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AIRAH Submission -

Review Terms of Reference: Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 and associated legislation.



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About AIRAH

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.

AIRAH – Strategic Aims

Claim the sustainability space

Through its conferences, publications, manuals and training, AIRAH will educate and motivate the HVAC&R industry and related fields about achieving sustainability. Our aim is to be the HVAC&R organisation whose values are aligned with sustainability in a practical sense

Close the skills gaps

At a time of rapid change of new technology and standards, and a shifting regulatory landscape, AIRAH will provide relevant professional development for HVAC&R industry personnel, and work alongside government and providers to ensure the voids in formal training are filled.

Inform regulation and policy decisions

As the key industry organisation representing HVAC&R in Australia, it is essential AIRAH collaborate with government at both the state and federal levels. The collective skills and specialist knowledge of the Institute can better inform decisions that affect society and the HVAC&R industry.

Build and engage membership

AIRAH will become the institute of choice for HVAC&R professionals in Australia. This means ensuring that formal connection with AIRAH provides benefits – actual and intangible – that are valuable, worthwhile and attractive to our members throughout their professional lives.

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AIRAH Submission on the review of the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* and associated legislation: Terms of Reference

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Terms of Reference

Rather than debating the Terms of Reference for the review, AIRAH would like to summarise what we think should happen (the actions) as a result of this review and request that the final TOR can be written to accommodate appropriate consideration of these actions.

Fundamentals

The Ozone Act needs to be expanded to cover indirect emissions of refrigeration and air conditioning systems. The environmental impacts of indirect emissions, the effects of the greenhouse gasses associated with the electricity consumption of the refrigeration system, must be addressed by the Act or it will ultimately fail to achieve what is intended. This means that the Act should be modified to address the ongoing operating efficiency and energy use of refrigeration and air conditioning systems.

This expansion in scope should not detract the Act from also focusing on the important environmental aspect of controlling direct emissions of ozone depleting and synthetic greenhouse gasses. Leakage matters, training in no-leak practices matters, and the full life-cycle impacts of refrigerant use needs to be addressed, including end of life issues for ozone depleting and synthetic greenhouse gasses in existing systems.

HFC/High GWP refrigerant phase down

There is significant potential for reductions in Australian direct and indirect emissions by transitioning the HVAC&R industry to low Global Warming Potential (GWP) refrigerant. About 23% of all electrical energy generated in Australia is used to drive vapour compression systems. It has been predicted that this energy consumption could be reduced by up to 30-40% through an orderly transition to low GWP refrigerant-based systems, which at the same time would gradually replace older out-dated systems most likely to contain ozone depleting or high GWP refrigerants. This transition could potentially reduce national emissions by 7-9%.

The Australian government has already made public commitments to phase down high GWP HFC refrigerants. It is expected that this will develop in line with international agreements and the Montreal Protocol. Industry needs to be informed and supported throughout this time of technical change. All sectors of the industry need to be aware of the implications of Australia adopting an HFC phase down. Government needs to act early and decisively to support this technical transition, so that industry has certainty and direction for its future planning. Market forces alone or regulation alone cannot guarantee industry readiness, training and competency, capacity to deliver, and quality of outcomes. All of these aspects need to be monitored and interventions made where necessary.

Note: High GWP refrigerants often have an atmospheric life of <20 years, and their 20 year GWP is often twice as high as their 100 year GWP. The review of the Act could review this technical flaw that we continue to use 100 year GWP figures when these may not be that relevant any more.

Licensing

The ARCTick licence scheme should be expanded to a full occupational licence scheme for refrigeration technicians and cover the use of all refrigerants in all sectors. The licensing scheme needs to be skills based and it needs to be applicable to individuals. Licenses need to be subject to periodic renewals and the renewals need to be subject to the candidate having satisfied the prescribed requirements for continual professional development with respect to technical, WHS and environmental legislation.

The details of the AIRAH proposed model for an expanded ARCTick License scheme is outlined in Appendix A.

Improving Enforcement

The review needs to tighten up enforcement of the Act and do so on the basis that systems do not have to leak and if they do leak excessively then they, and their owners, are in breach of the Act and are penalised accordingly.

The existing ARCTick enforcement arrangements could be strengthened by:

- Strengthening the existing ARC powers by providing right of entry for audit and allowing audits of individuals and increased penalties for violations including fines and public withdrawal of licence.
- Requiring a statement of compliance certificate or TAG for installed systems to facilitate targeted and deeper levels of compliance audit. Signing off on a system provides the licensee with added motivation to comply with all requirements and provides traceability and accountability.

