environmental investigation agency

Climate

Cooling the Climate Crisis

Why investing in sustainable refrigeration is crucial for decarbonising supermarkets

June 2025

ACKNOWLEDGEMENTS

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Find out more about natural refrigerant-based cooling equipment at our sustainable cooling database-cooltechnologies.org

ABOUT EIA

We investigate and campaign against environmental crime and abuse.

Our undercover investigations expose transnational wildlife crime, with a focus on elephants, pangolins and tigers, and forest crimes such as illegal logging and deforestation for cash crops such as palm oil. We work to safeguard global marine ecosystems by addressing the threats posed by plastic pollution, bycatch and commercial exploitation of whales, dolphins and porpoises. Finally, we work to avert climate catastrophe by strengthening and enforcing regional and international agreements that tackle short-lived climate super-pollutants, including ozone-depleting substances, hydrofluorocarbons and methane, and advocating corporate and policy measures to promote transition to a sustainable cooling sector and away from fossil fuels.

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Cover: Turbulent times ahead for retailers who fail to invest in HFC-free sustainable cooling

Above: Trolleys parked at a supermarket

Executive summary

As climate change accelerates, the role of supermarkets in driving greenhouse gas (GHG) emissions via their use of cooling has come under scrutiny. In 2024, the hottest year on record, global temperatures reached 1.55°C above pre-industrial levels, with cooling systems accounting for approximately seven per cent of global GHG emissions.

This report analyses the climate impact of supermarket refrigeration revealing that up to 70 per cent of a supermarket's Scope 1 and 2[i] emissions stem from cooling, primarily from energy consumption and the use of hydrofluorocarbon (HFC) refrigerants, potent greenhouse gases. Globally, HFC emissions are more significant than emissions from the aviation sector.

Fortunately, cost-effective sustainable cooling alternatives exist. Drawing on EIA's extensive expertise as well as detailed data from five major European retailers – Ahold Delhaize, Carrefour, Jerónimo Martins, Metro AG and Tesco – the report identifies leading practices and highlights gaps to develop EIA's Net Zero Supermarket Cooling Pathway, a strategic roadmap for investors and retailers alike.

The pathway is structured around four key pillars:

disclosing data – comprehensive, public reporting of refrigerant emissions, energy performance and transition planning is essential to transparency and accountability

cutting refrigerant emissions – cutting refrigerant emissions: – retailers must stop installing new HFC refrigeration and commit to HFC-free refrigeration in all European stores by 2030 and globally by 2040, supported by immediate action to reduce leaks and transition to natural refrigerants (non-fluorinated alternatives)

reducing energy usage – cooling-related energy emissions must be reduced by 55 per cent by 2030. Energy-efficient technologies, fridge door retrofits and renewable energy adoption are critical to achieving these savings

engaging the supply chain – supermarkets should extend climate action beyond their stores, influencing suppliers to reduce emissions from cold chain operations, particularly in transport refrigeration

Some retailers are distinguishing themselves through notable progress in reducing HFC emissions. Metro AG, for example, has pledged to phase out 90 per cent of HFCs across its global operations by 2030, aiming for a complete phase-out by 2040. Jerónimo Martins has committed to eliminating HFCs globally by 2035. Despite poor transparency, Tesco stands out as the only retailer using natural refrigerant technology in its transport fleet. Carrefour contributes valuable cost data, although it continues to report high levels of HFC emissions. In contrast, Ahold Delhaize appears to be falling behind, marked by significant emissions, limited transparency and a slower EU HFC phase-out date.

Case studies and Carbon Disclosure Project (CDP) data show that investing in natural refrigerant systems yields strong financial returns, with payback periods of 4-10 years. Given their 15-year lifespans, these systems continue to cut operational costs well beyond repayment. Further reductions in emissions and operational costs can be achieved by adding doors to fridges which, when combined with natural refrigerants, can deliver energy savings of 19-45 per cent, according to one retailer.

In Europe, soaring HFC refrigerant prices and regulatory penalties mean that retailers which have yet to transition away from HFC-based systems risk rising operational costs and long-term stranded assets. Upcoming EU sustainability reporting and due diligence directives, which will require companies to disclose credible climate transition plans, further highlight the urgent need for retailers to address cooling-related emissions, a significant driver of their Scope 1 and 2 emissions.

Regional market data on the adoption of natural refrigeration systems reveals that European retailers are leading the transition, while their US counterparts and businesses in developing markets continue to lag behind, facing potentially stranded assets and increased long-term costs.

Despite a global HFC phase-out resolution launched more than a decade ago and a 2025 commitment to install low-GWP systems, Consumer Goods Forum (CGF) members have yet to deliver on these pledges. With technological solutions now readily available, and several leading retailers holding influential positions within CGF, there is a clear opportunity to reignite momentum.

By offering granular sustainable cooling performance metrics, policy insights and actionable recommendations, this report serves as a vital tool for investors seeking to assess risk, evaluate sustainability performance and drive supermarket decarbonisation in alignment with global climate goals.

PART ONE

HOW COOLING AND REFRIGERANT EMISSIONS ARE DRIVING CLIMATE CHANGE

Amid the climate crisis, cooling systems present a dual challenge – they are essential for human comfort, food storage and vaccine preservation, yet are a major and growing source of global greenhouse gas (GHG) emissions.

These emissions come from both energy use and the release of powerful refrigerant gases such as hydrofluorocarbons (HFCs), which are climate super-pollutants. Although international agreements such as the Kigali Amendment to the Montreal Protocol aim to phase down these pollutants, experts caution that current efforts fall short of the targets needed to limit global warming to 1.5°C.

As the world seeks alternatives, EIA urges caution over the use of hydrofluoroolefins (HFOs) due to sustainability concerns and instead advocates for natural refrigerants.

Climate change poses a serious threat to both human society and the planet, with its impacts already being felt, due to the unprecedented concentration of greenhouse gases in the atmosphere. In 2024, the hottest year on record, global mean temperatures soared to 1.55°C above pre-industrial levels.[2]

The changing climate is causing an increase in extreme weather events, including droughts, wildfires, hurricanes and floods.[3] People the world over are now experiencing firsthand, and in ever greater numbers, the devastating impacts of a climate system in turmoil.

Climate change: A systemic threat to the economy

The impacts of climate change on our economy cannot be overestimated. Insurers have already warned that extreme weather is making some areas and certain risks, such as flooding and fire, uninsurable, with Aviva reporting extreme weather damages of $2 trillion in the decade up to 2023.[4]

The CEO of Allianz insurers has warned that climate change is a systemic risk threatening the very foundation of the financial sector, with the potential to destroy the economic value of entire regions and sectors.[5]

Cooling's contribution to the climate crisis

Sitting at the heart of sustainable development, cooling is essential for keeping food fresh and vaccines safe throughout their supply chain as well as cooling data centres, offices, homes and much more.

However, cooling is also a major driver of climate change.

Emissions from refrigeration are currently responsible for about of seven per cent of global GHG emissions.[6]

As temperatures and populations continue to increase, scientists estimate that emissions from refrigeration will double by 2030.[7]

Emissions from cooling stem from the energy used to power cooling equipment and from refrigerant gases, which leak during their production, use and at end-of-life. Hydrochlorofluorocarbons (HCFCs) and HFCs, fluorinated greenhouse gases (F-gases), are commonly used refrigerants .

