

ENGINEERING
TOMORROW

Danfoss

Optimised food safety Unsurpassed **energy savings**

Total energy solutions for supermarkets

33%

energy savings
in refrigeration
system alone with
the ADAP-KOOL®
solution

www.danfoss.com

The highest quality at the lowest lifetime cost

Looking for a refrigeration system that will ensure high food quality without compromising energy savings? Danfoss Food Retail's advanced ADAP-KOOL® range is able to reduce energy consumption by up to 33% in refrigeration systems alone. And the potential savings are even bigger if you choose to control additional store utilities like lighting and HVAC.

Around the world, more than 50,000 ADAP-KOOL® supermarket installations already operate to improve food quality and benefit energy consumption. And with good reason. Energy savings of as much as 60% are far from unusual in stores that have added control of simple activities like lighting and HVAC to the extensive control of their refrigeration systems.

Intelligent master control

The heart and soul of the ADAP-KOOL® solution is the intelligent system manager and our unique evaporator and pack controllers. By monitoring every activity in the refrigeration systems and storing the data the system manager is able to optimise operation to ensure the lowest life time costs on the market. Partly due to

significant energy savings but also because ADAP-KOOL® allows you to reduce downtime, minimise expensive onsite visits and in general cut back on maintenance. A totally flexible solution, ADAP-KOOL® features a range of adaptive products that can be configured to meet the exact requirements of your supermarket.

Multiple benefits

In short, the main benefits of a dedicated ADAP-KOOL® solution are:

- Extensive energy savings through optimisation of refrigeration, lighting and HVAC
- Reduced need for costly maintenance and external service
- Improved food quality and presentation
- Reduced food waste and/or loss
- Plug and play installation with few settings for improved peace of mind.

So take control of the energy-consuming utilities and get ready for sustainable energy savings that will benefit your image, your bottom line as well as the environment.



COOL food and beverages reliably to ensure safety.



CONTROL refrigeration, lighting and HVAC centrally.



CUT BACK on energy consumption by up to 33%.

A circular frame containing a close-up of a green leaf and a butterfly, with the text 'CO2' overlaid. The butterfly is black and white with red markings. The background is a blurred green forest.

Natural refrigerants – the cool way to sustainability

Five years ago, less than ten European supermarkets used CO₂ in their refrigeration systems. Today, CO₂ is the preferred refrigerant in more than 1,000 systems. Naturally, Danfoss Food Retail offers components that have been specially developed for CO₂ to ensure operation that is as cost-efficient as it is energy-friendly.

Benefits include:

- Carbon footprint reductions of more than 30% in supermarkets
- CO₂ has 4000 times less impact on global warming than traditional HFC refrigerants
- CO₂ will not be phased out.

Optimise your energy consuming utilities with ADAP-KOOL®

The ADAP-KOOL® family comprises a variety of control solutions, specially developed for the optimisation of refrigeration systems and other energy consuming utilities in supermarkets. As pioneers in the world of electronic control, Danfoss products are among the most advanced on the market. Over the years, they have been continuously fine-tuned to offer you outstanding performance and reduced running costs.

The controls are built for integration into complete systems using data communication but can just as easily adapt to work within existing installations. Whatever your requirements ADAP-KOOL® will take control of your refrigeration system to protect not only your food quality but also your investment as industry standards develop in the future.





System manager

The ADAP-KOOL® system manager monitors every activity in the system 24/7 and stores the data for extended management. This includes local or remote monitoring with alarm handling, control of refrigeration systems and other energy consuming utilities as well as proactive service management.



Compressor packs and condenser fan solutions

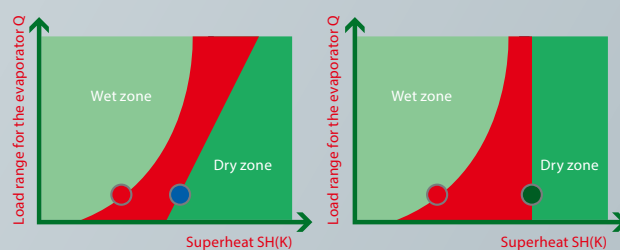
The ADAP-KOOL® pack controls ensure maximum performance and minimal energy consumption in refrigeration systems. The latest controllers include oil management, which makes investment in extra controllers for that specific purpose redundant. Furthermore, the continuous variable speed control offered by the ADAP-KOOL® drive enables intelligent speed control – which is a must in optimised refrigeration systems.



