

ENGINEERING
TOMORROW



Brochure | Food Retail Smart Store

Efficient, safe and green

Get it all with Danfoss Smart Store

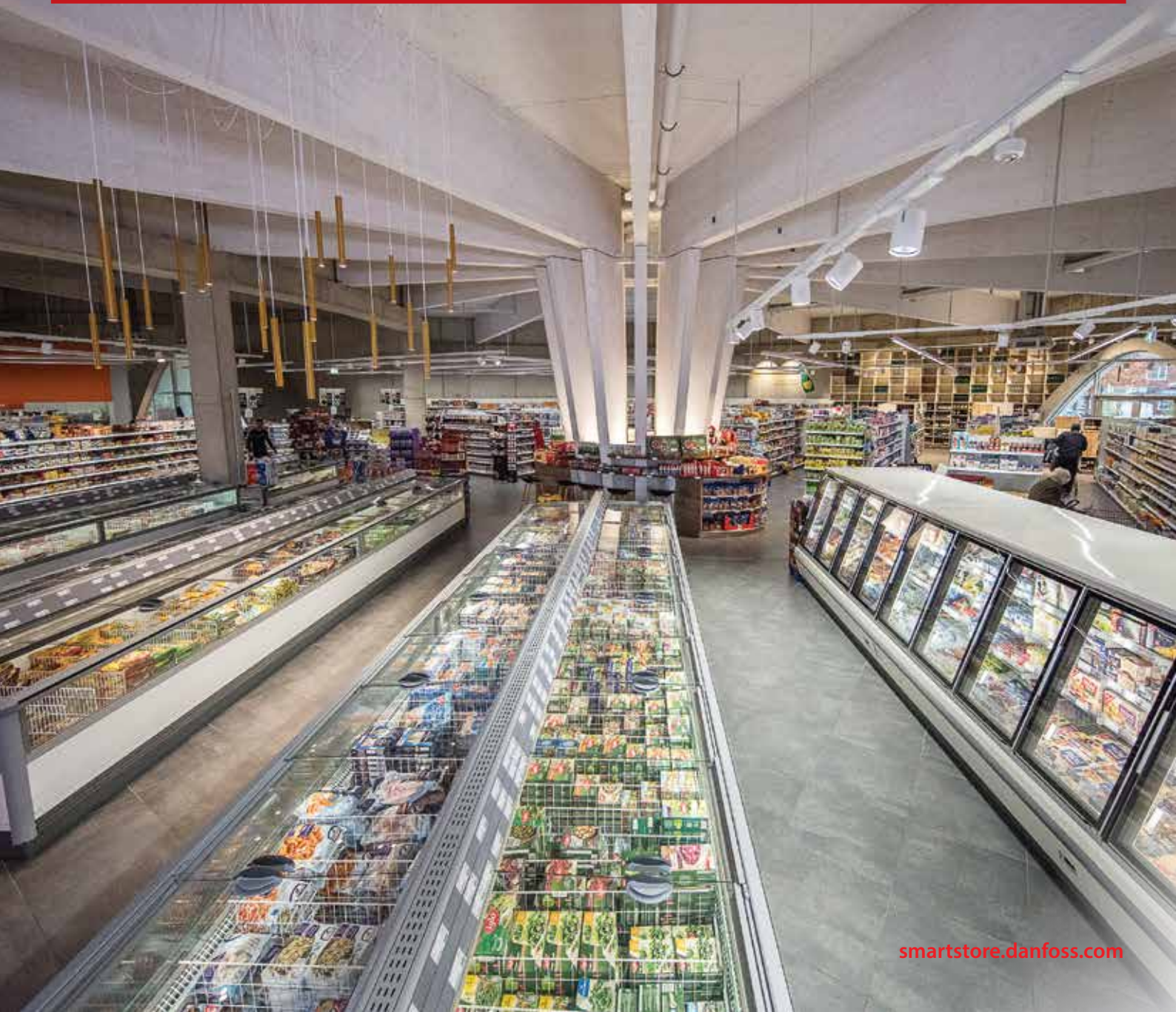
Proven in

50,000

installations around
the world



Learn more at
smartstore.danfoss.com



smartstore.danfoss.com

Are you ready to face the **challenges**?

Climate change, new demands to energy efficiency, concerns about food safety, and new opportunities to raise profitability with big data are just some of the trends that drive the present development in food retail.

