Benaiciai-1 Wind Power Project

1st Monitoring Report

Monitoring period: 30 September 2010 to 31 December 2011

Version 2

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Introduction

The purpose of this monitoring report is to calculate Greenhouse gas (GHG) emission reductions achieved by the Joint Implementation (JI) project Benaiciai-1 Wind Power Project during the period from the 30th of September, 2010 to the 31st of December, 2011. The monitoring report is earlier than in the PD document (01/01/2011), because the project succeeded in implementing earlier than anticipated.

1. General project activity information

1.1. Title of the project activity

Benaiciai-1 Wind Power Project
UNFCCC Joint Implementation (JI) reference number 0235

1.2. Short description of the project

The Project included installation of 17 wind power plants, each having a maximum capacity of 2MW, and a transformer substation, at the Benaiciai-1 wind power park, which is located in Kretinga district of Lithuania near villages Benaiciai and Zineliai and Pelekiai. The total installed capacity is 34 MW. The wind power plants installed are of Enercon E-82 type, produced by German company Enercon GmbH.
The project generates electricity and supplies it to the national grid. The project reduces greenhouse gas emissions by partially substituting power production in other power plants in Lithuania that run on fossil fuel. The project also reduces emissions of other pollutants arising from burning of fossil fuel, such as SO_2 and NO_x. In addition, implementation of this project helps promoting renewable energy resources and stimulates their use.

Figure 1. Location of Benaiciai-1 Wind Power Project

Benaiciai-1 wind power project is developed by:

UAB Renerga
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1.3. Monitoring period

30th of September 2010 – 31st of December 2011

1.4. Implementation of the project

Table 1. Main milestones in project implementation

Milestone	Date
UNFCCC JI procedures:	
Project Design Document submitted to Accredited Independent Entity	09 March 2011
The letter of Endorsement (LoE) No. (10-7)-D8- 9630 issued by the Lithuanian Ministry of Environment	06 November 2009
The letter of Approval issued by Lithuania Ministry of Environment by the Communication No (10-2)-D8-4333 of the Ministry of Environment of the Republic of Lithuania	06 May 2011
Final determination of the JI project	18 July 2011
Construction and operation of wind power park:	
Wind power park starts operating	30 September 2010

1.5. Monitoring methodology applied

Monitoring plan for the Benaiciai-1 wind power project was developed based on the PDD section D and Annex 3.

2. Monitoring activities implemented

2.1. Monitoring equipment and calibration procedures

Automatic energy meters were installed by AB Litgrid, national grid operator which buys electricity from the wind power park. The meters belong to AB Litgrid. They were manufactured by UAB Elgama, which also maintains them. They are calibrated once every 8 years.

Table 2. Monitoring equipment technical data

Position No.	T-102D	T-102 (before breakdown)	T-102 *(new)*
Purpose	Duplicated commercial meter	Main commercial meter	Main commercial meter
Was used for monitoring	2010.09.30-2011.12.31	20010.09.30-2010.10.07	2010.10.07-2011.12.31
Meter type	EPQS 113.22	EPQS 312.01	EPQS 113.22
Product No.	837580	109144	837641
Check date	2010 II quarter	2010 I quarter	2010 III quarter
Breakdowns and other events	No	Broken meter replaced with a new one on 7 October 2010	No

2.2. Data collection

2.2.1. Fixed values

Parameter	**Default value**	**Description**
EF_{LE}	0.626 tCO_2/MWh	Emission factor for power production at Lietuvos Elektrine

Emission factor for electricity production at AB Lietuvos Elektrine (Lithuanian Power Plant) (EF_{LE}) was estimated ex-ante, based on production of electric and thermal power, fuel consumption and production efficiency in AB Lietuvos Elektrine during a 4-year period from 2002 to 2005. In the integrated power network in Lithuania, AB Lietuvos Elektrine is the marginal plant: when the generators of electric power supply all quota and over-quota power to the integrated grid, the rest of the power demand is covered by the power produced at AB Lietuvos Elektrine. Therefore any additional power supply to the grid that comes from other sources displaces electricity generated at AB Lietuvos Elektrine.

The emission factor calculated based on fuel consumption from 2002 to 2005 is considered conservative, as AB Lietuvos Elektrine has been preparing to use higher share of orimulsion and decrease the share of natural gas, in an attempt to reduce dependence on single supplier of gas, Russia. An environmental upgrading project has been implemented at the power plant so that emissions of SO_2 and NO_x from burning of orimulsion would comply with the EU regulations. Lithuanian National Allocation Plan for 2008-2012 prepared under the EU Emissions Trading Scheme (http://ec.europa.eu/environment/climat/pdf/nap_lithuania_final.pdf, in Lithuanian language) states that it is anticipated that the average share of orimulsion will rise from 16.0% during 2002-2005 to 60.1% during 2008-2012. Even if a high share of 60.1% is not achieved, there is a definite trend of increase. As orimulsion has a higher CO_2 emission factor than natural gas, its higher share in the fuel mix drives up the combined emission factor for AB Lietuvos Elektrine.

