



8 November 2016

Fraser Clark
General Manager Operations
Electricity Authority
Wellington
(by e-mail: fraser.clark@ea.govt.nz)

Dear Fraser

Application for Whareroa industrial co-generation station to be classed as Type B for Code purposes

The Fonterra Todd Cogeneration Joint Venture (FTJV) is an unincorporated joint venture between Whareroa Power limited and Nova Energy Limited.

FTJV is applying for the Whareroa Cogeneration embedded generator connected to GIP HWA1102 to be classified as a "type B industrial co-generator" under Schedule 13.4 of the Code.

The Whareroa dairy factory complex consists of several dairy factories operating independently on a single site in Hawera, Taranaki. These take steam and electricity from the Whareroa cogeneration power station located onsite. Electricity generated in excess of the dairy factories' requirements is exported.

FTJV makes this application on the grounds that Whareroa meets the following definition of an industrial co-generation station as per Part 1 of the Code:

- (b) is reliant on a co-located industrial process because—
 - (ii) it provides some or all of the electricity that it generates to that co-located industrial process; and
 - (iii) it provides some or all of any by-product of generating electricity to that co-located industrial process; and
- (c) is tightly coupled to an industrial process;

As such it would benefit significantly from being relieved of the current requirement to stay within tolerance limits of dispatch instructions.

Whareroa Cogeneration Plant Description:

The Whareroa cogeneration plant is located at the single largest dairy factory site in the world. The factory site is made up of several dairy production processes that rely on a cogeneration plant for steam and electricity requirements.

Natural gas is used to fuel four 10.5MW gas-turbines each equipped with a heat recovery boiler (HSRG), which captures the thermal energy from the turbine's exhaust and uses it to make steam.

Two of the HRSGs are IST models that can be run dry to allow the turbines to run without the need to produce steam, although this mode of operation is very inefficient and normally only used during the steam system annual maintenance outage. The other two HRSG's are John Thompson boilers and require steam production/demand for the gas fired turbines to generate electricity.

Electricity is generated from the gas-turbines and a 28MW steam turbine. The steam supply for the steam turbine is somewhat variable as it depends mainly on the residual quantity left after dairy factory steam demand.

The Whareroa power station electricity exports are therefore a function of:

- Gas fired turbine production;
- Electricity load at the dairy factory site; and
- Steam turbine production, which in turn is dependent on,
 - Heat from the gas turbines,
 - HRSG steam production, and
 - The dairy factory demand for steam.

In addition there are several parameters and constraints for the plant to operate within including:

- cooling capacity constraints; and
- minimum running levels for the steam turbine.

Given the fluctuations in steam and electricity demand due to the independent operation of processes at the factories, it is difficult to maintain electricity exports within tolerance.

A line diagram is attached of the cogeneration steam and electricity production process.

Host Dairy Factory Description:

Fonterra Whareroa processes up to 14 million litres of milk per day. Annual milk volume processed at the site is around 1.7 billion litres, giving around 380,000 tonnes of product.

Products manufactured at site include:

- Whole milk powder
- Skim milk powder
- Milk protein concentrate
- Buttermilk powder
- Casein
- Cheese
- Butter
- AMF
- Whey products

The mix of products varies with milk production, market demand, and product mix at Fonterra's other processing sites.

The annual energy consumption for the Fonterra Whareroa site is approximately:

- 700,000 to 750,000 tonnes of steam

- 165 GWh of electricity

Seasonal Information

During the dairy season (August to May), the factory takes a significant proportion of the electricity generated and steam produced by the cogeneration plant. In the off peak winter months (June – July), the plant is able to operate more like a combined cycle plant with much less electricity and steam being taken by the factory, although there will still be times during the winter when changes in factory loads need to be catered for within the planned 1 hour gate closure.

During the dairy season, steam is supplied directly to the dairy factory. Depending on the mix of steam demand from the site, some electricity is generated through the steam turbine.

Fonterra does not have a resource consent to vent steam to atmosphere and this means that any excess steam not required by the factory processes must pass through the steam turbine. Condensate from the steam turbine is then recycled for steam production again.

Current conditions

Previously FTJV applied for and received an exemption from the Electricity Commission from certain dispatch instruction requirements, mainly the requirement to remain with +/- 1MW of the dispatch instruction.

FTJV believes that this constraint should no longer apply. FTJV still expects to be required to comply with dispatch instructions where the system operator has issued a formal notice as defined in part 1 of the Code.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Rob Wellington', with a long horizontal stroke extending to the right.

Rob Wellington
Manager Fonterra Todd JV



Single Line diagram of Fonterra Todd JV steam metering points