Evaporator controllers

Second to none, the ADAP-KOOL® evaporator controls offer adaptive routines for individual cabinet and cold room installation to optimise energy consumption. The wide range offers unique features like:

- Adaptive superheat control – ensures that injection of refrigerants to each display cabinet is measured according to actual demand
- Adaptive suction pressure (PO optimisation) – ensures maximum operating efficiency in every single display case
- Adaptive defrost – ensures that defrost cycles are only initiated when actually required
- Adaptive emergency operation - ensures that the cooling capacity is maintained during error to minimize risk of food loss.



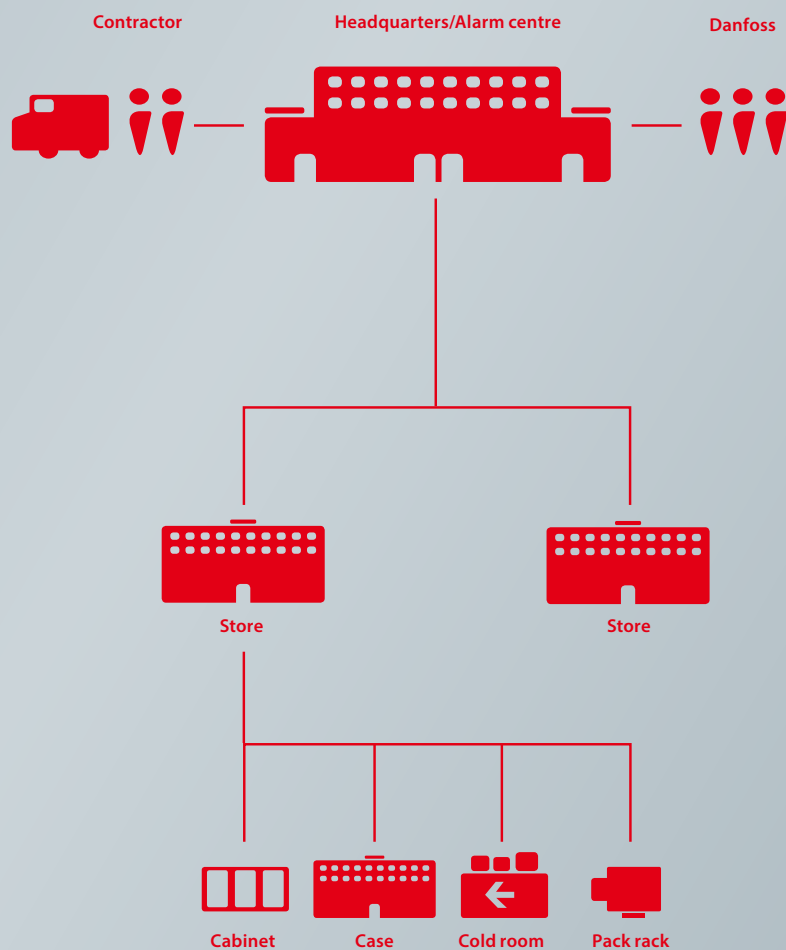
- Adaptive SH with electronic expansion valve
- Thermostatic expansion valve
- Fixed SH with electronic expansion valve
- Saved energy



ADAP-KOOL® provides documentary evidence and traceability for HACCP compliance to support high food quality.

Management tools make for operational stability & efficiency

An ADAP-KOOL® system solution leads directly to increased control and in turn significant energy savings in your supermarket thanks to efficient control. And the savings become even more substantial and perhaps more importantly sustainable when you continuously apply the management tools that are available with the system manager.