2.2.2. Data on GHG emissions by sources of the project activity

The Project activity does not result in greenhouse gas emissions. Energy taken from the grid for the operation of the wind power park is subtracted from the energy supplied to the grid for the estimation of emission reductions (see data on the baseline below and Annex I).

2.2.3. Data on GHG emissions by sources of the baseline

Table 3. Information on key parameter monitored

Data / Parameter:	**P_{WPP}**
Data unit	MWh
Value of data	See Table 4[1] and Annex I
Description	Annual net power supply to the grid from Benaiciai-1 wind power project
Source of data	Onsite power metering device and monthly power dispatch confirmation documents
Description of measurement methods and procedures applied	A commercial onsite power metering device measures power supplied to the grid and power taken from the grid for the park's internal purposes. Recorded data is stored in the memory of the metering device. The data is also automatically transferred via internet to AB Litgrid, which keeps records in their databases. Once a month, power dispatch confirmation documents, which list electricity bought from UAB Renerga and AB Litgrid, are signed between UAB Renerga and AB Litgrid. Energy for on-site use is taken from the grid when the park is not operational, i.e. UAB Renerga buys electricity from AB Litgrid. Energy taken from the grid has to be subtracted from the energy supplied to the grid to get net electricity supplied to the grid, which will displace power production in AB Lietuvos Elektrine. Monthly values of net hourly electricity supply to the grid are given in the table below, and data, that it is based on, is given in Annex I.

Table 4. Data on net hourly electricity supplied by Benaiciai-1 Wind Power Project to the grid in 2010-2011;

Month	**Net hourly electricity supplied to the grid, MWh**
September	4,599
October	2.379,787
November	6.471,285
December	6.806,062
Total over the monitoring period from 30th of September 2010 till 31st of December 2010	***15.661,733***
January	8.487,274
February	9.105,695
March	10.066,613
April	6.055,473
May	6.101,382
June	5.043,836
July	3.847,031
August	6.504,945
September	7.756,983
October	8.483,680
November	7.109,049
December	14.102,395
Total over the monitoring period from 1st of January 2011 till 31st of December 2011	***92.664,356***
Total over the monitoring period	**108.326,089**

[1] net electricity to the grid in 2011 was higher than in the PD document (86,000 MWh) due to higher than average wind speed (in 2009 - 6.03 m/s, in 2010 - 6.09 m/s, in 2011 - 6.31 m / s (based SCADA) and a small duration of outages.

2.2.4. Data on leakage

No sources of leakage have been identified.

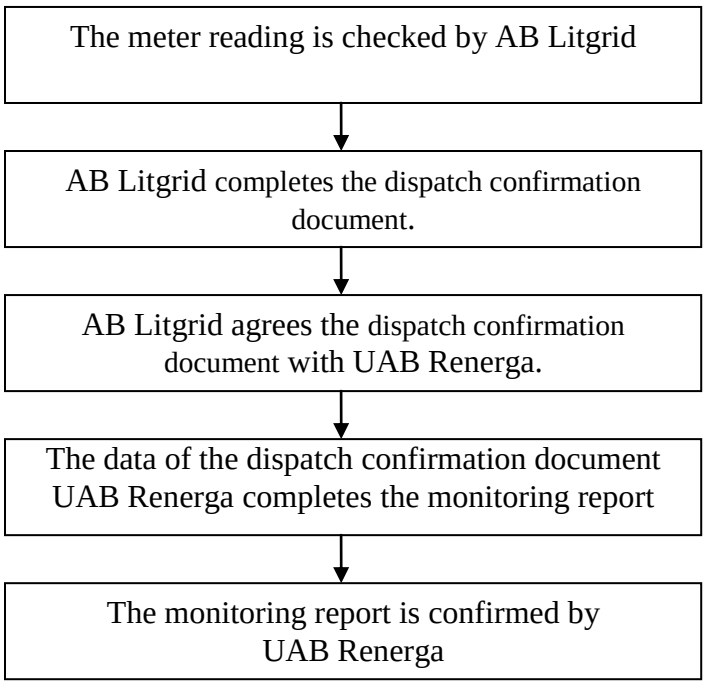
2.3. Special event log

Automatic energy meter breakdown occurred in T-102 position on the 7th of October 2010. Broken meter was replaced with a new one on the 7th of October 2010. Energy supply was not stopped. According to the 7th of October, 2010, the Act On Accounting Of Consumed Electric Energy (In Case Of Metering Device Breakdown) №.10-220 accounting of electricity stood from the 27th of September, 2010 01:00 to the 30th of September, 2010 00:00 due to automatic energy meter breakdown and consumed electric energy in this period was calculated based on 27th -30th of September, 2010, readings of redundant meter in position T-102D.

