2025 consultation

Submission type	Upload
Submitter	Daikin Australia
Response ID	277505

Disclaimer

DAIKIN AUSTRALIA PTY LIMITED

Head Office

62-66 Governor Macquarie Drive, Chipping Norton
N.S.W. 2170, AUSTRALIA
ABN 62 000 172 967 ACN 000 172 967

P.O. Box 120 Moorebank, N.S.W. 1875
Telephone: (02) 9725 8888
Sales Fax: (02) 9755 2017
Admin. Fax: (02) 9755 3450

11 July 2025

Net Zero Commission – 2025 Consultation

Daikin Australia welcomes the opportunity to contribute to the Net Zero Commission's consultation. As a leading air conditioning manufacturer with ten branches, six service centres, and a local production facility, we offer practical insights into the HVAC sector and built environment. Our products serve residential, commercial, and industrial markets, and we are committed to supporting Australia's sustainability goals.

Our global Environmental Vision 2050 outlines a clear path to net zero emissions. As part of this commitment, Daikin participated in Japan's NEDO Next-Generation Refrigerant Project under METI, which focused on developing low-GWP refrigerants and energy-efficient technologies—key areas aligned with the Commission's goals.

We support the focus on refrigerants as an emissions source. However, effective policy must be based on accurate data and reflect the technical realities of refrigerant use. We offer the following observations on emissions, market transitions, alternative refrigerants, and the safety and regulatory frameworks that guide their use.

Emissions Analysis
The analysis of emissions for refrigerants in the built environment appears overstated. It seems to represent total refrigerants, including refrigerants used in transport sector and not including CFC and HCFC refrigerants which were phasing out early this century. Transportation refrigerants are about one third of the total refrigerants and HCFC refrigerants in 2006 were about one third of the total.

Alternative refrigerants with a GWP less than 10 are **not available** for all equipment types and applications according to Cold Hard Facts 2024 (CHF2024), a report commissioned by Department of Climate Change, Energy, the Environment and Water.

https://www.dcceew.gov.au/environment/protection/ozone/publications/cold-hard-facts-4

Air Conditioners
Market transition from R-410A (GWP 2088) to R-32 (GWP 675) is nearing completion. There are no available alternatives with a GWP less than 10 according to CHF2024. Promising alternatives are in development, with commercial availability expected in the next decade.

Chillers
Market preference is for R-134a (GWP 1430). Available alternatives of GWP less than 10 according to CHF2024, include HFO refrigerants R1233zd, R-1234ze, R-1336mzz and R-514. Challenges for transformation include cost, efficiency, and safety.

Commercial Refrigeration
Market is starting the transition from R-404A (GWP 3922) to R-448A (GWP 1387) and R-449A (GWP 1397). Alternatives of GWP less than 10 are available according to CHF2024 for monobloc and split refrigeration types that include R-290 (propane) and R-744 (carbon dioxide). These alternatives are not suitable for all equipment types and applications. Challenges for transformation include cost and efficiency. Safety regulations limit the application of R-290 (propane).

Natural Refrigerants
Natural refrigerants such as **ammonia, hydrocarbons (including propane), and carbon dioxide** offer low-GWP alternatives but present significant safety risks, including high operating pressure, flammability, and toxicity. These hazards are well-documented and are the reason safety regulations and standards—such as those administered by NSW Fair Trading and SafeWork NSW—strictly limit their use. Standards like AS/NZS (IEC) 60335 series and AS/NZS (ISO) 5149 series define where and how these refrigerants can be safely applied, ensuring protection for occupants and workers. Their limited applicability is not arbitrary but reflects a necessary balance between environmental goals and public safety.

Ammonia – Suitable for application in cold storage, distribution, industrial refrigeration, and large process chilling in buildings where only authorized persons have access. Not suitable for buildings with general or supervised access such as hospitals, courts or prisons, theatres, supermarkets, schools, halls, hotels dwellings, restaurants, and offices. An ammonia leak would likely require fire brigade emergency response and necessitate evacuation including the surrounding buildings.

Hydrocarbons – Suitable for application in small refrigeration systems with limited refrigerant quantity to mitigate the explosive flammability hazard. Not suitable for large systems and limited by safety regulations.

Carbon dioxide – Suitable for application in refrigeration systems. It has characteristic of high operating pressure and low efficiency. Some case studies claim decreased power consumption after equipment replacement however the decrease is usually a result of another measure such as fitting doors to refrigerated display cabinets.

Natural refrigerants like ammonia, hydrocarbons (e.g. propane), and carbon dioxide offer low-GWP alternatives but pose serious safety risks, including high pressure, flammability, and toxicity. These hazards make them unsuitable for direct replacement in existing systems without costly reengineering. Safety regulations and standards—such as those enforced by NSW Fair Trading and SafeWork NSW—appropriately limit their use to specific applications where risks can be managed. In most cases, full system replacement is more practical and safer than retrofit.

Safety Regulation and Standards
Equipment for household, personal or similar use is regulated by the Gas and Electricity (Consumer Safety) Act Regulation administered by NSW Fair Trading. Air conditioners and refrigerating appliances are required to comply with relevant safety standards such as AS/NZS (IEC) 60335 series, referenced by NSW Gazette and AS/NZS 3820. For safety, these standards limit the use of flammable refrigerants to small systems.

https://www.fairtrading.nsw.gov.au/trades-and-businesses/business-essentials/selling-goods-and-services/electrical-articles/approval-of-electrical-articles

Plant, machinery and equipment are regulated by the Work Health and Safety Act and Regulation administered by Safework NSW. Manufacturers, importers, suppliers, and installers must ensue, so

far as is reasonably practical that the plant is without risk to workers throughout the lifecycle. For air conditioners, chillers and refrigeration relevant standards include AS/NZS (ISO) 5149 series. For safety, these standards limit use of refrigerants on basis of toxicity, flammability, and occupancy. Safework NSW has published a paper on flammable refrigerant gases.

https://www.safework.nsw.gov.au/your-industry/manufacturing/publications/machine-safety-manufacturers,-importers,-suppliers-and-installers

https://www.safework.nsw.gov.au/resource-library/hazardous-chemicals/flammable-refrigerant-gases-position-paper

Suggested Approaches

Refrigerant emissions directly come from leaks during use and poor recovery at end-of-life. These issues persist despite the shift to lower-GWP refrigerants and can undermine environmental gains if not addressed. Improving leak prevention, maintenance, and recovery rates should be the top priority for reducing refrigerant emissions in buildings.

Daikin recommends further consultation with key regulators— Department of Climate Change, Energy, the Environment and Water, NSW Fair Trading, and SafeWork NSW—to ensure refrigerant policies are both effective and safe. We also support ongoing dialogue with industry groups like Air Conditioning and Refrigeration Equipment Manufacturers Association (AREMA), Refrigerants Australia (RA), and Refrigerant Reclaim Australia (RRA), whose expertise can help develop practical, scalable solutions. Collaboration between government and industry is essential to meet NSW's climate targets while maintaining safety and performance.

Yours Faithfully

Gary Knox
BEng (Hons) F.AIRAH
Engineering Manager
DAIKIN Australia Pty. Limited