At Danfoss we have made it our business to help you make the most of the opportunities.

Combat Climate Change

What if supermarkets had zero emissions?

CO₂ has proved to be a highly efficient and climate-friendly alternative to traditional HFCs in food retail. With CO₂ or other low-GWP solutions, at least 50 million tons of equivalent CO₂ can be prevented from escaping into the atmosphere every year.

Danfoss Smart Store helps you boost both energy efficiency and the green image of your brand.



60 %

reduction in CO₂ equivalents when replacing synthetic refrigerants with natural refrigerants

Maximize Energy Efficiency

What if stores could deliver more energy than they use?

As the global population grows, energy consumption is expected to rise by one third in 2035. The situation calls for technologies that can maximize energy efficiency.

Danfoss Smart Store helps you maximize the energy efficiency of your store regardless of size and complexity. Our long-term ambition is to enable net-zero stores or even stores that give more than they take in terms of energy by pioneering smart solutions.



50 %

energy savings with Danfoss Smart Store

Optimize Food Safety

What if food loss situations could be predicted and food safety then could be guaranteed?

Today, roughly one third of the food produced for human consumption is lost or wasted. One fourth of the food loss takes place in the retail sector. This immense food waste is a key challenge and calls for action.

Danfoss Smart Store provides tight temperature control with near-zero downtime on vital refrigeration equipment to curb food loss.



24/7

temperature control with Danfoss Smart Store

Think ahead with Big Data

What if stores were connected and equipped with intelligent components?

The use of big data and self-learning technologies open a new world of opportunities for retailers.

Danfoss Smart Store helps you embrace the opportunities in digitalization and data management to improve revenue streams, control costs and drive change in business and delivery models.



9,000

Supermarkets worldwide use Danfoss Smart Store to be in control

Let **Danfoss** help you unleash the **opportunities**

Welcome to Danfoss Smart Store!

Danfoss Smart Store is the supermarket of tomorrow, enhancing food safety and maximizing energy efficiency from case to cloud.

Our Smart Store is constantly expanded and developed in close cooperation with the global community of food retailers. The solution is currently running in more than 9,000 stores worldwide, returning savings of up to 50 %.

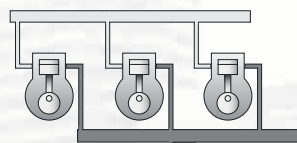
Every day, we are dedicated to make your supermarket just a little smarter!

2-3 years

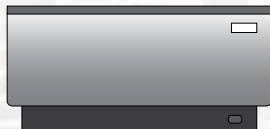
- is all it takes to
return your Smart
Store investment



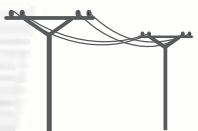

Monitoring and Management



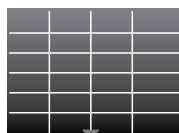
**Pack solutions, including
natural refrigerants**



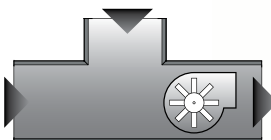
Evaporator Solutions



Smart Grid



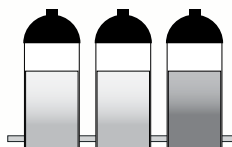
Solar Energy



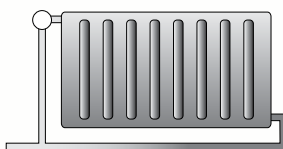
HVAC



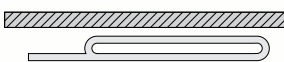
Lighting



**Battery, Cold and
Heat Storage**



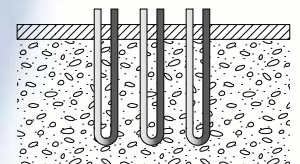
Hydronic Heating



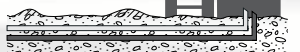
Floor Heating



De-Icing



**Energy well for
heatpump and cooling**



External Heating Grid

Think ahead and create value with Big Data

Information continues to grow exponentially and the next battlefield of food retail is online. Data integration and connectivity enable full transparency, new insights and proactive decision-making across sites, enhancing customer experience and adding value to the bottom line.

Danfoss Smart Store ensures lowest Total Cost of Ownership and premium user experience by providing full transparency of all relevant assets across Danfoss and non-Danfoss controlled stores.