3. Quality assurance and quality control measures

Power supplied to the grid and taken from the grid is monitored by a commercial power metering device. The power metering device is calibrated. It is sealed and therefore operator of the wind power park is not able to intervene in the measurements. Once a month, an inspector from AB Litgrid together with the representative from UAB Renerga checks the readings of the power metering device and writes down supplied power and taken power quantity on the dispatch confirmation document which is then signed by both parties. Data for the purpose of calculating emission reductions is taken from these documents. As electricity supplied to the grid is the main parameter for both UAB Renerga and the buyer of electricity, additional quality assurance and quality control procedures are not necessary. The entire processes from raw data to report are given in the process flow diagram below.

Diagram 1. An information/Process flow diagram



4. Calculation of GHG emission reductions

4.1. Formulae used

The general equation for calculating emission reductions is as follows:

$$ER = BE – (PE + L) \quad (1)$$

Where:
ER – Emission reductions, tCO_2e
BE – Baseline emissions, tCO_2e
PE – Project activity emissions, tCO_2e
L – Leakage, tCO_2e

Baseline emissions are calculated using the following formula:

$$BE = P_{WPP} * EF_{LE} \quad (2)$$

Where:
BE – project's baseline emissions, tCO_2e
P_{WPP} – net hourly power supplied to the grid from Benaiciai-1 wind power project, MWh
EF_{LE} – emission factor for power production at AB Lietuvos Elektrine, determined ex ante (0.626 tCO_2/MWh)

Net hourly power supplied to the grid from Benaiciai-1 wind power project is calculated using the following formula:

$$P_{WPP} = A – B \quad (3)$$

Where:
P_{WPP} – net hourly power supplied to the grid from Benaiciai-1 wind power project, MWh
A – produced power, which bought from UAB Renerga, MWh
B – consumed power, which bought from AB Litgrid, MWh

Project emissions are considered to be equal 0. Mostly renewable electricity generated on-site is used for on-site energy demand. When wind power plant does not work it uses energy from the grid but this electricity is taken into account in monitoring net hourly electricity supply to the grid and is reflected in the values of monthly net power supply to the grid. Therefore:

$$PE = 0 \quad (4)$$

No sources of leakage are identified:

$$L = 0 \quad (5)$$

Therefore emission reductions are calculated as baseline emissions:

$$ER = BE \quad (6)$$

4.2. GHG emission reductions

4.2.1. Project activity emissions

$PE = 0$

4.2.2. Baseline emissions

Baseline emissions are calculated using formula (2), based on monitored values on monthly net hourly electricity supply to the grid:

Month	Net hourly electricity supply to the grid, MWh	Emission reductions, tCO_2e
September	4,599	2,879
October	2.379,787	1.489,747
November	6.471,285	4.051,024
December	6.806,062	4.260,595
Total over the monitoring period from 30th of September 2010 till 31st of December 2010	***15.661,733***	***9.804,245***
January	8.487,274	5.313,033
February	9.105,695	5.700,165
March	10.066,613	6.301,700
April	6.055,473	3.790,726
May	6.101,382	3.819,465
June	5.043,836	3.157,441
July	3.847,031	2.408,241
August	6.504,945	4.072,096
September	7.756,983	4.855,871
October	8.483,680	5.310,784
November	7.109,049	4.450,265
December	14.102,395	8.828,099
Total over the monitoring period from 1st of January 2011 till 31st of December 2011	***92.664,356***	***58.007,886***
Total over the monitoring period	**108.326,089**	**67.812,131**

4.2.3. Leakage emissions

L = 0

4.2.4. Summary of emission reductions over the monitoring period

Variable	Value, tCO_2e
Project emissions	0
Baseline emissions	67,812
Leakage	0
Emission reductions	**67,812**

Annex I

Data on net hourly electricity supply to the grid, in MWh:

Month	Electricity bought from UAB Renerga, MWh	Electricity bought from AB Lietuvos Energija, MWh	Net hourly electricity supplied to the grid, MWh
	A	**B**	**A-B***
September	6,217	1,618	4,599
October	2.380,79	1,004	2.379,787
November	6.472,10	0,81	6.471,285
December	6.819,24	13,179	6.806,062
Total over the monitoring period from 30th of September 2010 till 31st of December 2010	***15.678,344***	***16,611***	***15.661,733***
January	8.488,966	1,692	8.487,274
February	9.107,551	1,856	9.105,695
March	10.067,789	1,176	10.066,613
April	6.058,601	3,128	6.055,473
May	6.103,357	1,975	6.101,382
June	5.045,411	1,575	5.043,836
July	3.850,016	2,985	3.847,031
August	6.505,951	1,006	6.504,945
September	7.757,563	0,580	7.756,983
October	8.486,877	3,197	8.483,680
November	7.111,514	2,465	7.109,049
December	14.106,643	4,248	14.102,395
Total over the monitoring period from 1st of January 2011 till 31st of December 2011	***92.690,239***	***25,883***	***92.664,356***
Total over the monitoring period	**108.368,583**	**42,494**	**108.326,089**

* - Energy taken from the grid for on-site use has to be subtracted from the energy supplied to the grid in order to get net electricity supplied to the grid, which replaces electricity generated in AB Lietuvos Elektrine.