The climate impact of these gases is measured by an index called Global Warming Potential (GWP), which compares their warming effect to carbon dioxide (CO_2) over a specific time frame, typically 100 years. HFCs used in commercial refrigeration typically have very high GWPs, with HFC-404A (a commonly used refrigerant) having a GWP 3,922 times that of CO_2.[8]

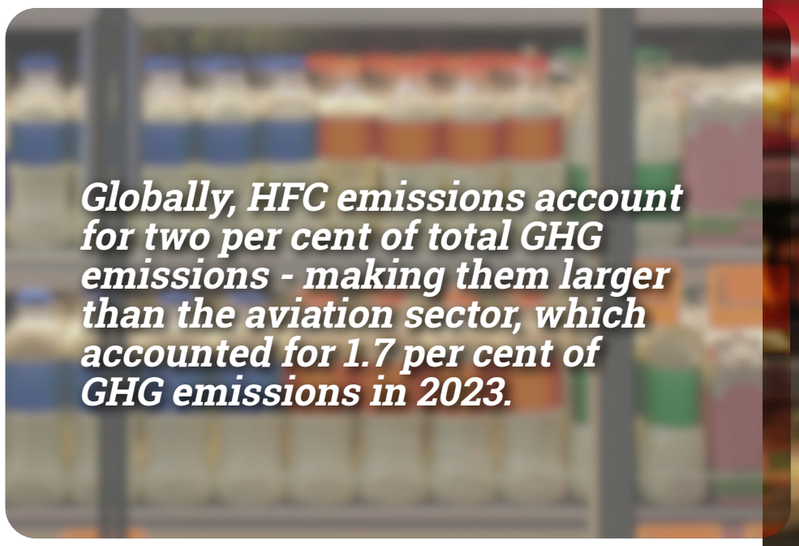
Globally, HFC emissions account for two per cent of total GHG emissions[9] making them larger than the aviation sector, which accounted for 1.7 per cent of GHG emissions in 2023.[10]

HFOs are not a sustainable solution

Natural refrigerant alternatives to HFCs include CO_2, ammonia, hydrocarbons, water and air. They have low GWPs, from zero to three. Their use in different refrigeration equipment has rapidly increased, particularly in Europe, and is discussed further in Part 4.

Following restrictions on HFCs, F-gas producers are now promoting a new generation of low-GWP fluorinated refrigerants, HFOs. HFOs are commonly blended with HFCs in order to reduce the GWP of the refrigerant. However, the resulting blends used by supermarkets still have high GWPs. For example, R-449A, a commonly used HFO-HFC blend, has a GWP of 1,397.

Additionally, many HFOs and HFCs are considered to be per- or poly-fluoroalkyl substances (PFAS), commonly known as 'forever chemicals'. The EU's F-gas Regulation already restricts the use of HFOs in certain equipment types from 2032, with further restrictions being explored under the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation in relation to their classification as PFAS.[11] In addition to PFAS-related concerns, the production of HFOs is energy intensive and leads to emissions of other high GWP or ozone-depleting substances.[12]



The international HFC phase-down under the Montreal Protocol is not 1.5°C aligned

Under the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, global HCFC consumption will be phased out by 2030 and HFC consumption is being phased down.

The approach requires developed countries to act first, beginning their phase-down in 2019 and reaching an 85 per cent reduction from their baseline by 2036. The majority of developing countries froze consumption in 2024 and will aim to reach an 80 per cent reduction from their baseline by 2045.[13]

While these reductions will reduce availability of HFCs in future, scientists warn that the reduction pathway is not consistent with limiting warming to 1.5°C above pre-industrial levels, noting that additional measures to accelerate the HFC phase-down will be necessary.[14]

PART TWO

THE SUPERMARKET SECTOR'S ROLE IN DRIVING HFC EMISSIONS

Supermarkets are major HFC emitters, largely due to the sector's heavy reliance on cooling across thousands of stores. Since launching its *Chilling Facts* campaign in 2009, EIA has tracked progress in both US and European supermarkets and is now developing a Net Zero Supermarket Cooling Pathway based on best practices from leading European retailers.

Despite the availability of alternatives, recent assessments by EIA show US retailers have made limited progress in adopting natural refrigerants. While broader climate initiatives assess corporate decarbonisation, few focus specifically on the supermarket sector's significant cooling-related emissions.

Supermarkets are among the largest users of HFCs, with emissions from commercial refrigeration accounting for approximately 27 per cent of US-reported HFC emissions in 2021.[15] Large supermarket chains operate a significant number of stores — many of them sizable and with high cooling loads — making them significant contributors to the commercial refrigeration sector's emissions.

EIA began monitoring the uptake of natural refrigerants in UK supermarkets in 2008, launching the first edition of *Chilling Facts* in 2009, a report assessing retailers' progress towards HFC-free cooling. The final, seventh edition of *Chilling Facts*, published in 2017, covered 22 retailers in the UK and EU and demonstrated growing uptake of natural refrigerants with retailers reporting their use in more than 3,000 stores.[16]

In 2019, EIA developed a Supermarket Score Card to assess US retailers' adoption of natural refrigerants. Its latest edition, released in 2024, issued a stark warning – despite the widespread availability of low GWP technologies, America's largest supermarket chains continue to use and emit HFCs at unacceptable levels.[17]

Of the 16 retailers surveyed, 11 had less than one per cent of their stores relying entirely on low GWP refrigerants.[18] Walmart, the world's biggest retailer, had just one store using entirely low GWP refrigerants. Only one retailer, Aldi US, showed progress, having committed to installing natural refrigerants in all new and existing stores by 2035, demonstrating that US companies can achieve a faster roll-out with better planning and investment.[19]

This report aims to assess long-term progress and lessons learnt in the European supermarket transition away from HFCs. Focusing on five large retailers – Ahold Delhaize, Carrefour, Jerónimo Marins, Metro AG and Tesco – EIA has reviewed best practices garnered from climate disclosures, financial decisions and direct engagement with the companies, combined with an assessment of the technical options, to develop a Net Zero cooling pathway for the supermarket sector.

A host of initiatives exist aimed at assessing company performance on issues such as decarbonisation, including the CDP, Climate Action 100+ and FTSE4good. However, while some retailers fall within the scope of one or other of these assessments, none focus specifically on assessing the performance of supermarkets in addressing the key source of their Scope 1 and 2 emissions, i.e. cooling-related emissions.

Below: Past EIA Chilling Facts reports-documenting the increasing uptake of natural refrigerants in European supermarket cooling

PART THREE

CLIMATE TRANSITION PLANNING – FROM VOLUNTARY PRACTICE TO LEGAL OBLIGATION

Climate transition planning is rapidly becoming a legal requirement for large companies operating in the EU, including supermarkets. Early action is essential to avoid the risk of significant fines.

While ambitious EU regulations on HFCs have already spurred innovation and adoption of natural refrigerants, many retailers – particularly in the US and developing countries – continue to lag. This leaves them vulnerable to rising costs, stranded assets and non-compliance sanctions.

Sustainability reporting has traditionally been voluntary, led by initiatives such as the CDP. Over time, efforts to standardise these disclosures resulted in the development of the International Financial Reporting Standards (IFRS) Sustainability Disclosure Standards in 2023 which require companies to disclose climate risks and opportunities in their financial reporting, with CDP reporting now aligned to these standards.[20]

Building on these voluntary efforts, the EU's Corporate Sustainability Reporting Directive (CSRD) requires large companies to issue climate transition plans.[21] These plans must show how a company's strategy aligns with the 1.5°C climate goal under the Paris Agreement and, where appropriate, detail 2030 and 2050 targets.[22]

Given that the EU has committed to a climate target of a 55 per cent reduction in emissions by 2030 (compared to 1990 levels), this would be an ideal target for companies to adhere to.

