



Chelsea Sugar reduces carbon emissions with new evaporation system

Chelsea Sugar, New Zealand



Switching to a more sustainable evaporation solution will enable the Chelsea Sugar Factory to cut carbon emissions and reduce its energy consumption while simultaneously optimizing the efficiency of its operations. Founded in 1884, NZ Sugar Company (Chelsea) is one of the country's top 100 companies. Its products are derived from natural sugar cane and the factory still operates from its original site on the seafront at Birkenhead, a suburb of Auckland.

A sustainable business

Proud to operate its facilities in compliance with environmental legislation and regulations, the company has integrated sustainability into its strategies, business plans and operations, and is committed to cutting carbon emissions by improving its operational processes to reduce both energy and water use and restrict the generation of solid, liquid, and gaseous waste.



Top priority: lower carbon emissions

So, when a decision was made to approach Alfa Laval with a view to upgrading the evaporation system at the Birkenhead factory, increasing energy efficiency and cutting carbon emissions were high on the agenda, and the strong focus on sustainability and decarbonisation led to the project receiving financial support from its shareholders, along with support from the New Zealand government for this multi-million dollar investment.



The existing evaporation system at the plant utilized Thermal Vapour Recompression (TVR) technology, which was installed by Alfa Laval 20 years ago. This system employs a series of boiler-steam-fed TVR units to increase the pressure and temperature of vapours coming off the first effect. The resulting mix of boiler steam and vapours are then used to provide heat to the first effect, as well as to several other parts of the process.

The process of upgrading this system was preceded by lengthy discussions to scope an optimal solution and the customer's positive experience of Alfa Laval's products and technical expertise proved key in their decision to opt for a more energy-efficient AlfaVap system with Mechanical Vapour Recompression (MVR).

Mechanical Vapour Recompression (MVR) utilizes a high-speed fan or compressor to re-compress evaporated water vapour – increasing the pressure (i.e., saturation temperature) of the vapour, which can then be re-used as heating steam.

"It is the ability of Chelsea to evolve and adapt to changing times, which has enabled us to thrive and grow over the past 138 years. Today, one of our biggest challenges is that we must develop an increasingly sustainable operation and business, and the environmental impact of our sugar production is an important part of this," says Graeme Smith (GM Operations ANZ) from Chelsea. "Our relationship with Alfa Laval goes back many years, and it is the strength of our interaction and the mutual confidence in our competences, which has now enabled Chelsea to take on the journey in making the business even more sustainable."

Alfa Laval's MVR technology reduces energy consumption and increases productivity

Alfa Laval's MVR technology will enable Chelsea to turn to wind, solar or another renewable power source and thereby cut carbon emissions from this part of the process to near zero. This will also lower natural gas usage at the sugar refinery by drastically reducing the input steam demand of the evaporator and cutting energy consumption of the evaporator plant by 76%. In concentrating the sugar from 65% to 78% dry solids, the energy consumption of the MVRs is 36 Wh/kg whereas in the existing TVR system, the

- By drastically cutting energy consumption in the refining processes, Chelsea Sugar reduces its plant's carbon emissions by 11 percent which equals 2,767 tonnes of CO₂ yearly.
- According to the UN, up to a third of the world's carbon emissions can be attributed to food production.

energy consumption is around 190 Wh/kg. Overall, the refinery's equipment upgrade reduces energy consumption for the whole site by 9%, and CO₂ emissions by 11%.

The MVR system also ensures efficient evaporator operation over the full range of expected operating conditions, with a smooth and quick start-up and shut-down, and fully automated CIP, culminating with a high sugar product quality with minimal colour formation. Technical, commercial and health & safety risk is minimized, and a cost-effective future upgrade of the equipment is also possible if required.

Other advantages of the MVR system are a strong financial return on investment, efficient operation, improved control accuracy and operating consistency, and minimized maintenance requirements; all of which underpin a strong alignment with Alfa Laval's sustainability commitment to planet and people.



AlfaVap system with Mechanical Vapour Recompression (MVR).

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

100006316-1-EN 2206