



Cooling as a Service
Refresh the planet

Case Study (update)



CaaS implementation in a dairy factory completes its first-phase and already outperform expectations

Clover, the largest dairy company in South Africa, is conducting a vast upgrading plan of its facilities across the country particularly emphasising their refrigeration systems. Its Queensburgh site is piloting Cooling-as-a-Service with results above forecasts.

Region

South Africa, KwaZulu-Natal

Year of implementation

2022

Sector

Industrial Refrigeration, Dairy

Retrofit or new

Retrofit and consolidation

Project size (cooling equipment)

10MW

Technology

Two-stage ammonia system with solar PV and heat recovery for hot water

Refrigerant

Ammonia

Investment

EUR 8,8 million

Partners



Energy Partners Refrigeration (EPR), an active implementer of the Cooling as a Service (CaaS) model in South Africa, completed the installation's first phase of the refrigeration system of the Clover dairy factory in Queensburgh, KwaZulu-Natal, last January.

Announced in June 2021, the planned upgrade of the cooling structure featuring a new, state-of-the-art 10MW ammonia system, is part of a wider consolidation program, Project Sencillo, by Clover to consolidate its manufacturing facilities in the country (a case study presenting the start of the project in June 2021 is available here).

124 years old, Clover is the largest dairy company in South Africa, holding 30% of the country's market shares. Built on the heights of Durban, perched above the Indian Ocean, its Queensburgh facility is one of its main production centres, but with a refrigeration system at its end-of-life, using outdated technology and unable to face the new production load resulting from the consolidation of various facilities into Queensburgh, its improvement constitutes the largest single CaaS investment EPR has made since adopting the servitisation approach.

As a dynamic member of the CaaS Initiative, the latter, a South African technology provider, is a key player in deploying as-a-service cooling solutions in the region. Energy Partners' pay-per-use model enables clients to benefit from the most efficient refrigeration equipment without the usual large upfront investment cost required with acquiring it, allowing them to drastically reduce their environmental footprints without the financial burden while enhancing their profitability.

Indeed, at the project's signature, the Queensburgh facility project was estimated to increase the plant Coefficient of Performance by 30% compared to the baseline, but the actual results already exceed the forecasts. Within its first months of operation, while measuring plant efficiency and comparing it to the previous operations, Energy Partners measured a close to 40% improvement in efficiency, outperforming the estimations previously mentioned. Moreover, currently, the company is operating the system within its contracted specifications and at 102% of its estimated load.

On a CaaS project of this size, accurate upfront modelling is key to success as a 10% error on efficiency

Energy Partners Refrigeration - Clover factory cooling system (first phase completed)





The photovoltaic installation takes advantage of the average 320 days of sunshine per year in the Durban region.

or load estimation can make the difference between profitability and loss. With a variation of less than 2% between the digital twin model and the actual data currently gathered, Energy Partners proved during this project their ability to predict both plant performance and load.

Furthermore, the project was engineered to be installed during the full production of the Clover factory; meaning the downtime of the plant was minimised to a few weekends for change-over. In that sense, the refrigeration load transferred from the old system to the new was established in coordinated steps with the factory which was an engineering challenge in itself.

In January 2022, the delivery of the first phase of the project was completed, including an all-new two-stage ammonia refrigeration system using modern control technology and limited ice storage for temperature stability, also with waste heat recovery to hot water. Simultaneously, solar assistance (from EPR Solar PV system) was implemented which significantly reduced the cost of operating the cooling to Clover. To date, the total amount of cooling available to Clover reaches 9500 kWR. Upon completion of phase 2, the low-temperature stage for butter freezing and ice storage system, the refrigeration system will provide 10 000 kWR.

However, the plant has been designed to be expanded to 15 000 kWR in the future. The second stage of implementation, expected to be completed in June 2022, will also be accompanied by a further upgrade in the Solar PV assist bringing the peak generation to 1900 kWp and total investment value of EUR8,8 million.

Environmentally, this project is exceeding all expectations. 16% Of all the electricity used by the new system is generated by solar PV on its own saving greenhouse gas (GHG) emissions of 2100 tons/year, Efficiency gains and hot water recovery from the refrigeration system add a further 4,470 tons/year.

“Being able to provide CaaS to a blue-chip company like Clover has been a great privilege and opportunity for us. It is a showcase for efficient and sustainable refrigeration brought about by the innovation of Cooling as a Service.” said Dawie Kriel, Head of Business Development at Energy Partners Refrigeration.

Financially, the project construction phase was funded by Investec, whilst Nedbank will support the long-term phase. Both Investec and Nedbank are highly supportive of EP's business strategy of investing, building and operating energy assets that provide core utilities, namely power, steam and refrigeration assets.

“Removing the upfront investment requirement enabled Clover to free-up capital to further invest in Project Sencillo. The latter benefit together with the fact that we have access to a modern automated refrigeration plant for which Energy Partners committed to guaranteed uptime and COPs / efficiency, in line with leading industry standards, resulting in lower operational costs and also a “greener system” ensuring that Clover is at the forefront of efficient and sustainable refrigeration technology in the country. Definitely a “win-win” situation for both parties ” states Anton Pretorius, Group Manager Clover.

As businesses seek ways to accelerate their path to Net Zero, whilst limiting their risk exposure and recovering from a global pandemic, CaaS provides a strong solution to support companies in doing so sustainably. CaaS brings forward energy efficiency gains, and increased life-cycle performance, while also accelerating the implementation of a circular economy.

The success of the CaaS initiative paved the way for the global Servitisation for Energy Transition (SET) Alliance; whose objective is to scale up the impact of the model by applying it to energy-efficient systems from and

beyond cooling. Energy Partners Refrigeration, with its strong experience on Cooling as a Service, joined the alliance as a steering committee member and plays a key role in shaping and influencing the actions of the newly formed SET Alliance.

Contact Information

For more information, please contact:

Dawie Kriel,
Head of Business Development Energy Partners Refrigeration
Dawie.K@energypartners.co.za
energypartners.co.za

www.energy-base.org
www.caas-initiative.org
www.cleancoolingcollaborative.org/

Energy Partners Refrigeration cooling installation in Queensburgh, South Africa.