Store and enterprise levels

2962.38 KWH

Measurement

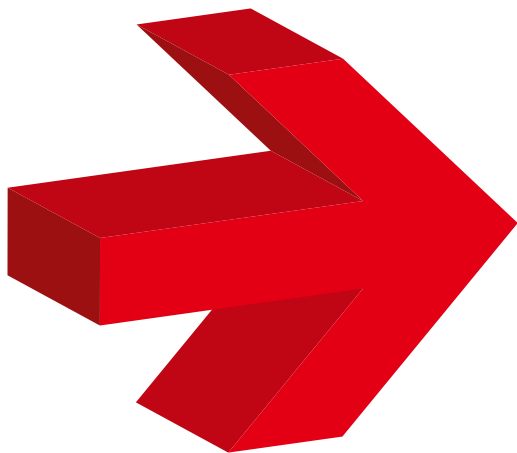
Only by measuring the various parameters in your system will you be able to optimise operation. The ADAP-KOOL® system manager allows you full transparency of everything that is going on in the store 24/7, making real time recordings of e.g.:

- Temperature performance in counters and cold rooms
- Light levels and schedules
- In-store humidity and ambient temperature (AC)
- Energy consumption (kWh) overall and/or by section or assets.



Implementation

The knowledge you gain from the measuring, the monitoring and the analysis must be continuously applied to drive improvement in your system. As an experienced partner Danfoss Food Retail is always able to add more optimising parameters to your system managers to expand sustainable operational stability and increase sustainable energy savings even further.



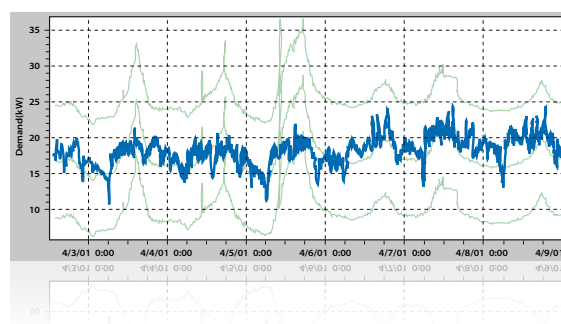
Monitoring & Reporting

Depending on requirements and resources ADAP-KOOL® offers a variety of monitoring and reporting options:

- **Data Harvest** Danfoss deliver only the hardware and you harvest and analyse the data yourself.
- **Danfoss Front-end** In addition to delivering the hardware, Danfoss harvest the data and do basic analyses, including HACCP Report and alarm handling. More specific analysis is up to you.
- **Dashboard** Danfoss provides you with whatever data or report you require, including temperature quality index and carbon footprint. Data are sent to your mobile or your desk to allow you access anywhere in the world.



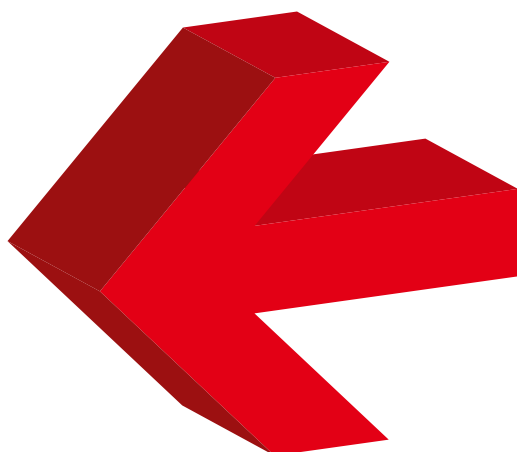
Headquarters/Alarm centre



Analysis

Analysis is the key to turning data into valuable knowledge. By carefully analysing the harvested data it is possible to:

