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Industry position on refrigerant transition and decarbonisation in the GCC

In a nutshell

The Kigali Amendment mandates the phasedown of hydrofluorocarbons (HFCs) for GCC countries starting in 2028, along with other measures aimed at reducing carbon emissions across the region.

Policymakers, industry stakeholders, and supply chain partners are urged to act now by investing in sustainable cooling technologies, enhancing regulatory frameworks, and supporting regional training initiatives. Without proactive planning, the post-2028 phase-down could lead to an estimated 40–60% shortfall in HFC refrigerant availability across the GCC, severely disrupting cooling supply, driving up operational costs, and impacting regional climate goals. Eurovent Middle East, representing the HVACR industry, outlines a series of critical recommendations and positions to support a smooth and timely transition.

Background

Decarbonisation is crucial for the GCC region as it strives to reduce its carbon footprint and meet global climate targets. With growing environmental concerns and the need for sustainable development, transitioning to low-carbon solutions are vital for a greener, more resilient future.

Decarbonisation is closely linked to adopting low-Global Warming Potential (GWP) refrigerants (fluorinated and non-fluorinated), which significantly reduce greenhouse gas emissions. By transitioning to these environmentally friendly alternatives, the region can cut carbon emissions while ensuring sustainable cooling solutions.

The ratification of the Kigali Amendment to the Montreal Protocol mandates a freeze on HFC consumption in GCC countries by 2028, while the phase-down of HFCs will commence from 2032 onwards. This will bring about several issues impacting the HVACR sector as well as wider implications to building codes, safety standards and qualification requirements for professionals.

GCC countries including Bahrain, Kuwait, Oman and the United Arab Emirates and most recently, the Kingdom of Saudi Arabia, as well as Egypt, Jordan, Lebanon, Syria and Türkiye have ratified the Kigali amendment. The announcement of UAE Federal Decree-Law No. (11) of 2024, on the Reduction of Climate Change Effects which came into effect on 30 May 2025, signals the impending introduction of legislation in the UAE aimed at phasing down greenhouse gases and transitioning to alternative solutions.

While Group 2 countries are expected to establish their baseline of HFC consumption by 2027 and begin their phase-down starting from 2032, ongoing socioeconomic development and growth in the coming decades will drive increasing demand for cooling, and consequently, refrigerants. This will put increased pressure on refrigerant availability in the years following the phase-down's commencement. To avoid shortages, price increases, and the unavailability of certain gases, it is important that certain steps would be implemented already now.

Eurovent Middle East, as the regional industry association representing HVACR manufacturers, distributors, and service providers active in the Middle East, has proactively identified several core recommendations to governments and market participants, to support the transition to low GWP alternatives and provide guidance for the development of regulatory frameworks.

Disclaimer: The choice of refrigerants varies based on the application and efficiency requirements. Refrigerants cannot be used interchangeably across all applications. The industry will need a variety of refrigerants to fit the full range of applications and conditions. Additionally, GWP values need to be balanced with safety, energy efficiency, applicability and affordability for end users, as well as other environmental considerations.

Key arguments

Position 1: Industry recommendation to Investors and Planners on residential and commercial Air-conditioning

Investment in HVACR equipment is costly and based on an average life expectancy of equipment of 15 years and more. Investors need to be sure that their operation of the equipment will not be faced with excessive costs for refrigerants in the future, and that such refrigerants will be available until the end of the life cycle of such machinery. Post-2028 the phase-down could lead to an estimated 40–60% shortfall in the availability of hydrofluorocarbon-based (HFC) refrigerants across the GCC, severely disrupting cooling supply, driving up operational costs, and impacting regional climate goals.

Considering international regulations and trends as well as the commitment by countries in the Middle East to reduce greenhouse gas emissions, Eurovent Middle East recommends Investors and Planners to:

Invest in new equipment which uses refrigerants with a Global Warming Potential (GWP) of 750 or lower (IPCC Fourth Assessment Report - AR4) for all general air-conditioning and cooling applications unless safety requirements at the site of operation would not allow it even if all safety standards related to A2L and A3 refrigerants would be followed.