Get connected - to improve control, increase performance, reduce costs and act sustainably.



smartstore.danfoss.com/bigdata

You get what you need – no more, no less

Danfoss Enterprise Services is built in modules that can be put together to fit your stores. All screens and functionality are customized to daily monitoring needs or executive reporting. The service module portfolio is continuously expanded in close collaboration with our food retail partners around the world.

Danfoss Enterprise Services Portfolio - Enabling value-adding decisions

- 24/7/365 Alarm Management
- Compressor Performance
- Leak Detection
- Refrigerant Levels
- HACCP (Temperature Management)
- Setpoint Control
- Energy Baselining & Benchmarking
- Lighting & HVAC
- Estate Performance Reporting
- Continuous Commissioning
- Demand Response Programs

Focus on **what you do best** and let us do the rest

Danfoss Enterprise Services offer powerful analytics and reporting tools that can be used to ensure that assets are performing top-notch at all times. With access to real-time data 24/7, your staff can act on facts and control the store around the clock via dashboards with information about temperatures, energy consumption, alarms, etc.



Connectivity features

- Secure data connection from source, to host and back to store.
- Firewall to firewall connection approved to certification standards.
- Connectivity options include VPN, 4G wireless (requires a SIM card), FTP and secure IP.
- Real-time, bi-directional data transfer.
- 99% uptime – constant 'ping' of connection.
- Fully backed up environment with restore services.
- Multi-brand gateway and controller connectivity.
- All communication protocols supported.

Danfoss System Manager – The brain of the Smart Store

Danfoss System Manager enables seamless integration of refrigeration and HVAC. Designed specifically for food retail applications, the System Manager provides all the functionality and tools for control, maximum reliability and high energy efficiency. Accessible from any device, the System Manager offers 100 % availability remote or on-site.

What's in it for you?

- Get connected from case to cloud
- Optimize COP on refrigeration and HVAC
- Monitor your facilities by means of user-friendly dashboards or detailed reports
- Configure your solution with easy-to-use wizards
- Control your system from any platform, stationary or mobile



While you **take care** of your **core business...**

Danfoss Enterprise Services provides you full on-demand insight into the operation, consumption, and equipment lifecycle analysis at all levels of aggregation.

Immediate leak detection

Effectively detects refrigerant leaks to protect the environment. Leak detection offers visual reporting on several sites, store level or store zones.

Global set-point control

Regular set-point adjustments in your store impact the quality and efficiency of the system. Global Set-point Control ensures optimum set-points throughout daily operation.

Energy Information System (EIS)

Creates baselines and benchmark reports for the store's energy usage. Provides insight into current usage against historical data to improve efficiency and reduce cost.

Executive reporting

Provides a monthly consolidated view of store performance to constantly improve performance.

Discover the hidden treasures of the compressor room

When looking to optimize the energy efficiency of your stores, go straight to the pack. The pack holds the key to meeting new regulation on refrigerants, reducing the energy consumption and minimizing the risk of break-downs that cause food loss and inconvenience to shoppers.

Danfoss Smart Store offers optimum pack control that integrates variable speed drives and options for heat recovery. When choosing Danfoss, you get a one-stop-shop for complete pack control for systems of any size and refrigerant.

Variable speed saves up to 30 % on compressor work

In many supermarkets, compressors only need to run at full speed about ten percent of the time. The rest of the time, the compressors can run at a lower speed and still deliver the required refrigeration.

Frequency converter enable speed variation and if, for example, you end up decreasing the speed of the compressor by 25%, the use of the frequency drive will generate a 25% energy savings.

Danfoss is a leading expert in drives for a large number of applications, including compressors.