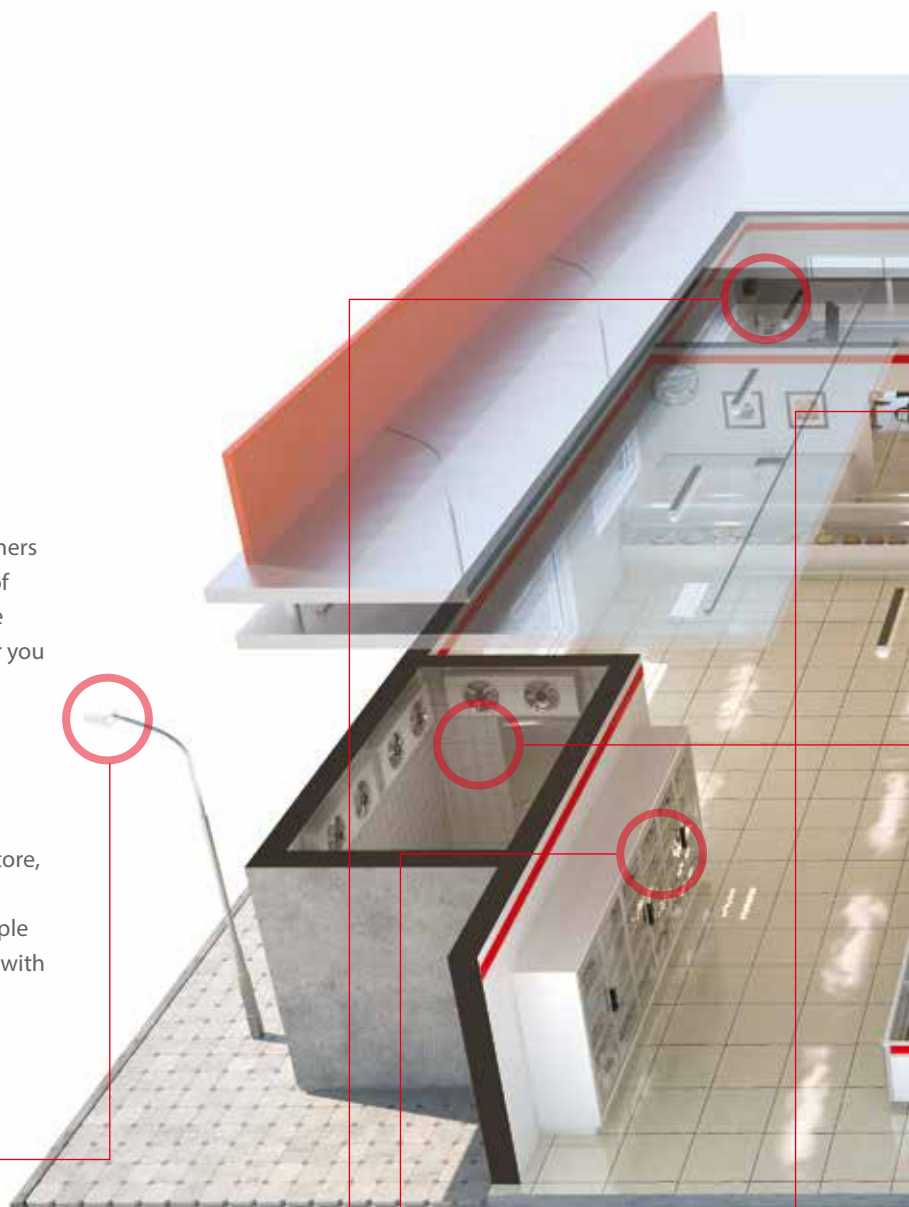
- Normalise stores
- Make Store Performance Reports
- Compare stores in Store Ranking



Efficient solutions begin with experience

Backed by more than 70 years of dedicated refrigeration know-how, Danfoss is one of the most experienced partners you can team up with. We are a leading global supplier of components for the refrigeration industry – and we have applied this expertise to the Food Retail Industry to offer you unsurpassed performance and reliability.

A Danfoss Food Retail system solution for supermarkets covers your every refrigeration requirement in terms of cooling, control and monitoring. Naturally, every system solution is customised to accommodate the size of the store, the layout as well as individual refrigeration needs. If required, the solution is easily extended to control simple store utilities like lighting and HVAC. And to present you with even more substantial energy savings.



AK- I/O module
These modules extend the control system, linking Refrigeration, HVAC, Lighting and Energy inputs to the AK-SC 255 system manager.



Supermarket System Manager, AK-SC 255
User-friendly control and monitoring of multiple utilities in supermarket stores, e.g. Refrigeration, HVAC, Lighting and Energy management.



