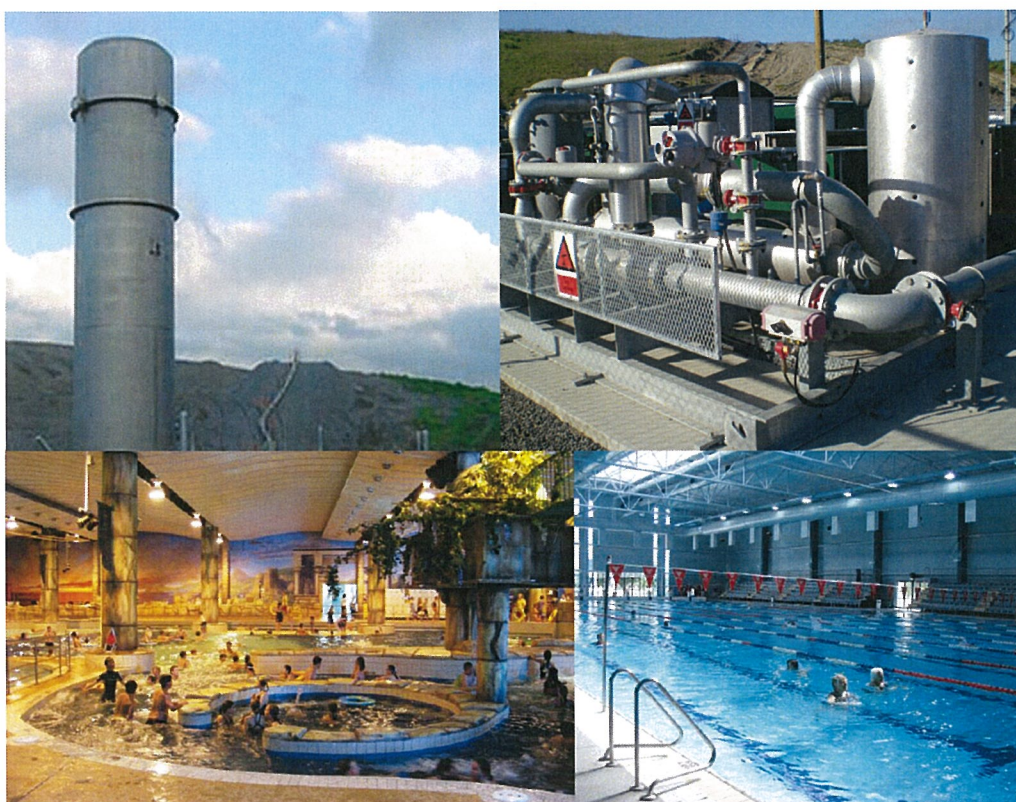


BURWOOD LANDFILL GAS UTILISATION PROJECT

KYOTO PROTOCOL JOINT IMPLEMENTATION PROJECT (TRACK 1)



ANNUAL EMISSION REDUCTION REPORT

2010 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	25-01-2011	DH			
2	27-01-2011	DH	SC		
3	31-01-2011	DH	SC	MC	31-01-2011
4					
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CONTACT DETAILS

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SECTION 1: PROJECT INFORMATION

1.1 Introduction

Christchurch City Council (CCC), New Zealand, is pleased to submit the third of five annual reports regarding Emission Reduction Units (ERU's) for the Burwood Landfill Gas Utilisation Project, for the 2010 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.

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 usage 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 and a gas boiler located in the new central city CCC Civic Offices
4. a gas boiler located at the Christchurch Wastewater Treatment Plant Biosolids Drying Facility

The construction of these facilities was completed in 2009 and construction emissions were reported within the 2009 calendar year. The commissioning of these facilities was commenced in 2010 and while all facilities are operational control and monitoring systems for the whole system are still to be completed. Delays in final commissioning have been caused by contractual delays and also the Christchurch Earthquake on the 4 September 2010. Data for this report has been obtained from data obtained through the Christchurch City Council building management system (BMS). Some data has had to be calculated based on available data from the BMS.

A SCADA system for system monitoring and data collection is being commissioned and in future will give full data for each piece of equipment used in the project.

A total of 46,917 ERU's are being claimed which have been achieved by the Burwood Landfill Gas Utilisation Project for the 2010 calendar year. Details regarding data and calculations for these ERU's can be found in Section 2 and Appendix A.1.

