



Energy Assurance – Take the risk
out of your energy decisions.

Nelson Landfill Gas Project

Energy for Industry Limited

(a subsidiary of Meridian Energy Limited)

ANNUAL REPORT - 2010

JANUARY 2011

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1 Introduction

Energy for Industry developed the Nelson Landfill Gas project to utilise gas recovered from the York Valley landfill that would otherwise be flared.

The project is a collaboration between Energy for Industry (EFI), Nelson Marlborough District Health Board (NMDHB) and the Nelson City Council (NCC), and was committed to by all parties in May 2005.

The project comprises a gas treatment facility at York Valley, a buried pipeline from York Valley to Nelson Hospital, and a steam boiler at the hospital. Steam generated by the landfill gas (LFG) fired boiler displaces steam generated by the existing coal fired boilers, thus reducing coal consumption and therefore CO₂ emissions.

The net project emissions also take into account the emissions from electricity used, and embodied emissions from construction materials.

The project was awarded 28,000 emission reduction units by the NZ Government for the 2008 – 2012 Commitment Period.

Conditions of this allocation include the submission of an annual report (which is the purpose of this report). The annual reporting requirements are;

- (a) tCO₂-e Emission Reductions resulting from the Project during the Year;

- (b) where another measure is used as a proxy measure to determine the Emission Reductions, then the quantum of that measure shall also be reported;
- (c) information to support the information reported in (b);
- (d) details of anything which the Participant is aware of that is, or has the potential to be a material impediment to achieving Emission Reductions during the Commitment Period.

2 Period Summary

GENERAL

This report is for the period January – December 2010 and is the sixth Annual Report submitted for the project. The project was committed by all parties in May 2005, construction commenced in August 2005 and was completed in December 2005. Commissioning was undertaken in January 2006, with the plant being available for operation in February 2006.

In April 2009 EFI committed to the Nelson LFG Utilisation Improvement project which saw the replacement of the original 1.5MWth LFG boiler with a higher capacity 2.5MWth LFG boiler. The original boiler was decommissioned in late August 2009 and the new boiler has been in full time operation since early September 2009.

Emission reductions due to the project are from displaced coal consumption through the use of LFG as a fuel to generate steam. The quantity of coal displaced is determined from the baseline coal boiler efficiency and the quantity of steam generated by the LFG fired boiler. The reduction in CO₂ emissions is then calculated from the quantity of coal displaced.

The net emission reductions achieved by the project during the 2010 calendar year were 4,022 tonnes CO₂-e.

OPERATION

With the exception of planned maintenance periods and minor technical issues that are expected for this type of plant, the plant operated continuously for the entire reporting period.

The LFG utilisation and associated emission reductions for the reporting period were higher than the previous period. The increase from the previous period can be attributed to a full years operation with the higher capacity LFG boiler that was

only operation during the final 3 months of the previous period.

The installation of the larger 2.5MWth LFG boiler has increased the peak LFG utilisation rate and enabled the hospital to adopt a less conservative operating philosophy with their existing coal fired boilers. The proportion of total site steam generated from LFG increased from an average of 52%, for the previous period, to 60% for the current reporting period.

EMISSION RELATED ACTIVITIES

COAL DISPLACEMENT

The coal consumption and steam generation data for period May 2005 – April 2006 was used as the basis for the coal displacement calculations. The coal displacement analysis for 2010 is included in Appendix 1.

Steam generated by the LFG fired boiler is measured with a dedicated steam flow meter.

During the current reporting period the plant has supplied 60% of the total hospital steam demand. This has resulted in the displacement of 1965 tonnes of coal with a subsequent reduction in CO₂ emissions of 4,106 tonnes for the period.

ELECTRICITY CONSUMPTION

Electricity is used in the treatment of the LFG, primarily for gas compression.

This electricity consumption of the treatment plant is metered, and CO₂ emissions calculated directly from the consumption.

The plant consumed 134,692 kWh of electricity during the period, with the resulting CO₂ emissions of 84 tonnes.

