

Christchurch Civic Centre Trigeneration Plant

Customer: Christchurch City Council **Application:** Trigeneration from Landfill Gas

Our latest gas engine project for the Christchurch City Council represents the next stage in Entec's successful and long-lasting relationship with the Council which dates back to the mid-1990's. Entec was engaged to design, supply, install and commission a landfill gas fuelled trigeneration plant for the Council's new Civic Centre building in the Christchurch CBD.

Trigeneration refers to the conversion of one energy input (in this case, landfill gas with a methane content of between 50-60%) into three energy outputs; electricity, heat and cooling. The heat recovered from the gas engine's jacket water and exhaust gas streams is to be used for both heating of the building and to power an absorption chiller for air conditioning.

The gas engine selected is a Waukesha model VGF36GLD, a 36 litre, V12 engine which drives a close coupled alternator with an electrical output of 475kWe. The thermal output of the engine is 712kW. An exhaust heat recovery unit is utilised to capture the exhaust heat which together with the heat from the engine's water jacket is the prime energy source for a Carrier Absorption Chiller. The trigeneration plant is able to provide 100% of the buildings' electrical load, 45% of the peak chilled water load and 40% of the peak hot water.

Fuel gas for the project is being piped from the 90 hectare Burwood Land-fill which operated between 1984 and 2005 on the north-eastern outskirts of the city. The gas pipeline travels 18 kilometres (directionally drilled and thrust underground) and with two river crossings via the QE2 Sports Complex, where Entec installed a smaller cogeneration plant in 2007, and via the Bromley Waste Water Treatment Plant which is home to a 1.5MW Waukesha cogeneration plant.

Methane is a powerful greenhouse gas with 22 times more impact on climate change than carbon dioxide, so mitigating this by burning the gas to generate electricity and provide heating and cooling is not only an economic success but an environmental one as well. Add to this the energy that is being displaced by this project (LPG and electricity from the national grid) and the fact that the landfill can be more easily re-vegetated because the landfill gas that damages plant roots is being removed, and you have a project that just keeps ticking more and more boxes. The Christchurch Civic Centre received the country's first 6 Green Star - Office Design rating from the New Zealand Green Building Council. The building is expected to save \$1.3 million in energy annually through its innovative Tri-Generation system.

During the commissioning and handover in August 2010 Entec received the following excellent feedback from both the Council's Project Manager and their Engineering Consultant; "We have appreciated the quality of installation works, the cooperation and solutions-focused attitude that you and your team have brought to this project..." and "We have been very impressed by Entec's commitment to this project and the quality of their installation works.

Waukesha VGF36GLD, 36 litre, V12 engine



Exhaust heat recovery unit



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