MONITORING REPORT NR.3, VERSION NO. 2

Project:	Lapes Landfill Gas Utilization and Energy Generation
Country:	Lithuania
Period:	01/01/2010 – 31/12/2010

Developed by:
Grue & Hornstrup A/S
in cooperation with UAB Ekoresursai

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Project Facts

Project information

Title of project activity:	Lapes Landfill Gas Utilization and Energy Generation
Location:	Lithuania, Kaunas County
Project Host:	UAB Ekoresursai
Project Investor:	Nordic Environmental Finance Corporation (NEFCO)
Start of crediting period:	2008
Date of final determination:	2009
Date of UNFCCC certification:	2009

Monitoring information

Monitoring report No:	3
Monitoring period:	01/01/2010 – 31/12/2010
Monitoring Excel spreadsheet version:	2010 Lapes Mon. Rept Excel
Approval date and version:	2011.02.23, version No. 2
Emission Reductions generated within the monitoring period:	**19.323,00** t CO2
Name of person compiling monitoring report:	Gerardas Žukauskas

1. Introduction

This Monitoring Report is elaborated for the JI project entitled "Lapes Landfill Gas Utilization and Energy Generation".

The project has been successful determined by TUV on 10/11/09 and the crediting period started on 01/07/08.

For the respective monitoring period from 01/01/2010 - 31/12/2010, the project generated a total of 19.323,00 tCO2 of emission reductions.

We used reliable data of national gas company AB "Lietuvos dujos", which is official Lithuanian gas provider, to determine caloric value of natural gas for monitoring period. AB "Lietuvos dujos" announces caloric value every month in web site www.lietuvosdujos.lt .

2. Project Description

UAB "Ekoresursai", a private Lithuanian company, is proposing the Lapes Landfill Gas Utilization Project as a Joint Implementation project. The objective of the project is to use landfill gas extracted from the Lapes landfill site for heat and power generation in a combined heat and power (CHP) plant to be constructed. This will significantly reduce methane emissions from the landfill. Substituting landfill gas for fossil fuels in heat and power generation will also reduce CO_2 emissions in the Lithuanian energy sector.

Lapes landfill is located near the city of Kaunas in Lithuania. Its exploitation started in 1973 and the total area of the landfill is 38.7 ha. The annual waste volumes disposed in the landfill have been around 110–120 thousand tonnes over the past years. The landfill is located on state land and operated by company VšI "Kauno regiono atliekų tvarkymo centras". UAB "Ekoresursai" has an agreement with the landfill operator for the extraction and utilisation of the landfill gas.

The project proponent is planning to build a landfill gas extraction system in the Lapes landfill. A combined heat and power (CHP) plant will also be constructed and connected to the gas extraction system. The CHP plant will provide electricity for the Lithuanian power grid and heat for the local district heating network. The CHP plant has an electrical capacity of 1.2 MWel and a heating capacity of 1.4 MWth.

The project developer has signed agreements with the local district heating company for land lease and heat sales.

The EU landfill directive requires that the landfills receiving biodegradable waste must have a gas collection system. There is a transition period for existing landfill sites, which in the case of Lithuania implies that existing landfills are required to have a gas collection system on 1st January 2012 at latest. So far there have not been any landfill gas capture systems implemented in Lithuania.

3. Baseline and Monitoring Methodology applied

The Decision 9/CMP.1 includes an Appendix B that establishes the criteria for baseline setting and monitoring. Furthermore, the Joint Implementation Supervisory Committee has agreed on additional guidance on these criteria at its fourth meeting in September 2006. The Version 01 of the document "Guidance on Criteria for Baseline Setting and Monitoring" states, inter alia, that "*the project participants may establish a baseline that is in accordance with appendix B of the JI guidelines. In doing so, selected elements or combinations of approved CDM baseline and monitoring methodologies may be used, as appropriate*" (paragraph 20b). The baseline of this project is established according to the appendix B.