Italy's largest hypermarket opts for CO₂ refrigeration

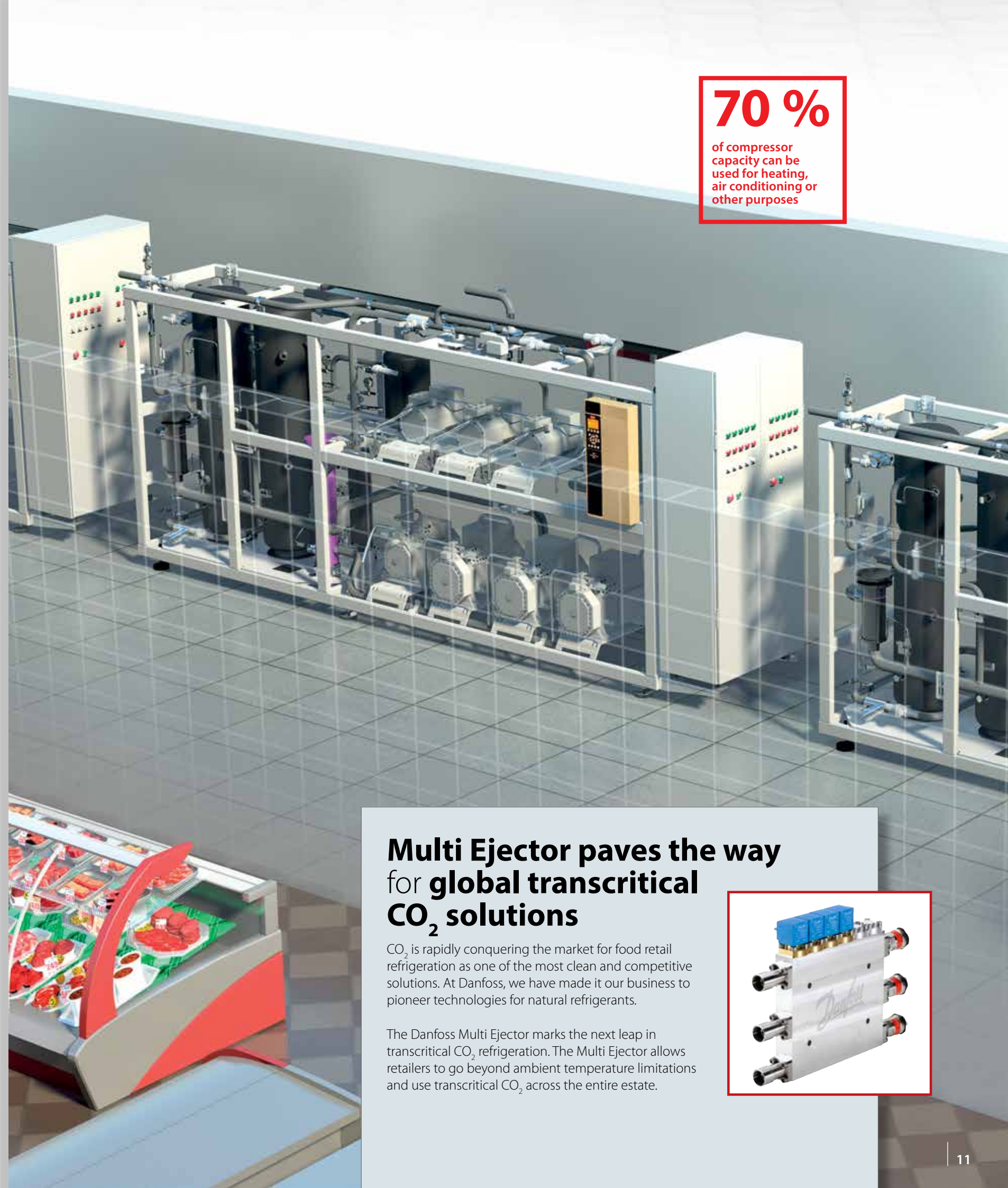
The use of CO₂ transcritical refrigeration in warm climates has been a hot topic for many years. Now, the tables are turning and CO₂ refrigeration advances across Southern Europe as an efficient and viable solution. In April 2016, the largest hypermarket in Italy opened its doors in Milan. The 10,000 m² brand new Iper market is a pioneer in CO₂ transcritical refrigeration system using Multi Ejector technology to enhance efficiency in ambient temperatures up to 38°C.



Read the full story here

70 %

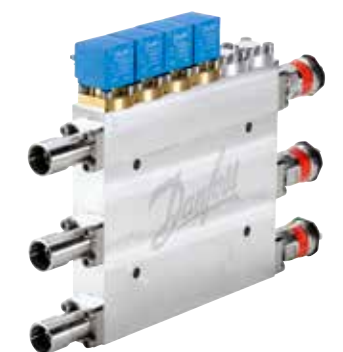
of compressor capacity can be used for heating, air conditioning or other purposes



Multi Ejector paves the way for global transcritical CO₂ solutions

CO₂ is rapidly conquering the market for food retail refrigeration as one of the most clean and competitive solutions. At Danfoss, we have made it our business to pioneer technologies for natural refrigerants.

The Danfoss Multi Ejector marks the next leap in transcritical CO₂ refrigeration. The Multi Ejector allows retailers to go beyond ambient temperature limitations and use transcritical CO₂ across the entire estate.



