MONITORING REPORT NR.5

Project:	Lapes Landfill Gas Utilization and Energy Generation
Country:	Lithuania
Period:	23/12/2011 – 31/12/2012

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:	5
Monitoring period:	23/12/2011 – 31/12/2012
Monitoring Excel spreadsheet version:	2012 Lapes Mon Rept Excel
Approval date and version:	2013.03.25, version 2
Emission Reductions generated within the monitoring period:	**7444** 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 23/12/2011 - 31/12/2012, the project generated a total of 7444,00 tCO2 of emission reductions. Increasing of emission reduction in period compare to planed is impact of renovation and upgrading of gas extraction system with new adjustable valwes and rotameters which let us to ajust gas extraction volumes very precisely and collect generated biogas in landfill more efficient.

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. Project change

In 23 December 2011 was finalized installation of biogas extraction system in Lapes landfill fields II-III, booster station and additional CHP plants with capacities of 1,6MWe and 1,57 MWth (construction completion certificate 23 December, 2011 No. SUA -2773-(15.34)). Natural gas as additional fuel source is not used any more. Emission reduction calculation methodology remains without any changes, however new monitoring scheme is applied since 23/12/2011, it is described in Annex1. Additional CHPs are installed due to low efficiency of existing cogeneration plant (35% electrical efficiency TEDOM, new one MWM advanced technology CHP plants with 42.5% efficiency). Another aim of increasing

of CHP plant capacity is additional heat energy requirement from district heating network consumers.

4. 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.

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.

5. 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 23/12/2011 – 31/12/2012 period Flare was not used.

6. Monitoring Parameters

ID umber	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording
1. F5.1 F5.2	Total amount of landfill gas captured	Continuous flow meter at Point 1	m^3	M	Cont.
2. T5.1 F5.2	Temperature of the landfill gas	Continuous measurement at Point 1	°C	M	Cont.
3. P5.1 P5.2	Pressure of the landfill gas	Continuous measurement at Point 1	Pa	M	Cont.
4. $CH_4$1	Methane fraction in LFG	Continuous measurement at Point 1	m^3_{CH4}/m^3_{LFG} (vol-%)	M	Cont.
5. E4	Electricity used in the MPR Station	Continuous metering at Point 4	MWh	M	Cont.
6. F6	Flow of natural gas	Point 6	m3	M	Cont.
7. P6	Pressure of natural gas	Point 6	Pa	M	Cont.
8. T6	Temperature	Point 6	°C	M	Cont.

	of natural gas				
9. E7 E8	Electricity generated by the project	Continuous energy metering at Point 7	MWh	M	Cont.
10. Q8	Heat generated by the project	Continuous energy metering at Point 8	MWh	M	Cont.

7. Emission Reductions

In the respective monitoring period 23/12/2011 – 31/12/2012, 7.444,00 t CO2 of emission reductions.

Detailed values of emission:

Emission reductions from methane avoidance (LFG flaring)	0	t CO2/yr
Emission reductions from methane avoidance (LFG utilization)	190	t CO2/yr*
Emission reductions from heat substitution	1189	t CO2/yr
Emission reductions from electricity substitution	6272	t CO2/yr
Emissions from natural gas consumption	4	t CO2/yr
Emissions from electricity consumption	204	t CO2/yr

*Emission reductions from methane avoidance (LFG utilization) are calculated until 31/12/2011, because Lapes landfill must implement a gas collection system by 1st January 2012, refer to PDD section A.4.3.

