



Helping Europe's small food retail adopt sustainable cooling

Refrigerants, Naturally! for LIFE
Laymen Report



**Refrigerants,
Naturally!**
for LIFE



The food retail sector is responsible for two percent of global greenhouse gas emissions. Refrigeration alone accounts for up to 50% of energy used in a food store. Climate action in the food retail sector, in particular the use of sustainable cooling and heating, is hence inevitable to make Europe climate-neutral by 2050. Still, small stores like organic food stores, butchers, or bakeries are often hesitant to invest in new refrigeration systems, climate-friendly refrigerants, and energy efficiency measures. The Refrigerants, Naturally! For LIFE project has helped them select the best options, and reap financial and climate benefits.

Food stores in the EU have a significantly higher energy use than stores in the non-food sector. With refrigeration systems accounting for a lion's share of energy used in a store they are often the largest contributor to a food retailer's environmental impact. The increasing use of air-conditioning for shoppers' thermal comfort is also set to consume ever more energy. As a result, the energy use from **refrigeration, air-conditioning, and heat pumps (RACHP) has become the primary factor in the emission of greenhouse gases (GHG)**, accounting for up to 60-90% of a food retailer's footprint.

What is more, commercial refrigeration keeping frozen vegetables, dairy or meat fresh, often operates with hydrofluorocarbons (HFCs). When HFCs escape from refrigerant systems, foams, or solvents, they become potent greenhouse gases, contributing to climate change. Already today, refrigerants used in the food retail sector are responsible for one third of HFC demand in the EU, and for up to 30% of the overall carbon emissions in EU stores.

As a result, a rising number of inefficient RACHP systems using HFCs will endanger the EU's 2030 climate targets, and put at risk climate neutrality by 2050.

The solution... and why small stores struggle to implement it

Natural refrigerants like hydrocarbons (R600a, R290 or R1270), carbon dioxide (R744), ammonia (R717), as well as water (R718) and air - all with a very low, or no, Global Warming Potential (GWP) - are a direct solution to reduce refrigerant related GHG emissions.

They are already used in a rising number of RACHP systems. However, natural refrigerants still face non-technical barriers, especially through non-favourable safety standards, lack of awareness, and missing specific skill sets in the RACHP servicing sector.

This is especially true for **small store owners** lacking easy access to reliable information about the impact of RACHP units and the use of fluorinated gases on the climate, energy usage, and financial resources. As independent, often family-run businesses or local chains they struggle with the selection and maintenance of the best available RACHP equipment, including that using natural refrigerants. For financial reasons and to maintain competitiveness with larger food retail chains, they tend to delay investments in new RACHP systems, although the installation of more energy-efficient equipment could be financially beneficial.

If small food retailers decide to replace their RACHP systems they often rely on local **small RACHP contracting and servicing companies** for installing and servicing those systems. However, the latter might have limited experience with natural refrigerants due to a lack of resources needed to train their staff.

The result is a vicious circle that has led to an above-average use of energy, a continued use of high-GWP refrigerants, and the use of outdated RACHP equipment in Europe's small food retail sector.



RefNat4LIFE helps small food retail adopt sustainable RACHP systems

In 2015, approximately 85% of all EU food stores had a sales area of below 1,000 m², out of which 64% were smaller than 400 m². Especially **organic food stores, small convenience stores, farm shops, butchers, poultry shops, confectionaries, bakeries and other specialised food shops** often fall in the category of small shops with a sales area below 1,000 m².

RefNat4LIFE addresses those small store owners, to reduce emissions in food retail, support them in the uptake of climate-friendly RACHP technologies, and accelerate the transition to natural refrigerants. Its second target group is the RACHP contracting and servicing sector to address the gap in trained technicians who promote climate friendly cooling amongst their customers. Other key stakeholders include RACHP equipment and component manufacturers, decision makers from public authorities and NGOs to strategically support the project goals.

The project defined **three pillars as instrumental in reaching its goals: 1) raise awareness** among end-users and their distribution chain, **2) increase uptake in training** on climate-friendly alternatives, and **3) disseminate tailored information on natural refrigerants and energy efficiency**. It brought together eight partners from five countries, representing relevant actors in the value chain for small food retail: organic food associations (BNN / Germany, SEAE / Spain, and Agrobio/ Portugal), refrigeration industry experts and technicians (project leader HEAT / Germany, KnVvK and STEK / Netherlands, BiV / Germany), and a market development company for natural refrigerants (shecco / Belgium). The project ran from June 2019 to December 2022.

