CITY OF PARRAMATTA

Technical Fact sheet:

Natural Refrigerant in Air Conditioning Systems

Strategic context:

Leakage or improper disposal of synthetic refrigerants with high Global Warming Potential (GWP) in new air-conditioning systems can be a significant source of greenhouse gas emissions. City of Parramatta has set an ambitious goal to reduce greenhouse gas emissions by 75% by 2038 (based on 2016 levels). The NSW Government also has a target to deliver a 70% reduction in emissions by 2035 and achieve net zero by 2050.

To achieve these targets and manage the impact of predicted growth in housing and population, Council has adopted requirements for the use of natural refrigerants with low GWP in air conditioning systems. This new requirement aims to reduce greenhouse gas emissions and future-proof new air conditioning systems from the global phase-down of Hydrofluorocarbons (HFCs) under the Montreal Protocol.

This Technical Fact Sheet serves as a resource for the community, industry experts, developers, and installers. It aims to clarify the function and application of the controls. For further information, external references are conveniently provided through links that provide supplementary information on the content.

1. What has been introduced?

As part of City of Parramatta's adopted Parramatta Development Control Plan 2023 (PDCP), provisions have been introduced in (Section 9.8.7, Section 5.4.5) to control the types of refrigerants used in air conditioning systems. The objectives of the provisions are to reduce the greenhouse gas emissions associated with the leakage or improper disposal of synthetic refrigerant gases with high GWP and to future-proof new air conditioning systems from the global phase-down of HFCs under the Montreal Protocol. GWPmeasures how harmful a refrigerant is to the atmosphere compared to carbon. The best practice synthetic refrigerant available (R32) has a 675 GWP, meaning it is 675 times more harmful than carbon.

For all new developments using air-conditioning and refrigeration equipment, only refrigerants with a **GWP** of less than 10 May be used:

- If the equipment can be supplied on similar terms to conventional systems, and
- if the cost is not more than 10% higher than the market rate for conventional systems.

The provisions are not a legal requirement in the NSW planning system; however, compliance with the Development Control Plan (DCP) is a factor for consideration when granting development consent.
These requirements are conditional – see control exemption (section 13) of this document for more information.

2. Where are the controls being applied, and when were they implemented?

The controls were first applied in the Parramatta City Centre and were later expanded across the remainder of the Local Government Area as part of the newly consolidated Parramatta Development Control Plan 2023 (often referred to as the Harmonisation DCP). Provisions have been introduced in two sections of the PDCP, as follows:

- Part 9 – Parramatta City Centre – Section 9.8.7 – These controls apply to land within the City Centre. These controls were endorsed by the Council on 28 November 2022 following consultation as part of the Parramatta City Centre strategic planning work and came into effect on 2 December 2022.
- Part 5 – Environmental Management – Section 5.4.5 – These controls apply to land outside of the City Centre and were endorsed by Council on Monday 28 August 2023 following consultation as part of the Draft Harmonisation Development Control Plan project, and came into effect on 18 September 2023.

3. What development types do the controls apply to?

This provision applies to all new air-conditioning systems and refrigeration equipment in all developments. It does not require retrofitting of existing equipment.

4. Why has Council introduced planning controls on natural refrigerants given the Federal Government controls the importation of HFCs?

A worldwide regulated phase-down of HFCs is currently underway, aiming for an 85% reduction by 2036.
As of 1 July 2024, Australia has banned the import of small air-conditioning equipment using refrigerants with a GWP of over 750.

The Australian Government initiated the phase-down of bulk HFC imports in 2018 following the global agreement reached as part of the Montreal Protocol and expects a transition to low GWP systems(Refrigeration | energy.gov.au).

Changes in the heating and cooling systems will be required in the future.
Council is proactively seeking to ensure our planning controls support developments in this transition to low GWP refrigerants in air-conditioning systems.

This helps Council to ensure future developments are future-proof and align with objectives outlined in the Environmental Sustainability Strategy.

It is acknowledged that the planning provisions will become more effective as the low GWP market expands.

5. What is Council's legislative power to enforce these controls?

Councils can adopt legislative control in their DCPs under the NSW Environmental Planning and Assessment Act 1979 (EPA Act). A DCP provides detailed planning and design guidelines to support the planning controls legislated in the Local Environment Plan (LEP).

The provision does not constitute a legal requirement in the NSW planning system, although compliance with the DCP is a factor to consider when granting development consent. The control is conditionally implemented – see control exemption (section 13) of this document for further information.

