MANAGING THE FINANCIAL AND ASSOCIATED RISKS OF THE REFRIGERANT LEVY

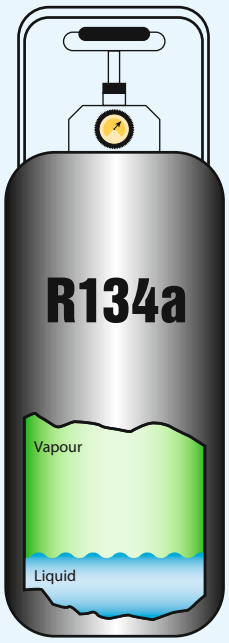
WHAT IS THE HFC LEVY?

Since July 1, as part of the Clean Energy Future Plan, synthetic greenhouse gas hydrofluorocarbon (HFC) refrigerants attract an equivalent carbon price or HFC levy based on their global warming potential (GWP). This will cause HFC refrigerants to become more expensive to purchase and replace, and system design, installation and management practices will change to reflect this new reality.

WHY ARE THERE RISKS ASSOCIATED WITH THIS NEW LEVY?

The HFC levy will stimulate the following changes:

- Improved design and installation standards to prevent refrigerant leakage
- Improved maintenance and refrigerant management/ handling standards to reduce emissions



- A move in equipment design to systems that use a smaller charge of refrigerant
- A move in design choices to the use of lower GWP refrigerants and systems.

Each of these changes presents financial and other risks that need to be managed. There is also the potential for perverse (unplanned and unwelcome) outcomes, which can adversely affect the energy efficiency of systems.

WHO IS RESPONSIBLE FOR ADDRESSING THE RISKS ASSOCIATED WITH THIS NEW LEVY?

The HFC levy will stimulate changes in the way that refrigeration and air conditioning is implemented in Australia. There are risks associated with these changes; some risks will need to be managed by system owners and operators while other risks will need to be managed by technical service providers.

WHAT ARE THE MAIN RISKS FOR SYSTEM OWNERS AND OPERATORS?

The main risks include:

Risk	Issues
Financial – existing systems	System failure costs. Refrigerant leakage replacement cost, total charge loss, insurance and security costs will all reflect new HFC refrigerant values and higher costs.
Financial – new/modified systems	Costs of higher design and installation standards, new operating and maintenance skills, costs of recovering and disposing of regulated refrigerants.
Security – theft of refrigerant	Security arrangements for high value refrigerants either in storage or within systems.
Refrigerant quality and supply	Counterfeit refrigerant, contaminated refrigerant, unauthorised refrigerant replacement and unauthorised removal of refrigerant.
Energy efficiency	Leaking refrigerant charge severely impacts system energy efficiency. Training of staff and end users in energy efficiency operation and use of systems is also important.
Compliance with regulations	Leak management, refrigerant handling, using only ARC licensed contractors, DSEWPaC monitoring compliance, ACCC monitoring product claims and representations, employer duties under WH&S legislation. Penalties apply for breaches of regulations.
Perverse outcomes	Poor and ill-informed design choices leading to an increase, rather than decrease, in direct and indirect emissions.

WHAT ARE THE MAIN RISKS FOR TECHNICAL SERVICE PROVIDERS?

Technical service providers include those involved with the design, supply, installation, commissioning, maintenance, service, and decommissioning of refrigeration and air conditioning systems. The main risks that technical service providers face due to the HFC levy include:

Risk	Issues
Financial – new and existing systems	Push-back from end users regarding higher refrigerant costs/price rises, managing systems with unknown refrigerant/poor documentation and dealing with unauthorised retrofits/drop-in replacements. Rising insurance, compliance and security costs.
Skill and technical capacity	Compliance with higher design and installation standards, natural and new low-GWP refrigerants, new operating and maintenance regimes, costs of training/CPD for staff.
Theft of refrigerant	Review and upgrade of security arrangements for refrigerants in storage.
Refrigerant quality and supply	Counterfeit or contaminated refrigerant, additional supply related price increases.
Inherent risks in low-GWP alternatives	Flammability and toxicity risks, lack of appropriate skills and knowledge, licences and registrations, WH&S duties, varying rules in different jurisdictions.
Energy efficiency	Leaking refrigerant charge severely impacts existing system energy efficiency, as electricity prices rise the energy efficiency of existing plant must be addressed.
Compliance with regulations	Leak management, refrigerant handling, maintaining appropriate licences and registrations, justifiable price rises, penalties apply for breaches.

WHAT ABOUT THE "DO NOTHING" APPROACH?

Doing nothing could mean that the refrigeration systems will lose their optimum refrigerant charge over time. This will adversely affect their operating efficiency and overall energy use. At best, doing nothing will reduce system efficiencies over time, leading to increased ongoing electricity costs, premature system failure and the overall risk that service failure means to you and your client's business. At worst, doing nothing could also lead to significant refrigerant replacement costs and potentially, legal penalties.

HOW CAN FINANCIAL RISKS BE MANAGED?

