NELSON LANDFILL GAS PROJECT

ENERGY FOR INDUSTRY LIMITED

(A Subsidiary of Pioneer Generation Limited)

ANNUAL REPORT - 2012

February 2013

CONTENTS

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

2.1 GENERAL

This report is for the period January – December 2012 and is the eighth 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 2012 calendar year were 3,901 tonnes CO2-e.

2.2 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 similar to the previous periods. This suggests that the LFG boiler continues to operate consistently and at a near optimal level in terms of utilisation.

The installation of the larger 2.5MWth LFG boiler has 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 was around 58%, down very slightly from the 60% for the previous reporting period. This remains consistent with the previous reporting periods of operation with the higher capacity LFG boiler.

2.3 EMISSION RELATED ACTIVITIES

2.3.1 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 2012 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 58% of the total hospital steam demand. This has resulted in the displacement of 1,931 tonnes of coal with a subsequent reduction in CO2 emissions of 3,985 tonnes for the period.

2.3.2 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 132,985 kWh of electricity during the period, with the resulting CO2 emissions of 83 tonnes.

2.3.3 EMBODIED EMISSIONS

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

2.3.4 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.

2.3.5 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 CO_2 Emissions

	Report Period	Sum of Previous Periods	Total
	2012	***2005-2011***	***2005-2012***
		tonnes CO_2	
Coal Displacement	-3985	-19675	-23660
Electricity	83	467	550
Embodied Emissions	0	39	39
Global Warming Potential	0	0	0
TOTAL	**-3902**	**-19170**	**-23072**

3 EMISSIONS REPORT

FOR THE PERIOD JANUARY – DECEMBER 2012

3.1 (1) CONSTRUCTION EMISSIONS

Not applicable.

3.2 (2) OPERATIONAL EMISSIONS

Element	Annual Usage	Factor	tCO_2-e
Diesel	0	0.00271 tonnes CO2-e per litre	0
Petrol	0	0.00232 tonnes CO2-e per litre	0
Electricity purchased	0.139	625 tonnes CO2-e per GWh	83.1
Iron/Steel - produced in NZ	0	2.01 tonnes CO2-e per tonne	0
Aluminium - produced in NZ	0	1.62 tonnes CO2-e tonne	0
Cement	0	0.46 tonnes CO2-e tonne	0
Total			**83.1**

3.3 (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]	1931 tonnes coal

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

3.4 (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

3.5 (5) TONNES OF METHANE COMBUSTED

Measure	Total
Tonnes methane combusted[2]	0

3.6 (6) CO2 EMITTED FROM METHANE COMBUSTED

Measure	Total CH4	Total tCO2-e
Tonnes CO_2 emitted	0	0

3.7 (7) EMISSION REDUCTION

Element	Annual Production	Factor	tCO2-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)	1931 tonnes	2.064 t CO_2-e per tonne coal	3984.6
Methane Combusting (6)	0	21 t CO_2-e per tonne methane	0
		Total	**3984.6**
		Less construction emissions and/or other project emissions (1),(2)	0

[2] Corrected for temperature, pressure and water content

		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)	0.133	625 tonnes per GWh	83.1
		Less steam/hot water energy content (heat output) not part of the project (4)(b)	0
		Net Emission Reductions for the year	**3901.5**

3.8 (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.

3901.5 t CO_2-e x 0.98 = 3823 Emission Units

3.9 (9A,B,C) ELECTRICITY METERING

Not applicable.

4 EVIDENCE AND STATEMENTS

4.1 (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.

4.2 (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.

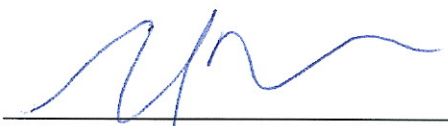
We are not aware of any potential material impediment that will prevent continuing Emission Reductions by the Project during the Commitment Period.