EMBODIED EMISSIONS

There was no construction activity undertaken during the period of this report.

GLOBAL WARMING POTENTIAL

The project utilises landfill gas, which would otherwise be flared, as fuel in a boiler to generate steam.

The same gas recovery system is used for both the existing flare and the boiler. Both processes involve the combustion of the landfill gas (which is approximately 55% methane by volume). Whenever the boiler is not in operation the flare is operating, and vice-versa. Therefore no additional methane is released or combusted as a result of the Project.

NET EMISSIONS

The net CO₂ emissions from the Project are shown in Table 1 below (note that rounding may mean that columns do not appear to sum correctly). Negative numbers in Table 1 indicate reductions in CO₂ emissions.

Table 1 Net CO₂ Emissions

	Report Period	Sum of Previous Periods	Total
	2010	2005- 2009	2005- 2010
	<i>tonnes CO₂</i>		
Coal Displacement	-4106	-11435	-15541
Electricity	84	296	380
Embodied Emissions	0	39	39
Global Warming Potential	0	0	0
TOTAL	-4022	-11101	-15123

3 Emissions Report

For period January – December 2010

(1) Construction Emissions

Not applicable.

(2) Operational Emissions

Element	Annual Usage	Factor	tCO ₂ -e
Diesel	0	0.00271 tonnes CO ₂ -e per litre	0
Petrol	0	0.00232 tonnes CO ₂ -e per litre	0
Electricity purchased	0.135	625 tonnes CO ₂ -e per GWh	84.2
Iron/Steel - produced in NZ	0	2.01 tonnes CO ₂ -e per tonne	0
Aluminium - produced in NZ	0	1.62 tonnes CO ₂ -e tonne	0
Cement	0	0.46 tonnes CO ₂ -e tonne	0
Total			84.2

(3B) ENERGY OUTPUTS

Element and Measure	Total
i. Electricity (GWh)	0
ii. Steam (tonnes)	0
iii. Steam (energy content)	0
iv. Hot Water (tonnes)	0
v. Hot water (energy content)	0
vi. Heat Plant efficiency	0
vii. Equivalent quantity of fuel displaced ¹	1989 tonnes coal

(4B) Energy Outputs - Not Attributable to the Project

Measure	Total
i. Steam (tonnes)	0
ii. Steam (energy content)	0
iii. Hot Water (tonnes)	0
iv. Water (energy content)	0

(5) Tonnes of Methane Combusted

Measure	Total
Tonnes methane combusted ²	0

(6) CO₂ Emitted from Methane Combusted

Measure	Total CH ₄	Total tCO ₂ -e
Tonnes CO ₂ emitted	0	0

¹ Calculated after subtracting any figures recorded in 4 (b)

² Corrected for temperature, pressure and water content

(7) Emission Reductions

Element	Annual Production	Factor	tCO ₂ -e
Steam/hot water (tonnes) (3)(b)(ii)/(3)(b)(iv)	0	As per schedule	0
Steam/hot water Energy content (heat output) (3)(b)(iii)/(3)(b)(v)	0	As per schedule	0
Displaced Coal (3)(b)(vii)	1989 tonnes	2.064 t CO ₂ -e per tonne coal	4105.8
Methane Combusting (6)	0	21 t CO ₂ -e per tonne methane	0
		Total	4105.8
		Less construction emissions and/or other project emissions (1),(2)	0
		Less tonnes of CO ₂ emitted by the project as a result of methane combusted	0
Less other generation not part of the project, recorded by the meters (GWh) (4)(a)	0.135	625 tonnes per GWh	84.2
		Less steam/hot water energy content (heat output) not part of the project (4)(b)	0
		Net Emission Reductions for the year	4021.6

(8) Emission Units Claimed

Emission Units claimed for the year using the emission ratio "C" set out in Clause 5.1 of the Project Agreement.

$$4021.6 \text{ t CO}_2\text{-e} \times 0.98 = 3941 \text{ Emission Units}$$

4 Evidence and Statements

(10) CERTIFICATION OF EQUIPMENT

Evidence that the metering and recording equipment has been certified by a reputable, independent quality assurance service provider.

