

ELECTRODE BOILER FACT SHEET

Synlait has commissioned New Zealand's first large-scale electrode boiler to provide renewable process heat in their \$125 million advanced dairy liquids facility at Synlait Dunsandel.

The deliberate decision to not build another coal boiler is part of [Synlait's bold sustainability strategy announced on 28 June 2018](#) and leads the way to a lower emissions future for New Zealand.

The electrode boiler was commissioned from early 2019 and completed in March. It's an example of how Synlait will progress their goal of reducing off-farm greenhouse gas emissions by 50% by 2028.

HOW DOES IT WORK?

The electrode boiler uses electrodes that are submerged into water. Electricity flows through the electrodes to make contact with the water, vaporising it into steam and creating renewable process heat.

It is a very energy efficient way to create process heat at scale, as it's on demand and you don't need to store hot water.

An electrode boiler is easy to manage. It can heat from cold in less than five minutes or from standby in about one minute.

Variable amounts of steam can be produced as required and maintenance on the electrodes is minimal.

An electrode boiler is quite different to a household kettle or domestic water heater, which use elements to heat water.

The process heat (steam) from the electrode boiler will be used to pasteurise milk, sterilise milk, clean production lines and help form product packaging, among other uses.

The electrode boiler capacity will initially be 6 megawatts (MW). Synlait has the ability to increase this capacity to 12 megawatts. Recent upgrades to the local Dunsandel electricity network have anticipated this possibility.



Energy Plant Solutions' 3D model of Synlait's electrode boiler.

LOWER EMISSIONS FOR SYNLAIT

Traditionally, dairy processors have relied on coal as a cost effective way to create large volumes of process heat required to dry liquid milk into powder.

With a commitment to significantly reducing emissions in Synlait's supply chain by 2028, Synlait evaluated several options including diesel, gas and biomass but chose the electrode boiler as it had the lowest carbon footprint and makes long-term business sense.

The electrode boiler, including the electrical supply infrastructure and running costs (at 2018 rates), requires an almost two times greater investment than coal over a ten year period. Increased costs of carbon over the next ten years were anticipated in the business case.

The carbon equivalent (CO₂-e) saving of this electrode boiler – compared to a coal alternative – is 13,714 tonnes CO₂-e / year.

Over a ten year period, the electrode boiler's estimated emissions savings are roughly the same as emissions from 9,600 households. On an annual basis, it's approximately the same as removing 5,300 cars from the road¹.

Synlait is working with experts to help address their existing coal infrastructure and reduce use at Dunsandel, which consists of three coal boilers (total capacity of 75MW).

PROCESS HEAT AT OTHER SYNLAIT SITES

Synlait's Pokeno site will also require process heat.

While the same electrode boiler option was considered for Synlait Pokeno, the electrical infrastructure isn't yet available. Natural gas will be used to achieve the commissioning target of the 2019 / 2020 season.

Synlait is working with the local electricity company to assess possibilities and options for using electricity in the future at Pokeno.

PROJECT PARTNERS

Synlait proudly partnered with the following organisations to make the electrode boiler a reality.



Energy Plant Solutions are industrial heat and boiler experts. They designed, constructed and installed the electrode boiler system.
www.energyplantsolutions.co.nz



Babbage Consultants provided the project management expertise for this project.
www.babbage.co.nz



EECA provided financial support through the Technology Demonstration project.
www.eeca.govt.nz



Orion delivered infrastructure upgrades to the Dunsandel electricity network to provide the necessary power for the electrode boiler.
www.oriongroup.co.nz

1. These figures are based on a carbon equivalent (CO₂-e) emission savings figure of 13,714 tonnes CO₂-e / year.