Complementing the CSRD, the Corporate Sustainability Due Diligence Directive (CSDDD) shifts the focus from reporting to action. It requires companies to identify, prevent and mitigate adverse environmental and human rights impacts, including through implementation of their climate transition plans.[23]

Applicability and deadlines

In 2024, the European Commission issued an omnibus proposal aimed at simplifying these directives, including easing requirements for small businesses. However, large supermarkets remain unaffected and squarely within the scope of both directives.

Under the CSRD, EU retailers with more than 1,000 employees and either an annual turnover of €50 million or a balance sheet exceeding €25 million must file sustainability reports for the 2024 financial year, due in 2025.[24] Non-EU companies generating more than €150 million, or with EU branches generating more than €40 million in revenue, will need to report starting from the 2028 financial year, potentially impacting a broader group of international supermarket chains.[25]

The CSDDD introduces a phased compliance approach, beginning with larger companies. From July 2028, EU companies with more than 5,000 employees and global turnover of €1.5 billion and non-EU companies with EU turnovers exceeding €1.5 billion are required to comply.[26]

Although compliance with the CSDDD will not begin until July 2028, meeting 1.5°C-aligned 2030 emissions reduction targets requires companies to act now. Delay will make compliance more difficult and increase risk exposure. Penalties under the EU's CSDD will be determined at the national level but may be significant — with fines of up to five per cent of global turnover allowed under the Directive.[27]

Despite growing adoption of climate transition plans, recent analysis shows none of the companies with Science Based Target initiative (SBTi)-validated goals have developed transition plans that are credible and fully aligned with a 1.5°C pathway, highlighting the need for greater ambition and detail.[28]

Regulatory action on HFCs in Europe and beyond

The EU's 2014 F-gas Regulation was the first global legislation to mandate a phase-down of HFCs. It also banned their use in new secondary circuits of centralised refrigeration systems – a common set-up in supermarkets – starting in 2022.

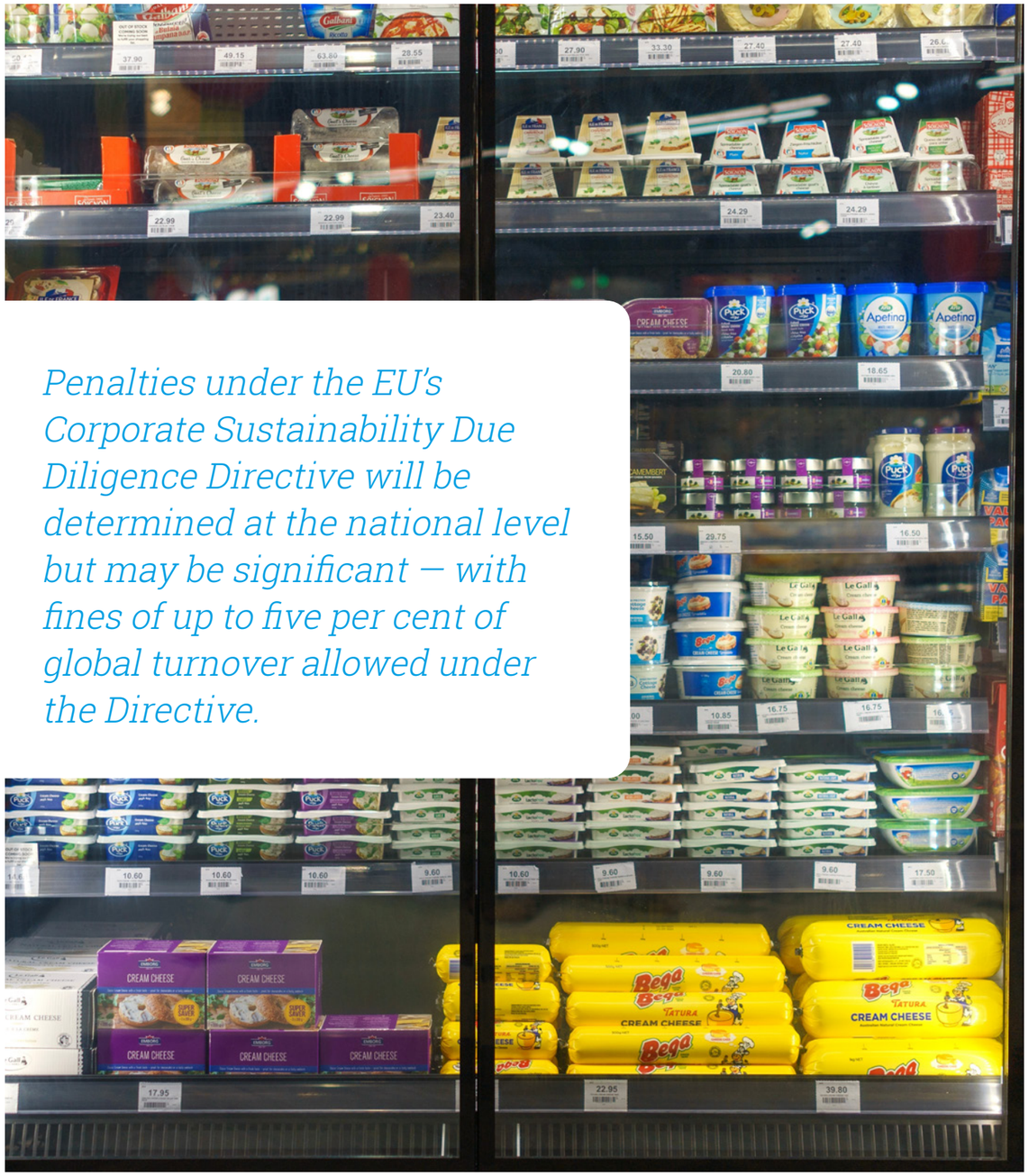
In 2024, the EU updated the Regulation to strengthen HFC reduction targets, expand equipment bans across additional sectors and introduce the world's first complete HFC phase-out.[29] It is expected the 2024 EU F-gas Regulation will lead to emissions savings of 500 million tonnes of CO2-equivalent ($MtCO_2e$) by 2050, a key tool in supporting EU climate goals.[30]

Outside of Europe, countries are also introducing new equipment restrictions to support their HFC phase-down obligations under the Montreal Protocol. In 2023, the US Environmental Protection Agency proposed new rules to ban the use of several HFCs in most new refrigeration equipment from 2025.[31] For supermarkets, the use of refrigerants with a GWP of 300 or more will be banned in new systems from January 2027.[32] Additional state-led restrictions such as those in New York and California will further restrict HFC use.[33]

Rising HFC use in commercial refrigeration is also having an impact on emissions in developing countries. As part of their Kigali Implementation Plans, Colombia and Ecuador have identified commercial refrigeration as accounting for 15-26 per cent of their national HFC consumption in 2023.[34,35] To support efforts to reduce HFC use in this sector Columbia has banned the import and manufacture of stand-alone commercial refrigeration equipment from 1 July 2029.[36]

Other countries in the region, such as Costa Rica, are implementing similar measures.[37]

Below: Supermarkets should invest in sustainable cooling now to meet emission reduction targets



Penalties under the EU's Corporate Sustainability Due Diligence Directive will be determined at the national level but may be significant — with fines of up to five per cent of global turnover allowed under the Directive.