Current calibration certificates for the steam meters used to determine steam generated by the landfill gas boiler were included in the 2007 report.

The certificate of accuracy of the weighbridge used to determine the quantity of coal delivered to the hospital is included in Appendix 1.

(11) MATERIAL IMPEDIMENT

A statement detailing anything that has, or has the potential, to be an impediment to achieving the agreed emission reductions during commitment period one.

We are not aware of any potential material impediment that will prevent continuing Emission Reductions by the Project during the Commitment Period.

(13) REPORT COMPLIANCE

A statement identifying that this report:

- has been prepared using the methodology of Schedule 2 – Measurement of Emission Reductions
- When considering the literal wording of Schedule 2, we have concluded that it is reasonable to describe the method applied as a “proxy method” as described in

Schedule 4[b], in that the energy content of the steam generated by the project is calculated on the basis of Specific Enthalpy values obtained from internationally recognised Steam Tables rather than "metered" as prescribed by the Schedule. What is "metered" is the mass of the steam flow. The internationally accepted method of determining the energy content of steam is to measure the mass flow of the steam and convert this to energy as we have done. We are not aware of any on-line industrial scale instrument that directly measures Enthalpy.

- meets all other requirements of Schedule 4 - Contents for Annual Reports, of the Project Agreement.

As far as we are aware this report has been prepared as per the project methodology, and meets the requirements of the Project Agreement for annual reporting.

Signature:



Jonathan Suggate

Position:

Development Project Manager – Industrial Energy Solutions

Date:

27-JAN-11

Appendix 1

SUPPORTING DOCUMENTATION

CO2 Emission Reduction Calculation

January – December 2010

NMDHB Steam and Coal Data Summary

2004 – 2010

Calibration Certificates

Coal Weighbridge – Supplied by Toltec Scale Ltd
Expiry date 10/03/10

Energy for Industry
Nelson Landfill Gas Project



CO₂ Emission Reduction Calculation

27 January 2011

January - December 2010

Coal Displacement

Steam Produced by LFG Boiler	12,727	tonnes steam
Boiler Efficiency Rate	0.1563	t coal / t steam ^{Note 1}
Coal Displaced by LFG Boiler	1,989	tonnes coal
Coal CO ₂ Emission Factor	2.064	tonnes CO _{2-e} / tonne coal
CO₂ Emissions	- 4,105.8	tonnes CO₂

Electricity Consumption

Electricity Consumption	134,692	kWh
Electricity CO ₂ Emission Factor	625	tonnes CO _{2-e} / GWh
CO₂ Emissions	84.2	tonnes CO₂

Construction

	Quantity Used tonnes	Embodied Emission Factor tonnes CO _{2-e} / tonne	CO ₂ Emissions tonnes CO _{2-e}
Cement - locally produced	-	0.46	-
Steel - imported	-	-	-
Steel - locally produced	-	2.01	-
Aluminium - imported	-	-	-
Aluminium - locally produced	-	1.62	-
CO₂ Emissions			- tonnes CO₂

Net Project CO₂ Emissions - 4,021.6 tonnes CO₂

Emission Reductions (2010)	4,021.59	tonnes CO ₂
Emission Units	3,941	
Emission Reductions (2005 - 2009)	11,101.11	tonnes CO ₂
Emission Units	10,879	
Emission Reductions (2005 - 2010)	15,122.70	tonnes CO ₂
Emission Units	14,820	

Note 1 : For baseline period May 2005 - April 2006

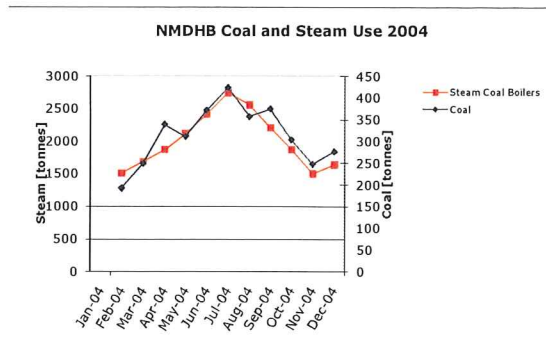
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NMDHB Steam and Coal Data Summary 2004 - 2010