Systems need to be considered on the basis of investment need and opportunity. The most important short-term option for HFC systems that are to be retained is leak minimisation. The increased cost of HFCs will be passed on through the supply chain when purchasing new refrigerant for new systems or for replacement of refrigerant that has leaked unintentionally. Leak minimisation techniques can be used to manage system leakage rates. For sudden catastrophic leak risks, advice from the insurer should be sought to, determine if the cost of lost refrigerant is, or can be, covered. In addition, there are several design and retrofit strategies that can be employed to reduce the risk of a sudden catastrophic leak in existing systems.

Fact sheet three *(Leak prevention strategies)* in AIRAH's HFC Refrigerant Levy fact sheets series provides additional information on this subject. Additional fact sheets in the series can be downloaded at www.airah.org.au (select the Resources tab, then HFC Refrigerant Levy tab).

In the medium term, maintenance contracts and design/installation specifications should be rewritten to include maximum leakage rate targets as a performance target and to prevent intentional leakage. In the long term, strategies need to be put in place to transfer all refrigeration and air conditioning systems to low-GWP solutions.

HOW CAN THE SECURITY AND QUALITY RISKS BE MANAGED?

The HFC levy means that refrigerants are more valuable now than previously and may become the target of criminal behaviour.

Security around refrigerant storage and access to refrigeration systems should be reviewed. Refrigerant cylinders can be secured and cylinders and system access points fitted with locking caps to prevent tampering and unauthorised access.

To ensure quality, refrigerant should only be purchased from licensed suppliers and never from unknown sources. If refrigerant prices sound too good to be true, the source may be questionable. Refrigerant may need to be stockpiled and stored (refer ARC and WH&S regulations) if the security of the supply chain cannot be guaranteed.

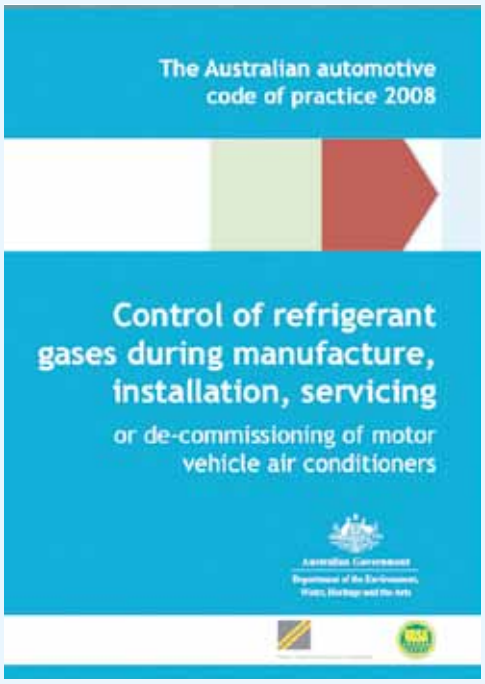
HOW CAN THE ENERGY EFFICIENCY RISKS BE MANAGED?

As electricity prices rise due to a number of factors including rising generation, distribution and peak demand costs, as well as carbon pricing effects, the operating costs of air conditioning and refrigeration systems will also increase. In order to manage these risks:

- All existing systems need to be audited for energy efficiency and potential energy efficiency improvements
- All new systems need to be designed with best practice energy efficiency in mind
- All systems need to be subject to a regular and high-standard maintenance program.

Fact sheet five *(Energy saving strategies – existing systems)* in AIRAH's HFC Refrigerant Levy fact sheet series provides additional material on this. It was featured in the October issue of HVAC&R Nation, in the Skills Workshop.

HOW CAN THE REGULATORY RISKS BE MANAGED?



The HFC levy is implemented through the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*. The act and regulations control the handling of all HFC and HCFC refrigerants and makes venting of these refrigerants to the atmosphere (including via known leaks) illegal. To manage these risks owners and technical service providers should only utilise qualified designers, and licensed installers, maintenance, and service providers.

Regulatory issues to be aware of include:

- Ozone Protection and Synthetic Greenhouse Gas legislation and regulation: The act controls the manufacture, import and export of ozone depletion potential (ODP) and SGG gases. The regulations contain controls for specific end-uses. For more information, visit www.environment.gov.au/equivalentcarbonprice
- Australian Refrigeration Council (ARC) licence scheme: The ARC administers refrigerant handling licences and refrigerant trading authorisations, for more information visit www.arctick.org
- Refrigerant handling codes of practice: For more information on the Refrigerant Handling Code of Practice (2007), visit www.airah.org.au. For more information on the Australian Automotive Code of Practice (2008), visit www.arctick.org
- Refrigeration design standards: AS/NZS 1677 Parts 1 and 2 (under revision), AS/NZS 60335.2 product safety standards, for more more information visit www.saiglobal.com

Warning: Handling fluorocarbon refrigerant without a refrigerant handling licence is an offence.

HOW CAN THE INHERENT RISKS IN LOW-GWP ALTERNATIVES BE MANAGED?