PART FOUR

ALTERNATIVE COOLING TECHNOLOGIES IN THE SUPERMARKET SECTOR

The use of natural refrigerant technologies is now commonplace across Europe, reflecting the region's leadership in sustainable cooling. Beyond Europe the situation is variable, with significant use in Japan and signs of growth in the US and parts of Latin America, creating a clear window for supermarkets to support and accelerate this transition.

Supermarkets occupy a critical position in the cold chain. In addition to operating stores, distribution centres and transport fleets, they have the potential to influence suppliers and support the wider adoption of sustainable practices throughout the industry.

Currently, poor access to cold chains leads to the loss of approximately 23 per cent of perishable foods in developing countries, compared to just nine per cent in developed regions.[38] Addressing this disparity could require the deployment of an estimated 4.5 billion new cooling units by 2050[39]—a major challenge given the urgency of reducing HFC and energy-related emissions from cooling.

EIA has been promoting the use of sustainable cooling across various sectors through its Cool Technologies platform for more than a decade. The website is regularly updated and features a wide range of natural refrigerant technologies deployed globally.

CO_2-based centralised refrigeration

Centralised systems – commonly used in supermarkets – consist of a machine-room-based refrigeration unit, with refrigerant circulated via piping to in-store display cases. Centralised systems typically last for about 15 years, making them significant long-term investments.[40] Centralised systems are prone to high leakage rates, resulting in significant HFC emissions, for example retailer Carrefour reported an annual leakage rate of 20 per cent in 2022.[41]

CO_2 (GWP 1) is a natural refrigerant alternative increasingly used in centralised systems. EIA first documented the use of CO_2 centralised systems in the UK in 2008, when only 17 stores were using natural refrigerants.[42] At that time, retailers cited concerns around energy efficiency and a shortage of technicians trained to work with high-pressure CO_2 systems.

However, 18 years on, the technology is now well-established across Europe. According to clean cooling market accelerator, ATMOsphere, as of 2024, 30 per cent of EU supermarkets (about 76,200 stores) use centralised CO_2 systems.[43]

Advancements in system design have improved energy efficiency, with many retailers now reporting significant energy savings, as detailed in Part 6.

Beyond Europe, CO_2 systems are also gaining popularity. In Japan, more than 12,200 stores now use the technology, predominantly in smaller condensing units.[44] North America has also seen notable progress, with a 40 per cent year-on-year increase in uptake and 4,100 stores using CO_2 systems by the end of 2024.[45] Adoption in the US is expected to grow by 176 per cent between 2024-28, according to the North American Sustainable Refrigeration Council.[46]

Growth is also underway in Latin America, with approximately 580 stores.[47] The General Manager of Colombia's Weston food stores recently observed that the regional market is expected to expand significantly.[48] Ecuador serves as a strong example of what is possible; despite its smaller market size – about 13 per cent of supermarkets there have already adopted centralised CO_2 systems.[49]

Hybrid centralised refrigeration

Hybrid HFC/CO_2 systems use HFCs in the primary circuit and CO_2 in the secondary circuit.

While these systems still involve HFCs, the quantity used is greatly reduced. Carrefour has been using the technology

in the Latin American region and in 2011 a representative from Carrefour noted that hybrids can offer a practical transition technology, allowing technicians to gain experience with CO_2 systems in a phased manner.[50]

However, given the need to rapidly reduce HFC emissions and the long life spans of centralised systems, ongoing investment in any kind of HFC based technology at this stage could undermine a company's ability to meet Net Zero targets.

Hydrocarbon plug-ins

Hydrocarbon plug-in units are self-contained refrigeration display cases with integrated systems. The most common natural refrigerant chosen to replace HFCs in plug-in systems is propane (R-290), which has a GWP of less than one.[51]

Plug-ins are attractive due to their lower initial costs and simplified installation and maintenance. However, because they discharge heat directly into the sales area, they can increase the need for supplementary air-conditioning. To mitigate this, British retailer Waitrose has added a secondary water-cooling loop, which has delivered energy savings of approximately 20 per cent.[52]

These units are particularly well suited to smaller store formats and have seen widespread adoption. By December 2024, more than 17 million plug-in units were in use in Europe, with an additional 8.5 million in Latin America.[53] Jerónimo Martins has adopted this technology extensively, reporting that 86 per cent of its stores now use natural refrigerant plug-in freezer units.

Distribution centres

Many supermarkets operate cold storage distribution centres, which serve as central hubs for goods before reaching retail outlets. Within this sector, the adoption of natural refrigerants is already widespread, with modern systems typically using low-charge ammonia (GWP 0)[54] or CO_2, which is becoming increasingly common.

In Europe, the number of distribution centres using CO_2-based systems rose by 48 per cent in the year to December 2024, reaching 4,900 sites. Growth in North America was even more dramatic, with a 74 per cent increase in the same period.[55]

Low-charge ammonia systems are also prominent, with 3,600 sites globally, including 1,230 in North America. In Mexico, interest in natural refrigerants is growing. Cold chain logistics provider Frialsa has reported that its most energy-efficient warehouses are cooled using ammonia or CO_2, highlighting their potential for operational cost savings as well as environmental benefits.[56]

Transport refrigeration

Transport refrigeration is an essential link in the cold chain, responsible for maintaining temperature control during the movement of goods.

Most current road-based systems rely on auxiliary diesel engines and use high GWP refrigerants such as HFC-404A (GWP 3,922), HFC-134a (GWP 1,430) and HFC-452A (GWP 1,945).

Progress in transitioning this sector to natural refrigerants has been slow, but recent technological advances are beginning to accelerate change. One promising solution from Austrian manufacturer PBX involves a fully sealed plug-in refrigeration unit mounted on the roof of refrigerated vans. These systems use propane (R-290) and are powered by the vehicle's battery, making them ideal for use with electric vehicles (EVs).

PBX reports that this solution can reduce refrigeration-related emissions by 85 per cent, increase payload capacity and extend EV driving range by as much as 25 per cent, all without relying on a diesel-powered auxiliary engine.[57]

Tesco is also piloting innovative natural refrigerant-based cooling systems in its logistics fleet, with some technologies reportedly achieving 98 per cent emissions reductions.[58]

Overcoming barriers to natural refrigerants

Several retailers, especially in developing markets, cite limited access to skilled refrigeration technicians as a barrier to adopting natural refrigerants. However, this challenge is not new and can be solved.

This issue arose in the early 2010s in the EU and UK as retailers were beginning to consider HFC-free commercial refrigeration. Retailers helped address this by supporting:

- **technician training schools**
- **on-site courses and certifications**
- **testing centres and standardised qualifications.**

Progress was further bolstered by partnerships with academic institutions and industry associations, leading to standardised training pathways.[59]

Today, the EU's F-gas Regulation requires all member states to implement mandatory certification schemes by September 2025. Similar regulatory frameworks and training support are now urgently needed in non-EU markets to unlock the full potential of sustainable cooling technologies worldwide.

In 2018, the Consumer Goods Forum (CGF) committed to overcoming barriers to enable the purchase of new equipment relying on natural or ultra-low GWP refrigerants by no later than 2025.[60]

Ongoing challenges reported by retailers suggest that there is still more work to be done in this area.

Below: Supporting the training of installation and service technicians in the safe handling of natural refrigerants is essential to enabling their global adoption.

PART FIVE

ANALYSIS OF RETAILERS' COOLING PRACTICES

EIA has reviewed the cooling-related emissions, sustainable cooling goals and practices of five retailers – Ahold Delhaize, Carrefour, Jerónimo Martins, Metro AG and Tesco.