Market study, stock model & interviews: Establishing a baseline

In the context of sustainable cooling and heating the small food retail sector and its needs is often over-

looked in European and national statistics. RefNat4LIFE set out to first get a better understanding of the total number of stores, the sector's structure, its economic position and challenges, and the potential for GHG emissions savings. Personal interviews and two EU-wide surveys were launched to receive input both from small food retailers and their RACHP servicing companies. Results are summarised in the **public report "Towards sustainable cooling in the European organic and small food retail sector - Status, technology needs and expectations"**. It finds that in stores of less than 400 m² sales area, plug-in refrigeration systems dominate. Retailers usually lack the financial capacity to opt for more energy-efficient new RACHP systems. Capital cost is more important than taking a lifecycle perspective, despite the fact that energy costs for running the equipment can take a share of up to 90% from the total cost of (inefficient) models. Due to uncertain commercial prospects of small stores, the lifetime of RACHP systems is often extended beyond recommended periods, or leads to a purchase of second-hand systems with low energy efficiency and possibly more harmful refrigerants. Most small food retailers have limited knowledge about the key technical specifications of their RACHP systems, such as the refrigerants used, or their energy consumption. They therefore lack an understanding of its cost and environmental impact.

In the European small food retail sector the use of synthetic high-GWP substances is still widespread and not in line with quickly increasing political pressure to ban certain substances.



As a family business and organic supermarket, we feel responsible. [...] Ekoplaza is focusing on natural refrigerants and energy savings and aims to be 100% converted to natural refrigerants in the future.

- Geert-Jan Smits, Ekoplaza

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A second result of the market study is the **first-ever stock model on RACHP-related emissions from Europe's small food retail**. It covers stores with up to 1,000 m² sales area and their business-as-usual (BAU) GHG emissions, as well as a mitigation (MIT) scenario projected up until 2025. Despite its uncertainty (numbers of stores estimated at an accuracy margin of +/-30%, as it relied on indicators prior to the COVID-19 pandemic), the resulting data is unique, as it is the first approximation for the small food retail sector alone.

The model finds that overall, the smaller a store with RACHP systems, the higher its energy use per m² compared to larger stores. While up to 50% of energy is used for refrigeration, another 20% is used for air-conditioning. As a result, small supermarkets (400-999 m² sales area) contribute 40% and superettes (<400 m²) around 27% to total RACHP emissions. The total **GHG emissions savings from best practice energy-efficient natural refrigerant RACHP equipment in the five project countries amount to 0.4 Mt CO₂eq in 2025 alone**, as compared to business-as-usual technology.

Case studies & Guides: Showing good practice

Based on the needs identified, the project developed tailored guidance documents for store owners and the RACHP servicing sector alike:

A **[RACHP Inventory Checklist](#)** documents current equipment in the store, whereas a **[Checklist for choosing the right RACHP Equipment](#)** evaluates needs and facilitates the decision-making process. A **[Guide on Technology and Market](#)** offers a summary of relevant definitions, available technology options, policy trends, refrigerant characteristics, financial considerations, and market data. A **[Guide on Plug-in Refrigeration vs. Centralised Systems](#)** compares technology options based on store size and layout, and presents benefits and challenges for each option. Finally, a **[Policy Guide for Spain, Portugal, the Netherlands, and Germany](#)** was published to provide an overview of

global, European Union, and national policies regulating direct and indirect GHG emissions.

Dedicated Guides provide support on questions of markets, policy, and technology for RACHP.



Four **[Case Studies from an organic food retail chain in Belgium, an organic farm shop in Germany, a bakery chain in Cyprus, and an organic shop in the Netherlands](#)**, provide evidence of working solutions in the small food retail sector.

Online courses & training list: Closing the knowledge gaps

Complementing the guidance documents and case studies the free online course **["Climate-friendly cooling in the small food retail sector"](#)** provides small food retailers with expert knowledge on RACHP options, and their optimal installation and maintenance. The self-paced e-learning provides information related to climate change in general, and on policies and regulations affecting the use of RACHP equipment, in particular the F-Gas Regulation restricting or banning the use of high-GWP fluorinated refrigerants. Store owners also learn about the basics of refrigerants used in cooling systems, where to find technical support for their use, and how to obtain public funding for the installation of new energy-efficient RACHP systems.

A second **[online course for technicians: "Natural refrigerants in the RACHP sector"](#)**, describes the characteristics of natural refrigerants, their benefits, and safety requirements. One module explains

how to best advise the small food retail sector on the uptake of natural refrigerants technology.

Both courses use quizzes and tests for a more interactive user engagement. Links to available support tools complement the course. Each course is available in the five project languages German, English, Dutch, Spanish and Portuguese.



RefNat4LIFE results

RefNat4LIFE has supported the uptake of climate-friendly RACHP solutions with the following:

A RACHP information toolbox for small food retail and servicing companies:

guidance documents, case studies, RACHP product finder, online training courses for both food retailers and servicing technicians, store check and rating system for sustainable small stores, training database, webinars... and more

146 communication activities in up to six languages with a multilingual website, eight e-newsletters, seven webinars, articles in specialised press, more than 1 million website views, 19,000 Twitter followers

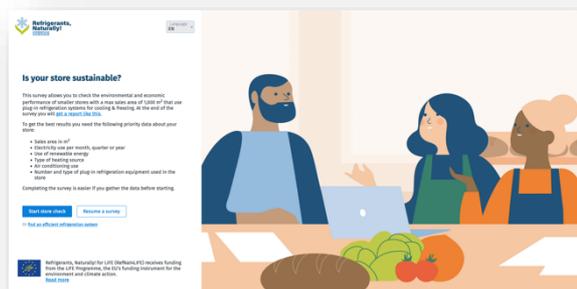
30 dissemination events attended live or online, despite COVID-19 restrictions

Natural refrigerants added to Spanish National Integrated Plan for Energy and Climate (PNIEC), anchoring political support for sustainable cooling

A [Training Directory](#) helps those RACHP servicing companies interested in educating their technicians on the best use of natural refrigerants find suitable training providers. Filters allow a search for language, format, country, refrigerant(s), and cost.

