

## Landfill Gas Powers New Zealand Cities

Auckland is New Zealand's largest city, with a population of approximately 1 million. It, along with the city of Wellington, receives part of its electricity from power generation projects utilizing Waukesha Engine VHP engines.

Mighty River Power is a state-owned enterprise committed to the sustainable use of natural resources to produce electricity with a total generation capacity in excess of 1,000 megawatts – mainly from hydroelectric resources on the Waikato River. The company, one of the country's major retailers of electrical energy to domestic and commercial users, also owns a geothermal plant and is a major shareholder in three New Zealand power projects using methane gas generated by landfills to power engine/generator packages.

These three landfill gas power stations comprise about 13 percent of New Zealand's installed generating base.

The Auckland landfills commenced operations in the late 1980s, accepting solid waste from domestic, commercial and industrial sources, and were originally owned and operated by the Auckland Regional Council. The operating function was later contracted to Envirowaste Services in the early '90s. The landfill gas power stations were designed and built in 1991 for the local power board, the operation of which was later acquired by Mighty River Power in 1998.

At the time of the construction of the landfill power stations, Entec Services acted as the main contractor for the supply, installation and commissioning of the generating plant, controls and switchgear. Entec Services has been the Waukesha Engine Distributor for New Zealand since 1981 and has established itself as the leader in the gas engine market.

The generating plants at the landfill power stations employ Waukesha VHP7100GLD Enginator® units, each producing 920 kW at 50 Hz. The Rosedale plant in Auckland has three Enginator generators as does the Silverstream plant in Wellington, giving each a capacity of 2.7 MW. The Greenmount station, also in Auckland, has six Enginator units installed for a total plant capacity of 5.5 MW. Both Rosedale and Greenmount operate the year-round supplying energy into the local grid for sale to Mighty River Power's customers.

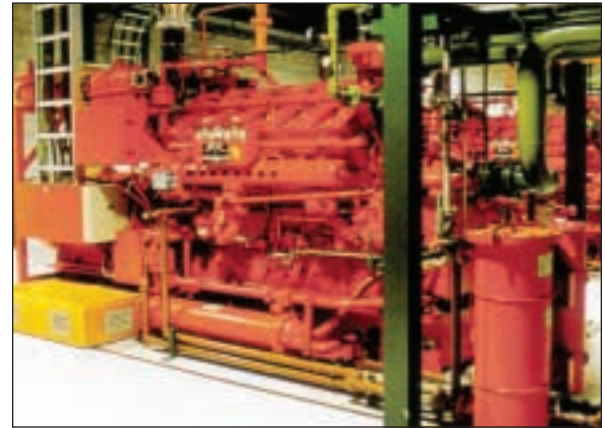
In order to minimize the corrosive effects of the landfill gas, the engines operated at an elevated jacket water temperature of 104°C (220°F), the waste heat is not used in any co-generation plan.

Each Enginator is computer controlled and integrated into a station control system that can be accessed remotely, so that all nine units can be operated from either site. Outside of regular office hours, an operator can monitor and control the plant from home.

The twelve Enginator units have accumulated in excess of 825,000 hours of operating time since commissioning, with the nine Auckland units each approaching 80,000 hours. Plant availability has been high throughout this period, which is very impressive given the harsh nature of the gas. The Greenmount station, with six Enginator units, has experienced gas shortfalls during dry periods, while the Rosedale plant, with three units, typically has surplus landfill gas and has demonstrated annual capacity factors of 95 percent.

Along the way several product improvements have been made involving teamwork between Waukesha Engine, Entec Services and the plants' owner. Specific improvements have included the introduction of a new three-ring piston design, new water pump bearing seals, moly-coated cylinder head components and new, long-reach spark plugs. The cylinder head improvements have been particularly impressive, with cylinder head life in excess of 24,000 hours now being routinely achieved.

The long-term reliability of the plant has been achieved through diligent operating measures along with preventive maintenance schedules and rigorous oil analysis, all carried out by Entec Services since the units were commissioned. ■



*Above: One of three Enginator® power generators in operation at the Rosedale plant. Together, all three Enginator units provide 2.7 MW of power.*

*Background: The Rosedale plant located in Auckland, New Zealand.*