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Palmerston North City Council
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Your ref.: PNCC Contract dated 22/04/2010	Our ref.: SCCAU987UDDIN110325-1	Date: 25/03/2011

Palmerston North City Council Awapuni Landfill Gas to Electricity Generation Project: Verification of Emission Reduction Units

1 AUDIT ARRANGEMENTS

1.1 Scope

Det Norske Veritas Climate Change Services AS (DNV) has been engaged to conduct audit procedures associated with verification of the Emission Reduction Units (ERUs) achieved by the Palmerston North City Council Awapuni Landfill Gas to Electricity Project (the "Project") for the calendar year 2010. The project is located in the Awapuni Ward, Palmerston North City, North Island of New Zealand, approximately 150km north-west of Wellington.

DNV has conducted sufficient verification procedures to express an opinion on the following matters:

- The number of ERUs proposed to be verified in respect of the calendar year 2010 have been calculated accurately and consistently in all material respects:
- Based on accurate and reliable electricity generation and LFG records and other relevant supporting documentation.
- In a manner generally consistent with the intent of the monitoring and calculation clauses of the Project to Reduce Emission (PRE) Project Agreement between the New Zealand Government and Palmerston North City Council dated 13 April 2004 and amended Project Agreement dated 3 March 2005, and amended Project Agreement 2 dated 16 February 2010 (the "PRE Project Agreement").

1.2 Project description

The project comprises of the following components:

- Collection of landfill gas (LFG) from the closed Awapuni Landfill.
- Gas conditioning to remove particulates and moisture.
- Conversion of the LFG to electricity in a Deutz gas engine and alternator set (the "Genset")
- Flaring of the excess or unused LFG captured
- Transformation of the electrical energy to 11kV and connection to the 11kV busbar of the adjacent Waste Water Treatment Plant (WWTP).
- Export of surplus electricity (to the requirements of the WWTP and Recycling Plant) to the main electricity grid.

The landfill gas is metered for temperature, pressure, flow and methane content. Temperature, pressure and flow are measured before gas conditioning and methane content are measured after gas

conditioning. Electrical energy is metered at the alternator terminals and at an import-export revenue meter located at the main connection point of the WWTP busbar to the electricity grid.

The Project has previously completed a successful determination under the New Zealand Projects to Reduce Emissions program (DNV report *DAWES980001:2005* dated 17 May 2005).

Palmerston North City Council (PNCC) has a Power Purchase Agreement (PPA) with Mighty River Power Ltd for excess electricity exported to the grid. In case there is not enough electricity generated from the gas-to-electricity for on-site consumption, PNCC imports electricity from the electricity grid.

1.3 Verification procedures

The management of PNCC is responsible for operation of the project. Mercury Energy is responsible for export revenue metering. PNCC is responsible for gas and electricity metering within the project and the WWTP. We have not conducted any audit procedures with respect to the internal control environment of PNCC taken as a whole. As such, no assurance is given on any internal controls not associated with the creation of ERUs.

Our verification has been conducted in accordance with International Standard on Assurance Engagements 3000 *Assurance Engagements other than Audits or Reviews of Historical Information* and according to the New Zealand Government's PRE (Project to Reduce Emission) and to provide reasonable assurance that the ERUs have been calculated in a manner consistent with the PRE Project Agreement. A PRE project's emission reduction verification protocol was adopted and customized to record verification witnessing. Accordingly, we have conducted such tests and procedures as we considered appropriate including:

- Review of the Project Design Document (PDD).
- Review of the calculation spreadsheet Emission Reduction Calc 2010 XL dated 10 March 2011.
- Review of the electricity data claimed as being the data representing the exported electricity to the grid, including the report from the electricity purchaser Mercury Energy Ltd as the retail unit of Mighty River Power Ltd.
- Review of SCADA, STREAM and metering data.
- Review of Annual Report 2010 prepared for the Crown (Ministry for the Environment, New Zealand).
- Review of the Annual Report 2010 prepared for the Austrian JI/CDM Program.
- Site visit to the PNCC landfill sites to confirm the actual facilities were in accordance with the approved project arrangements.
- Discussions with the relevant PNCC personnel.
- Observation and review of relevant documentation.

This report has been prepared for PNCC. We disclaim any assumption of responsibility for any reliance on this report to any person other than PNCC, or for any purpose other than that for which it was prepared.

1.4 Verification Findings

Our verification comprised a review of the information contained in the documents described above, with an on-site audit conducted on 10 March 2011. A completed PRE emission reduction verification protocol is attached to this Verification Opinion.