Argumentation:

It is crucial for the industry to advocate for a shift away from new equipment that relies on high-GWP refrigerants, as this will help significantly slow down the rising demand for such refrigerants in the region's cooling systems. With the exception of specific types of air-conditioning applications required to meet safety requirements at the site of operation, the industry can provide cooling equipment with low GWP fluorinated or non-fluorinated refrigerants. It also allows those manufacturers not yet offering such products, to initiate the transition in due time, being incentivised by a stronger market demand.

Position 2: Industry recommendations for industrial and commercial refrigeration

Industrial and commercial refrigeration is a specific type of application, with a wide variety of options and requirements. While in larger installations the transition to low GWP fluorinated refrigerants and their non-fluorinated alternatives can be recommended with ease, for smaller facilities such as small cold storages running under single condensing units, the transition is possible but should be assessed with care.

Eurovent Middle East recommends the following to investors and planners which should be considered in line with relevant safety standards:

- For new large refrigeration installations (above 40 kW refrigeration load), the use of fluorinated refrigerants with a GWP lower than 150, as well as non-fluorinated refrigerants (GWP <3), is technically feasible with current technologies and recommended.
- For new smaller installations (below 40 kW), a shift to refrigerants with a GWP below 150 is possible but advised to make use only of alternatives with an A1 flammability classification.
- For self-contained units (Plug-in type) the use of hydrocarbons (non-fluorinated refrigerants having GWP <3) as well as fluorinated refrigerants with GWP <150 is already the standard based on current technology.

Argumentation:

For applications such as industrial refrigeration plants, the use of non-fluorinated refrigerants or low-GWP mixtures of HFCs and Hydrofluoroolefins (HFOs) is feasible with currently available technology. Any potential safety risks can be mitigated through proper employee training with the support of the manufacturers.

In smaller applications, such as supermarkets, longer transition periods will be necessary to allow sufficient time for the education, training, and qualification of personnel. Hence an intermediate step to GWP <1500 is recommended. Emphasis should be placed on technician training, updates to safety standards, and establishing supply chain readiness for new refrigerants and components.

As most existing installations cannot be retrofitted with low GWP refrigerants, the industry recommends transitioning to refrigerants with a GWP not higher than 1500 when retrofitting, which is possible with existing refrigerant options without the need to change any components.

Proactively adopting a shift away from high-GWP refrigerants across industry segments will help alleviate pressure on available supplies once the phase-down begins, thereby helping to prevent price hikes for specific refrigerants in use.

Position 3: Industry recommendations for district cooling

District cooling is a large-scale utility application with centralised infrastructure and long-term planning cycles. In the GCC, where district cooling plays an important role in urban development and energy efficiency, the transition to low-GWP refrigerants presents both challenges and opportunities.

Eurovent Middle East recommends:

- For existing architecture and equipment, retrofit using refrigerants with a GWP < 750
- For new installations, non-fluorinated refrigerants or fluorinated refrigerants with GWP < 300 are suggested

Argumentation:

While newer, large-capacity chillers can more readily adopt low-GWP alternatives such as HFOs or non-fluorinated refrigerants, legacy systems using high-GWP HFCs will require phased retrofits or replacements. Given the capital intensity and regulatory environment, the transition is expected to progress gradually, guided by government policy, supplier readiness, and system design compatibility.

Position 4: Implementation and promotion of international safety standards related to the use of A2L and A3 refrigerants

Implementation of safety standards and leak detection requirements based on refrigerant volumes and GWP

Governments and industry need to accommodate the potential use of A2L and A3 refrigerants by adjusting the current regulatory landscape, wherever building codes and safety regulations would be prohibitive or where safety requirements would be absent.

Eurovent Middle East recommends:

- Careful evaluation of whether low-GWP fluorinated or non-fluorinated refrigerants are viable options considering product performance, building codes and safety standards.
- Adaptations of such codes and standards to reference international safety standards and mandate their adherence. This would include harmonisation of safety standards (IEC, ISO, EN) in the relevant building codes.
- Inclusion of UL/IEC 60335-2-40 and UL/IEC 60335-2-89 standards in product related technical regulations for energy efficiency.
- Adoption and industry wide implementation of the latest version of the following safety standards:

