



## Project Review

### Fonterra Te Awamutu Conversion Project

#### 43MW<sub>th</sub> Superheated Steam Boiler Conversion From Coal To Pellets

Client: Fonterra

Location: Te Awamutu, Waikato, New Zealand

Duration: 24 months from desktop feasibility, to fuel trial, to full implementation install & commissioning

#### Background

Due to the need to decarbonise energy, Fonterra made the commitment of reducing their global emissions by 30% by 2030, and to fully decarbonise, reach net zero carbon emissions, by 2050. The first boiler targeted for this decarbonising strategy was chosen to be the 43MW superheated steam boiler at Te Awamutu. This is a B&W Towerpak™ boiler that was installed by Windsor, then Easteel Industries, in 2004.

The process was completed in stages in a fully collaborative nature to ensure Fonterra's expectations were being met and assessments could be made on the next steps as soon as we found results. The first step was a desktop study to assess the feasibility of the conversion on a biomass fuel. The next stage required a fuel trial to practically confirm the results of the study and discover what equipment needed to be modified, replaced, or added to allow the boiler to fully function to the best of its potential on the new pellet fuel.

As expected with older boilers, the emissions equipment needed to be replaced to allow the larger flue gas

volumes to be cleaned to acceptable conditions. This also gave Fonterra an opportunity to improve their equipment further to exceed council particulate requirements and allow for future stricter emissions limits to be met.

#### The Solution

The final implementation stage involved significant changes in four main areas:

##### Fuel handling system

Pellet fuel is much more susceptible to explosion risks with increased amounts of dust compared to coal. Provisions needed to be in place to mitigate these risks, and also contain the dust as much as possible. Pellets cannot get wet, so enclosures needed to be installed for weather protection of the fuel handling equipment

##### Combustion system

Combustion of the pellet fuel differs significantly from coal. Different fuels require differing amounts of combustion air, and will burn differently on the grate. All these areas needed to be considered, and modified, to ensure optimised combustion conditions.

##### Emissions system

The lighter pellet ash has different characteristics than coal ash, and a higher carry over rate which increases the risk of sparklers continuing down the flue gas system. With new emissions equipment selected, including both a multicyclone system, and dual baghouses, Fonterra is assured of safe and reliable low emissions.

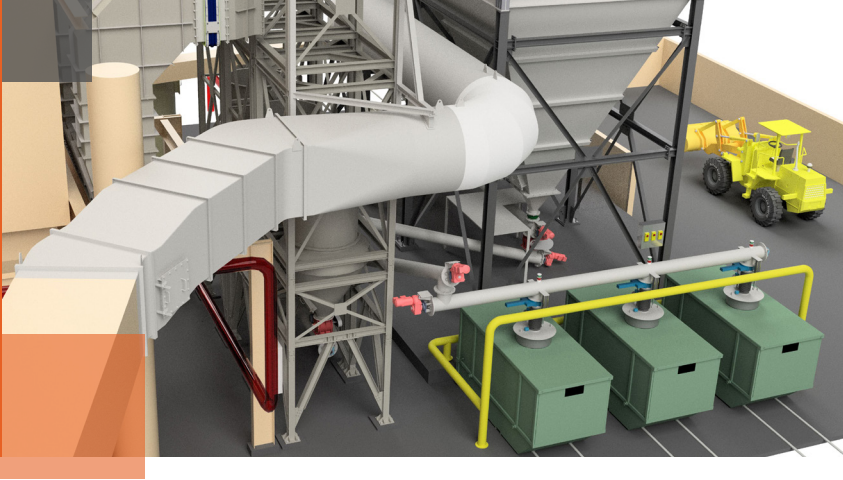
##### Ash handling system

To fit the new equipment, and minimise any escaping ash, a new ash screw system was installed to feed the ash into automated sealed ash containers.

Despite the Covid-19 lockdown during the fabrication and install stages, Windsor was able to complete the program in the expected timeframe as all the right precautions were in place for possible delays.

With the boiler running 100% on pellets, it is estimated this will eliminate 84,000 tonnes of carbon emissions per year which reduces Fonterra's overall coal energy consumption by 10%. This is the largest biomass fuel conversion in New Zealand to date.





## 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 Name	Te Awamutu Coal To Pellet Conversion
Project Number	J12255
Date Project Completed	2020
Boiler Type	B & W Towerpak® Boiler
Combustion System	Travelling Grate
Thermal Capacity	43 MW
Fuel Source	Wood Pellets
Boiler Design Code	AS 1228
Steam Output	55,000 kg/h
Steam Temperature	407°C
Operating Pressure	40 Bar G
Design Pressure	50.64 Bar G
Feedwater Temperature	105°C

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