Energy Efficiency

6. How will refrigerant choice influence appliance energy efficiency?

The requirement to use natural refrigerants is not anticipated to greatly impact energy use.
Refrigerant selection is one factor in considering air-conditioner efficiency, generally influencing the system's efficiency by around 5-10% (The Importance of Energy Efficiency in the air conditioner system). In many cases, low-GWP refrigerants are at least as efficient, if not more efficient, than high-GWP refrigerants.

Also, to maximise the energy efficiency of air conditioners it is important to consider appropriate equipment type, size, and installation quality, as well as good operating and maintenance practices to support efficient operation throughout the life of the equipment. Figure 1 provides a high-level overview of some approaches to achieving greater energy efficiency in air-conditioning systems.

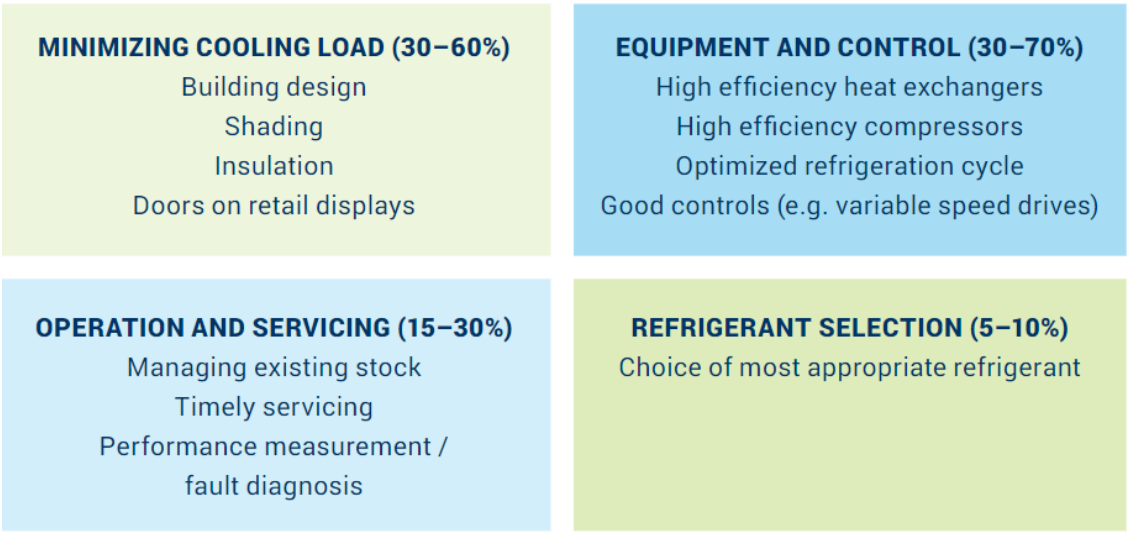

Figure 1 Potential energy efficiency improvements (with indicative savings ranges) in air conditioning system

Additionally, the Office of Environment and Heritage (OEH) has published NSW Government's HVAC optimisation guide which aims to provide detailed information on energy-efficiency initiatives relating to air-conditioning systems.

Safety:

8.How can equipment using natural refrigerants be installed safely?

In general, concerns regarding work practices are managed by Safe Work Australia and these are outside the scope of natural refrigerant planning controls.

National regulations apply to those who work in the refrigerant and air-conditioning industry and work with Synthetic Greenhouse Gases (SGGs) and Ozone-Depleting Substances (ODS).
For handling of these substances in bulk and equipment, or working with equipment containing these substances, a refrigeration handling license is required. Additionally, a Refrigerant Trading Authorisation is required for businesses that acquire, possess, or dispose of these substances to ensure proper equipment installation.

The Australian Refrigeration Council (ARC) is appointed as the industry board to administer refrigeration handling licences and Refrigerant Trading Authorisations. To meet Work Health and Safety obligations and ensure the equipment is installed safely, existing refrigeration and air conditioning workers require further training.
This ensures that they safely handle, install, commission, service and repair stationary refrigeration and air-conditioning systems that use natural or flammable refrigerants.
To support the industry's transition to the use of natural refrigerants, the ARC has introduced alternative refrigerant training for existing workers.

All refrigerants have unique hazard properties that need to be managed to avoid serious safety concerns, such as fire risks, and leakage. When handled appropriately, natural refrigerants can be used safely (Safety considerations when using flammable refrigerants - DCCEEW).

