


The Use of Landfill Gas and Co-generation - Christchurch, New Zealand	
Keywords	Renewable Energy Sources, Landfill gas, Co-generation, Carbon credits
Pictures	
Objectives	<p>The action objectives were: to displace fossil fuel previously burnt for heating, with a renewable energy source while generating renewable electricity, to destroy the GHG methane and prevent it from escaping to the atmosphere, to reduce operating costs of a public building and, finally, to use the revenue from the sale of carbon credits for funding a broad range of energy action measures for the City community.</p>
Description	<p>The project consisted of a 3.7 km underground pipeline from the city's landfill site to QEII swimming complex, the installation of a gas treatment/compression plant, the conversion of existing 3.4 MW boilers at the swimming complex from LPG to landfill gas, and the installation of a 250 kW co-generation plant at QEII site. Both, the landfill site and the QEII complex are owned and operated by Christchurch City Council. Prior to the project, the landfill gas mostly escaped to the atmosphere and was partly collected and burnt in a flare, and the QEII Swimming Complex was heated by LPG-fired boilers. Now landfill gas displaces LPG in the boilers, and both electricity and heat are generated from landfill gas in a co-generation plant. Methane (that makes up 53% of landfill gas) is being destroyed (converted into CO₂), which reduces its harmful greenhouse gas effect by a factor of 21.</p> <p>The plant was commissioned in May 2007. The project lifespan is estimated at 15 years. Capital cost of the project was NZ\$4.2M. Initially, simple payback period was estimated at 7.5 years. At that stage, the Council received 200,000 emission reduction units - from the Government's Projects to Reduce Emissions Programme. A possible revenue from the sale of these carbon credits made the project financially viable, so the Council decided to proceed with its implementation. By 2007, prices for LPG and electricity increased to such extent that energy cost savings resulting from the project exceeded NZ\$1M per annum, reducing the payback period to 4.7 years.</p>
Results / Achievements	<p>Overall gains resulting from the project:</p> <ul style="list-style-type: none"> - 13 GWh of non-renewable energy displaced - CO₂ savings in excess of 40,000 tonnes per year - Energy cost savings in excess of NZ\$1M (€ 500,000) per year and operation cost savings (energy cost savings less extra operating costs) of NZ\$900,000 per year - Revenue from sale of carbon credits: €1,800,000 over 5 years - Facilitated re-vegetation of the site as harmful landfill gas is captured - Strengthened relationship between council and community as a result of positive publicity in the media with regards to the project <p>The revenue from the sale of carbon credits will be used to fund the action plan of Sustainable Energy Strategy for Christchurch 2008-2018.</p>
Friendly advice for replication	<p>The most effective and efficient use of landfill gas can be achieved at a swimming complex as such a public building requires both heat and electricity all year round and is therefore an ideal place for co-generation. As part of landfill gas treatment plant, we use gas fired refrigeration equipment. This was an alternative to a traditional electrically driven refrigeration plant. This feature alone saves 0.3 GWh of electricity a year and uses instead "free" landfill gas.</p>
Online information	<p>http://www.eeca.govt.nz/eeca-library/brochure/eeca-energywise-awards-winners-booklet-07.pdf (pages 4 and 22)</p>
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