Our findings highlight examples of best practice and reveal the huge impact cooling has on Scope 1 and 2 emissions in the supermarket sector. We provide key retailer specific insights regarding progress in decarbonising cooling.

Large publicly listed retailers with revenues above €30 billion and a presence both in the EU and beyond Europe's borders were selected. To complete this analysis, EIA has accessed 2023 CDP data (relating to activities in 2022), publicly available disclosures and requested retailers to complete a survey. Carrefour and Ahold Delhaize did not respond to the survey request and, despite initially responding, Tesco subsequently withdrew its responses.

CDP is a global environmental disclosure system offering environmental data and climate risk information. Its Capital Market Signatory programme offers investors various tools and insights, including collaborative engagement initiatives.[61]

The role of cooling in Scope 1 and 2 emissions

Table 1 highlights the significant impact of supermarkets' cooling-related emissions. While HFC emissions are directly reported, retailers are not required to separate out emissions from cooling in climate disclosures. In their response to EIA's survey, Jerónimo Martins and Metro AG noted that emissions from cooling account for approximately 50 per cent of total energy use.

When asked to comment, Ahold Delhaize contested the assumption that cooling accounts for about 50 per cent of Scope 2 emissions, noting differences in store sizes and electrification have not been considered. However, in Ahold's response to a 2014 EIA survey the company noted that refrigeration commonly accounted for about 50 per cent of energy related emissions at that time.

Ahold Delhaize has the highest proportion of Scope 1 and 2 emissions attributed to cooling, totalling 2.16 $MtCO_2e$ in 2023. Carrefour follows with 1.05 $MtCO_2e$, while the remaining three retailers report lower levels, about 0.5 $MtCO_2e$ each.

Table 1. Retailers' global cooling-related emissions and their relative contribution to Scope 1 and 2 emissions (millions tonnes CO_2e)[62]

Retailer	2022				2023			
	Scope 1 emissions accounted for by refrigerants		Scope 1 and 2 emissions accounted for by cooling[63]		Scope 1 emissions accounted for by refrigerants		Scope 1 and 2 emissions accounted for by cooling	
	$MtCO_2e$	per cent	$MtCO_2e$	per cent	$MtCO_2e$	per cent	$MtCO_2e$	per cent
Ahold Delhaize	1.18	65	1.70	58	1.32	71	2.16	61
Carrefour	0.71	86	1.09	70	0.68	86	1.05	69
Jerónimo Martins	0.11	50	0.50	50	0.10	44	0.49	48
METRO	0.44	99	0.76	70	0.24	64	0.52	56
TESCO	0.36	34	0.64	40	N/A	N/A	N/A	N/A

Analysing sustainable cooling actions

Under the EU's CSDDD, retailers are required to submit climate transition plans. However, as discussed in Part 3, the level of detail in these plans varies widely. Given the significant role that cooling plays in a retailer's overall emissions, EIA has conducted a more in-depth analysis of key elements within these transition plans.

Table 2 outlines sustainable cooling actions reported by retailers. These include, for instance, whether retailers have mapped out and costed a full conversion to low GWP refrigerants.[64]

EIA has also analysed the capital expenditure a company allocates toward adoption of low GWP alternatives and evaluated this in relation to their overall capital expenditure. In addition, retailers' HFC phase-out commitments are reviewed alongside their actual progress in phasing out HFCs across stores, distribution centres and transport refrigeration.

The analysis also considers energy-saving measures and engagement with supply chain partners on cooling-related goals.

Table 2. Sustainable cooling actions reported by retailers[65]

	Ahold Delhaize	Carrefour	Jerónimo Martins	METRO	TESCO
Climate transition plan?	Yes	Yes	Yes	Yes	Yes
Mapped cooling use?	Yes	Yes	Yes	Yes	No information available
Disclosed a costed out conversion to low GWP refrigerants?	No	Yes	Yes	Yes	No
Investment in low GWP refrigerant annually[66]	No information available	€80 million (2022)	€90.1 million	€72.6 million	£60 million
Per cent of capital expenditure allocation in low GWP refrigerants[67]	No information available	4.3 per cent (2022)	7.5 per cent	6.15 per cent	4.7 per cent
EU HFC phase-out date	2040	2030	2030	90 per cent by 2030, 100 per cent by 2040	2035
Non-EU HFC phase-out date	low GWP by 2040	2040	2035	90 per cent by 2030, 100 per cent by 2040	2035
Per cent of stores which are HFC-free (numbers of stores are bracketed)	40 per cent of EU stores. Does not report on US stores	19 per cent	57 per cent (2953 stores)	50 per cent (262 stores)	33 per cent of stores. (approx 1,000)
Per cent of distribution centres using low GWP refrigerants	No information available	No information available	67 per cent (24 distribution centres)	100 per cent natural refrigerants	No information available
Transport refrigeration	No information available	No information available	70 per cent of cooling used in shipping uses natural refrigerants	Using HFCs	Trialling natural refrigerants
Doors on fridges	No information available	Yes	Used in 86 per cent of stores	Used in 100 per cent of stores	No information available
Waste heat recovery	No information available	No information available	Yes, 34 per cent of stores	Yes	No information available
Are they taking action to improve supply chain sustainable cooling?	No information available	Yes	Yes. Committed to cutting transport emissions by five per cent by 2026 (vs. 2021)	No	Yes, key suppliers are setting Net Zero targets

Ahold Delhaize operates more than 7,700 stores across Europe, the US and Indonesia. In Europe, the company operates in several countries, including the Netherlands, Belgium, Greece, Romania, Czechia and Serbia.[68]

In 2023, Ahold Delhaize generated €88.6 billion in revenue,[69] with €54.5 billion coming from the US market, suggesting a significant amount of capital expenditure to invest in this region.[70]

Actions taken

Ahold Delhaize's 2024 annual report iterates the company's commitment to adopt low GWP or natural refrigerants across its estate by 2040.

Areas for improvement

Growth in refrigerant emissions

Emissions from refrigerants and energy use associated with cooling represent a major part of Ahold Delhaize's Scope 1 and 2 emissions, represented by the fact the average GWP of gases it used was 2,341 in 2024. Recent data shared by the company notes that emissions from refrigeration decreased by 9.4 per cent from 2023-24.

Disclosure

While its 2024 annual report states 40 percent of its EU stores use natural refrigerants, this information does not include its US stores.[71]

Costed comprehensive cooling transition plan

Ahold Delhaize identifies refrigeration as one of four decarbonisation levers in its climate transition plan .[72]

Although the company notes that it has allocated financial resources for its climate transition plan until 2028, according to the company's 2023 and 2024 CDP disclosures, it has not yet estimated the cost of a comprehensive cooling transition plan, which is increasingly urgent due to stricter EU regulations and lagging U.S. progress.

While the company notes that three per cent of capital expenditure supports its broader climate plan,[73] it remains unclear what share is dedicated to natural refrigerant systems—clarity other featured retailers provide.

International operations

As a major EU and US retailer, Ahold Delhaize should address lagging US performance, highlighted by a low 24/100 score in EIA's 2024 Scorecard and fewer than one per cent of US stores using low-GWP refrigerants.[74]

Carrefour operates more than 14,000 stores across more than 40 countries, with a significant presence in Europe, Brazil and Argentina.[75] In 2023, it reported revenue of €84.91 billion.[76] Its acquisitions of Brazilian brands BIG and Atacadão have enabled Carrefour to become a major player in the Brazilian market.