4.3 (14) 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: Commercial Manager – Industrial Energy Solutions

Date: 20-FEB-13

5 APPENDIX 1

5.1 SUPPORTING DOCUMENTATION

5.1.1 CO2 EMISSION REDUCTION CALCULATION

January – December 2012

5.1.2 NMDHB STEAM AND COAL DATA SUMMARY

2004 – 2012

5.1.3 CALIBRATION CERTIFICATES

Coal Weighbridge – Supplied by Toltec Scale Ltd Expiry date 31/03/12

Energy for Industry
Nelson Landfill Gas Project

CO_2 Emission Reduction Calculation

14 February 2013

January - December 2012

Coal Displacement

Steam Produced by LFG Boiler	12,351	*tonnes steam*
Boiler Efficiency Rate	0.1563	*t coal / t steam* Note 1
Coal Displaced by LFG Boiler	1,931	*tonnes coal*
Coal CO_2 Emission Factor	2.064	*tonnes CO_{2-e} / tonne coal*
CO_2 Emissions	**- 3,984.6**	***tonnes CO_2***

Electricity Consumption

Electricity Consumption	132,985	*kWh*
Electricity CO_2 Emission Factor	625	*tonnes CO_{2-e} / GWh*
CO_2 Emissions	**83.1**	***tonnes CO_2***

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	-

CO_2 Emissions	**-**	***tonnes CO_2***

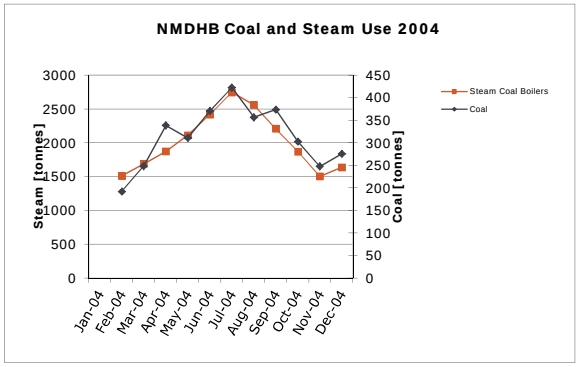
Net Project CO_2 Emissions	**- 3,901.5**	***tonnes CO_2***

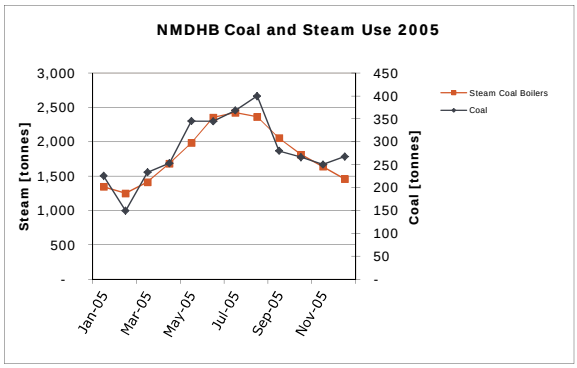
Emission Reductions (2012)	3,901.49	*tonnes CO_2*
Emission Units	3,823	
Emission Reductions (2005 - 2011)	19,170.06	*tonnes CO_2*
Emission Units	18,787	
Emission Reductions (2005 - 2012)	23,071.54	*tonnes CO_2*
Emission Units	22,610	

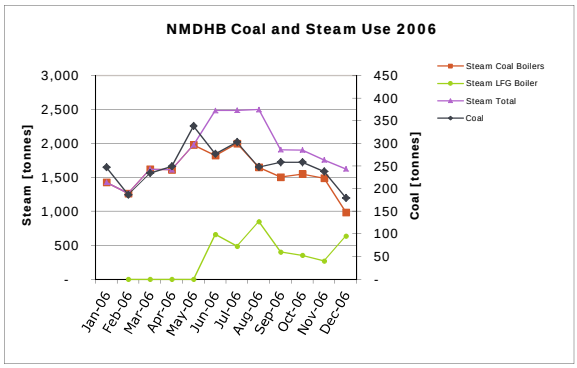
Note 1 : For baseline period May 2005 - April 2006