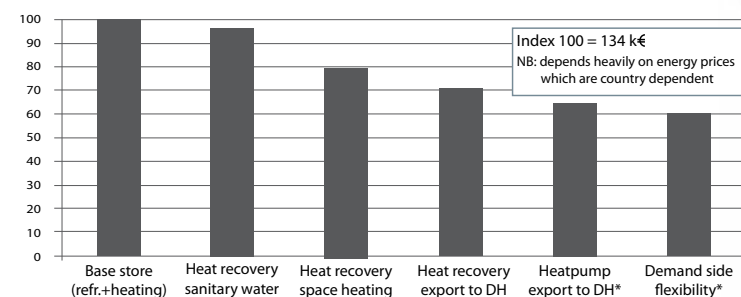
Smart grid – Your store is part of the solution

Increasing energy efficiency inside the store is not the only way to optimize Total Cost of Ownership. Flexibility in energy demand – or smart grid integration – is also part of the solution. Flexibility in cooling demand and connection to district heating/cooling networks or micro-grids are some of the opportunities available to make supermarkets energy suppliers, adding valuable capacity to the energy network and new revenue streams to your business.

Danfoss Smart Store takes maximum advantage of smart grid solutions and offers a wide range of solutions to integrate the use of renewables.

From component to grid – your store is part of the solution

Supermarkets can play a significant role in smart and integrated energy systems. The Excess compressor capacity can be used to turn the supermarket into an energy producer, by using the compressors as heat pump. Excessive heat from the refrigeration system can be sold into the district heating system. And when combined with solar energy, the supermarket can be transformed to a local micro heat and power system.



* Expected

Potential for energy savings inside and outside the store



smartstore.danfoss.com/refrigeration

New Heat Recovery Unit

Danfoss has developed and designed a Heat Recovery Unit (HRU) to manage waste heat from transcritical CO₂ systems in supermarket.

Recovered heat can be used for own heating purposes or sold back to a district heating utility network or other micro grids available.

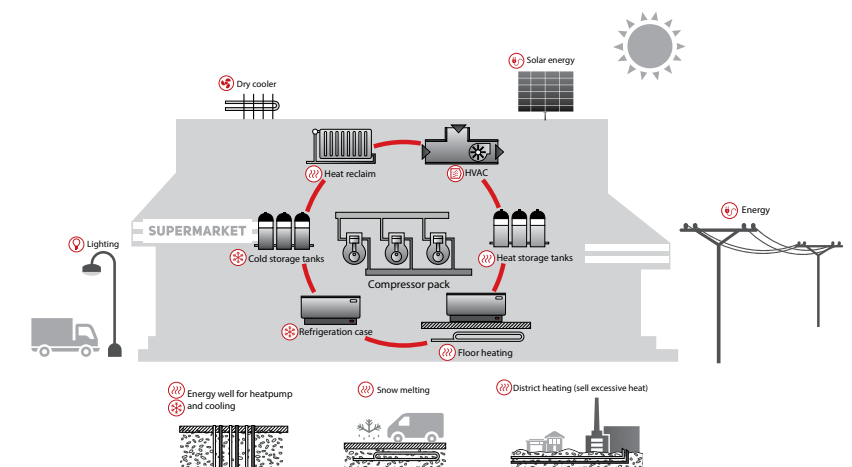
The system includes a heating substation with special designed buffer tanks and control system, to ensure correct flow through the system.

Danfoss prefabricated HRU-substations reduces space demand by approximately 30% compared to build-on-site solutions



Up to 1,000 supermarkets become energy producers

Danfoss is part of a joint venture with scientists, innovators and retailers that seek to transform supermarkets into energy producers. Under the heading 'Super Supermarkets', the project aims to rebuild up to 1,000 supermarkets in Denmark and Northern Germany to demonstrate and document the full potential of energy recovery from supermarkets as part of local electricity and district energy grids.



Save energy without compromising food safety

A profitable supermarket relies on flawless operation of cold cases and freezers regardless of ambient temperatures and load conditions. Relentless focus on food safety explains why electricity consumption by cases and freezers count for close to one third of the total energy consumption in the supermarket.

Danfoss Smart Store proves that optimized control of cold cases and freezers can reduce the energy bill by up to one third without compromising food safety. No two stores are the same, but with the wide range of control options from Danfoss, you achieve the flexibility to configure the most reliable and energy efficient solution for every store in your chain.