Actions taken

Costed comprehensive cooling transition plan

Carrefour launched its HFC phase-out plan in 2011.[77] In its 2023, CDP disclosure the company estimates it will cost €650 million to convert 406 remaining European hypermarkets to natural refrigerants.[78] However, it does not mention how many smaller stores still need conversion.

Action beyond the EU

Carrefour began adopting natural refrigerant systems in Brazil in 2016, supporting local training initiatives and helping to stimulate broader industry uptake in the region.[79] The company also claims to share best practices on the adoption of natural refrigerants in the Latin American regional group of the CGF.[80]

Disclosure

Although Carrefour did not respond to EIA's information requests, its CDP disclosures and online reporting suggest a transparent approach to sustainable cooling.
Carrefour is the only retailer analysed here which is also assessed by Climate Action 100+. While that assessment marks the company down for not detailing its emissions abatement measures,[81] EIA's analysis finds evidence that Carrefour's investments in natural refrigerant technology serve as a key mitigation strategy that should be acknowledged more broadly.

Areas for improvement

Significant proportion of stores still use HFCs

Although Carrefour's refrigerant emissions fell between 2022-23, the relatively low percentage of stores reportedly using natural refrigerants remains a concern, especially when compared to some of the other featured retailers.

Need for additional capital expenditure allocation

Carrefour allocates the lowest capital share to natural refrigerants among the four disclosing retailers. To speed up its slow store conversions, it needs to increase this investment.

Supply chain actions

The company notes that rising online food sales may boost transport emissions and acknowledges the need to adapt its operations but does not specify how it will do this.[82]

Better engagement with civil society

Carrefour did not respond to EIA's survey, leaving its use of natural refrigerants in distribution and transport unclear.

Jerónimo Martins

As of 2023, Jerónimo Martins operated more than 5,769 stores across Portugal, Poland and Colombia, with a significant presence in Colombia where it has 1,438 stores.[83] The company achieved an annual revenue of €30.6 billion, with 2023 sales at its Colombian stores increasing by more than 37 per cent compared to the previous year.[84]

Actions taken

Costed comprehensive cooling transition plan

In 2020, Jerónimo Martins conducted a comprehensive mapping of its stores using HFCs with higher GWP, identifying those that need to transition to low-GWP alternatives by 2030.[85] The company estimated that converting these stores between 2022-30 would cost approximately €450-650 million.[86] This financial planning has enabled a rapid transition, with 1,276 new store openings or renovations to low-GWP systems reported across 2022 and 2023.[87]

Reducing emissions

These efforts are reflected in the company's significant emissions reductions. By 2023, refrigerant emissions had dropped to 0.10 $MtCO_2e$, reducing the overall share of cooling-related emissions in its total Scope 1 and 2 footprint (as detailed in Table 1.).

Action beyond the EU

Jerónimo Martins has demonstrated notable progress in Colombia, where in its response to EIA's survey, it notes that more than 97 per cent of its stores now use low GWP refrigerants. This success has been driven largely by the widespread use of propane based plug-in systems, which are particularly suited to the company's smaller store formats.

Supply chain actions

The retailer is taking steps to address Scope 3 emissions within its transport supply chain. As most of its refrigerated transport is outsourced, Jerónimo Martins reports that 70 per cent of its shipped goods now travel in containers using natural refrigerants. The company also notes it is working with logistics partners to adopt more efficient CO_2-cooled trucks, further supporting its commitment to decarbonisation.

Areas for improvement

As a member of the Latin American regional steering committee of the CGF, Jerónimo Martins is well placed to help accelerate progress across the region. However, there is currently limited evidence of knowledge-sharing efforts. The company could play a more active role in disseminating its experience and best practices, particularly in adopting natural refrigerants in emerging markets like Colombia.

METRO

Metro AG is an international food wholesaler with operations across Europe and Asia. As of 2023, the company operated 624 wholesale stores in 21 countries, including Kazakhstan, Pakistan and Ukraine, with a revenue of €31 billion.[88]

Actions taken

Costed comprehensive cooling transition plan

Metro AG has made a strong commitment to sustainable cooling, pledging to phase out 90 per cent of HFCs across its global operations by 2030, with a complete phase-out by 2040. To support this transition, the company has allocated €1.1 billion in investment between 2022-40, recognising the importance of sustained financial commitment to meet its climate goals.[89]

Reducing emissions

In 2023, Metro AG reduced its Scope 1 refrigerant emissions by almost half, with the retailer reporting that this was due to a rapid phase out of ozone-depleting refrigerants in its non-EU stores.[90]

Action beyond the EU

The company is making significant progress toward its targets. As of 2024, 50 per cent of Metro AG's stores were already using natural refrigerants. Notably, the company has expanded the roll-out of these systems beyond the EU, in countries where HFC regulations are less stringent. Currently, 266 non-EU stores, located in Moldova, Slovakia, Serbia, Ukraine and Russia, are operating with natural refrigerants. Metro AG has already achieved 100 per cent HFC-free operations in Moldova, with similar transitions planned for Slovakia and France by the end of 2026.[91]

Areas for improvement

Given its success with natural refrigerants in stores, Metro AG should explore the use of natural refrigerants in its transport fleet. It should also share progress within the CGF to support broader change within the industry.

Tesco operates more than 4,700 stores across the UK, Ireland, Czechia, Slovakia and Hungary.[92] In 2023, the company generated a revenue of £65.3 billion.[93]

Actions taken

Lower refrigerant emissions

Tesco was one of the first retailers to begin phasing out HFCs from its estate and its early action is now delivering results. The company's 2022 reported emissions are relatively low; however, its failure to share 2023 emissions data makes progress hard to track. As of 2022, Tesco estimated that about 33 per cent of its stores were using natural refrigerants.[94]

Addressing transport refrigeration

Tesco is the only retailer in this report currently using natural refrigerants in refrigerated road transport, publicly recognising the importance of lower impact refrigeration in meeting its Net Zero goals.[95]

Areas for improvement

Disclosure

Tesco's 2023, CDP disclosure lacks a considerable amount of information. Despite its clear progress in phasing out HFCs, the retailer fails to report progress within its disclosure and has withdrawn information previously shared with EIA.

As Vice Co-Chair of the CGF, Tesco CEO Ken Murphy has a responsibility to lead by example. Greater transparency and knowledge-sharing – both within the CGF and publicly – are essential to help stakeholders assess Tesco's progress toward its Net Zero goals.

Supply chain actions

It is positive to see Tesco encouraging its key suppliers to adopt Net Zero targets.[96] EIA encourages Tesco to use this opportunity to share insights in order to drive uptake of sustainable cooling across its supply chain.

PART SIX

HOW SUSTAINABLE COOLING SAVES EMISSIONS AND MONEY

Despite the need for initial capital expenditure, investment in natural refrigerant-based cooling offers attractive long-term returns via energy and refrigerant costs savings. Retailers who lag behind in their transition away from HFCs risk spiralling refrigerant costs and compliance related penalties.

Assessment of capital expenditure by retailers analysed in this report detailed in Table 2 shows that supermarkets are investing 4.3-7.5 per cent of annual capital expenditure in low GWP technologies, with leading retailers Jerónimo Martins and Metro AG allocating at least six per cent.

While the costs of refurbishing and building new stores relying on natural refrigerant cooling is significant, reduced operating costs and avoided penalties make a compelling case for early action.

Table 3 provides a snapshot of Carrefour's and Jerónimo Martins' annual investments in low GWP cooling systems, along with the resulting emission reductions and cost savings.