This Verification Opinion was prepared on the basis of the validated PDD and the project facility *as built*. At this onsite audit we found that the

- Arrangements proposed in the PDD had been implemented accordingly.
- Metering of total electricity generation and recording of electricity exported to the grid was in accordance with good practice and provided reliable data.
- PNCC LFG to electricity generation facility experienced continued decline in gas quality being drawn off the gas field. This has resulted generating electricity in an on-off manner for the entire year.
- Under normal operating condition gas composition is monitored by gas composition meter (Drager meter). Gaps in methane content and gas flow data were observed due to failure of electronic data capture from PNCC LFG to electricity generation facility. During 12/03/2010 to 01/06/2010, a static methane content data (60.4) has been recorded. Alternative database have been acquired via two data sources - iFix and Citect SCADA in order to retrieve missing data. iFix is located at Wastewater Plant. The classic Historian on the iFix system is logging landfill data (this system is the predecessor to the GS iHistorian). This second database is queried and data exported to CSV file format (comma separated values) for the required duration and data intervals. Citect SCADA is located at the PNCC LFG and is logging landfill pressure and temperature data at 2 second intervals. This data was exported and then queried for the require duration. Then the data is filtered to obtain only the data points for the 15 min interval as required as per monitoring plan.
- Under normal operating condition LFG flow is measured by Instromet gas flow meter. An alternative method was adopted to calculate amount of LFG generated during the period from 14-31 December 2010 as no LFG data was recorded. During this period LFG data was recorded as 'no data'. The adopted calculation method based on the tested energy conversion efficiency of the Genset using default energy content for methane is in accordance PRE Project Agreement and is reasonable.
- The electricity generation during the period was 4.62 GWh. The import from the grid amounted to 1 GWh.
- A total of 2 171.244 tonnes CO_2-e of emission was avoided by the net displacement of grid electricity (export-import (4.62 – 1 = 3.62 GWh). The CO_2 emissions avoidance due to electricity generation (gross) is 2772 tonnes CO_2-e. A total of 19 903.17 tonnes CO_2-e of emission avoidance was achieved due to use of methane (947.77 tonnes) for electricity generation.
- Hence the total baseline emissions are 22 675 tonnes CO_2-e.
- The project boundary does not include any flaring of methane other than electricity generation via Genset.
- The project emissions include emission due to combustion of methane, import of electricity, use of fossil fuel. Following project emissions are estimated as per following table.

	Emissions CO_2-e
Combustion of methane	2606.3700
Purchase of electricity	601.0422

Emissions from diesel use	5.2340
Emissions from petrol use	0.6894
Total emissions	3213.3356

Total project emission is estimated (due to combustion of methane, import of electricity, and use of transport fuel amount) to 3 213.3356 tonnes CO_2-e.

Hence, the total claims for emission reduction of 19 462 (total emission avoidance 22657.457 - project emissions 3213.3356 = 194 62.122) tonnes CO_2-e during the calendar year 2010 was found, in all material respects, to be fairly stated.

1.5 Inherent Limitations

Because of the inherent limitations in any internal control structure it is possible that fraud, error, or non-compliance with laws and regulations may occur and not be detected. Further, the verification was not designed to detect all weakness or errors in internal controls so far as they relate to the requirements set out above as the verification has not been performed continuously throughout the period and the procedures performed on the relevant internal controls were on a test basis. Any projection of the evaluation of control procedures to future periods is subject to the risk that the procedures may become inadequate because of changes in conditions, or that the degree of compliance with them may deteriorate.

The verification opinion expressed in this report has been formed on the above basis.

2 VERIFICATION OPINION

In our opinion:

1. The ERUs claimed are additional, as the Project is approved as an additional project activity by the New Zealand Government under the PRE Program.
2. The 19 462 ERUs claimed in respect of the Project for the 2010 calendar year has been fairly and accurately stated and calculated and is:
   - based on accurate and reliable electricity generation data and amount of landfill gas flared records and other relevant supporting documentation; and
   - has been calculated in a manner generally consistent with the intent of the monitoring and calculation clauses of the Project Agreement between the New Zealand Government and Palmerston North City Council dated 13 April 2004 and Amendment dated 3 March 2005 and Amendment 2 dated 16 February 2010.

Yours faithfully
for DNV AUSTRALIA

Dr Noim Uddin
Lead Climate Change Verifier

Chandrashekara Kumaraswamy
Regional Manager,
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Annex – Palmerston North Awapuni Landfill Gas to Electricity Generation Project, 2010 Emission Reduction Units Verification Protocol