Reducing direct emissions

Direct emissions still account for a significant proportion of overall emissions, although reports and estimates of the exact split can vary widely between technologies and end use sectors. The following actions are recommended to address direct emissions:

1. Strengthening pipeline/system construction standards - Actions to be considered include:
 - Mandate AS ISO 5149 when it is published/adopted as an Australian Standard?
 - Review and revise Refrigerant Handling Code of Practice (Parts 1-3)
 - Not allowing "Flare" fittings or connections for TX valves, driers and sight glasses. Flare connections should only be used for pressure and control access/take off points where necessary. Any permanent tubing connections should be via a UV stabilised thermoplastic refrigeration rated flexible tubing. Cost to industry would be minimal but the savings are potentially extremely high.
Note: Holland did this with a greater than 30% reduction of refrigerant losses in small medium commercial refrigeration systems.

2. Consider mandatory requirements or published best practice voluntary guidelines on the whole area of testing existing refrigeration and air conditioning systems for leaks. These could be modelled on the European Union F-Gas regulations as summarised in Appendix B. This could be supported by a requirement that systems remain below mandatory maximum leakage rates between leakage tests. Excessive and persistent leakage rates could be taken as an indicator that the system has exceeded its service life and replacement or scrapping becomes mandatory.
3. Better reporting of refrigerant usage at point of use or end user level. Australia currently has inadequate data as to the final end point for a lot of refrigerant, which leads to guesses and estimates of refrigerant emissions. Better data could be developed by:
 - Refrigerant logging for owners?
 - Refrigerant logging by technical service providers?
 - Reviewing Hard Cold Facts 2 for data gaps
4. There needs to be a way to penalise excessive leakage. Perhaps a system that records initial system charges and reporting and tracking of any leakage top ups with penalties for excessive usage.
5. Facilitating the development of best practice design and safety guides for new low-emission technologies such as CO₂, modern NH₃, solar cooling etc. The low-emission technologies need to be underpinned by best practice application guides, for use by technical service providers and for the comfort and information of end users.
6. Improve end of life reclamation of appliances and unitary systems (refrigerators, freezers, window air conditioners, and retail modules) - all self-contained systems have the opportunity to be collected and the refrigerant appropriately handled. These are the group with a high risk for Ozone Depleting Substance (ODS) and Synthetic Greenhouse Gas (SGG) direct emissions into the future.
 - Reclamation and recycling scheme for single piece equipment
 - Buy back scheme for ODS and SGG?
7. Existing reclamation and use system operated by Refrigerant Reclaim Australia is working well and needs to be maintained, strengthened and supported. Recycling and reuse of non-ozone depleting refrigerants should be promoted and supported by technical procedures and standards.

Reducing indirect emissions

MEPS and GEMS cover the energy efficiency of individual pieces of equipment, but no energy efficiency rules covers 'systems', or ongoing operation. This means that highly efficient equipment can be operated highly inefficiently, potentially defeating the purpose and intent of these regulations. AIRAH propose that indirect emissions associated with refrigeration and air conditioning be addressed by the following actions:

1. TEWI Calculations and assessments for new 'system' designs - this principle should be adopted by Government procurement guidelines and promoted to all owners, designers and operators of refrigeration and air conditioning equipment. The industry needs to be

encouraged and enabled to think about these systems in terms of the whole of life costs and impacts.

2. Mandatory minimum maintenance requirements addressing potential refrigerant leakage, and system operating efficiency should be established. Poorly maintained and badly installed and/or controlled air conditioning and refrigeration systems use significantly higher amounts of energy than well maintained and optimised systems. If the Australian Government has a desire to reduce emissions associated with refrigeration and air conditioning then the whole issue of operation and maintenance needs to be addressed.
3. For residential systems there is no minimum standard governing performance, design, selection, installation or control. An Australian Standard on minimum energy and environmental requirements for residential air conditioning design and installation would be beneficial.
4. The introduction of a voluntary quality assurance scheme delivering systems of a guaranteed annual energy performance provided the scheme's design guidelines are adhered to.
5. For refrigeration systems - A single standard energy efficiency rating system should be adopted in Australia, with COP and/or energy consumption star rating tests and conditions for refrigeration condensing units, with which any equipment (imported or local) must comply. Currently there is no 'equipment rating standard' and the only thing that governs most importers and manufacturers of refrigeration units for the Australian market is lowest market price- which never means efficient units.

Safety

Safety should be addressed by the expanded ARCTick licensing scheme. Moving away from ozone depleting substances and high global warming substances may have safety implications, e.g. an increase in flammable, toxic or high pressure refrigerant use. A holistic approach needs to be adopted by the Act and future licensing arrangements need to include refrigerants like Hydrocarbons (HC), newly developed Hydrofluoroolefins (HFO), ammonia (NH₃), and carbon dioxide (CO₂).