The power of adaptive refrigeration

Adaptive refrigeration holds the key to maximizing energy efficiency and COP. The secret lies in the Minimum Stable Superheat (MSS) algorithm that ensures perfect balance of the refrigeration system, where the full surface of the evaporators is used without risk of liquid damage to the compressors.

Thousands of retailers across the world already take advantage of adaptive superheat in their cooling systems with energy savings up to 12 percent over alternative technologies.

AKV - The Supermarket Superstar

The Danfoss AKV electric expansion valve was the first ever electric valve for food retail refrigeration. Today, the AKV has been installed in more than two million refrigeration systems across the world due to its outstanding performance and reliability. The product range is constantly improved and expanded to match new refrigerants, notably CO₂, new energy efficiency standards and innovative system configurations.

Energy consumption can be reduced by up to 33 % if you take advantage of the full ADAP-KOOL® system with suction and condensing pressure optimization. The built-in adaptive defrost control ensures constant high energy efficiency without compromising food safety.



33 %

energy savings on
optimized control
of cold cases and
freezers

New Integrated Controller Tray Brings Retail Refrigeration Systems Up-to-date

The saying "One size fits all" is a good description of the integrated controller tray; the result of a collaboration between Danfoss and Viessmann Refrigeration Systems Oy. A modernised gear tray and a case controller are seamlessly integrated in one product. With the controller tray, it is possible to replace hundreds of different types of electromechanical solutions in a cabinet manufacturer's production. The new technology allows control function changes on a case controller even in the middle of production, because the control algorithms are imported to the controller tray in a separate memory card (ID-Key).



Read the full story here

Reduce complexity with integrated control of refrigeration and HVAC

Many stores operate separate control systems for refrigeration and HVAC. But why not integrate monitoring and control of all power-consuming applications in one system?

By integrating control of refrigeration, heating, ventilation and air conditioning, Danfoss Smart Store reduces complexity and thereby operational costs. Integrated control unlocks the full potential of each application and increases the efficiency of the entire system.

Get the most out of integrated control with Danfoss MCX

The Danfoss range of universal MCX programmable controllers allows you to make the most of your heating, ventilation and air conditioning solutions. MCX offers full flexibility due to its modular design, standard programming interface and versatile connectivity options.



Components that will boost the performance of your HVAC system

Danfoss introduces the digital actuator **NovoCon® S**, a true revolution in hydronic balancing and control. The actuator is tailor made to fit **AB-QM** – the market leading pressure independent balancing and control valve for more than a decade – creating a perfect connection between superior hydronic performance and building automation. This gives you complete control and access to tomorrow's HVAC benefits today.

The daily load variation in HVAC facilities is considerable. **Variable speed control** of electrical motors has proved to be one of the most effective cost-reducing measures available. By reducing the average speed of a motor in, for example, a pump or fan by 20%, energy savings of 50% can be achieved. Reducing the average speed by 50% increases the savings to 80%.

Better power supply quality, system diagnostics, humidity control, energy savings, accurate temperature control, less noise, greater comfort. **Inverter compressor** technology offers new opportunities for air conditioning systems. The compressor matches power input with cooling capacity which can represent over 30% reduction in the energy bill every year compared to a fixed speed or mechanically modulated compressor.



80+
years of experience
in HVAC control
solutions

20 % savings during daytime – 46 % savings at night

A French discount chain made a bold move to take full advantage of the opportunities offered by Danfoss Smart Store. They achieved 20% energy savings during the day and 46% savings during the night by:

- Installing a new pack control with variable speed on compressor/condenser
- Installing a new front-end for integrated control of refrigeration, HVAC and lighting
- Implementing light zoning and activation according to daylight and usage patterns
- Applying reversible heat pumps

Big opportunities in **smaller formats**

Smaller formats are becoming big, as retailers respond to shoppers' desire for a quick shopping experience. The increasing number of convenience stores in tight urban areas are facing the exact same challenges as traditional supermarkets in terms of food safety, energy efficiency and environmental protection.

Danfoss offers Smart Store solutions to convenience stores and other smaller store formats to optimize total cost of ownership.