Authorised businesses for air conditioning and refrigeration installation, repair & decommissioning can be found using the Australian Refrigeration Council (ARC) authorised business search (ARC authorised business search).

9. Are natural refrigerants flammable?

Some natural refrigerants are hydrocarbons and are highly flammable. The DCP controls do not require hydrocarbon refrigerants, but they may be used.
The most suitable low-GWP refrigerants for residential use are propane and isobutane, which are both highly flammable. Heating and cooling systems that use natural refrigerants require professional design, handling, and installation, like other energy and natural gas systems, and must adhere to the relevant safety standards.
There are also refrigerants available in Australia that are not hydrocarbons and have a GWP of less than 10 and may be appropriate for use in the same application as HFCs. These include refrigerants such as ammonia (R717, R744), and carbon dioxide, as well as Hydrofluoroolefins (HFOs) such as 1234yf and HFO1234ze.
The risk of flammable refrigerants is managed by limiting the maximum charge of refrigerant that can be released into an enclosed space. The requirements for maximum refrigerant charges are guided by AS/NZS 60335.2.40:2019. The maximum amount allowed is a factor of the volume of the enclosed space, and the refrigerant charge is partly determined by the length of refrigeration pipework. This is a matter for an engineer to determine in the context of the proposed building design, and it is noted that systems can also locate all refrigerant elements externally.
These substances have been used as refrigerants for many years; however, they are now finding their way into applications where fluorocarbons were previously the preferred option.
A Natural refrigerants case studies report, prepared by The Australian Institute for Refrigeration, Air-Conditioning and Heating, provides an overview of different natural refrigerants, and case studies on how they've been used in Australia.

AVAILABILITY:

11. How does this provision meet market availability?

It is acknowledged that there may be limited refrigeration products available with low GWP options in the current market. The "Natural Refrigerants Market – Forecast (2021-2026)" report indicates that market growth is expected to continue, and the availability of natural refrigerants is anticipated to increase soon.

HFCs will be subject to restrictions within the next 13 years. Consequently, the market will be compelled to adapt by transitioning production and supply towards alternative refrigerants. This shift is likely to result in a gradual reduction in product costs over time and technological advancement.

New refrigerants with low GWP and high efficiency will become available as the market responds to the regulations. Many new refrigerants will be based on ammonia or carbon dioxide, which will make them more widely available and cost competitive.

Europe began phasing down HFCs over a decade ago, implementing stringent regulations on HFC trading, banning synthetic refrigerants in new systems, and requiring the proper retrofitting of existing equipment. Extensive research has been conducted on the availability and feasibility of alternative products. Heating and cooling systems that use natural refrigerants with very low GWP are now ready for the EU market and are expected to make their way to Australia soon.

EXEMPTION:

13. Is there any exemption?

Council acknowledges that the market supply of air conditioning systems using natural refrigerants with a GWP of less than 10 is currently limited. To respond to the current market condition, Council has introduced an exemption in the Parramatta Development Control Plan 2023. The applicant may request an exemption from the control by demonstrating that:

- The equipment cannot be supplied on similar terms to the conventional system, and
- The cost of the equipment is more than 10% higher than the market rate for conventional systems.

14. To find out further information

For additional information and reference, a collection of relevant resources has been provided below.

1. Refrigeration systems energy tool Australian Government
2. Industrial Refrigeration Guide NSW Government
3. Energy Efficiency Best Practice Guide - Industrial Refrigeration (PDF 663KB) Victorian Government
4. Australian Refrigeration and Air-conditioning Volumes 1 and 2 AIRAH
5. Cool room efficiency fact sheet (PDF 1.0 MB) AIRAH
6. Fact sheet: Energy efficiency for warehousing, refrigerated stores and materials handling (PDF 970 KB) SCLAA
7. Refrigeration guide UK Carbon Trust
8. General framework for revising class A3 refrigerant charge limits - a discussion.
9. Department of Climate Change, Energy, the Environment and Water: HFC phase-down – Frequently asked questions
10. Department of Energy and Environment: Emissions reduction options for synthetic greenhouse gases Regulatory Impact Statement
11. Ozone depleting substances
12. Hydrofluorocarbon (HFC) phase-down - DCCEEW Federal Government's phase-down
13. https://www.energy.gov.au/business/equipment-guides/refrigeration.
14. HFC phase-down – Frequently asked questions.
15. Ban on import and manufacture of HCFC and CFC refrigeration and air conditioning equipment
16. Australian Institute of Refrigeration, Airconditioning and Heating (AIRAH)