Benchmarking model, Store check & Product finder: Accelerating market uptake

To support store owners on their journey towards climate friendly shops, an online tool was developed specifically for the RefNat4LIFE project to check the environmental performance of stores with a maximum sales area of 1,000 m². The [Store Check: "Is your store sustainable"](#) for desktop and mobile use is based on a set of criteria to rate small stores on items such as electricity use in total / per m², the use of renewable energy, the store's carbon footprint, the use of sustainable plug-in refrigeration systems (natural refrigerants use, age of systems, frequency of internal and external maintenance, use of doors & covers), lighting and environmental management.



"Is your store sustainable?" – a Store Check compares a store's environmental performance against other small stores in the country.

At the end of the store check, results allow for a first benchmark of emissions at store level, and the calculation of cost and GHG emission savings related to the exchange of old with new appliances. A [Criteria Catalogue for Climate-Friendly Stores: Store Check](#) outlines the avoidable impact from energy use and/or GHG emissions, provides best practice on how to address each factor, and links to further tools like checklists and guides.



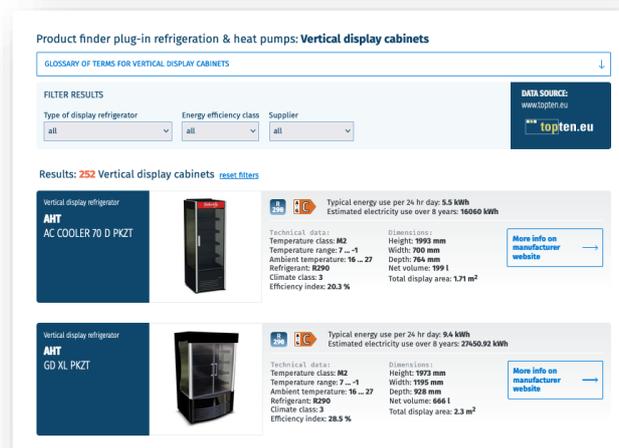
Some of us knew about the problems caused by fluorinated gases but we were not capable of suggesting real alternatives. Now almost the whole Spanish organic sector has had access to the information and when stores are interested in improving their cooling system, we know how to help them. [...] It's just a matter of perseverance.

- Aina Calafat Rogers,
Spanish Society for
Organic Farming & Agroecology (SAEA)

The Store Check is based on a new **Benchmark Tool**. The model rates a store's energy efficiency along four classes (top / bottom 25% or 50%) based on country, store size, climate conditions, and the use of heat pumps and/or air-conditioning. It calculates electricity use taking statistical data for non-household small electricity users, and the total store carbon footprint using the carbon intensity of a country's electricity mix. The comparison for small stores then calculates the carbon footprint of a store as compared to the most efficient ones of the same sales area in a country using 100% renewable energy. The model works for 30 countries, to allow for a pan-European data collection, and an easier replication of such tools to other interested parties.

To facilitate an easy selection of energy-efficient RACHP systems, the project also developed a **Product Finder for RACHP Equipment** that enables a search among five product groups often found in small food stores: vertical display cabinets, horizontal display cabinets, beverage coolers, ice cream freezers, and heat pumps. All models use natural refrigerants. Air-conditioners were not included as currently no appliances using natural refrigerants are available within the EU. The tool allows to filter results by sub-type of product, energy efficiency class, and supplier name. A cooperation was agreed with

the **TopTen project** allowing access to their information on best practice plug-in appliances for commercial refrigeration. While the TopTen database is only available in English and still lists some products with synthetic refrigerants, the RefNat4LIFE tool provides information in all five project languages for natural refrigerants only.



A product finder helps small store owners select energy-efficient plug-in refrigeration systems and heat pumps with natural refrigerants

Recommendations

Europe's small food retail sector faces significant challenges in the uptake of climate-friendly RACHP systems. Our recommendations for a more effective switch to energy-efficient, natural refrigerants-based systems:

Initiate behaviour change for food retailers:

Stakeholders at the regional, national and EU level need to increase their efforts to reach and tailor their message to small food store owners and technicians. Multipliers like associations or finance partners (banks) could be most effective.

Build capacity in the servicing sector: Training and certification schemes for natural refrigerants are needed to increase confidence in their use among new and experienced RACHP technicians. Easy-to-use formats, including online introductory courses, can speed up the process.

Bundle tools in one place: RefNat4LIFE has produced a variety of online tools and guidance material tailored to the small retail sector and its RACHP servicing partners. A seamless integration of information sources and support tools is needed to lower entry barriers for small store owners on the important subject of RACHP systems.



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Our project partners



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