BURWOOD LANDFILL GAS UTILISATION PROJECT

KYOTO PROTOCOL JOINT IMPLEMENTATION PROJECT (TRACK 1)

ANNUAL EMISSION REDUCTION REPORT
2009 CALENDAR YEAR

CHRISTCHURCH CITY COUNCIL
NEW ZEALAND

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DOCUMENT CONTROL REGISTER

Document Version	Date Version Created	Last Edited By	Final Version Quality Checked By	Final Version Approved By	Date Final Version Approved
1	21-12-2009	GE			
2	06-01-2010	GE			
3	26-01-2010	DH			
4	27-01-2010	DH	SC		
5	28-01-2010	DC	SC	MB (acting for MC)	28-01-2010
6	04-03-2010	DH	SC	MB (acting for MC)	04-03-2010
7	16-04-2010	DE	SC	MB (acting for MC)	16-04-2010

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SECTION 1: PROJECT INFORMATION

1.1 Introduction

Christchurch City Council (CCC), New Zealand, is pleased to submit the second of five annual reports regarding Emission Reduction Units (ERU's) for the Burwood Landfill Gas Utilisation Project, for the 2009 calendar year.

Burwood Landfill opened in 1984 for the disposal of municipal waste generated from Christchurch, accepting waste from both domestic and commercial sources. Approximately half of this waste is organic matter. In 2005, Burwood Landfill closed and a new landfill opened in Kate Valley, north of Christchurch. Since its closure, capping and planting have been carried out at Burwood Landfill as part of a rehabilitation programme before the site is vested as a reserve for recreational purposes.

The Burwood Landfill Gas Utilisation Project (also known as the Burwood Landfill Gas to QEII Park Project) is a Track 1 Joint Implementation Project (JI) under the Kyoto Protocol and an approved emission reduction project under the New Zealand Government's Ministry for the Environment "Projects to Reduce Emissions" (PRE) programme. Gas extracted from the landfill is currently used to replace Liquefied Petroleum Gas (LPG) used in boilers to heat swimming pools at the QEII Leisure Park, and flared at the Burwood Landfill Gas Treatment Plant. It is this use and destruction of landfill gas from which ERU's for the Burwood Landfill Gas Utilisation Project have been generated.

Note an Amendment to the Project Agreement between Christchurch City Council and the New Zealand Government's Ministry for the Environment was signed by both parties in October 2009. This Amendment now allows CCC to attain ERU's associated with new gas plant being commissioned in 2010, which includes;

1. the co-generator gas engine located at QEII Leisure Park (already commissioned)

2. gas boilers located at the Christchurch Art Gallery

3. a tri-generator gas engine located in the new central city CCC Civic Offices

4. a gas boiler located at the Christchurch Wastewater Treatment Plant Biosolids Drying Facility

The development of these facilities is underway and construction emissions will be reported within the 2010 calendar year.

A total of 50,051 ERU's are being claimed, 45,968 have been achieved by the Burwood Landfill Gas Utilisation Project for the 2009 calendar year and 4,083 for gas burnt in the QEII Park Cogeneration Plant in 2008 which under Amendment 1 for the project can be included . Details regarding data and calculations for these ERU's can be found in Section 2 and Appendix A.1a.

For further details regarding the Burwood Landfill Gas Utilisation Project, refer to the Project Design Document.