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

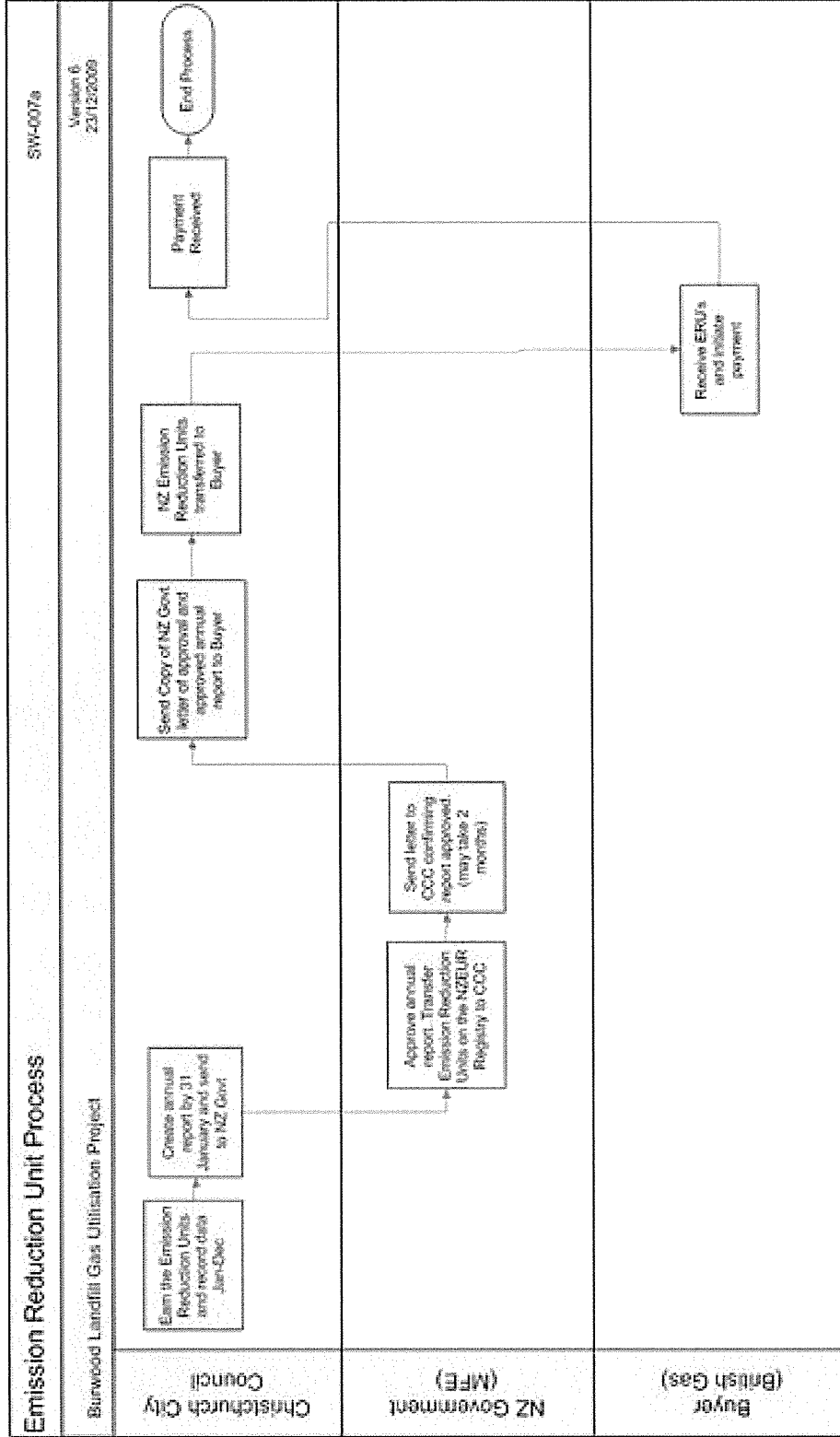
1.2 Project Team

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_2010" worksheet within Appendix A.1 for further details. Note any data identified or deemed to contain anomalies has 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: 2010 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	tCO₂-e
Diesel	0 litres	0.00271 tonnes CO ₂ -e per litre	0.00
Petrol	0 litres	0.00232 tonnes per CO ₂ -e per litre	0.00
Electricity purchased	0 GW hours	625 tonnes CO ₂ -e per GWh	0.00
Iron/Steel – produced in New Zealand	0 tonnes	2.01 tonnes CO ₂ -e per tonne	0.00
Aluminium – produced in New Zealand	0 tonnes	1.62 tonnes CO ₂ -e per tonne	0.00
Cement	0 tonnes	0.46 tonnes CO ₂ -e per tonne	0.00
			Total: 0.00