Low-GWP alternatives include systems that use natural refrigerants which are low cost, low-GWP and offer good energy efficiency characteristics as well as new synthetic refrigerants that have been designed for low GWP. These refrigerants have inherent risks and up-skilling and retraining are imperative if the industry is to fully embrace a low-GWP future. Owners, operators, and technical service providers all need to be trained to address these risks. Duties under WH&S legislation also apply.

Note: Replacing system refrigerant without an appropriate design/ risk review by a competent person should not be attempted.

MORE INFORMATION

Refer to the following websites for further information on handling the inherent risks of low-GWP alternatives, and the HFC levy itself:

- Clean Energy Future Plan information and fact sheets: www.cleanenergyfuture.gov.au
- Equivalent carbon price – Information, cost estimator and fact sheets: www.environment.gov.au/equivalentcarbonprice
- Refrigerant handling licences and refrigerant trading authorisations: www.arctick.org
- Monitoring product claims, representations and anti-competitive behaviour: www.accc.gov.au/carbon

THE FACTS

There are five AIRAH HFC Refrigerant Levy fact sheets, explaining the Clean Energy Future Plan, its opportunities and risks, and leak prevention and energy saving strategies. They are available for download at www.airah.org.au by selecting the Resources tab, then the HFC Refrigerant Levy tab. Alternatively, HVAC&R Nation's October Skills Workshop (featuring fact sheet five: *Energy saving strategies – existing systems*) can be downloaded at www.airah.org.au by selecting the Publications tab, then the HVAC&R Nation tab.

PULLOUT

HVAC&R Skills Workshop
MODULE 56

ENERGY-SAVING STRATEGIES
FOR EXISTING SYSTEMS

WHY ENERGY EFFICIENCY?

Since the July 1 introduction of the carbon-equivalent levy, hydrofluorocarbon (HFC) refrigerants have become more expensive to purchase and replace based on their direct global warming potential (GWP). The indirect emissions of refrigeration and air conditioning systems are also being addressed by encouraging improved energy efficiency and reduced electricity use through carbon pricing. Electricity prices are rising due to a number of factors including rising generation, distribution and peak demand costs, as well as carbon pricing effects. With escalating costs in both electricity and refrigerant supplies, the operating efficiency of refrigeration systems and their energy consumption and demand has never been more important.

The steps to improving the energy efficiency of existing systems are:

Step 1	Prevent leaks, optimise refrigerant charge, benchmark current system performance
Step 2	Audit system to identify potential energy-efficiency improvements
Step 3	Consider options, select and implement financially viable improvements
Step 4	Monitor and re-evaluate system performance

All energy-efficiency intervention steps need to be well managed. In some cases, it may be more cost-effective to replace an existing HFC system with a new low-GWP refrigerant based system rather than attempt energy efficiency interventions.

WHICH LOW-GWP REFRIGERANTS ARE THE MOST ENERGY EFFICIENT?

Natural refrigerants have a low GWP and good energy-efficiency characteristics. The efficiency of any particular refrigeration design solution is defined by its coefficient of performance (CoP).

CoP = Cooling capacity (kW)/Power input (kW)

Generally, the largest environmental impact of stationary refrigeration and air conditioning is through electricity generation to power the equipment.

AIRAH provides a standardised method of calculating Total Equivalent Warming Impact (TEWI) for new, stationary refrigeration and air conditioning systems at the design stage. TEWI compares the environmental implications of different technical options available to meet the refrigeration and air conditioning requirement.

Note: Refer to AIRAH Best Practice Guideline Methods of Calculating Total Equivalent Warming Impact (TEWI). Available online at www.airah.org.au

WHAT ARE THE ENERGY-SAVING OPTIONS FOR EXISTING REFRIGERATION SYSTEMS?

There is potential to save large amounts of operating energy in existing refrigeration systems simply by implementing some well-established energy-efficiency interventions including upgrades and repairs.

The first question to consider is: where is energy used in a typical refrigeration plant?

- Compressors: 40–60 per cent
- Condenser fans: 10–25 per cent
- Evaporator fans: 10–20 per cent
- Defrost system: 5–20 per cent

Potential energy-efficiency interventions can be grouped into two distinct focus areas:

- Interventions to reduce the heat load on the systems
- Interventions to improve the operating efficiency of the systems

Quantifying and monitoring system energy consumption and demand is the first step to achieving energy efficiency and understanding energy use. Electricity charges are generally calculated based on both the peak demand and the total consumption and both these aspects should be considered. Saving energy reduces operating costs and can also extend the system or component service life, reduce system faults or failures, and improve service security.

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The information in this month's skills workshop was taken from AIRAH's HFC Refrigerant Levy factsheets, which were produced with support from the Australian Government Department of Sustainability, Environment, Water, Population and Communities. They can be downloaded at www.airah.org.au, select the Resources tab, and then the HFC Refrigerant Levy tab.

Next month — Opportunities in a low-emission future