There needs to be a much clearer definition of what constitutes a "competent person" in the context of the WHS Act(s). This comment relates to every level of industry from trades person to engineer.

Education

The industry needs to be facilitated and mentored to change behaviours and develop new approaches and practices. A part of this is providing information to industry on how to improve performance in the area of direct and indirect emissions. Part of the revenues generated by the Ozone Act should be dedicated to providing industry practitioners covered by the ARCTick licence scheme with industry related low-emission technical information.

Training

Existing resources need to be updated for new entrants into the VET training system. In addition some mechanism needs to be employed (possibly tied to licensing) to incentivise and deliver continuing professional development and skills maintenance opportunities for technicians and other technical service providers that have already completed their training. See Appendix A.

Existing exemptions

The review should include gases that are currently exempt, i.e. blowing agents, aerosols and anaesthetics.

Research needs

There are several areas of research that could be supported to assist the refrigeration and air conditioning transition to low-emission technologies and practices:

- The maintenance value proposition – Research project to measure system performance and energy use before and after maintenance routines and quantify the benefits and costs.
- The energy efficiency cost of leaks – Research project to quantify cost benefits (kWh/bill) from maintaining the proper levels of refrigerant charge in equipment and systems.
- Application of leak detectors and detection – Research project to examine and test various leak detection technologies in different applications and scenarios.
- Refrigerant containment strategies and technology – Research project to examine and test various engineering solutions to refrigerant containment in different applications and scenarios.
- The embedded value in old HVAC&R plant – Research project to discover and document the monetary value of HVAC equipment recyclables.
- Carry out and publish energy/cost analysis for air cooled versus water cooled in both HVAC and Refrigeration applications.
- Identify and review relevant international projects related to automated fault detection and diagnosis (FDD).
- Research and document the feasibility and energy savings potential of automated fault detection and diagnosis (FDD) tools in both the HVAC and refrigeration fields.
- Technology research leading to reduced charge, leakage mitigation, and refrigerant substitution.
- Full independent long-term life cycle analysis of all refrigerants in all applications to determine relative advantages and disadvantages.

Innovation

The industry transition to low-emission practices and technologies will continue to cause a high level of innovation in the industry. It is critical that Government innovation policies recognise and support the high degree of innovation required to enable this transition within the HVAC&R industry.

Reducing compliance costs

Expanding and streamlining the ARClick licensing system to cover all refrigerants in all sectors would provide Government at all levels with the opportunity to harmonise licensing, WHS and other regulations in this area.

This could significantly reduce state and federal regulation and provide the potential for harmonisation of requirements to help assist the goal of a seamless national economy.

Reducing or eliminate conflicting WHS and other regulations would facilitate the take up of Low GWP technologies.

Appendix A - The AIRAH model occupational licence

The AIRAH model Occupational licence

The AIRAH model **Occupational licence** is based on an expansion/extension of the coverage of the existing Commonwealth “ARctick” licence. The industry needs an occupational licence system that covers the use of all refrigerants and can be applied in all sectors.

The current ARctick licence does not cover natural refrigerants or new low GWP synthetic refrigerants. These refrigerants all have some level of safety hazard associated with them (toxicity, flammability, or high pressures) and the competency of persons working with these substances needs to be proven. As the industry moves away from ODS and SGG refrigerants the transition to other working fluids needs to be recognised by the licensing system.

The expanded ARctick licensing scheme, as proposed by AIRAH, would need to include for:

- Mandatory competencies for: Working with ODS and SGG refrigerant (existing ARctick arrangements) – at two levels as is currently administered under the existing scheme, (Certificate II and Certificate III).
- Mandatory competencies for: Restricted plumbing and electrical licences – restricted electrical with fault-finding endorsement necessary to fault find, disconnect and reconnect air conditioning and refrigeration systems from water and electrical supplies.
- Voluntary competencies for: Working with natural refrigerants (including ammonia NH₃, carbon dioxide CO₂, and hydrocarbons HC), new low-GWP synthetic refrigerants (HFO), and new blends of existing HFC refrigerants. Competency requirements would be based on new VET units for natural refrigerants developed by E-OZ and revised existing units for synthetic refrigerants.
- Voluntary competencies for: Working with large commercial and industrial refrigeration – Competency requirements based on the industry endorsed codes of practice for large commercial and industrial refrigeration.

The term voluntary is used in relation to the licensing because it is not intended that every technician would need to hold a licence for all classes. It is expected that the Act would mandate a minimum level of Licensing, i.e. the Act/Regulations would make the various classes of licences mandatory and tradespeople intending to work in the area would voluntarily achieve the licence requirements.