    - UL/IEC 60335-2-40 - Household and similar electrical appliances - Safety - Part 2-40: Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers
    - UL/IEC 60335-2-89 - Household and similar electrical appliances - Safety - Part 2-89: Particular requirements for commercial refrigerating appliances and ice-makers with an incorporated or remote refrigerant unit or motor-compressor
    - EN 378-2016 - Refrigerating Systems and heat pumps – Safety and environmental requirements
    - Pressure Equipment Directive (PED) 2014/68/EU
    - ISO 5149 – Refrigerating systems and heat pumps – Safety and environmental requirements
    - ASME Boiler and Pressure Vessel Code
    - ASTM E681 – Standard Test Method for Concentration Limits of Flammability of Chemicals (Vapors and Gases)

Argumentation:

Equipment using A2L and A3 refrigerants are already in wide use in many international markets. To ensure safe design and safe operating conditions, a wide set of dedicated standards and regulations have been introduced and refined over the years. These standards define limits on allowed refrigerant charges based on their flammability properties, operating and environmental temperatures, and pressure. They also define leak detection requirements and installation rules to ensure the safe operation of equipment.

Position 5: Reducing refrigerant leakages and banning intentional venting will free up quotas substantially

Up to 70% of the annual quantities of refrigerants placed on markets in the region are either leaked or vented into the atmosphere. Apart from the environmental impact, it represents a significant loss in energy efficiency and a waste of refrigerants.

Reducing leakages and prohibiting intentional venting of refrigerants on the other hand can free up large quantities once the phase down is implemented, thus greatly supporting the transition and reducing carbon emissions in the region. In parallel, Eurovent Middle East suggests mandating the use of carbon labels, which display the total greenhouse gas (GHG) emissions a product generates (CO2eq) to raise awareness.

Eurovent Middle East recommends the following to Governments:

- Implement qualification requirements for technicians with specific focus on brazing and leak detection skills to reduce leakages.
- Mandate the use of fixed refrigerant detectors where applicable to warn of refrigerant leaks and rapidly detect leaks to enable faster repair.
- Introduce mandatory periodical leak check requirements for systems using fluorinated refrigerants with frequency based on the CO2eq charge (see EU F-Gas Regulation).
- Implement regulations to ban deliberate venting of refrigerants.
- Implement refrigerant reclamation infrastructure and policies.

Argumentation:

Cooling and refrigeration equipment only runs as per designed performance with full refrigerant charges; leakages lead to reduced performance and highly increased energy consumption. Therefore, reducing leakages will prompt a significant reduction of carbon emissions from direct evaporation as well as reduced energy consumption.

Coupled with policies which prevent intentional venting and will force reclamation of refrigerants, this will have the biggest effect on decarbonisation allowing countries to meet with international and national requirements.

Position 6: Initiating a training and qualification campaign throughout the region

Technology can only be as good and as safe as the people selecting, installing, and operating it. Education, training, and qualification harbours the largest saving potential regarding energy and carbon emissions, as well as operational costs for HVACR installations. These operational costs consist of energy, refrigerants and other consumables, but also costs from premature degradation of installations.

Mandatory training requirements already exist in other regions. For example, certification to handle F-Gases is a key requirement for technicians outlined in the EU F-Gas Regulation. Similarly, the United States EPA 608 certification is required for any technicians who maintain, service, repair, or dispose of equipment holding refrigerants.

Thus, upskilling the labour force is without alternative if countries want to achieve their sustainability targets. Eurovent Middle East recommends the following to governments and industry:

- Promote and incentivise upskilling initiatives
- Introduce qualification requirements for defined labour roles
- Mandate education and training on safety standards for MEP engineers, designers, and technicians
- Adapt existing educational curriculums in academia and vocational schools with international safety standards and introduce certification on safety

Argumentation:

Studies have shown that with proper maintenance of HVACR installation, energy consumption can be reduced by up to 25%. Further significant savings can be achieved with better design and installation. Additionally, the

introduction of new refrigerants will require new skill sets and knowledge. Implementing training and qualification requirements therefore will not only help transitioning to new refrigerants, but it will also provide significant savings to the overall HVACR usage.

Position 7: Adaptation of legal frameworks for the industry

One of the cornerstones for a successful adoption of new refrigerants will be a clear legal framework which defines liabilities and responsibilities across all stakeholders in the industry, and which covers the full life cycle of products, from production to shipping, storage, installation, operation, and maintenance.

