

Maximise supermarket efficiencies



Thomas Michael Kolster
Director of service innovation
Danfoss

Today's food retail environment is under immense pressure to improve efficiencies, with global megatrends including the fight against climate change, improving food safety while reducing loss, electrification, and digitalisation of operations creating both opportunities and challenges within this sector.

"One of the major focuses within food retail today is the creation of smarter stores that are able to optimise their use of energy, help reduce food wastage and manage environmental impact, and which are more sustainable," said Thomas Michael Kolster, director of service innovation at engineering firm, Danfoss.

Speaking at the recent Southern African Energy Efficiency Confederation's (SAEEEC) annual conference, Kolster advised delegates that a connected system, which leverages the benefits of Internet of Things (IoT) devices, platforms and applications, can deliver transparency and efficiency gains to the food retail environment.

He then outlined five technical strategies to help supermarkets not only stay ahead of society's emerging demands but even to potentially benefit from them.



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Sustainable refrigeration with the integration of CO₂

CO₂ is swiftly becoming the refrigerant of choice within food retail, and it is now recognised as the most viable and efficient solution among natural refrigerants in food retail applications.

"CO₂ offers superior energy performance over hydrofluorocarbons (HFCs), and when up to 60 percent of in-store energy consumption can be attributed to refrigeration, this environmentally-friendly refrigerant can help save up to 20 percent of energy in warmer climates like Africa, with zero impact on global warming."

Danfoss' latest innovation, the CO₂ Adaptive Liquid Management (CALM) solution, can improve the energy efficiency of transcritical CO₂ refrigeration systems, protecting compressors by pulling liquid refrigerant from the suction side and injecting it into the evaporator of display cases and cold rooms.

"A full year's tests by German supermarket corporation the Edeka Group showed additional energy savings of 1 200 Euros per year over more traditional CO₂ systems, delivering not only efficiency gains but also improved controls," Kolster explained.



Intelligent refrigerant monitoring = refrigerant leak predictions

“Low refrigerant levels can cause ‘flash gas’ scenarios, where the opening of the valve lets in gas as well as the liquid. Because gas is less efficient at cooling than liquid, the opening degree increases. By using intelligent refrigerant monitoring, stores are able to establish a baseline for each case, which is then monitored independently, and a detection algorithm will trigger an alarm for each case,” he stated.

“The main benefits of intelligent refrigerant monitoring are early warnings of refrigerant leaks, and the ability to store logbook files and visualise data. The ability to predict leaks sooner brings with it the added advantages of greater equipment longevity, less spend on refrigerant refills, and a more efficient system, which uses less power.”

Kolster then cited the example of a French Danfoss customer that is now able to spot leaks three to four weeks ahead of traditional detection systems, allowing the organisation to top up refrigerants ahead of time and run more efficiently.

Heat recovery deals with heat demand

“Heat recovered from a CO₂ refrigeration system is able to cover between 30 and 50 percent of heating demand within a store, without raising discharge pressures. Essentially, heat is recovered from refrigeration and can be used within the store itself, for space heating or hot tap water, or perhaps within a microgrid, like a shopping centre.

“We have worked with a Danish supermarket that is now able to fulfil 95 percent of heating demand from its own cooling display cases. Surplus heat in peak periods is fed into the district heating network and can heat up to 15 households within the neighbourhood.”

From energy efficiency to digital energy optimisation

“There is intense pressure on operating margins across the board, and the digitalisation of operations within stores can help them to leverage newer

5 ways to maximize efficiency with Smart Store solutions

Danfoss Smart Store solutions help build the supermarkets of tomorrow by reducing costs, minimizing environmental impact, and finding a competitive advantage, while safeguarding food safety.



technologies and trends such as solar photovoltaic (PV) technology, e-mobility, blockchain, load shifting and more. In another real-world example, German supermarket Aktiv & Irma was able to use digitalisation and automation to reduce peak energy costs, using a combination of

battery and cooling systems to reduce peaks (up to 40kW) to save 15 percent on annual energy costs,” Kolster said.

