



Project Review

Fonterra Waitoa Biomass Project

30MW_{th} Saturated Steam Bubbling Fluid Bed Boiler

Client: Fonterra
 Location: Waitoa, Waikato, New Zealand
 Duration: 2 years

Background

Mid 2023 Fonterra chose to lift their decarbonisation ambition and modify their targets to aim for a 50% reduction in emissions by 2030 - an improvement from their original 30% goal.

As Fonterra travel their road to decarbonisation, they have elected to purchase new steam generating boilers at sites where converting end of life assets is not economical or effective. This resulted in Fonterra installing their largest to date new biomass boiler at Waitoa.

This new plant enabled Fonterra to mothball old coal boilers and supply reliable biomass-generated steam to dry milk. This displaces 48,000 tonnes of CO₂ emissions per annum.

The Solution

The combustion technology selected for Waitoa was a Bubbling Fluid Bed, BFB boiler which burns the lowest grades of fuel which would not burn in a converted boiler. The fuel is presently "hogged" or chipped woody biomass with moisture content between 40%-55%.

Windsor completed a full Engineer Procure Construct (EPC) Contract for this project which included a complete scope from fuel reception and handling, energy plant, as well as civil and building works. The fuel handling scope included:

- A semi-enclosed drive through fuel reception with in-ground plate conveyor designed to clear a standard chip liner in less than 25mins
- Fuel storage building to store approximately 1,000m³ of biomass to fire the boiler for one day
- Fuel screening system for ferrous and oversized material. This is an integrated unit with a self-cleaning permanent magnet and disc screen to remove fuel exceeding 200mm in length

The state of the art energy plant is highly automated and operates with minimal operator involvement.

- A sonic sootblower supplements the steam sootblowers which allows highly efficient and more regular cleaning of the boiler generating bank without disturbing the steam to process

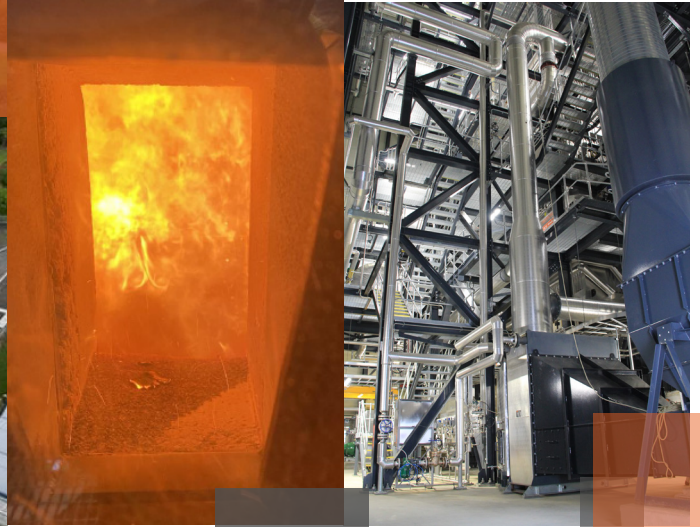
- Fully enclosed sand system that screens (for overs and fines) and recirculates the sand in the BFB system. This greatly reduces the sand consumption
- Sufficient sand storage to allow complete drainage of the BFB for maintenance purposes
- Automated startup by preheating the fluid bed with auxiliary burners

The plant also highlights the latest energy efficiency measures Windsor offer including:

- A helical finned economiser which allows for more heat transfer surface in a smaller footprint when compared to a bare tube economiser
- Make-up water heater which recovers the remaining heat from the flue gas before the stack and heats the cold makeup water entering the feedtank.

The plant is great success and has burned out of specification fuel as dry as 35% moisture content and as wet as 63% moisture content.





Why Windsor Energy?

As a proven supplier of plant and services worldwide, Windsor Energy offered the following advantages:

- Extensive installed base of heat plants in the dairy industry and for other large industrial clients.
- Innovative plant design for high efficiency and simple operation.
- Modular plant design optimised for safe and simple shipping and erection.
- Clean burning biomass combustion technology, resulting in low total emissions of contaminants.
- Project team experienced in the practical details of designing and converting a variety of boiler types with a range of different fuels.

Project Name	Fonterra Waitoa 30MW BFB Boiler
Project Number	J13212
Date Project Completed	2023
Boiler Type	B & W Towerpak® Boiler
Combustion System	Bubbling Fluidised Bed
Thermal Capacity	33 MW
Fuel Source	Biomass
Boiler Design Code	AS 1228
Steam To Process	47,000 kg/h
Steam Temperature	239°C
Operating Pressure	32 Bar G
Design Pressure	41.5 Bar G
Feedwater Temperature	105°C

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