Eurovent Middle East recommends establishing intragovernmental working groups with the addition of industry representatives from manufacturing, consulting, contracting, and maintenance to assess legal requirements and implications.

Argumentation:

Already a growing percentage of the market is shifting to new refrigerants. Defining liabilities will incentivise all stakeholders to adopt and adhere to safety standards, as well as qualification and certification requirements.

Position 8: Harmonisation of the refrigerant transition in the region

A harmonised approach of all countries in the region is imperative for the industry. Different timelines, levels and types of allowed refrigerants, or product declaration and registration requirements would result in exorbitantly higher costs, less choice in markets, and thus significantly higher consumer prices.

Likewise, the adoption of safety standards, education and certification requirements for professionals need to be implemented in a harmonised way to ensure that all professionals are adhering to the same rules and that thus understanding, qualifications, skills, and experience can be built up in a progressive and coherent way across the region. A regional regulation, such as the EU's F-Gas Regulation, would ensure an orderly and cost-effective phase-down across markets.

The support of the joint industry will be essential for a successful transition, which can only be provided if the region at large agrees to move forward in a collaborative way.

References

- Intergovernmental Panel on Climate Change (IPCC) - Fourth Assessment Report (AR4 – 2007)
- Kigali Amendment to the Montreal Protocol – 15 October 2016
- Regulation (EU) 2024/573 of the European Parliament and of the Council of 7 February 2024 on fluorinated greenhouse gases

Annex I

Overview of HVAC products and possible low-GWP refrigerants

Air Conditioner Type	Equipment	Capacity Class (btu/hr)	Current Refrigerants	Low-GWP Alternatives	Flammability and Toxicity
Air Cooled	Ducted, Non-Ducted	< 65,000	R410A, R32	R32, R454B	A2L
	Rooftop Package Units	> 65,000 and ≤ 760,000]	R410A, R134a	R32, R454B	A2L
	Multi-Split	< 19,000 and < 135,000	R410A, R32	R32, R454B	A2L

	VRF	> 135,000 and < 240,000	R410A, R32	R454B	A2L
Water Cooled	Ducted	< 65,000	R410A, R32	R32, R454B	A2L
	Rooftop Package Units	> 65,000 and ≤ 760,000	R410A, R134a	R32, R454B	A2L
	Multi-Split	< 19,000 and < 135,000	R410A, R32	R32, R454B	A2L
	VRF	> 135,000 and < 240,000	R410A, R32	R454B	A2L
Chillers	Air-cooled chillers	< 1,800,000 and ≥ 1,800,000	R134a, R410A, R513A	R1234ze, R513A	A2L, A1
	Water cooled chillers	< 900,000 and ≥ 7,200,000	R410A, R134a	R32, R454B, R1234ze, R513A	A2L, A1
Centrifugal Chillers	Air Cooled	< 960,000 and ≥ 7,200,000	R134a	R513A, R515B, R1233zd R1234ze	A1, A2L
	Water Cooled	< 1,800,000 and ≥ 7,200,000	R134a, R1234ze, R1233zd	R1233zd, R513A, R515B, R1234ze	A1, A2L

Overview of Refrigeration products and possible low-GWP refrigerants

Product Type	Eurovent Recommendation	Refrigerant Options	Flammability and Toxicity
Small refrigeration installations (< 40kW)	Non-fluorinated refrigerants	R744/CO_2 (GWP 1)	A1
	Fluorinated refrigerant with GWP < 150	R513A (GWP 631) R455A (GWP 148) R454C (GWP 148)	A1 A2L
Large refrigeration installations (> 40kW)	Non-fluorinated refrigerants	R744/CO_2 (GWP 1)	A1
		R717/ NH_3 (GWP 0)	B2L
	Fluorinated refrigerants	R455A/R454C (GWP 148)	A2L
Self-contained units (plug-in)	Non-fluorinated refrigerants	R290 (GWP 3)	A3
	Fluorinated refrigerants with GWP < 150	R448A (GWP 1386), R449A (GWP 1396) R455A/R454C (GWP 148)	A2L
Retrofit of existing commercial refrigeration systems	Fluorinated refrigerants with GWP < 1,500	R448A (GWP 1386) R449A (GWP 1396) R513A (GWP 629)	A1
Large industrial refrigeration installations	Non-fluorinated refrigerants	R744A/CO_2 (GWP 1) R717 (GWP 0)	A1
	Fluorinated refrigerants with GWP < 150	R1234ze (GWP 7)	A2L
		R515B (GWP 239)	A1