Semi-plugin or remote ? – Make the right decision

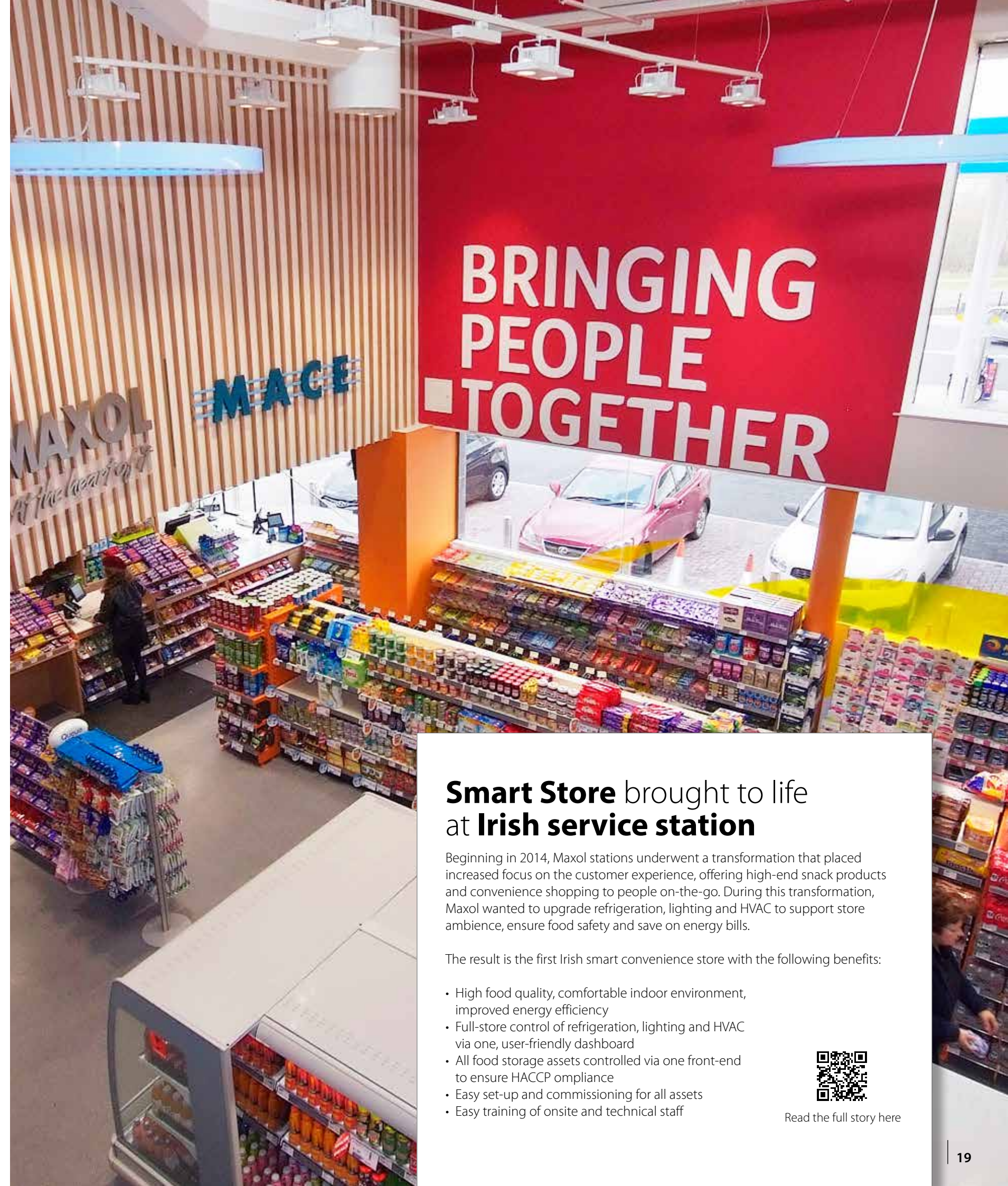
Small store owners are facing the critical decision to go for plug-in cabinets with or without water loop system, or to go for central refrigeration system with remote cabinets. There are pros and cons for both solutions, and Danfoss refrigeration experts can help you make the right decision on which way to go.

Compared to plugin cases, water loop systems typically provide an efficiency advantage as they may operate with lower condensing pressures and at the same time avoid indirectly loading the air conditioning system.

In small stores water loop systems may provide a lower initial cost as the incremental costs of the remote pack is relatively more significant. In larger stores, water loop systems become less attractive as parasitic losses from pumps and additional heat transfer grow in importance. In addition, with remote systems, high quality heat may be reclaimed from the system to efficiently provide both hot sanitary water as well as hydronic space heating.

