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FOOD RETAIL DECARBONISATION WITH HEAT RECOVERY

A Practical Guide for Supermarkets and Retail Chains

Swegon

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Introduction

The food retail sector is at the forefront of the decarbonisation challenge. Supermarkets and retail chains operate in energy-intensive environments where refrigeration, heating, and cooling systems often represent more than 50% of total energy consumption. At the same time, retailers are under increasing pressure to reduce operational costs, comply with evolving EU regulations on refrigerants, and demonstrate progress towards Net Zero commitments.

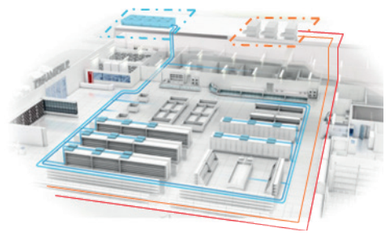


Figure 1: Heat Recovery Configuration

Heat recovery emerges as a strategic lever: it transforms unavoidable refrigeration waste heat into a valuable energy source for space heating and hot water. With the right system integration, supermarkets can cut energy bills, reduce carbon footprint, and future-proof their operations.
This white paper outlines the regulatory context, the role of heat recovery in decarbonisation, and Swegon's unique approach with R290 heat pumps, integrated modules, and system-level controls. It also presents use cases, ROI considerations, and a roadmap for food retail owners to transition towards sustainable HVAC and refrigeration solutions.

Market Context & Regulation

The global **supermarket refrigeration market** was valued at $17.2 billion in 2023 and is projected to reach $33.7 billion by 2032, growing at a CAGR of 7.7%. This reflects the dual push from cost reduction and environmental responsibility (source Allied Market Research).

Thus, regulatory drivers brought an impact on Food Retail owners with correlated challenges to face.

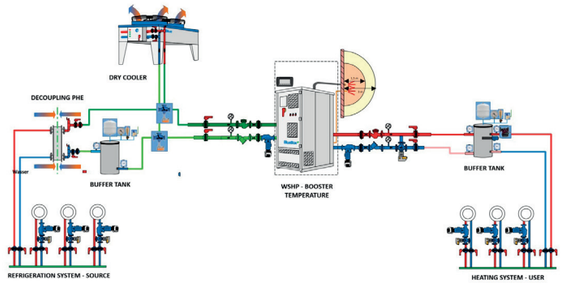
DRIVERS	IMPACT
F-Gas regulation	2025 → EU Ban on centralized systems ≥ 40 kW with GWP > 150 | 2027 → EU Ban on any commercial refrigeration using refrigerants with GWP > 150
Eco-design & Energy Labelling	Stricter minimum efficiency performance standards
Incentives & Certifications	Limited period of access to national subsidies with bureaucratic processes

The main challenges are the following:

- Limited technical space in existing stores.
- Integration between HVAC and refrigeration systems.
- Rising energy prices and operational costs.
- Demand for clear ROI on sustainability investments.

The Role of Heat Recovery in Decarbonisation

Refrigeration systems continuously reject large amounts of heat. Traditionally, this waste energy has been expelled into the atmosphere via gas coolers or dry coolers. With heat recovery, that energy is redirected to cover **heating and hot water needs.**



Swegon's Approach

Swegon provides **a system approach** designed specifically for food retail applications, integrating heat recovery, hydronic solutions, and smart controls starting directly from the perimeter of the field for the correlated application.

The main key solutions are:

- Centralized Rack Systems: Integration between Zeta Zero ASHP (30–70 kW) and Sigma Zero (80–290 kW) WSHP, the latter embedded inside a hydraulic module for large supermarkets.
- Waterloop Systems: Modular heat recovery through Sigma Zero range used as a booster temperature, with Zeta Zero range as integrated source when needed.
- Package Systems (Plug-in Units): Geyser Sky range (20–30 kW) for smaller stores or distributed applications.

If heat recovery is not feasible in the case of Package Systems, for the other two solutions, it is a benefit in terms of energy efficiency.
We dealt with both, centralized rack systems, that are more common in existing buildings, while waterloop systems are the last generation of refrigeration systems for Food Retail stores, more visible in new buildings. In these cases, the heat recovery could be done based on the following conditions:

- **Total Recovery:** Waste heat fully meets heating needs (typically in mid-seasons).
- **Partial Recovery:** Waste heat covers part of the demand, with integration from ASHPs.

Thus, the result is to obtain a system able to guarantee the IEQ of the building, exploiting the maximum quota of the waste heat available from the refrigerated cabinets, reducing the OPEX costs of the Food Retail store. In this way, to bridge the gap between Food Retail constraints and system development during refurbishment, we must anchor our approach to customer-defined scope, typically energy efficiency, minimal downtime, and ROI. Prioritize clear requirement gathering to avoid scope creep.
The key differentiators that are part of this system approach are:

- **Natural Refrigerants:** R290 (propane) systems with high efficiency and future-proof compliance.
- **Customized Hydraulic Modules:** Compact, plug-and-play integration for rapid deployment.
- **Advanced Controls:** Proprietary software ensuring optimal recovery, redundancy, and remote monitoring.
- **Sustainability Proof:** Environmental Product Declarations (EPDs) based on lifecycle assessments.

Figure 3: Customized Hydraulic Module with software embedded

Solutions by Store Type

In the world of food retail, energy flows shift with the seasons and so do the opportunities for heat recovery.

For **small stores**, typically equipped with plug-in refrigeration units, the heat generated by the cabinets is expelled outdoors, because the quota is very low and the investment is not feasible compared to its possible ROI.

Medium-sized stores, often running on distributed rack systems, follow a similar rhythm. During the cooling season, recovery is not feasible – the priority is maintaining food-safe temperatures while rejecting excess heat. But as temperatures drop, recovery begins to play its part. In mid-seasons, waste heat alone can fully cover heating needs (total recovery). In colder winter conditions, it is blended with the output of the Zeta Zero heat pump (partial recovery), striking a balance between efficiency and comfort.

For **large supermarkets and hypermarkets**, where centralized rack systems dominate, the seasonal cycle becomes even more powerful. In summer, waste heat escapes through gas coolers as usual. Yet in the shoulder months, the volume of available waste heat is so significant that it can completely cover space heating and hot water needs. Come winter, when heating loads peak, a Sigma Zero booster heat pump integrates seamlessly, lifting temperatures to the required levels and ensuring uninterrupted comfort.

Across all store types, the principle is the same: **no recovery in cooling season, total recovery in mid-seasons, partial recovery in winter**. What changes is the scale and the system architecture. The outcome, however, remains constant: supermarkets turn waste into value, cutting operating costs while making meaningful strides towards decarbonisation.

Conclusions & Opportunities

Heat recovery is no longer a distant prospect – it is an opportunity waiting just around the corner for every food retail owner. The systems already in place produce more heat than most realize, and with the right integration, that "waste" becomes a reliable source of comfort heating and hot water.

The business case is clear: by leveraging heat recovery, supermarkets can cut operating expenses by up to 50%, reduce CO_2 emissions by 20–40%, and secure payback in just a few years. At the same time, they position themselves ahead of regulatory deadlines and strengthen their brand reputation in sustainability.

For food retail owners, the moment to act is now. Decarbonisation pathways are being shaped by legislation, energy markets, and customer expectations. With modular, prefabricated solutions and proven technologies like R290 heat pumps, the transition is low-risk and highly rewarding.

In short: **heat recovery turns today's compliance pressure into tomorrow's competitive advantage**. Those who move first will not only lower costs but also redefine their stores as resilient, sustainable, and future-proof.

Feel good **inside**

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