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

Element	Annual Usage	Factor	tCO₂-e
Diesel	0 litres	0.00271 tonnes CO ₂ -e per litre	0
Petrol	240 litres	0.00232 tonnes CO ₂ -e per litre	0.56
Electricity purchased	0.405,14 GW hours	625 tonnes CO ₂ -e per GWh	253.21
Iron/Steel - produced in New Zealand	0 tonnes	2.01 tonnes CO ₂ -e per tonne	0
Aluminium - produced in New Zealand	0 tonnes	1.62 tonnes CO ₂ -e tonne	0
Cement	0 tonnes	0.46 tonnes CO ₂ -e tonne	0
			Total: 253.77

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 year¹.**
- 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)	19,638.08 GJ
(vi) Heat Plant efficiency	Boiler 1: 81.2% Boiler 2: 90.1%
(vii) Equivalent quantity of fuel displaced ²	792,433 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 not 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 not 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 & other CCC facilities excluding QEII	1,985.25
Methane combusted in QEII Boiler 1	311.93
Methane combusted in QEII Boiler 2	62.95
Methane combusted in co-generator	206.69
Total Methane combusted³	2,566.82 <i>(Please refer to Appendix A.1 for further details)</i>

Proxy Method

Throughout the year additional equipment to utilise landfill gas has been commissioned at the Christchurch Wastewater Treatment Works Biosolids Drying Plant, the Christchurch City Councils Civic Offices and the Christchurch Art Gallery. Delays and problems with commissioning plant, particularly the Biosolids Drying Facility and instrumentation for recording gas flows at the individual sites, together with further delays in commissioning as a result of repairs following the 4 September 2010 earthquake have resulted in changes in the data recording and calculations for the 2010 report. To improve accuracy of gas usage, the total flow from the gas field measured by a new RMG turbine flow meter, was used to calculate the total gas burnt through the various plant items. To calculate gas burnt in the two boilers at the QE II complex the gas was measured using existing Fox Flow Meters that had been recalibrated or were new meters. Gas usage at the flare and other facilities was then calculated by subtracting the gas usage at QE2 from the total gas flow to the gas treatment plant.

(6) A calculation showing tonnes of CO₂ emitted by the project as a result of methane combusted. (Tonnes of methane combusted; multiplied by 44/16).

Measure	Total CH₄	Total t CO₂-e
Tonnes CO ₂ emitted	2,566.82	7,058.75

³ Corrected for temperature, pressure and water content

(7) A record of the amount of tCO₂-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)	19,638.08 GJ	0.06537 tonnes CO ₂ -e per GJ's of heat output	1,284
Methane Combusted (6)	2,566.82 tonnes	21 t CO ₂ -e per tonne methane	53,903
		Total	55,187
		Less construction emissions and/or other project emissions (1),(2)	254
		Less tonnes of CO ₂ emitted by the project as a result of methane combusted (6)	7,059
		Less other generation <u>not</u> part of the project, recorded by the meters (625 tonnes per GWh) (4)(a)	0
		Less steam/hot water energy content (heat output) <u>not</u> part of the project (4)(b)	0
		Net Emission Reductions for the Year	47,874

⁴ Conversion into tCO₂-e

___The tCO₂-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.

47,874 (Table 7 total) x **0.98** (contract emission ratio) = **46,917** 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. Readings are taken weekly apart from times when meter is being recalibrated off site in Auckland.

“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 were 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. A new RMG meter was purchased to replace the damaged meter.

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 2010 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 Manager, Christchurch City Council

Date: 31 January 2011

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:	2010
5	Participant's account identifier:	NZ-1149
6	Quantity of units (8): 2010 Calendar Year	46,917
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.