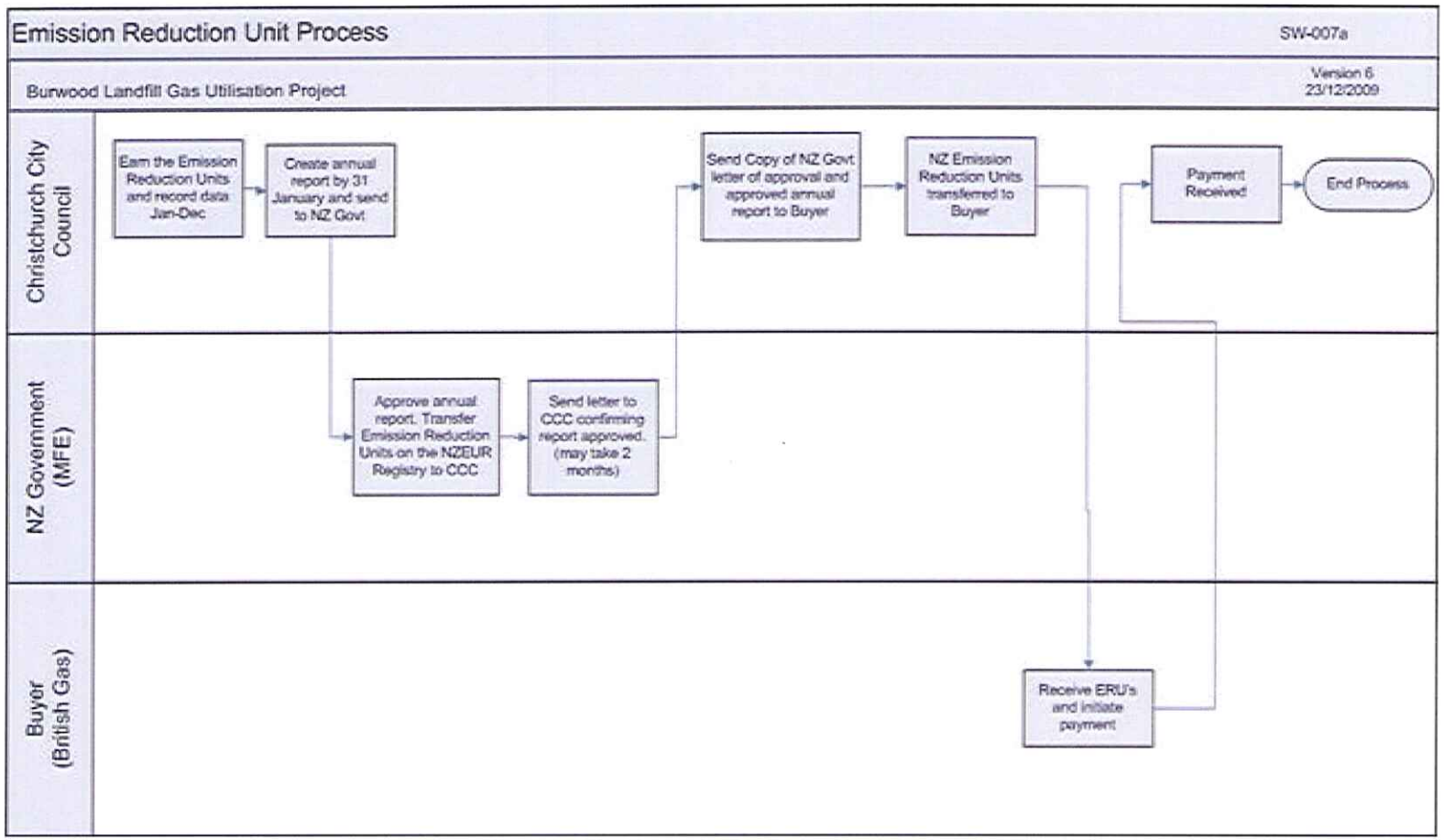
1.2 Project Team

The following CCC personnel are directly involved with the Burwood Landfill Gas Utilisation Project (note details differ slightly to those presented within the Project Design Document):