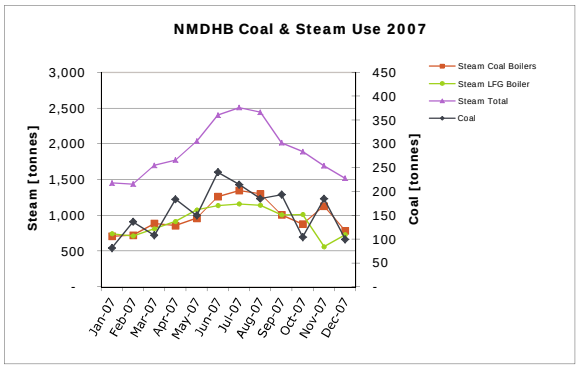
NMDHB Steam and Coal Data Summary 2004 - 2011

	Coal		Steam - Coal	Coal / Steam	Steam - LFG	Steam - Total
	tonnes	*MJ/kg*	*tonnes*	*t / t*	*tonnes*	*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
					16.2%	
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	100		787		732	1,519
Total 2007	1,884		11,856	0.1589	11,027	22,883
					48.2%	



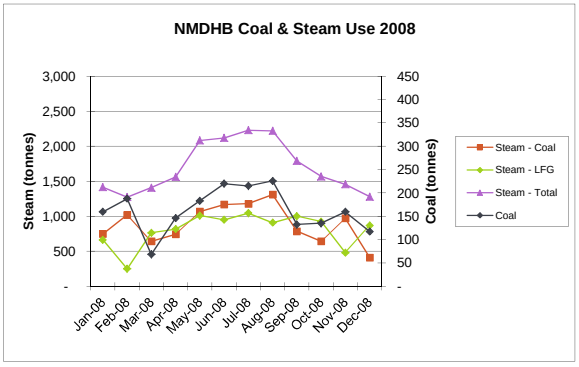






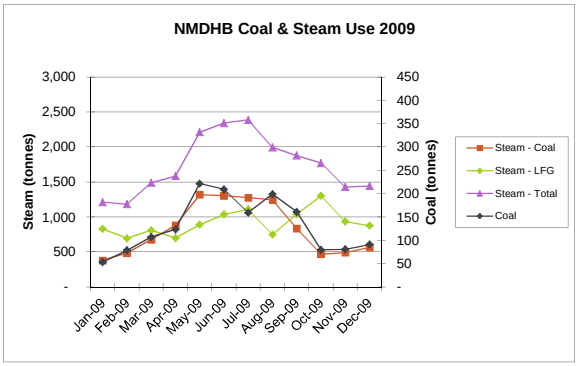
2008

	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	118	413	870	1,283
Total 2008		1,954	10,723	0.1822	9,706	20,429
					47.5%	



