

# R-515B FOR REFRIGERATION IN INNOVATIVE AND SUSTAINABLE COOLING SYSTEM FOR FOOD INDUSTRY

## Case Study

### Sikorski Sausages Company Ltd Replaces R-404a with Solstice® N15 (R-515B) in Critical Industrial Meat Processing Applications.

#### BACKGROUND

Sikorski Sausages Company Ltd is a second-generation family-run business in Southwestern Ontario, which produces and packages over one hundred high-quality specialty European meat products. As quality meat processors, Sikorski understands the need to be environmentally conscious while protecting their profits. The company relies heavily on large refrigeration systems to maintain product safety and freshness during processing, packaging, and storage operations. Food waste produces substantial amounts of methane that contributes to harmful greenhouse gasses. The necessity to utilize top-quality cooling systems is imperative for both protecting the environment from harmful emissions and ensuring the quality of their products.

Oxford Energy Solutions Inc (OES) is a privately owned and operated company. Since 2006, OES has been developing and promoting Canadian designed and built refrigeration equipment

from their facility in the Woodstock area. For the past 16 years, OES has challenged stagnant, inefficient refrigeration designs and executed better cooling systems. The company created a world-leading platform that offers global solutions to the impact of cooling on the environment.

OES is driven by the Net-Zero NOW mentality, choosing “action” over “waiting,” since the global environmental issue is not a slow-moving target. The company has developed an industry-first with their oil-free compressor design along with the off-the-shelf solar package. Grocery stores and cold storage warehouses are now installing completely integrated, lower GWP refrigerant, zero ODP, oil-reduced and oil-free systems with solar panel energy offset. Using cutting-edge technology, superior designs, and sustainable methods, OES delivers some of the most efficient systems available on the market today. They have seen rapid growth and success primarily in the agricultural, food processing, and

#### THE OPPORTUNITY

With an upcoming expansion, Sikorski Sausages Ltd needed a sustainable and long-term solution with safe and efficient low-GWP chemicals, innovation, and effective designs to provide superior cooling, energy savings, and benefit the bottom line. The Oxford LPPTM (OLPP) platform combined with Honeywell's R-515B offered the customer the future-proof solution they needed.

health care sectors and have attracted the attention of large corporations. They work and partner with these companies as well as other contractors across Ontario, providing a large network of high-quality equipment and services for many production facilities.

To eliminate waste and improve efficiency while protecting their investments, Sikorski Sausages Ltd partnered with OES to focus on equipment reliability that will ensure food quality, safety, and productivity, leading to improved operational efficiencies and greater profits.

**Honeywell**

## CHALLENGES

With an upcoming facility expansion, Sikorski Sausages Ltd required new equipment that would offer the company long-term solutions and saw the opportunity to transition to a system with advanced design and control platforms that would allow for significant energy savings. They were looking to avoid having to address issues in the future with decommissioned refrigerants and systems with components that lacked longevity and required high-cost maintenance.

An estimated 10-30% of the refrigerant charge in large refrigeration systems are leaked into the atmosphere annually, contributing to the depletion of the ozone layer and GHG emissions. Owners and operators of systems that utilize HCFC/HFC refrigerants face the requirement to address the chemicals employed due to new regulations. The Sikorski facility was using the refrigerant R-404a, which is no longer allowed to be utilized in new installations. With regulations that accelerate the phase-out of manufacturing, importation, and distribution of chemicals for cooling, alternative refrigerants had to be considered. HFO-based refrigerants meet regulatory requirements of reducing harmful atmospheric emissions with a GWP of approximately 60% lower than hydrofluorocarbon-based refrigerants.

Sikorski Sausages Ltd is well-tuned to the need for energy efficiency but also the importance of maintenance efficiency – since equipment downtime can be costly and detrimental to products. The relationship between refrigerants and maintenance requires the consideration of the effects that pressure has on the system. HFC alternatives operate

at considerably higher pressures than HFO low-pressure refrigerants. Higher pressures can cause stress on system components, resulting in greater maintenance requirements. The option of using an environmentally friendly low-pressure refrigerant combined with a system designed to eliminate the need for high pressures and mechanically driven components can provide a solution with longevity.

With higher pressures, components must work harder to achieve results. Conventional refrigeration systems employing a high-pressure refrigerant put stresses on components prone to leaking, resulting in environmental risks and higher maintenance costs. Choosing a high-pressure system at the Sikorski facility would have increased the risk of compromising product safety due to the increased possibility of maintenance downtime.

Sikorski Sausages Ltd has integrated, focused strategies to become sustainable while protecting its bottom line. On par with the company's sustainable development goals, Sikorski goes beyond the minimum requirements of government mandates and ensures that the decisions and investments it makes today will protect the environment and its business tomorrow.