Handy condensing unit for smaller stores

Danfoss Optyma™ Plus Inverter is the ideal choice for the smaller store. The compact condensing unit offers tight temperature control, 25 % higher energy efficiency and runs with several different refrigerants. The unit comes as an easy plug and play package, easy to install and maintain.



Smart Store brought to life at Irish service station

Beginning in 2014, Maxol stations underwent a transformation that placed increased focus on the customer experience, offering high-end snack products and convenience shopping to people on-the-go. During this transformation, Maxol wanted to upgrade refrigeration, lighting and HVAC to support store ambience, ensure food safety and save on energy bills.

The result is the first Irish smart convenience store with the following benefits:

- High food quality, comfortable indoor environment, improved energy efficiency
- Full-store control of refrigeration, lighting and HVAC via one, user-friendly dashboard
- All food storage assets controlled via one front-end to ensure HACCP compliance
- Easy set-up and commissioning for all assets
- Easy training of onsite and technical staff



Read the full story here

Engineering **Tomorrow's** Food Retail **Solutions**



3rd party integration

XML

Open XML interface



Remote Management Tool
Web Browser



System Manager



Store View Desktop



Site Service App

Evaporator Control



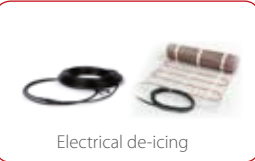
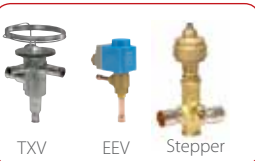
Pack Control



HVAC



Light, Aux. Control



One-Stop-Shop

Danfoss is your one-stop-shop which offers flexible control solutions for all Food Retailers. Through our wide range of adaptive products and solutions, Danfoss is your business partner that will enable you to achieve to the optimal solution in your supermarket through:

- Supplier base consolidation
- One point of contact
- Time savings through reduction of order handling
- Field and electronically delivered services, all in one
- Application design support

250

food retail experts
will help you all
the way

Danfoss is with you all the way

Are you in the market for high-performing turnkey solutions for control of your stores? Are you looking for expert application knowledge to design your next generation control solution? Or do you want to dive into leading-edge technologies and solutions for CO₂ refrigeration, COP management or smart grid integration?

Before committing to your next solution, consult with Danfoss to choose the right solution for your stores. At Danfoss, we build our business on trust and integrity, and we work hard to make sure that our products and services delight our customers every time.

Learn more. Achieve more

Learn more about Danfoss' many energy saving and efficient products and solutions at Danfoss Learning. Our new online education platform is packed with courses developed by experts - and is open 24/7. All our courses have been developed according to best practice principles by trained trainers who know their field to the smallest detail. This is your guarantee that your time at Danfoss Learning is well spent.

Visit Danfoss Learning today and get started. It's fast, easy and you will quickly feel the effect of more knowledge in your daily work.

Update your CO₂ know-how in new mobile training unit

In order to harvest the full potential of transcritical CO₂, there is a need to cultivate know-how on properties and solutions. In order to meet this need for competence building, Danfoss has fitted a mobile training unit with equipment and components for CO₂ solutions accompanied by interactive panels for training. The container is staffed by Danfoss CO₂ champions with in-depth knowledge of transcritical solutions - from simple gas-bypass systems to more complex parallel compression with or without heat reclaim. Furthermore, the brand new Multi Ejector technology is introduced.



Danfoss Learning



Danfoss Services

Services at every stage of your store's lifecycle.



Let's talk

At Danfoss we believe that long term partnerships starts with a good dialog

- To understand your situation
- To find the best solution
- To provide the evidence

Contact your local Danfoss representative – and let's talk.





Discover the opportunities with Danfoss Smart Store

As a market leader with more than 50,000 food retail installations worldwide, Danfoss leads the development of integrated control solutions. Our Smart Store solution has been developed based on 30 years of close cooperation with the global community of food retailers. The solution is currently running in more than 9,000 stores worldwide, returning savings of up to 50 %.

Danfoss continues to develop the portfolio of components, controllers and advanced algorithms with the long-term ambition to create net-zero stores or even stores that give more energy than they take. Together with forward-thinking retailers around the world we take sustainable solutions to the next level through constant development of innovative technologies and service concepts.

Visit Danfoss Smart Store at:
smartstore.danfoss.com