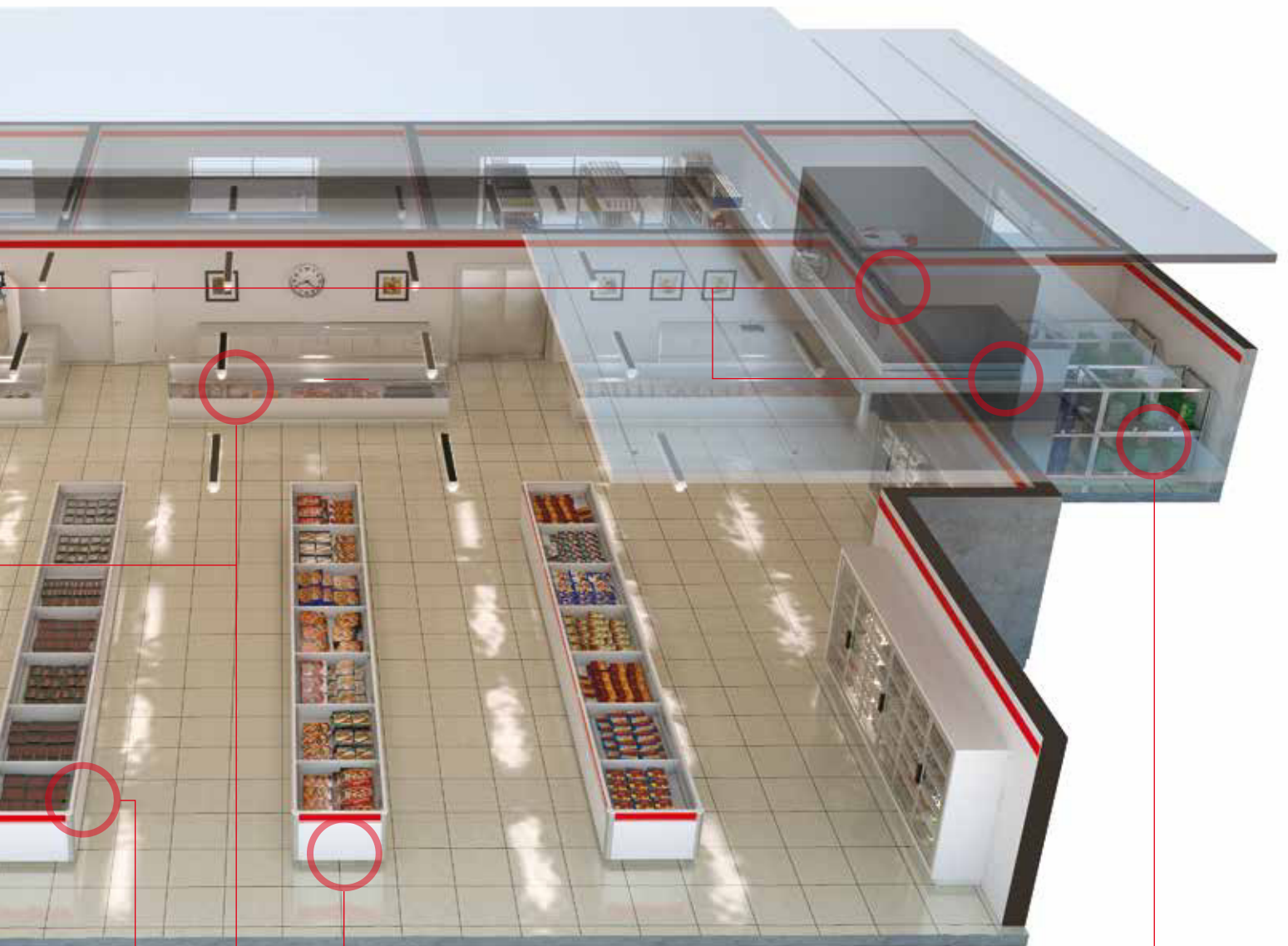
Electronic Expansion Valve, AKV
Robust injection valve controlled by AK-CC550 with unique adaptive superheat control, offering maximum store up-time and energy efficiency.



Compressor and Condenser Speed Controller, AKD 102
A unique Speed Drive and Compressor (3) Pack controller for energy efficiency and control.



Temperature Sensor, AK-HS 1000
Dedicated product simulation sensor for temperature monitoring, data logging and documentation in support of HACCP compliance.



Pressure transmitters and temperature sensors
Advanced transmitter and sensor technology enable high control accuracy in a refrigeration system.