Both retailers report payback periods ranging from 4-10 years, depending on site-specific factors, though the available data suggests returns are closer to the four-year mark. With cooling systems typically lasting about 15 years,[97] the ongoing annual savings continue well beyond the payback period, offering a strong and sustained return on investment.

Table 3. Disclosure information detailing retailer investment in low GWP cooling and subsequent emissions and financial saving

Retailer	Annual investment in low GWP cooling	Annual savings	Annual CO_2e savings (tonnes)	Payback period	**Operational savings are significantly driven by the subsequent energy savings associated with natural refrigerant-based systems:**
Carrefour[98]	€80 million (2022)	€27 million	66,936	4-10 years	• Carrefour reports energy savings of 7-25 per cent compared to older HFC systems[101] • Metro AG reports energy savings of 20 per cent.[102]
Jerónimo Martins[99]	€60.2 million (2022)	€14.8 million	75,928	4-10 years	
Jerónimo Martins[100]	€90.1 million (2023)	€20.6 million	76,215	4-10 years	

Further emissions and cost savings can be achieved through additional measures such as installing doors on refrigeration units. Carrefour notes that when combined with low GWP systems these can result in energy savings of 19-45 per cent.[103] Jerónimo Martins reports a payback period for this measure of 1-3 years.[104]

Switching to natural refrigerants also helps retailers avoid the sharp rise in HFC refrigerant costs, some of which have surged by more than 800 per cent in Europe in the past four years.[105]

Supermarkets are major HFC consumers, with a store using 400-700kg of HFCs per year to refill systems.[106] Based on the current price of R-449a (a commonly used HFC blend) of €50/kg,[107] this would amount to annual refrigerant costs of up to €35,000 per store. As HFC supply is further reduced, HFC prices will continue to increase, further increasing costs. Similarly, in other regions phasing down HFCs, such as the US, supply restrictions are likely to drive up prices.[108]

In addition to spiralling refrigerant costs, lagging retailers also risk regulatory penalties. Carrefour has estimated the cost of non-compliance with the EU's F-gas Regulation to be about €100,000 per hypermarket, resulting in a potential cost of €40.6 million for its 406 hyperstores still using HFCs in Europe.[109]

Switching to natural refrigerants also helps retailers avoid the sharp rise in HFC refrigerant costs, some of which have surged by more than 800 per cent in Europe in the past four years.

PART SEVEN

A NET ZERO SUPERMARKET COOLING PATHWAY

Drawing on EIA's experience in monitoring and reporting on this sector in the past two decades as well as the best practices shared by retailers, EIA has developed a Net Zero Supermarket Cooling Pathway focused on four key areas: disclosing data, cutting refrigerant emissions, reducing energy use and engaging with supply chains.

Net Zero pathways

The need to move away from HFC-based cooling within the sector was acknowledged by the CGF (a global CEO-led consumer goods retailer and manufacturer association) in 2010 when it issued a resolution calling on retailers to begin phasing out HFCs by 2015.[110]

This was updated in 2018 when CGF member companies committed to install only ultra-low GWP or natural refrigerants where viable and, in markets where barriers exist, to overcome those barriers in order to enable the purchase of new equipment relying on natural or ultra-low GWP refrigerants as soon as possible and no later than 2025.[111]

With 102 global retail members, the CGF is uniquely positioned to lead a coordinated transition toward sustainable cooling. However, EIA's analysis of key CGF-member retailers reveals a mixed picture. While some companies have made notable progress, others – including Ahold Delhaize, whose CEO served as Co-Chair of the CGF– appears to have fallen short of their commitments.

EIA asked Ahold Delhaize to comment on our assessment that it was lagging behind other supermarkets on accelerating the drive to net zero decarbonisation in its cooling systems when its own CEO, Frans Muller was, until standing down on 13 June 2025, the Co-Chair of the CGF. The company denied it was not doing as well as others.

Market data on the uptake of natural refrigerant technologies outside Europe further suggests that many other CGF members are in a similar position. Moreover, according to the CGF Secretariat, "the individual companies continue to work on the refrigeration resolution but we no longer have an active community of companies working collectively on this at the CGF".[112]

CGF retailers had committed to install new low GWP equipment across their global estate by 2025, yet EIA's analysis suggests this has not happened. CGF retailers must recommit to the rapid roll-out of low GWP systems globally and ensure these commitments are met through reestablishing a CGF community focused on this critical issue. The CGF's recently launched Towards Net Zero initiative could provide a valuable space to develop this work.[113]

Other efforts to support decarbonisation in refrigeration include a 2021 Climate Action Pathway for Net Zero Cooling, promoted by the United Nations Framework Convention on Climate Change's High-Level Champions.[114] The pathway emphasised the need for rapid adoption of ultra-low GWP refrigerants and energy-efficient equipment. It called on investors to prioritise funding for ultra-low GWP cooling solutions, urged manufacturers to ensure that more than half of their product range uses ultra-low GWP refrigerants and encouraged businesses in high cooling-demand sectors to commit to purchasing ultra-low GWP equipment.[115]

In 2023, the Carbon Trust issued a stocktake on the path to Net Zero for cooling suppliers, assessing progress made along the pathway outlined in 2021. The stocktake found that reprioritising capital investment to include climate targets and engaging in collaboration and experience sharing with industry peers was instrumental in driving progress.[116]

A 2025 Carbon Trust report explores how the supermarket sector can accelerate progress towards Net Zero.[117] While the report primarily focuses on strategies to address Scope 3 emissions, the Carbon Trust underscore that achieving a Net Zero pathway requires a significant reduction in Scope 1 and 2 emissions by 2030.

EIA's Net Zero Supermarket Cooling Pathway

The pathway proposed by EIA aims to build upon previous efforts by offering a more detailed approach for supermarkets to deliver on Net Zero commitments. EIA proposes commitments in four areas, with milestones to measure progress. Detailed disclosures are the first step along the pathway, offering clarity on allocation of finance and progress towards decarbonisation of cooling. This is followed by targets to reduce refrigerant, energy and Scope 3 cooling-related emissions.

Disclosing data

The first step along the pathway involves transparency and planning. Successful retailers have mapped out the number of stores and other assets relying on HFCs, particularly those with a higher GWP. This is followed by a costed plan to convert existing and new stores to natural refrigerants along with allocation of sufficient and sustained capital expenditure to meet these targets.

In Europe, where installation of new stores using HFCs is restricted, retailers should focus on rapidly converting existing stores using HFCs to natural refrigerants. Outside of Europe, retailers must ensure that all new stores avoid the use of HFC refrigerants.

Disclosing this data and progress along the transition in a consistent and comprehensive way is essential for investors and other stakeholders to accurately monitor progress.

Reducing Scope 1 refrigerant emissions

Commitments made by Jerónimo Martins and Carrefour to phase out HFCs in European stores by 2030, and in non-European stores by 2040 at the latest, form the basis of the refrigerant emissions reduction target within this pathway.

Given that commercial refrigeration systems typically have a lifespan of about 15 years,[118] achieving these goals requires immediate investment and action in both EU and non-EU markets.

Additional measures aimed at cutting refrigerant emissions, such as tackling leakage and prioritising cooling systems using the most polluting HFCs for early phase-out, are suggested. Harder-to-tackle sectors such as transport refrigeration should not be overlooked, as progress in development of natural refrigerant technologies in this area is opening new possibilities.

