

REFRIGERATION REVOLUTION

OXFORD ENERGY SOLUTIONS INC



THE TRANSFORMATIVE POWER OF HOLISTIC DIGITIZATION

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In response to the urgent global need to meet climate targets, there is a clear emphasis on reducing energy demand, with industries actively pursuing reductions. However, the refrigeration sector has not fully recognized the potential for substantial energy benefits. It is necessary to overhaul both conventional architectures and the prevailing mindset among original equipment manufacturers (OEMs), which currently confines them to design systems within the limitations of their components. Fortunately, the emergence of digital integration presents opportunities for achieving optimal efficiency and unlocking the system's full potential. This transformation is crucial, as energy consumption plays a pivotal role in determining the environmental and economic impact of refrigeration systems.

Conventional refrigeration systems, characterized by manual, pressure-driven, or analog controls, manifest inefficiencies contributing to excessive energy use, elevated greenhouse gas emissions, and heightened operational costs. Shifting system design away from the operational constraints of outdated components is crucial.

However, the industry continues to center its approach on designing within the limitations of antiquated devices and methods like condenser flooding, heated receivers, and water requirements. Conventional systems, tailored to accommodate these limitations, result in heightened energy consumption, increased operating pressure, and elevated operational stress. This approach diminishes the overall effectiveness and efficiency of the cooling process, shortens the system's life expectancy, and necessitates more frequent servicing. The transition towards digital controls and smart infrastructure signifies a substantial leap in mitigating environmental impact while simultaneously enhancing benefits for system owners.



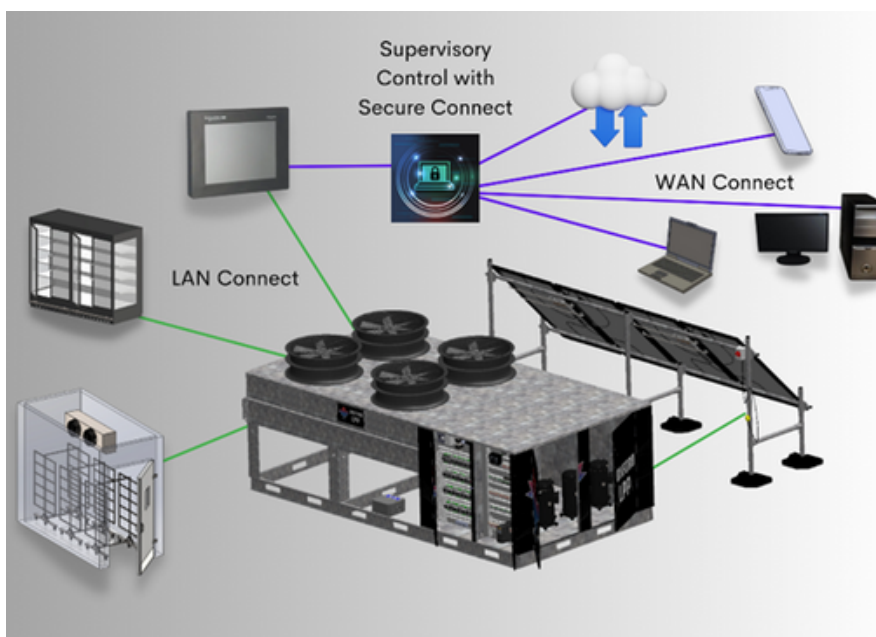
SENSORI™ CONTROL PANEL

The efficiency achievable is determined by how digital technology is implemented. To fully harness the complete potential of electronic components and the energy benefits of digitization, it is essential to go beyond simply integrating sensors and digital controls into traditional designs, where isolated components lack communication and operate independently. Adopting a comprehensive approach is crucial, as focusing on individual components alone is insufficient. The transition should begin with establishing a completely interconnected system. Platforms like Oxford Energy Solutions' Low-Pressure Platform (LPP™), integrated with Sensori™ BAS, facilitate a holistic connection throughout the system.