The Oxford LPPTM system is designed to meet these requirements and accommodate low pressure, reduced GWP, zero ODP HFO refrigerants such as Honeywell's R-515B – giving Sikorski Sausages Ltd the future-proof designs they needed for their cold storage equipment.

## THE SOLUTION

Oxford Energy Solutions selected Honeywell Solstice® N15 (R-515B) refrigerant, providing Sikorski Sausages Ltd with a solution to meet its sustainable development goals.

“Continually looking for ways to improve for customers, the environment, and the global community should be what drives an industry – Honeywell and Oxford share this vision.”

– BEN KUNGL, PRESIDENT AND OWNER  
OXFORD ENERGY SOLUTIONS

“By combining the innovative design of the Oxford LPP with Honeywell's sustainable low-pressure R-515B, Sikorski Sausages Ltd is cutting energy costs, virtually eliminating maintenance, and protecting their profit margins.”

–PETER SIKORSKI, CEO AND CO-FOUNDER  
SIKORSKI SAUSAGES LTD.

## SOLUTION

The goal of Oxford Energy Solutions is to reduce service, operating, maintenance, and electrical cost – which leads to energy savings for customers. The Oxford LPP platform architecture takes advantage of low-pressure refrigerants that have less mechanical stress on key system components such as piping, fittings, gaskets, and connections while lowering the risk of potential refrigerant leaks.

The OES customers are interested in systems that they will not need to replace in the next 7-10 years due to changing regulations or system failures and that will increase energy efficiency. They want refrigerants and cooling systems that have the longevity needed to support growing, lucrative businesses as well as to make the best environmental choice to meet global and individual sustainable development goals.

The control architecture is the backbone of the Oxford LPP system. It allows the implementation of a low-pressure/low-GWP refrigerant to be applied to outdoor condensing unit applications for all weather conditions.





The system utilizes low-pressure, zero ODP, HFO based refrigerant – Honeywell's R-515B proving to be the most promising alternative. R-515B is a non-flammable, hydrofluoro-olefin (HFO) blend with a much-reduced GWP of 293. It demonstrates environmental and performance benefits in commercial refrigeration systems, offering a low environmental impact alternative to HFC fluids that do not meet regulatory criteria.

The design architecture of the Oxford LPP lowers the required system head pressure; it also lowers the required compressor ratio, leading to a reduction in the required internal heat of compression in the system; and maintains the lowest possible pressure differentials throughout the system to achieve a long-term platform that targets zero refrigerant leakage.

The Oxford LPP architecture also reduces the overall required system charge. With conventional systems, more refrigerant is needed; while the Oxford LPP solution uses a much lower charge to accomplish greater efficiency. Furthermore, the energy savings of a low-pressure HFO refrigerant is apparent when compared to alternative higher-pressure fluids. Maximizing the energy reduction of low compression ratios offers better energy consumption results, lowers the environmental impact, and removes end-of-life equipment issues.

The investment in a reduced GWP/ HFO platform has no limitation to ambient conditions and removes the requirement for any secondary inputs – such as water. Sustainable refrigeration cannot come at the expense of consuming a natural resource at vast rates. This resonates deeply in the food production industry, where owners are continually striving to find ways to reduce water waste.