		R455A (GWP 148) R454C (GWP 148)	

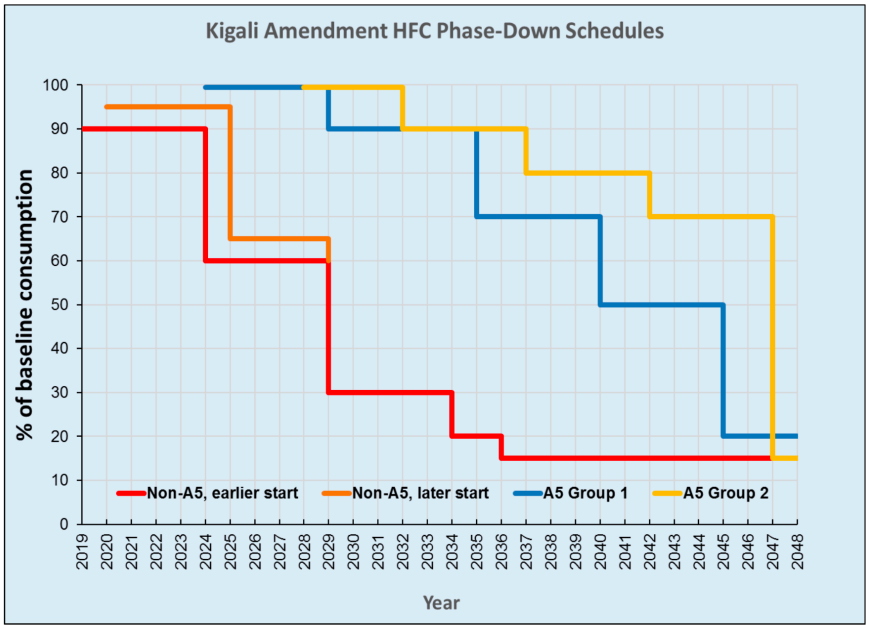
NOTE – Medium pressure refrigerants vs low pressure refrigerants

Overview of refrigerants used in District Cooling applications and possible low-GWP refrigerants

Product Type	Current Refrigerants	Transitional Refrigerant Option	Low GWP Refrigerant Option	Flammability and Toxicity
Centrifugal Chillers	R134a	R513A	R1234ze, R1233zd, R515B	A2L, A1
Screw Chillers	R134a	R513A, R450A	R1234ze, R515B	A2L, A1
Oil Free Centrifugal Chillers	R134a		R1234ze, R515B, R513A	A2L, A1

Annex II

Schedule of HFC Phase-Down in line with the Kigali Amendment



Visual representation of HFC Phase-down

Phase-down schedule for HFCs applicable to Article 5 and non-Article 5 parties

	A5 Parties (developing countries) – Group 1	A5 Parties (developing countries) – Group 2	Non-A5 Parties (developed countries)
Baseline formula	Average HFC consumption for 2020-2022 +65% of HCFC baseline	Average HFC consumption for 2024-2026 + 65% of HCFC baseline	Average HFC consumption for 2011-2013 +15% of HCFC baseline*
Freeze	2024	2028	-
First step	2029 – 10%	2032 – 10%	2019 – 10%
Second step	2035 – 30%	2037 – 20%	2024 – 40%
Third step	2040 – 50%	2042 – 30%	2029 – 70%
Fourth step	-	-	2034 – 80%
Plateau	2045– 80%	2047- 85%	2036 - 85%

*Note - For Belarus, Russian Federation, Kazakhstan, Tajikistan, Uzbekistan, 25% HCFC component of baseline and different initial two steps (1) 5% reduction in 2020 and (2) 35% reduction in 2025

1. Group 1: Article 5 parties not part of Group 2
2. Group 2: Bahrain, India, Islamic Republic of Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia and the United Arab Emirates

3. Technology review in 2022 and every 5 years
4. Technology review every four to five years before 2028 to consider compliance deferral of two years from the freeze in 2028 of Article 5 Group 2 to address growth in relevant sectors above a certain threshold.