Evaporator Controller AK-CC (for electronic expansion valves)
Dedicated control for effective energy optimisation of refrigeration display cases and cold rooms.



Evaporator Controller EKC (for thermostatic expansion valves)
Accurate temperature control of refrigeration appliances and cold rooms.



GD and DGS Gas Detectors
Special Refrigerant sensors to monitor and detect any system leaks according to EU F-Gas regulations.



Pack Controller
Used in installations ranging from compact systems with only two hermetic compressors up to large power packs



Electrically operated valve CCM
The valve is capable of functioning both as an expansion valve and as a gas bypass valve for CO₂ systems.

CO₂ reduces carbon footprint in Sainsbury's

A year ago, only two Sainsbury's stores used CO₂ in their refrigeration systems. Today, the number has increased to 50 – and by 2030 the environmentally responsible refrigerant will have replaced F-gases in many of Sainsbury's 800 stores.

Sainsbury's was the first UK retailer to make a commitment to convert every store across the UK to CO₂ refrigeration and in so doing reduce their carbon footprint by a third. Danfoss has been part of the project since the beginning in 2009.

"We chose Danfoss because of their proven record and the level of technical support they were able to provide us with", says John Skelton who is Head of Refrigeration at Sainsbury's. "Four of the seven pilot stores were existing Sainsbury's stores and it was crucial that trading was maintained in all of these during the retrofit."

That goal was successfully achieved through a novel approach: A collaboration of 23 suppliers, including Danfoss, joined

their expertise and installed three different transcritical CO₂ refrigeration systems in the seven pilot stores. All achieved on time and with minimal disruption to trading. Subsequently, a blueprint was created to achieve "Right first time" for future installations.

And the expectations for the outcome are high. While the carbon footprint reduction has been the primary reason for converting to CO₂ refrigeration in all 800 Sainsbury's stores, the potential operating savings are interesting as well.

"Around 40% of the energy consumption in a supermarket is related to refrigeration so obviously it is important for us to look at ways to reduce that figure", says John Skelton. "We know that simply replacing old components with new ones will reduce our consumption – but we do expect that with Danfoss' dedicated CO₂ components we will be able to achieve even further savings".





17.5% cutback in energy consumption

Energy savings of 17,5% have become a reality for the TUS supermarket chain after the installation of Danfoss ADAP-KOOL® solutions in 54 stores across Slovenia. The next step is to extend the control from just refrigeration to lighting and HVAC as well for further optimisation.

A single test store laid the foundation for the savings the TUS chain is experiencing today – and also paved the way for internal support. While some store managers were initially sceptical about the promised achievements, the excellent results from the test store easily convinced them. A 19.68% efficiency improvement, corresponding to electricity cost savings of around 7,000 Euro per year was the tangible result of letting a Danfoss ADAP-KOOL® solution control the refrigeration system.

"The initial investment is slightly higher when you choose Danfoss products but the pay-back time is short as they enable

much more significant energy savings", says engineer Andrej Kusar from the energy department of TUS supermarkets.

"Moreover, the new Danfoss cooling system is much more stable and efficient than the old one which improves product quality and presentation in the store".

The plan is to install Danfoss' ADAP-KOOL® solution in more than 100 TUS stores in Slovenia to increase the annual savings of 200,000 Euro the chain is now benefiting from. But it does not stop there. According to Andrej Kusar the next step is to monitor all energy consuming utilities, including refrigeration, lighting and HVAC, in a new test store to see how far Danfoss' Total Store Solution can take TUS in terms of energy efficiency.

"TUS is already one of the most energy-efficient supermarkets in Slovenia but I see no reason to stop improvements when it is clear that we can do even better with the right installation".

50,000 ADAP-KOOL® systems worldwide **Danfoss Food Retail**

Danfoss Food Retail provides complete store solutions for customers all over the world. Major global food retail chains are among the companies that utilise the Danfoss expertise and we take pride in their choice and application of our products. Our defined goal is to enable sustainable results when it comes to energy savings and food safety. Offering a close-knit global sales and service network we are easy to do business with and provide easy access to professional know-how wherever you are located. Danfoss Food Retail is part of the Danfoss Group, a leading global manufacturer of mechanical and electronic components and solutions for a wide range of industries and sectors.



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