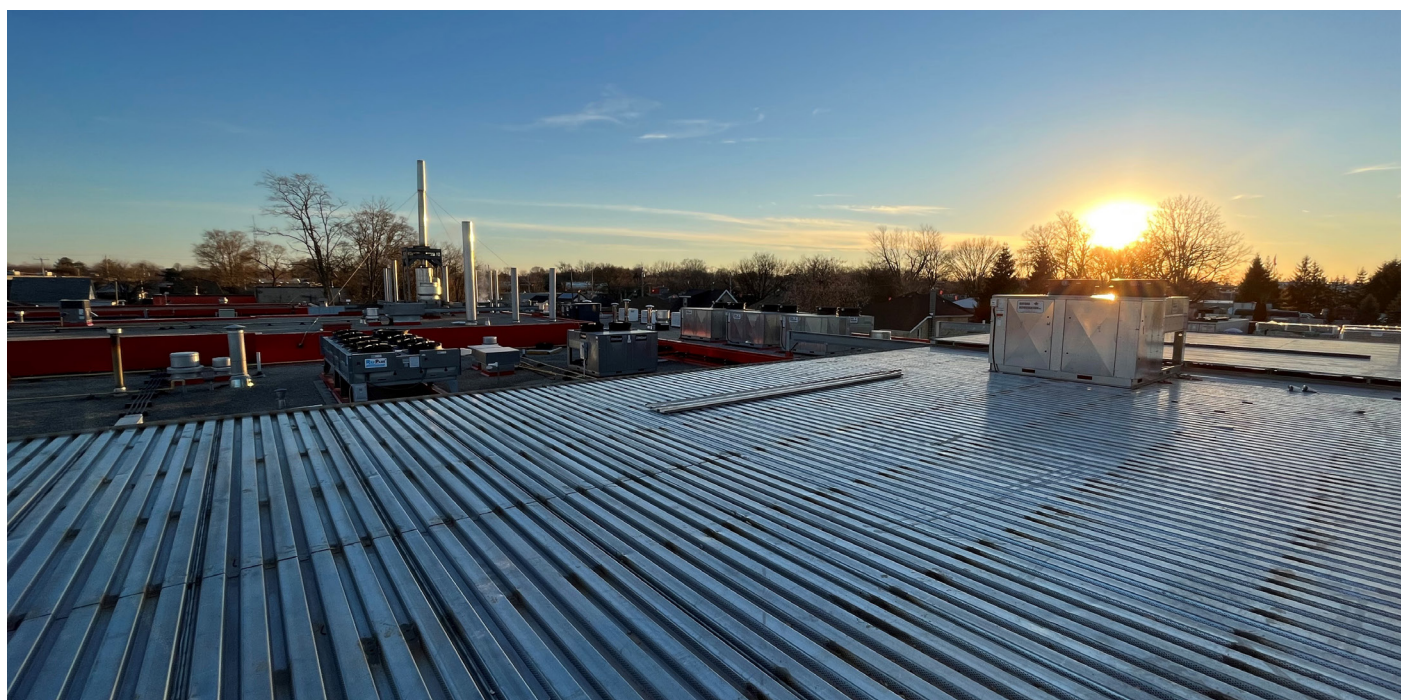
The Sensori Control System™ with integrated digital controls and automated equipment gathers and processes data, providing real-time information on each component in the Oxford LPP, with complete diagnostics on functioning. Machine learning and adaptive predictability allow the system to display all temperatures and pressures at each compressor individually and assess their operation and efficiencies. The control system is digitally controlling pressures needed to push refrigerant through the equipment – based on constant influx of information that is gathered from sensors that consider factors like changes in ambient temperatures. Adapting to ambient conditions, temperature changes in cases, or load profiles and adding more sensors for greater information makes the system more efficient and provides end-users better system management.

## **HONEYWELL SOLSTICE N15 (R-515B)**

R-515B is a nonflammable/ non-toxic replacement for existing HCFCs or HFCs, with the lowest GWP available for severe-duty A/C applications.

- Blend of R-1234ze and R-227ea (91.1%/8.9%)
- Nonflammable (ASHRAE A1), safe for use in high-ambient A/C applications
- GWP 292, 50% lower than R-124 (609) and 80% lower than R-134a
- Azeotropic blend with zero glide, simplifying the equipment design process

The reduced system refrigeration charges due to the architecture, improved safety, and system training all add to the benefits of this low-pressure refrigerant application. The Oxford LPP design maximizes how the refrigerant is being used – because the refrigerant in Oxford systems is limited to the required amount to do the work, there is no extra chemical and no waste.



## RESULTS

The conventional system previously used by Sikorski Sausages Ltd was generating approximately 34.66 tons of Co2e. With the Oxford LPP system, emissions were calculated to be reduced to 6.18 tons: a reduction of 28.48 tons CO2e – or 82%.

If we compare the Oxford LPP solution to new conventional equipment, we are seeing a reduction in energy of approximately 15%.

Sikorski Sausages Ltd also maximized the available land for their business and increased their facility by 40–45%.

The attributes of the platform, in combination with the utilization of

Honeywell's R-515B, are stable even with a high-operating ambience, due to high critical temperatures. They do not require additional resources – which is the opposite of a CO2 system.

R-515B has an efficiency equivalent to R-134a, while the discharge temperature/pressure of the Honeywell refrigerant is much lower than R-134a.

The ability to employ Honeywell's R-515B in a commercial food storage/manufacturing facility accelerates a greater sustainable outcome than Ammonia or CO2-based refrigerants on overall mechanical requirements, energy consumption, and maintenance costs over the life cycle of the equipment.

## CONCLUSION

Honeywell's R-515B meets mandated regulations while offering customers the longevity they need from investments in their refrigeration equipment. The Honeywell refrigerant, along with the OLPP innovative platform, enables Sikorski Sausages Ltd to reach their sustainable development goals, reduce energy consumption, and protect their profits. The decisions Sikorski Sausages Ltd has made during their facility expansion allow the company to represent its commitment to being a leader in sustainability.



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[www.honeywell-refrigerants.com](http://www.honeywell-refrigerants.com)

**Honeywell Refrigerants**  
115 Tabor Road  
Morris Plains, NJ 07950  
800-631-8138

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