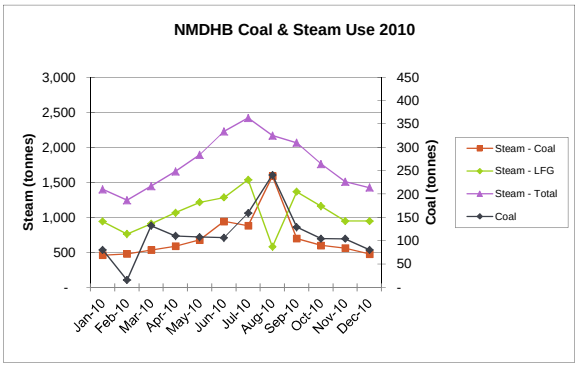
2009

	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	20,941
					52.5%	



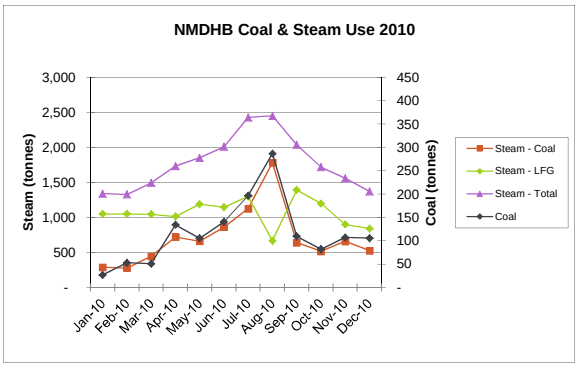
2010

	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	21,233
					59.9%	



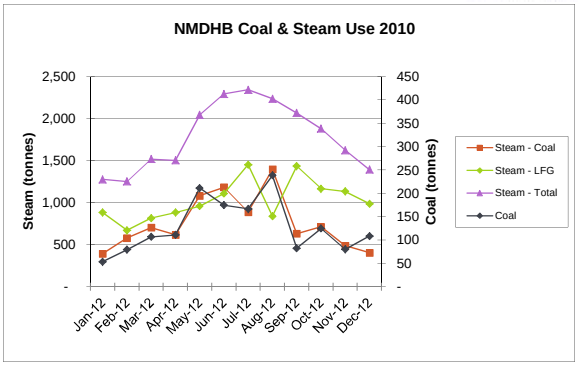
2011

	Jan-11	27	290	1,052	1,342
	Feb-11	53	278	1,052	1,330
	Mar-11	51	447	1,047	1,494
	Apr-11	135	722	1,014	1,736
	May-11	106	663	1,190	1,853
	Jun-11	141	865	1,147	2,012
	Jul-11	197	1,128	1,303	2,431
	Aug-11	287	1,782	670	2,452
	Sep-11	110	643	1,395	2,038
	Oct-11	82	520	1,200	1,720
	Nov-11	107	661	901	1,562
	Dec-11	106	529	844	1,373
Total 2011		1,402	8,528	0.1644	12,815	21,343
					60.0%	



2012

	Jan-12	54	394	884	1,278
	Feb-12	79	581	673	1,254
	Mar-12	107	704	817	1,521
	Apr-12	111	620	884	1,504
	May-12	211	1,084	961	2,045
	Jun-12	175	1,184	1,111	2,295
	Jul-12	167	890	1,454	2,344
	Aug-12	239	1,398	840	2,238
	Sep-12	83	633	1,436	2,069
	Oct-12	125	714	1,168	1,882
	Nov-12	80	490	1,135	1,625
	Dec-12	109	405	989	1,394
Total 2012		1,540	9,097	12,351	21,448
				57.6%	



TOLTEC SCALE LTD

www.toltec.co.nz

CERTIFICATE OF ACCURACY
Weighbridge

Customer: Solid Energy
Location: Reefton

The weights/weighing instruments specified in the schedule to this certificate has/have been examined and tested by an accredited person and found to comply with the requirements of Regulation 20 of the Weights and Measures Regulations.

THIS CERTIFICATE OF ACCURACY EXPIRES ON: 18-Apr-13

Schedule of equipment to which this certificate relates:

Description of weight/weighing instrument

Make & Type: Mettler Toledo IND310

Identifying Features: 50,000kg

Serial No: 01130236KL

This Certificate of Accuracy is issued by: Ihakara Tutaki

Personal Identifier: 16.7

Signature: Ihakara Tutaki

Unit 1, 12 Kilronan Place, PO Box 7248, Christchurch. Tel: (03) 366-5800

6 APPENDIX 2

6.1 (15) UNIT TRANSFER DETAILS

1	Project name:	Nelson Landfill Gas Utilisation Project
2	Date of project agreement:	9 May 2005
3	Name of the project developer/company:	Energy for Industry Limited
4	Project ID:	NZ-1018-INT
5	Calendar year for which units are being transferred:	2012
6	Account identifier:	NZ-3439
7	Project Participant (investor):[3]	Vertis Environmental Finance
8	Quantity of units (refer to section 7 of this report):	3823
9	Type of units:	AAUs

[3] Project Participant (investor) is a party that the project developer/company has an agreement with to transfer emission reduction units (ERUs) or assigned amount units (AAUs) to.