	Coal tonnes	MJ/kg	Steam - Coal tonnes	Coal/ Steam t / t	Steam - LFG tonnes	Steam - Total tonnes
Total 2004 - 2010	16,629		103,905		48,115	152,020
Average 2004 - 2010				0.1600		
Baseline Period May 2005 - April 2006	3,444		22,031	0.1563		

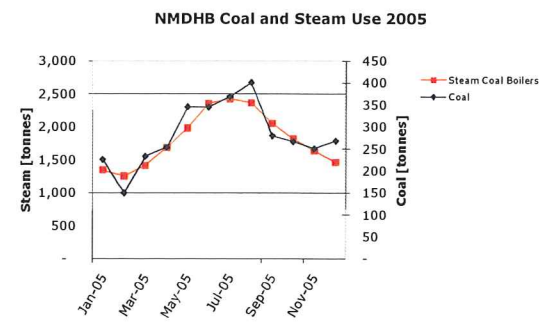
2004

Jan-04						
Feb-04	192		1,512			1,512
Mar-04	249		1,691			1,691
Apr-04	339		1,876			1,876
May-04	311		2,114			2,114
Jun-04	371		2,421			2,421
Jul-04	423		2,750			2,750
Aug-04	357	21.43	2,562			2,562
Sep-04	374	21.81	2,212			2,212
Oct-04	303	21.96	1,874			1,874
Nov-04	248		1,505			1,505
Dec-04	276		1,642			1,642
Total 2004	3,443	21.73	22,159	0.1554	-	22,159



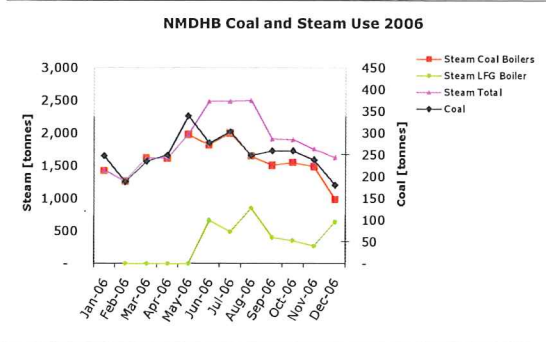
2005

Jan-05	226		1,347			1,347
Feb-05	150	21.61	1,252			1,252
Mar-05	233	21.29	1,416			1,416
Apr-05	254		1,685			1,685
May-05	345		1,985			1,985
Jun-05	345	20.93	2,356			2,356
Jul-05	369	20.99	2,427			2,427
Aug-05	401	21.43	2,366			2,366
Sep-05	280	21.59	2,056			2,056
Oct-05	267		1,817			1,817
Nov-05	251		1,640			1,640
Dec-05	268	21.69	1,460			1,460
Total 2005	3,388	21.36	21,807	0.1554	-	21,807



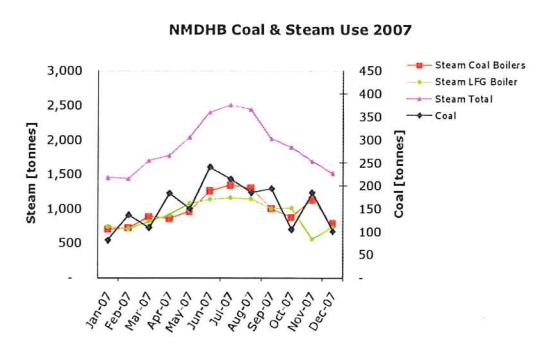
2006

Jan-06	247		1,427			1,427
Feb-06	187		1,264		-	1,264
Mar-06	235		1,620		-	1,620
Apr-06	249		1,613		-	1,613
May-06	339		1,978		-	1,978
Jun-06	277		1,823		662	2,485
Jul-06	303		2,000		488	2,488
Aug-06	248		1,650		849	2,499
Sep-06	259		1,505		403	1,908
Oct-06	259		1,551		352	1,903
Nov-06	238		1,488		270	1,758
Dec-06	180		986		639	1,625
Total 2006	3,020		18,905	0.1598	3,663	22,568