Having these requirements in place would ensure that there is an occupational licence category available to cover safe working with any substance that is used as a refrigerant in a refrigeration vapour compression system.

All licence holders would be required to meet the mandatory competency requirements for working with ODS and SGG refrigerant to meet the Australian government international commitments under Montreal and Kyoto. All licence holders would be required to meet the mandatory competency requirements for working with restricted plumbing and electrical licences. Meeting the competency requirements for working with natural refrigerants and working with large commercial and industrial

refrigeration would be voluntary and need only be held by those licensees who wish to undertake this type of refrigeration work.

AIRAH believes that an expanded ARCTick licensing system as proposed would guarantee a mobile, skilled and appropriately licensed HVAC&R technical workforce at the least cost to industry and government.

Full details of the licence classes and their coverage should be agreed by the industry and could be based on readily available refrigerant classifications (ODP, GWP, flammability, toxicity) as well as the “system” size and application risks. The Danish licensing system is constructed in this way and could be used as a model for an expanded ARCTick licensing scheme.

The Danish licensing model:

Two groups of refrigerants; Group 1 – NH₃ and HC and Group 2 – HFC, HCFC, CO₂

Two levels of system size; less than 50 kg refrigerant charge or over 50 kg refrigerant charge

Four classes of refrigeration licence

- Class A – plants with less than 50 kg refrigerant Group 2
- Class B – plants with more than 50 kg refrigerant Group 2
- Class C – plants with less than 50 kg refrigerant Group 1
- Class D – plants with more than 50 kg refrigerant Group 1

All classes of licenses would require minimum Cert III and carry the restricted electrical with fault finding endorsement

Skills maintenance (continuing professional development)

The AIRAH view on skills maintenance and continuing professional development is very strongly in favour of licensing systems requiring licensees to respond to changes in practice and legislation, and updates to standards and codes. This would enrich their knowledge and skills and encourage the adoption of new work practices. The air conditioning and refrigeration industry has been going through significant changes over the last 15 years and it will continue to do so as energy efficiency drives new technologies.

Skills maintenance (or continuing professional development) aims to manage consumer and safety risks by providing a competent workforce of professionals who are up-to-date in their skills, knowledge and practices. There are significant implications if licensees are allowed to de-skill to such an extent that safety, performance and sustainability are compromised.

Mandating face-to-face formal training may not be practical for this cohort, but requiring a license holder to complete a short online skills update prior to renewing their license could be a practicable approach. There are examples of this approach already in place; the electrical regulator in Queensland already requires this and plumbing regulators in Victoria maintain an online toolbox with online training.

Any licensing scheme must include minimum mandatory requirements to ensure that licensees maintain their skills and knowledge through continuing professional development. The licensing

system also provides a delivery mechanism where fact sheets and seminars and other skills maintenance tools can be targeted at licence holders.

Up-skilling and re-training

If the proposed licensing system was adopted then trades people would need to up-skill into the new licence classes. The classes of licence required would be mandated by the Act but working in the new classes would be voluntary. Safety requirements for the design, installation and handling of all refrigerants would be addressed by the licence competencies.

Up skilling and an expanded licensing system would need to be underpinned by new VET/TAFE units and competencies covering all aspects of a system lifecycle; design, installation, maintain, decommission, for all refrigerants.

Depending on market forces, the attitude of industry, and end users driving demand in particular classes, this will be a big training task.

Administrator of the expanded ARctick licence scheme

AIRAH proposes that the Australian Refrigeration Council (ARC) continues to administer the expanded ARctick licence scheme.

Appendix B European Union F-Gas requirements for leakage testing.

Summary of existing and new (2014) F-Gas requirements for system leak testing

LEAK CHECKING INTERVAL	EXISTING F GAS: BASED ON kg	NEW F GAS : BASED ON CO ₂ eq (CO ₂ eq = kg X GWP)
1 X 12 Months	3-30 kg	5-50 Tonnes CO ₂ eq
	If hermetically sealed not required if <6 kg	If hermetically sealed not required if <10 Tonnes CO ₂ eq
		1 x 24 Months If automatic leak detection installed
		Note: <3 kg or 6 kg Hermetically sealed does not require inspection until 31.12.2016
1 x 6 Months	30- 300 kg	50-500 Tonnes CO ₂ eq
	1 X 12 Months If automatic leak detection installed	1 X 12 Months If automatic leak detection installed
1 x 3 Months	300 kg or more	500 Tonnes CO ₂ eq or more
	1 X 6 Months If automatic leak detection installed	1 X 12 Months If automatic leak detection installed

End of submission