The unified system design aggregates thousands of real-time data points, creating an optimal operational framework. Advanced algorithms continuously analyze data, adjusting

settings based on variables like temperature, humidity, and system load. The processed data is shared across the platform, transmitting meaningful information that improves the performance of every device.

The LPP™ achieves the required refrigeration capacity without relying on additional energy-consuming processes. Electronic controls eliminate the need for conventional pressure differentials and leverage low compression ratios, which lowers discharge temperatures and minimizes secondary waste heat. Reducing compression ratios decreases the work required by the compressor. This leads to a more responsive and efficient process that minimizes energy waste and reduces the overall carbon footprint. When each part of the system is digitally optimized and can influence all other components, it creates a ripple effect that impacts the entire system.



The comprehensive digitization of the entire system, combined with the interconnected design of the Oxford Low-Pressure Platform (OLPP), serves as the catalyst for a highly efficient, data-driven, and optimally functioning system.

Enhancing equipment performance through digital integration reduces energy consumption and fosters a sustainable refrigeration approach. It offers more than just environmental benefits; it benefits system owners financially. Remote capabilities enable achieving greater equipment longevity through enhanced system protection, immediate anomaly notifications, and the ability to intervene promptly, ensuring durability and reliability. Access to all pertinent

information eliminates guesswork, simplifying the management and monitoring of refrigeration systems. The resulting energy savings from increased efficiency directly reduce operational costs, enhancing overall profitability. Furthermore, embracing smart technologies positions system owners to meet stringent environmental regulations and opens potential opportunities for securing government support through energy grants or programs.

SUSTAINABLE TRANSFORMATION: CORNERSTONE CO-OP'S JOURNEY WITH ERA AND LPP™

In pursuing a sustainable future, governments worldwide actively promote initiatives, such as grants and targeted campaigns, encouraging businesses to reduce their carbon footprint. One such initiative is the Emissions Reduction Alberta (ERA), a government-run incentive program that supports businesses in enhancing operational efficiency while simultaneously lowering emissions. The ERA's commitment to promoting cost-effective, energy-efficient technologies aligned perfectly with the goals of Cornerstone Co-op in Mannville, Alberta.

The cooperative was operating an outdated system with obsolete technology that had exceeded its intended lifespan. Confronted with high energy consumption and escalating repair costs, they hesitated to invest in similar equipment that would replicate the inefficiencies of their current system. The existing system ran continuously at maximum parameters with static setpoints, an

unnecessary practice leading to energy wastage.

Lacking an energy management system to monitor their operations, they sought a scalable platform that would allow the business to attain dependable equipment performance, enhance efficiency, achieve cost savings, and align with environmental goals.

Upon discovering the energy and longevity benefits of the fully integrated Oxford Low-Pressure Platform with Solar (OLPP-S), the Co-op opted to replace compressors and condenser coils serving retail cases, the walk-in cooler, and the freezer. With support from the ERA, they embarked on a retrofit project to significantly reduce energy costs and enhance overall operational efficiency. This initiative resulted in a \$92,000 incentive payout for the Co-op from the Technology Innovation and Emissions Reduction Fund.

RESULTS:

The Co-op invested in a complete outdoor skid without any conventional characteristics. The innovative design of the LPP™ yields impressive results, utilizing a low-pressure refrigerant in an environment with temperatures ranging from +40 to -50 degrees Celsius. The new, fully integrated platform, driven by advanced digital technologies, facilitates comprehensive system management through Sensori™ BAS. This empowers the Co-op to monitor their system's performance effortlessly, providing valuable insights into how their refrigeration affects their business and environmental objectives.

The system incorporates a built-in energy meter, functioning like a third-party device. It communicates through Modbus, meticulously tracking power usage for compression, condenser, walk-in cooler, freezer evaporator fans, and defrost heaters. Thanks to the net optimizing benefits of the BAS, the average energy reduction is 50-60%



CORNERSTONE CO-OP OUTDOOR SKID

compared to the previous system. The Co-op's efficiency gains, robust system management capabilities, and the enhanced adaptability and performance of their refrigeration system underscore the transformative power of a holistic digital transition.