Maintaining operational efficiency

Automatic and remote monitoring services can deliver cost savings through performance optimisation, reduced energy consumption, and fewer service calls, he added.

“By optimising your entire store, through asset management, energy efficiencies, controls and alarms (for instance a high temperature alarm in a perishables case) and analysis to managed services, the advantages can include a lower cost of ownership, full transparency of assets and 24x7x365 alarm management.

“We saw quantifiable results from a Swedish food giant that recently rolled out the Danfoss monitoring and management solution across its entire supermarket chain. The company is already seeing a number of performance and efficiency benefits, including enhanced reporting and control; energy savings of between 400 to 500 kWh per store on a daily basis, equating to a daily energy saving of between 60 and 75 Euros per store; a reduction in service call outs of around 50 percent; and a project return on investment (ROI) of between two to three months.

“And we’re certain that tomorrow’s smart store will be able to run with even greater efficiencies,” Kolster continued.

“If we had to look into a crystal ball, future solutions will be even more proactive and automated, paving the way for predictive analytics and self-diagnosing/ self-fixing systems.”

Danfoss has assisted the food retail business sector for many years, working with hundreds of food retail chains worldwide in more than 60 countries since the company was originally set up as “Dansk Køleautomatik og Apparatfabrik” in 1933.

For more information on Danfoss and its solutions visit www.danfoss.com

Let us help you **unleash your potential**



Monitoring and management
Automatic and remote monitoring services deliver cost savings through performance optimization, reduced energy consumption, and fewer service calls.

Technologies:

- Danfoss Enterprise Services
- Case-to-cloud connectivity
- ADAP-KOOL® System Manager

Benefits:

- Lowest total cost of ownership
- Full transparency of all relevant assets across Danfoss and non-Danfoss controlled stores
- 24/7/365 alarm management

Up to
30%
reduction in
service calls



Case control
Case controls boost refrigeration efficiency by balancing capacity and demand. This secures food safety without wasting energy on unnecessary cooling output.


Technologies:

- ADAP-KOOL® case control solutions
- Adaptive superheat
- Commissioning and service smartphone app

Benefits:

- Save energy without compromising food safety
- Connected solutions for optimum efficiency
- Save time during commissioning and service

Up to
12%
energy savings
compared to other
EEV technologies



Sustainable refrigeration
CO₂ refrigeration has developed tremendously over the last 10 years and is rapidly becoming the preferred refrigerant in food retail applications. Thanks to our new technologies, efficient CO₂ solutions are available for all climates and store sizes.

Technologies:

- Multi Ejector Solution™
- Pack control solutions for small to large plants
- CO₂ Adaptive Liquid Management

Benefits:

- Keeping up with new regulations on refrigerants
- Energy-efficient CO₂ refrigeration in all climates
- Optimum pack control

More than
30%
reduction of
carbon footprint
on store level



HVAC integration
Harness the benefits of integrated refrigeration, heating, air conditioning, and ventilation solutions.

Technologies:

- Heat recovery
- Multi-pack systems
- Danfoss Turbocor® for large plants

Benefits:

- Reduce complexity
- Recovered heat can be used for own heating purposes or sold to other premises
- One system for all your heating, cooling, and A/C needs

90%
reduction in
your heating
costs



Smart energy
Smart energy can turn traditional supermarkets into the supermarkets of tomorrow by taking advantage of renewable sources, energy storage, and arbitrage.

Technologies:

- Solar energy
- Demand response
- Car charging
- Electric and thermal storage

Benefits:

- Cut your energy costs
- Offer car charging to customers
- Become an energy producer
- Strengthen your green profile

Take a step
towards a
Zero
energy store

Every day, we are dedicated to making your supermarket just a little smarter.

Graphics courtesy of: Danfoss

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