For the calculation of the baseline, a project-specific approach, mainly based on the approved baseline and monitoring methodology for CDM projects ACM0001 version 2, "Consolidated baseline methodology for landfill gas project activities", is used. Version 2 of that methodology was in use for CDM projects submitted before 14 July 2006 and the baseline for this JI project was first established during that time. There are no significant differences between version 2 and the current version of the methodology that concern

this project. The applicability of the methodology is valid in both versions, the basis for the calculation of baseline emissions is the same and all the monitored parameters are the same.

Since $MD_{reg,y}$ = 0 for new landfills until 16 July 2009 and old landfills until 1st January 2012 and $MD_{reg,y} = MD_{project,y}$ for new landfills after 16 July 2009 and for old landfills after 1st January 2012, there is no need to estimate the destruction efficiency of the baseline system.

The project-specific approach deviates from ACM0001 version 2 only in its use of the CDM "Tool to determine project emissions from flaring gases containing methane" for determining the flare efficiency. This Tool was not available at the time of version 2 and thus, it was not required under version 2 of ACM0001. For this project, the Tool was applied as part of a revision of the PDD, to ensure a commonly accepted, up-to-date approach to determining flare efficiency. A default flare efficiency of 90% is selected according to the Tool.

The CDM methodology ACM0001 is applicable to landfill gas capture project activities, where the baseline scenario is the partial or total atmospheric release of the gas. This methodology can be used in a situation where the captured gas is used to produce energy (e.g. electricity/thermal energy), and emission reductions are claimed for displacing or avoiding energy generation from other sources. In this case a baseline methodology for electricity and/or thermal energy displaced shall be provided or an approved one used.

According to the ACM0001 version 2 "The methane destroyed by the project activity ($MD_{project,y}$) during a year is determined by monitoring the quantity of methane actually flared and gas used to generate electricity and/or produce thermal energy". This is the approach taken in this project.

Owing to the characters of the Lithuanian electricity system and because the emission reductions claimed from the electricity generation are quite small (around 4,300 tCO2e per year), a simple methodology is used to establish the emission factor for displaced electricity. The emission factor of the Lithuanian Power Plant that operates at the margin is taken to be the emission factor for electricity displaced. This is justified by two facts:

1. The Lithuanian Power Plant is the second-largest power plant in Lithuania (after the Ignalina nuclear power plant). It operates on the grid as a marginal plant. It covers all power demand which remains after other power plants (nuclear power, CHP plants and hydro power plants) have supplied their power to the grid. The emission factor of the Lithuanian Power Plant is therefore the operating margin of the Lithuanian grid.
2. There is a surplus of installed electric capacity in Lithuania and the country is a net exporter of electricity. This means that new power plants are not being built and build margin therefore does not impact the emission factor.

4. Monitoring Management and Quality Assurance System

Monitoring Management for respective period from 2008.06.01 by 2008.12.31 was implemented by collecting data and transferring collected data to dispatch room server trough SCADA every day. We used direct SCADA data transfer to the spreadsheet as monitoring management reports for mentioned period.

A Monitoring Management and Quality Assurance System has been developed and implemented for the respective JI project activity from 2009.01.01. In this context the following forms and procedures were issued and are followed by the respective personal involved in the JI project activity:

Form A1a_Process Data Sheet (week)
Form A1b_Process data Sheet (month)
Form A2_Daily check form (LFG Plant)
Form A3_Daily Check form (CHP)
Form A4_ Monthly QA Check Form
Form A5_Calibration Log Sheet

Procedure B1_Records Keeping
Procedure B2_Data Transfer
Procedure B3a_Daily Check for LFG Plant
Procedure B3b_Daily Check for CHP
Procedure B4_Calibration Records
Procedure B5_Monthly QA Check

Flare system has CE certificate and correspond EU regulations. Flare system is standby equipment to CHP if for some reason CHP would not be in operation. By 01/01/2010 – 31/12/2010 period Flare combusted 0,09 % of total amount of Landfill gas extracted. Flare temperature meter has manufacturer's calibration certificate and was not calibrated additionally. According PDD arranged that Flare combustion efficiency is 90%, if flare not functioning or temperature drops below 500 °C, efficiency meaning is 0%.