Reducing Scope 2 cooling emissions

The targets set for energy-related emissions align with EU 2030 emission reduction commitments of 55 per cent reduction from baseline, which companies will be obliged to track as part of their European sustainability due diligence commitments.

Refrigeration is one of the largest energy uses in supermarket operations, therefore reducing emissions from refrigeration is essential to achieving corporate climate targets.

Retailer disclosures confirm that transitioning to natural refrigerant-based systems, alongside other energy efficiency measures such as adding doors on fridges and use of heat recovery, is critical to reducing energy consumption.

Additional simple steps, such as raising frozen food temperatures from -18°C to -15°C, also offer savings. A University of Birmingham study estimates that this adjustment could cut global cooling emissions by 17 $MtCO_2e$ annually.[119] Onsite renewable energy generation (e.g., solar panels) provides further decarbonisation potential.

Reducing Scope 3 cooling emissions

While progress on direct emissions is evident, Scope 3 (supply chain) cooling-related emissions remain largely unaddressed.

Among the companies analysed, Jerónimo Martins stands out for engaging suppliers to shift to natural refrigerants in shipping containers and working with transport refrigeration providers to support adoption of natural refrigerants in this hard-to-shift sector.

EIA's pathway calls on retailers to engage with suppliers to reduce Scope 3 cooling emissions using a similar approach developed by the Carbon Trust in its most recent supermarket report.[120]

EIA's

Net Zero Supermarket Cooling Pathway

I Disclosing data

Supermarkets disclose sustainable cooling related emissions and actions publicly and to the CDP

Disclosures should include:

1. stores and other assets using HFCs across the entire estate and a roadmap for each country they operate in for converting to HFC-free cooling
2. costs and operational savings associated with transitioning away from HFCs across their estate
3. financial risks of ongoing use of HFCs across their estate, including possible regulatory fines and estimated increased operating costs due to anticipated HFC price increases
4. allocation of at least six per cent of capital expenditure towards sustainable cooling transition, to be regularly reviewed and sustained over the long term
5. quantitative progress on the proportion of stores running on natural refrigerants
6. engagement with suppliers to support the broader roll-out of natural refrigerant based cooling.

EIA's
Net Zero Supermarket Cooling Pathway

II Cutting refrigerant emissions

Supermarkets commit to having natural refrigerant only cooling in European stores by 2030 and in non-European stores by 2040

Actions should include:

1. immediate measures to reduce leakage through improved system maintenance and refrigerant recovery and destruction from older systems
2. development of a plan outlining how all new stores, refurbishments and distribution centres will be HFC-free
   - in Europe, retailers should focus on expediting conversion of existing HFC stores to natural refrigerants
   - outside of Europe, all new stores and refurbishments should be HFC-free
3. globally, all new distribution centres should be HFC-free
4. trial use of natural refrigerants in transport refrigeration, combined with targets to ensure all related assets have transitioned away from HFCs by 2040.

EIA's
Net Zero Supermarket Cooling Pathway

III Reducing energy used for cooling

Supermarkets commit to reducing cooling related energy emissions by 55 per cent by 2030

Actions should include:

1. retrofit doors on fridges with the entire estate to be covered by 2030
2. maximise installation of onsite renewable energy, such as photovoltaic panels
3. consider uptake of heat recovery where appropriate
4. implement further energy demand-reduction measures such as increasing temperature for frozen food, using passive cooling where possible and installation of LED lighting
5. engage with manufacturers to support ongoing development of increasingly efficient refrigeration equipment.

EIA's
Net Zero Supermarket Cooling Pathway

IV Engaging with supply chains

Supermarkets take actions to reduce supply chain related cooling emissions

Actions should include:

1. develop an internal strategy on use of natural refrigerant-based cooling and decide how to track performance
2. identify which suppliers have the largest cooling-related emissions
3. support suppliers where needed; for example, the use of natural refrigerants in distribution centres is well established, but less so in transport refrigeration. This could include financial incentives, penalties or information sharing
4. use data driven insights to refine this process.

PART EIGHT

CONCLUSION AND RECOMMENDATIONS

This report provides a strategic roadmap for investors, outlining EIA's Net Zero Supermarket Cooling Pathway, a practical guide detailing the critical steps retailers must take to align cooling use with Net Zero goals.

These actions are structured around four key pillars – data disclosure, refrigerant emissions reduction, energy efficiency and supply chain engagement. The framework is designed to support meaningful action, not only among the five profiled companies but across the broader supermarket sector.

Cooling-related emissions represent a major share of supermarkets' carbon footprint, ranging from 36 per cent to 70 per cent of Scope 1 and 2 emissions for the retailers analysed.

As climate regulations tighten across Europe and globally, urgent action is required. New corporate reporting and sustainability directives in the EU mandate that large European companies – and non-EU firms with substantial EU revenue – publish detailed climate disclosures, including 1.5°C-aligned transition plans. Given the disproportionate impact of refrigeration on emissions, rapid action to reduce this source is both necessary and strategic.

Retailers operating in Europe face strong financial signals – some HFC prices have surged by more than 800 per cent in recent years and regulatory penalties further increase the cost of inaction. Retailers that have yet to transition away from HFC-based systems risk rising operational costs and long-term stranded assets.

Outside Europe, the picture is no less urgent. Continued installation of HFC systems – which typically operate for 15 years – could lock in carbon-intensive infrastructure just as global HFC supply restrictions and price increases begin to bite.

The good news is that natural refrigerant systems offer strong financial returns. Their lower energy use yields payback periods of 4-10 years, making them an attractive investment over the system's lifespan. When combined with additional measures, such as adding doors to refrigeration units, they can deliver energy savings of up to 45 per cent.

EIA's analysis of Ahold Delhaize, Carrefour, Jerónimo Martins, Metro AG and Tesco highlights both progress and gaps:

- Metro AG has pledged to phase out 90 per cent of HFCs globally by 2030, with over half of its estate already transitioned
- Jerónimo Martins has committed to a full global HFC phase-out by 2035 and has the highest proportion of HFC-free stores in the retailers analysed here
- Tesco lacks transparency in its CDP disclosures, but data shared publicly indicates about one-third of its stores now use natural refrigerants and it is the only retailer applying these systems in its transport fleet
- Carrefour provides useful cost data but still reports high HFC emissions, with a limited roll-out of HFC-free stores
- Ahold Delhaize is critiqued for high ongoing HFC emissions, insufficient disclosure on its refrigerant transition and slower EU HFC phase-out date.

Sustainable cooling presents a broader green growth opportunity. While adoption of natural refrigerants remains limited in many regions, stronger corporate commitment, supportive regulation and technician training can unlock faster progress globally.

The CGF has so far failed to deliver on its long-standing HFC phase-out pledges. However, with some of its members showing leadership, the CGF has a renewed opportunity to drive global progress by establishing a permanent refrigeration working group to support implementation of CGF retailers' commitment to install natural refrigerants in all new stores from 2025.

Recommendations

- **Retailers are urged to adopt the Net Zero Supermarket Cooling Pathway, accelerating action and learning from the examples of best practice highlighted in this report**

- **The Consumer Goods Forum should renew its commitment to a global HFC phase-out, ensuring that all new stores adopt natural refrigerant systems. To support and sustain this transition, the CGF should also establish a permanent refrigeration working group. The Net Zero Supermarket Cooling Pathway presented in this report provides a practical framework to help members achieve this goal**

- **Investors are encouraged to use the retailer-specific findings, along with the broader pathway, to guide their conversations with portfolio companies and advocate for stronger policies that enable sustainable cooling solutions**

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