
AIR CONDITIONING



Refrigeration Safety Standards

- National Seminar series
- Online learning



The screenshot shows the AIRAH website with a navigation menu and a main banner for 'Refrigeration Standards Update'. The banner includes the text 'Safety and Environmental Requirements AS/NZS/ISO 817 and AS/NZS5149 (Part 1 to Part 4)' and buttons for 'Overview', 'Webcast', 'Presenter', and 'Contact'. Below the banner, there is a paragraph of text: 'AIRAH and Standards Australia ran a seminar series in February and March 2017 around Australia on the recently adopted and published refrigeration safety and environmental standards.' and another paragraph: 'AS/NZS ISO 817:2016 Refrigerants - Designation and safety classification which replaces AS/NZS 1677.1:1998 and AS/NZS 5149 Refrigerating systems and heat pumps - Safety and environmental requirements: Parts 1 to 4, which replaces AS/NZS 1677.2:1998.'



Coming up – need in principle support to develop
AS/NZS 5149 / AS/NZS ISO 817 application training...
Who's in?



Do you remember?

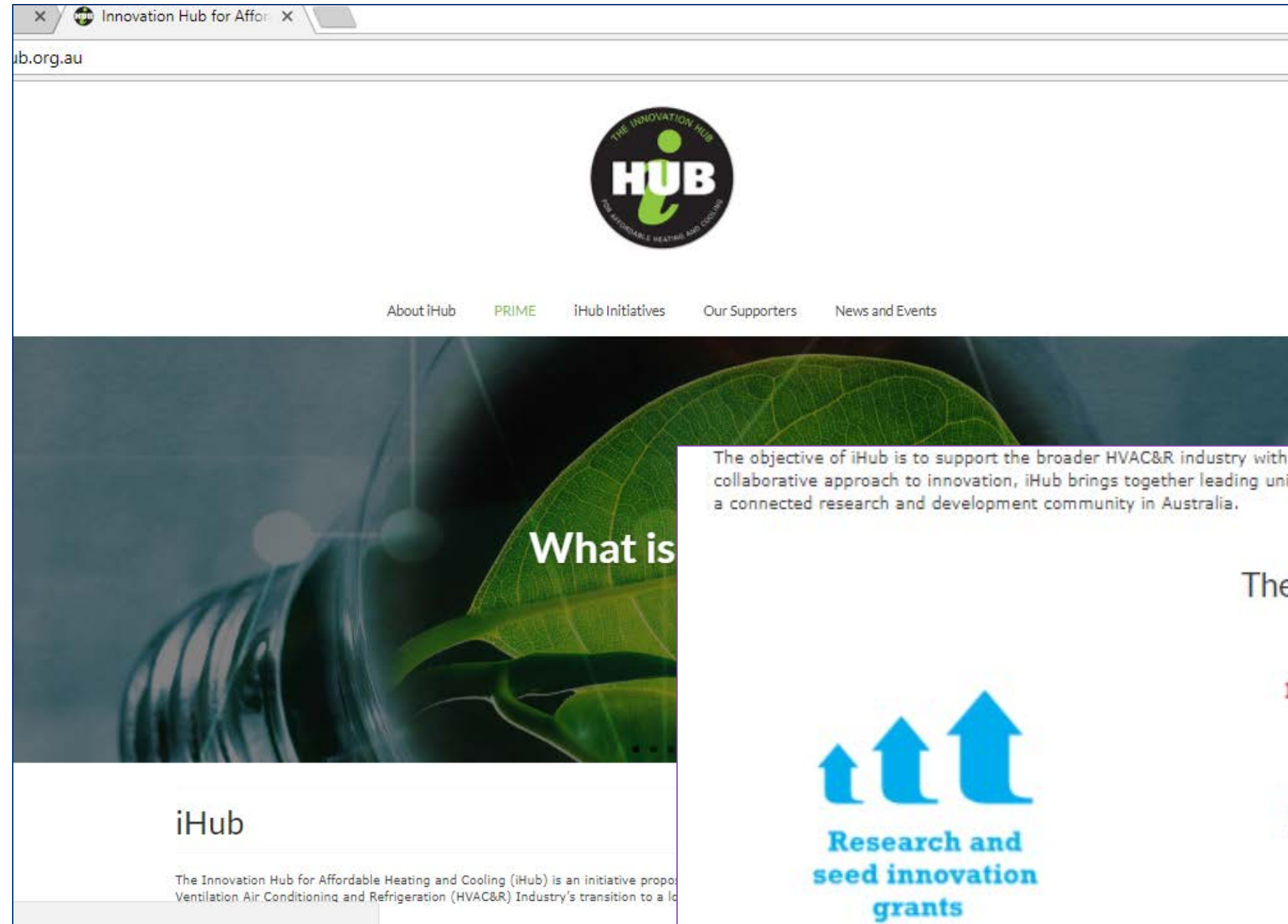
PRIME

For the future



The HVAC&R industry's blueprint for a successful transition to a low-emissions future through Professionalism, Regulation, Information, Measurement, and Emission abatement.





\$100 Million



The iHub Initiatives



Creating a better future with HVAC&R Innovation

Heating and cooling Australian buildings is energy intensive. Air conditioning and refrigeration accounts for 22% of all electricity generated in Australia. It is

The future – how do we get there...



What will the future look like ...

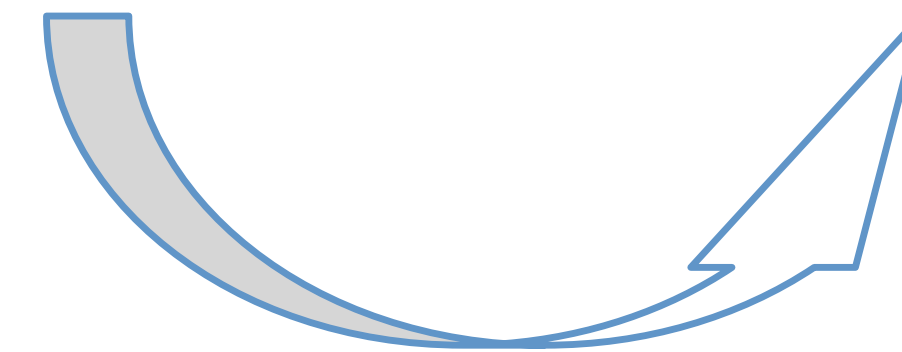
- Net zero buildings
- New technology - less vapour compression?
- Big data and analytics
- Artificial Intelligence
- Augmented reality
- More women
- Food grown in labs, CBD vertical farms
- HFOs
- More natural refrigerant systems
- Predictive maintenance
- Drone technology for inspection...





Be part of the change. We need a plan.

1. Join one of the associations moving the industry forward and get involved
2. We need an industry training taskforce
3. AIRAH Refrigeration Special Technical Group
4. WE NEED A PLAN



**HOPE
IS NOT A
PLAN**



Be part of the change.
Get involved



This is why I love my job
The people



Thank you and lets be



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ATMO
sphere

Thank you very much!