Monthly values of LFG plant

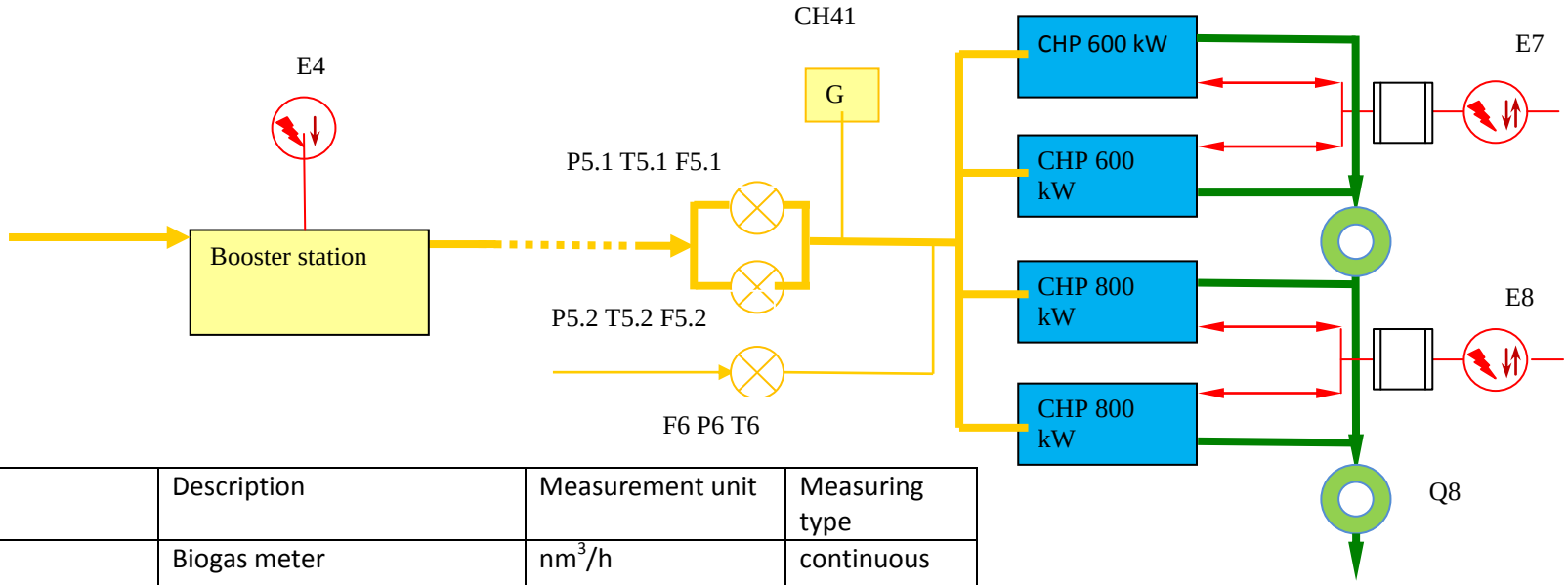
Year	Month	Initials of person logging in input data	Total amount of LFG flared	Methane fraction in LFG	Flate temperature	Methane avoidance from flaring	Electricity consumed in the MPR Module
			Nm3	vol-%	C°	t CH4	MWh
			0	57%	0	0	0
2012	January		0	52%	0	0	25,55
	February		0	53%	0	0	17,62
	March		0	55%	0	0	19,16
	April		0	55%	0	0	15,27
	May		0	56%	0	0	27,70
	June		0	57%	0	0	17,73
	July		0	58%	0	0	25,13
	August		0	56%	0	0	36,25
	September		0	57%	0	0	33,94
	October		0	56%	0	0	34,29
	November		0	57%	0	0	39,42
	December		0	57%	0	0	41,92

Total/Average		**0**	**56%**	**0**	**0**	**334**

Monthly values of CHP

Year	Month	Initials of person logging in input data	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
2011	December 23-31		166720,00	0	0	43,77	34,71
2012	January		442.484,00	161	8888	748,30	630,00
	February		361.483,00	2592	8904	619,18	511,90
	March		426.159,00	0		742,42	699,60
	April		416.659,00	0		738,21	439,60
	May		452.112,00	0		830,88	222,90
	June		440.734,00	0		837,49	171,60
	July		466.322,00	0		869,34	190,00
	August		514.992,00	0		953,75	195,90
	September		527.912,00	0		987,17	208,20
	October		537.021,00	0		977,13	459,40
	November		524.901,00	0		936,31	712,90
	December		551.821,00	0		990,22	848,60
	Total/Average		**5.829.320,00**	**2753**	**5930,67**	**10274,16**	**5325,31**

Annex 1. MONITORING SCHEME (is applied since 23/12/2011)



Symbol	Description	Measurement unit	Measuring type
	Biogas meter	nm^3/h	continuous
	Electricity meter one direction	kWh/kVar	continuous
	Electricity meter two direction	kWh/kVar	continuous
GA	Gas analyzer	$CH_4/CO_2/O_2/H_2S$	continuous
	Heat meter	MWh	continuous
	0.4/10 kV transformer		continuous
NG	Natural gas meter	nm^3/h	continuous

Symbol	Description
	Biogas
	8,5 Biogas line
	Natural gas
	Heat energy
	Electricity power