Name:	**Mark Christison, City Water & Waste Unit Manager**
Project Role:	Project Sponsor
Project Responsibilities:	Approve annual ERU report
Brief Background:	Mark heads up CCC's City Water & Waste Unit and is ultimately responsible for the operation and maintenance of the city's water supply & wastewater infrastructure, and the provision of solid waste & recycling services to the community.
Name:	**Grant Evans, Resource Analyst**
Project Role:	Project Administrator
Project Responsibilities:	Contract administration Client and Government liaison Administration of report audit process Compilation and submission of annual emission reduction report.
Brief Background:	Grant is primarily responsible for monitoring and reporting on solid waste & recycling performance for CCC, developing Levels of Service for management plans, and acting as Project Administrator for the Burwood Landfill Gas Utilisation Project.
Name:	**Dave Harris, Landfill Aftercare Officer**
Project Role:	Burwood Landfill Site Manager
Project Responsibilities:	Management of Burwood Landfill Gas Treatment Plant and associated equipment (including calibrations). Management of emission reduction data collection. Quality Assurance of emission reduction data.
Brief Background:	Dave is the Landfill Aftercare Officer for CCC and manages the Gas Treatment Plant at the Burwood Landfill. Dave is responsible for collecting, analysing and performing quality checks on data gathered for the Burwood Landfill Gas Utilisation Project.
Name:	**Bill Kruhlenko, QEII Plant Manager**
Project Role:	QEII Plant Supervisor
Project Responsibilities:	Provide data and information regarding operation of QEII when required.
Brief Background:	Bill manages the operation of plant at the QEII Leisure Park, for which some of the gas extracted from Burwood Landfill is being used to heat swimming pools.

1.3 Project Process Map

The process map below is an internal CCC document that demonstrates the flow of key tasks undertaken for the annual reporting of ERU's to the New Zealand Government's Ministry for the Environment and British Gas (ERU buyer):



1.4 Methodology

Methodology adopted for the capture and burning of landfill gas by the Burwood Landfill Gas Utilisation Project (from which consequent ERU calculations have been developed) follows that of ACM0001 (Consolidated Baseline Methodology for Landfill Gas Project Activities) and AMS-III.B (Approved Small Scale Methodology - Switching Fossil Fuels). Both of these methodologies have been approved by the CDM Executive Board for JI projects.

Further to the above, the measurement and recording of landfill gas and ERU calculations have also been undertaken as per Schedule 2 and 4 of CCC's Project Agreement with the New Zealand Ministry for the Environment.

1.5 Quality Assurance

1.5.1 Annual Report

The Project Team have made best endeavours to ensure the quality and completeness of this report and supporting data & documentation, and believe these documents meet the reporting requirements under CCC's Project Agreement with the New Zealand Ministry for the Environment.

This report has a Document Control Register, has been peer reviewed by Simon Collin (Water & Waste Planning Team Leader), and has been approved for release by Mark Christison (City Water & Waste Unit Manager) as part of the project's quality control process.

1.5.2 Data for Annual Report

In terms of data quality, a number of automated integrity checks have been applied to raw data and formula used for the basis of emission reduction calculations – refer to the "Data_2009" worksheet within Appendix A.1 for further details. Note any data identified or deemed to contain anomalies have not been included in emission reduction calculations.

Data and calculations for this annual report have also been cross-checked by Project Team members.

1.5.3 Gas Treatment Plant & Landfill Site Management

Weekly visits to Burwood Landfill and the associated Gas Treatment Plant continue to be undertaken by Dave Harris (Landfill Aftercare Officer). These visits are primarily for gas monitoring purposes and to ensure the Plant is operating satisfactorily.

1.5.4 Project Audits

Previous audits have been undertaken on the Burwood Landfill Gas Utilisation Project by external organisations, including a verification audit conducted by GHD in 2006, the project's determination audit conducted by DNV in 2007, and a verification audit conducted by SGS in 2008. These audits have confirmed CCC's confidence in the quality and accuracy of data, information, and methodology used for the project.

SECTION 2: EMISSION REDUCTION REPORT

ANNUAL REPORT FOR LANDFILL GAS PROJECTS (PRE 2)

Project Title: **Burwood Landfill Gas Utilisation Project**

Description of Project: **To capture and burn landfill gas for heating swimming pools at the QEII Leisure Park and flaring at the Burwood Landfill Gas Treatment Plant**

Company: **Christchurch City Council**

Year Reported on: **2009 Calendar Year**

(1) Break down and total of emissions generated during construction using the emission factors listed in Schedule 2 *(if applicable to the year being reported on).*

