



GREEN LIGHTS FOR THERMAL ENERGY STORAGE

How thermal energy storage will move the European food industry to meet the EU's energy goals.

The European Commission estimates that heating and cooling make up nearly half of all of the European Union's (EU) energy demand and 84% of that energy is generated from fossil fuels. The estimated 7.2 million tons of oil equivalent consumed annually for industrial cooling alone does not fit into the EU's ambitious climate and energy goals such as the Energy Efficiency Directive's target of 30% energy efficiency by 2030. There is a clear regulatory impetus to improve energy efficiency with potential energy savings in the European cold chain industry as high as 72%. Cold chain operators and those in the food industry also have a strong financial incentive to improve efficiency, with energy representing the largest expense in the industry.



HEATING AND COOLING TECH

One way the European Commission seeks to achieve its energy goals is through its Energy Performance of Buildings Directive, which most significantly calls for all new buildings to be nearly zero energy by 2020. To specifically address buildings' heating and cooling systems, the European Commission developed a Heating and Cooling Strategy in 2016. The strategy outlines initiatives to help

reduce energy consumption from heating and cooling systems, which includes increasing the share of renewables and integrating heating and cooling systems with intelligent controls and emerging technologies, such as thermal energy storage. Thermal energy storage (TES) is one highly effective route towards reducing the energy consumption of the cold chain industry. TES acts like a battery for cooling systems, using phase change material (PCM) – or 'engineered ice' – to store thermal energy for future use. Viking Cold Solutions is one of the leading thermal energy storage provider enabling flexibility and savings for the

In line with the EU's Energy Performance of Buildings Directive, TES systems include intelligent controls to optimally balance temperature stability, run-time, and energy savings.



Photo: Viking Cold Solutions

energy-intensive low-temperature cold chain industry. Their TES systems leverage PCM, intelligent controls, and 24/7 monitoring & reporting software to reduce energy consumption and costs. During low demand hours, customers' existing refrigeration equipment freezes the PCM. During high demand hours, a facility can dramatically reduce the mechanical run time of its costly, grid-dependent refrigeration systems by 20-35% and rely on the PCM to augment the refrigeration. During these periods of reduced run time, the PCM absorbs and stores 85% of all heat infiltration in the freezer, maintains 38% more temperature stability of the food product to ensure food quality and safety, and helps avoid up to 90% of energy consumption during high demand hours.

CASE STUDY - SAN DIEGO FOOD BANK

In addition to calling for increased energy efficiency, the EU – which is currently a net importer of energy – wants to increase its share of renewable energy to 27% by 2030. This increase in renewable energy will also drive the demand for better energy storage solutions to offset the intermittent nature of renewable energy production and reduce the need for backup energy from fossil fuel derived sources. TES can integrate with solar installations as a means of storing that energy for future use in low-temperature cold storage applications. In 2016 one of Viking Cold's customers, the California-based San Diego Food Bank (SDFB), had 60% of their operating costs tied to refrigeration energy. SDFB wanted to reduce these costs and build upon their existing sustainability initiatives. The Food Bank installed a TES system that integrated with its existing rooftop solar photovoltaic (PV) system. During prime solar hours SDFB runs its existing refrigeration system, and overnight the grid-powered refrigeration is shut down and they rely on the TES to maintain temperature stability. Along with heightened protection for its frozen food products, the TES system improved SDFB's efficiencies, added time-of-use flexibility to their

refrigeration system, and helped them achieve their Net Zero Energy goals. Overall SDFB's daily energy consumption was reduced by 34 kilowatt hours. Their night time energy consumption fell by 95% and they achieved independence from the electrical grid for its refrigeration and cold storage needs. These improvements resulted in an annual energy savings of 39%.

EUROPEAN UNION'S TARGETS

In addition to energy savings, the reduced mechanical run time helps to prolong the life of refrigeration systems and cuts down on maintenance costs. In line with the EU's Energy Performance of Buildings Directive, TES systems include intelligent controls to optimally balance temperature stability, run-

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of San Diego Food Bank's operating costs were tied to refrigeration energy, before implementing a TES system.

time, and energy savings. The system's remote monitoring software also provides operators a real-time view of temperatures, energy savings, and refrigeration operations, which identifies issues before they become costly problems. The regulatory and financial green lights along the EU cold chain show the open road for European supermarket and cold storage operators to increase energy efficiency. Thermal energy storage enables cost-effective, sustainable energy management, with no maintenance, which further reduces its environmental impact. In any cold storage application, TES systems will serve as a valuable tool in reducing energy consumption, improving temperature stability, and maximizing refrigeration efficiencies. All sectors handling frozen food should seize the opportunity now to lower costs while better protecting food and to contribute to Europe's vision for a more sustainable and secure energy future. ■

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