5. Monitoring Parameters

ID umber	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording
1. F1	Total amount of landfill gas captured	Continuous flow meter at Point 1	m^3	M	Cont.
2. T1	Temperature of the landfill gas	Continuous measurement at Point 1	°C	M	Cont.
3. P1	Pressure of the landfill gas	Continuous measurement at Point 1	Pa	M	Cont.
4. CH_41	Methane fraction in LFG	Continuous measurement at Point 1	m^3_{CH4}/m^3_{LFG} (vol-%)	M	Cont.
5. F2	Amount of LFG flared	Continuous measurement at Point 2	m^3	M	Cont.
6. FE3	Flare combustion efficiency	90% default efficiency used. Continuous measurement of flare operating time and temperature.	90%. If flare not functioning or temperature below 500 °C, efficiency is 0%	E	Cont.
7. E4	Electricity used in the MPR Station	Continuous metering at Point 4	MWh	M	Cont.
8. F5	Amount of LFG to CHP-plant	Continuous flow meter at Point 5	m3	M	Cont.
9. F6	Flow of natural gas	Point 6	m3	M	Cont.
10. P6	Pressure of natural gas	Point 6	Pa	M	Cont.
11. T6	Temperature of natural gas	Point 6	°C	M	Cont.
12. E7	Electricity	Continuous	MWh	M	Cont.

	generated by the project	energy metering at Point 7			
13. Q8	Heat generated by the project	Continuous energy metering at Point 8	MWh	M	Cont.

6. Emission Reductions

In the respective monitoring period 01/01/2010 – 31/12/2010, 19.323,00 t CO2 of emission reductions.

Detailed values of emission:

Emission reductions from methane avoidance (LFG flaring):	14	t CO2/yr
Emission reductions from methane avoidance (LFG utilization)	16250	t CO2/yr
Emission reductions from heat substitution	972	t CO2/yr
Emission reductions from electricity substitution	2888	t CO2/yr
Emissions from natural gas consumption	689	t CO2/yr
Emissions from electricity consumption	111	t CO2/yr

Monthly values of LFG plant

Year	Month	Total amount of LFG flared	Methane fraction in LFG	Flate temperature	Methane avoidance from flaring	Electricity consumed in the MPR Module
		Nm3	vol-%	C°	t CH4	MWh
2010	January	40	54,9%	900	0,01	12,33
	February	801	52,7%	900	0,28	13,90
	March	458	44,7%	900	0,14	15,40
	April	281	43,6%	900	0,08	17,03
	May	269	47,5%	900	0,09	15,50
	June	0	47,6%	0	0	17,49
	July	0	48,1%	0	0	18,68
	August	121	50,0%	900	0,04	17,53
	September	17	49,8%	900	0,01	17,27
	October	13	47,1%	900	0,00	13,00
	November	72	49,4%	900	0,02	12,07
	December	29	50,1%	900	0,01	12,32
	Total/Average	**2.101**	**49%**	**750**	**1**	**183**

Monthly values of CHP

Year	Month	Total amount of LFG to CHP	Total amount of NG consumed	Calorific Value of NG	Total amount of electricity produced	Total amount of heat produced
		Nm3	Nm3	kCal/Nm3	MWh	MWh
2010	January	197.010,00	28222	8001	403,80	471,20
	February	178.034,83	30953	7999	371,40	475,00
	March	222.546,70	30255	7993	437,06	518,00
	April	222.201,41	19640	7990	353,76	331,00
	May	203.250,45	18726	8021	328,65	249,00
	June	197.435,99	21947	8023	339,74	193,00
	July	217.292,32	28788	8020	389,41	193,00
	August	192.877,00	22697	8041	383,89	191,00
	September	201.582,00	18232	8035	391,43	223,00
	October	198.602,00	62265	8012	532,52	592,00
	November	172.741,00	42241	7998	392,47	463,00
	December	179.304,00	44324	8003	405,89	452,00
	Total/Average	**2.382.877,71**	**368290**	**8011,33**	**4730,00**	**4351,20**