CONSTRUCTION EMISSIONS			
Element	**Usage**	**Embodied emission factors**	**tCO_2-e**
Diesel	65,175 litres	0.00271 tonnes CO_2-e per litre	176.62
Petrol	0 litres	0.00232 tonnes per CO_2-e per litre	0
Electricity purchased	0 GW hours	625 tonnes CO_2-e per GWh	0
Iron/Steel – produced in New Zealand	50 tonnes	2.01 tonnes CO_2-e per litre	100.50
Aluminium – produced in New Zealand	0 tonnes	1.62 tonnes CO_2-e per tonne	0
Cement	6 tonnes	0.46 tonnes CO_2-e per tonne	2.76
			Total: 279.88

(2) Once abatement commences the following to be recorded if used in the operation of this project *(if applicable):*

Element	Annual Usage	Factor	tCO_2-e
Diesel	0 litres	0.00271 tonnes CO2-e per litre	0
Petrol	240 litres	0.00232 tonnes CO2-e per litre	0.56
Electricity purchased	0.26840 GW hours	625 tonnes CO2-e per GWh	167.75
Iron/Steel - produced in New Zealand	0 tonnes	2.01 tonnes CO2-e per tonne	0
Aluminium - produced in New Zealand	0 tonnes	1.62 tonnes CO2-e tonne	0
Cement	0 tonnes	0.46 tonnes CO2-e tonne	0
			Total: 168.31

Reminder: Emission Reductions cannot exist until after the requirements of 4.4 of the Project Agreement have been met.

(3) (a) If the project produces electricity, a record of the quantity of electricity exported by the Project during the year.

(b) If the project produces steam/hot water, a record of the quantity and energy content of the steam/hot water generated by the Project during the year[1].

A statement of the heat plant efficiency and the equivalent quantity of fuel displaced

Element and Measure	Total
(i) Electricity (GWh)	0
OR	
(ii) Steam (tonnes)	0
(iii) Steam (energy content)	0
(iv) Hot water (tonnes)	0
(v) Hot water (energy content)	22,710 GJ
(vi) Heat Plant efficiency	Boiler 1: 81.2% Boiler 2: 90.1%
(vii) Equivalent quantity of fuel displaced[2]	916,387 litres LPG

NB: Emission factor to convert heat output to LPG displaced is 0.06537 tCO2-e per GJ's of heat output.

(4) (a) If the project produces electricity, identify and measure any other generation that is <u>not</u> part of the project that flows through the above meters. *(This generation to be subtracted from the metered electricity generation to determine the electricity output of the project).*

Measure	Total
Electricity (GWh)	0

(b) If the project produces steam/hot water, identify and measure any other steam or hot water generation that is <u>not</u> part of the project that flows through the above meters. *(This generation to be subtracted from the metered steam/hot water generation to determine the heat output of the project).*

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

[1] Need to take account of any condensate return

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

(5) Tonnes of methane combusted. This will be calculated from the weekly methane content measurements in accordance with the methodology set out in Schedule 2 of the Project Agreement. Please append the raw data, calculations and explanatory notes.

Measure	Total (Tonnes)
Methane combusted in landfill flare & gas treatment plant	1,774.16
Methane combusted in QEII Boiler 1	415.01
Methane combusted in QEII Boiler 2	47.45
Methane combusted in co-generator 2008	228.37
Methane combusted in co-generator 2009	276.80
Total Methane combusted[3]	**2,741.79** *(Please refer to Appendix A.1 for further details)*

Proxy Method

On the 26 August the main blower fan at the gas treatment plant failed and debris from the failure damaged the main RMG Turbine gas flow meter. A temporary replacement flow meter, Fluxi 6 150 ID, was obtained and installed on the 6 October. For the period between the 26 August and 6 October the plant was operated with settings on valve openings and blower and compressor speeds that were known to produce gas flows to the plant of at least 650 cubic metres per hour, to ensure a minimum of 200 cubic metres per hour was available at all times for the flare, its minimum design flow. Therefore over this period only the gas burnt in the QE 2 boilers and congeneration plant plus 200 cubic metres per hour for the flare was used to calculate the carbon reductions. Details of this proxy method are set out in cell B54 of Appendix A.1a

(6) A calculation showing tonnes of CO_2 emitted by the project as a result of methane combusted. (Tonnes of methane combusted; multiplied by 44/16).