2007

Jan-07	82		708		745	1,453
Feb-07	137		724		714	1,438
Mar-07	108		887		814	1,701
Apr-07	184		858		916	1,774
May-07	150		961		1,078	2,039
Jun-07	241		1,264		1,139	2,403
Jul-07	215		1,348		1,161	2,509
Aug-07	185		1,302		1,142	2,444
Sep-07	194		1,008		1,009	2,017
Oct-07	105		878		1,014	1,892
Nov-07	185		1,131		563	1,694
Dec-07	150		787		732	1,519
Total 2007	1,884		11,856	0.1589	11,027	22,883



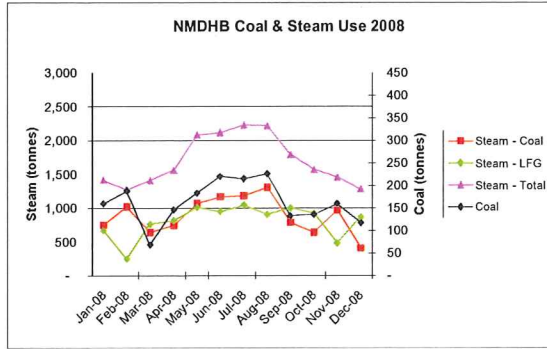
16.2%

48.2%

2008

Jan-08	160	751	666	1,417
Feb-08	188	1,023	252	1,275
Mar-08	68	645	766	1,411
Apr-08	146	746	818	1,564
May-08	183	1,071	1,013	2,084
Jun-08	220	1,171	951	2,122
Jul-08	215	1,182	1,048	2,230
Aug-08	226	1,312	910	2,222
Sep-08	133	789	1,004	1,793
Oct-08	136	645	925	1,570
Nov-08	160	975	483	1,458
Dec-08	113	413	870	1,283
Total 2008	1,954	10,723	0.1822	9,706

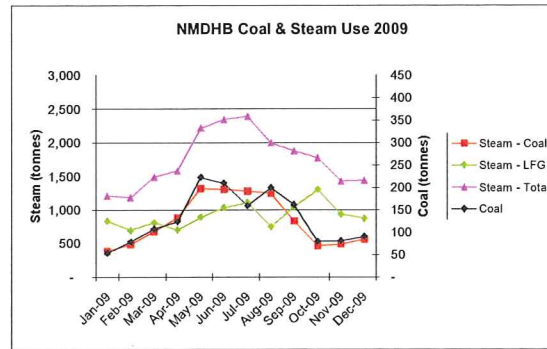
47.5%



2009

Jan-09	54	382	832	1,214
Feb-09	79	486	698	1,184
Mar-09	107	679	812	1,491
Apr-09	124	883	703	1,586
May-09	222	1,321	892	2,213
Jun-09	209	1,306	1,037	2,343
Jul-09	159	1,278	1,110	2,388
Aug-09	199	1,245	751	1,996
Sep-09	161	838	1,040	1,878
Oct-09	80	470	1,302	1,772
Nov-09	81	494	937	1,431
Dec-09	91	567	878	1,445
Total 2009	1,567	9,949	0.1575	10,992

52.5%



2010

Jan-10	81	461	941	1,402
Feb-10	16	481	764	1,245
Mar-10	133	536	910	1,446
Apr-10	111	590	1,068	1,658
May-10	108	680	1,216	1,896
Jun-10	107	945	1,284	2,229
Jul-10	159	882	1,538	2,420
Aug-10	241	1,590	580	2,170
Sep-10	129	699	1,368	2,067
Oct-10	105	602	1,161	1,763
Nov-10	104	562	948	1,510
Dec-10	81	478	949	1,427
Total 2010	1,373	8,506	0.1614	12,727

59.9%