Measure	Total CH_4	Total t CO_2-e
Tonnes CO_2 emitted	2,741.79	**7,540**

[3] Corrected for temperature, pressure and water content

(7) A record of the amount of tCO_2-e Emission Reductions resulting from the Project during the year determined by the relevant emission factors as per Schedule 2 of the Project Agreement.[4] The construction emissions should be subtracted from this total for each of the years that are reported on when construction takes place. Once abatement commences the total of any emissions recorded in (2) above should be subtracted from the total.

Element	Annual Production	Factor	t CO_2-e
Electricity generated (GWh) (3)(a)(i)	0	625 tonnes per GWh	0
OR	0		0
Steam/hot water generated (tonnes) (3)(b)(ii)/(3)(b)(iv)	0	As per schedule	0
Steam/hot water Energy content generated (heat output) (3)(b)(iii)/(3)(b)(v)	22,710 GJ	0.06537 tonnes CO2-e per GJ's of heat output	1,485
Methane Combusted (6)	2,741.79 tonnes	21 t CO_2-e per tonne methane	57,577.
		Total	**59,062**
		Less construction emissions and/or other project emissions (1),(2)	448
		Less tonnes of CO_2 emitted by the project as a result of methane combusted (6)	7,540
		Less other generation not part of the project, recorded by the meters (625 tonnes per GWh) (4)(a)	0
		Less steam/hot water energy content (heat output) not part of the project (4)(b)	0
		Net Emission Reductions for the Year	**51,074**

[4] Conversion into tCO_2-e
The tCO_2-e in respect of each of the quantities used in, purchased by or introduced into the project, the electricity or steam/hot water generated and the methane combusted in the project will be calculated according to the conditions and emission factors set out in Schedule 2 of the project agreement.

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

51,074 (Table 7 total) x **0.98** (contract emission ratio) = **50,051 ERU's**

(Please refer to Appendix A.1 for data and formula used to calculate the above Emission Reduction Units)

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

Please refer to Appendix A.4 for certification.

Note the "GA2000" gas sensor/analyser that measures the composition of gas flow into the Burwood Landfill Gas Treatment Plant is calibrated on average every 6 months
"Fox Flow" meters that measure gas in-flow to the QEII boilers and co-generator are calibrated on average every 2 years. Two additional meters where purchased in 2009 to allow the meters to be removed for recalibration at the Fox factory on a two year cycle.
A RMG turbine flow meter is used to measure gas flow through the flare and treatment plant and this was replaced temporarily with a Fluxi meter when the RMG meter was damaged.
Calibration certificates for these meters are included in Appendix A 4

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

The Project Team of CCC are not aware of any issues that will impede our ability to achieve the emission reductions set out in our Project Agreement with the New Zealand Government's Ministry for the Environment.

(11) A statement identifying that this report:

- **has been prepared using the methodology of Schedule 2 – Measurement of Emission Reductions**
- **meets all other requirements of Schedule 4 - Contents for Annual Reports of the Project Agreement.**

The Project Team of CCC confirm that to the best of our knowledge, this annual report for the 2009 calendar year meets requirements of Schedule 2 and Schedule 4 of the Project Agreement with the New Zealand Government's Ministry for the Environment.

Signature: 

Position: **City Water & Waste Unit Manager, Christchurch City Council**

Date: **16 April 2010**

Unit Transfer Details

Please Note: To obtain the emission reduction units you will need a NZEUR account to transfer the agreed/allowed Emission Units.

1	Project name:	Burwood Landfill Gas Utilisation Project
2	Name of the project developer:	Christchurch City Council
3	Project ID:	NZ-1000030
4	Calendar year for which units are being transferred:	2009 with the exception of 4,4083 ERU's from methane burnt in the Cogeneration Plant in 2008 and not previously claimed as allowed for in Amendment No 1 for the project.
5	Participant's account identifier:	NZ-1149
6	Quantity of units (8): 2008 Calendar Year 2009 Calendar Year	 4,083 45,968
7	Type of units:	Emission Reduction Units (ERU's)

Note: Units can only be awarded for Emission Reductions during CP1, i.e. from 2008 to 2012.