Benaiciai Wind Power Park
Joint Implementation Project

2nd Monitoring Report

Monitoring period: 1 January 2008 to 31 December 2008

Version 1

6 April 2009

Prepared by:

ENVIRONMENTAL INVESTMENT GROUP

Table of contents

Introduction

The purpose of this monitoring report is to calculate Greenhouse gas (GHG) emission reductions achieved by the Joint Implementation (JI) project Benaiciai Wind Power Project during the period from 1 January 2008 to 31 December 2008.

1. General project activity information

1.1. Title of the project activity

Benaiciai Wind Power Project

UNFCCC Joint Implementation (JI) reference number 0034

1.2. Short description of the project

The Project included installation of 6 wind power plants, each having a maximum capacity of 2.75 MW, and a transformer substation, at the Benaiciai wind power park, which is located in Kretinga district of Lithuania near villages Benaiciai and Zineliai. The total installed capacity is 16.5 MW. The wind power plants installed are of V-100 type, produced by Danish company Vestas.

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 wind power park

Benaiciai wind power park project is developed by:

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1.3. Monitoring period

1 January 2008 – 31 December 2008

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	27 October 2006
Letter of Approval from the Lithuanian Ministry of Environment as a legal and authorised representative of the Government of Lithuania received	4 July 2007
Final determination of the JI project	2 June 2008
Construction and operation of wind power park:	
Wind power park starts operating	11 December 2006

Benaiciai wind power project was developed by UAB Achema Hidrostotys. In April 2008, UAB Achema Hidrostotys was renamed into UAB Renerga. A letter from the Lithuanian Ministry of Environment was issued on 29 April 2008, which confirms that all the statements of the Letter of Approval concerning the Benaiciai wind power JI project are applicable to UAB Renerga.

1.5. Monitoring methodology applied

Monitoring plan for the Benaiciai wind power project was developed based on the CDM ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources" version 6 but the plan was adapted to suit situation in the Lithuanian energy grid.

2. Monitoring activities implemented

2.1. Monitoring equipment and calibration procedures

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

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 use for the operation of the wind power park is subtracted from the power production 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 2. Information on key parameter monitored

Data / Parameter:	**P_{WPP}**
Data unit	MWh
Value of data	See Table 3 and Annex I
Description	Annual power supply to the grid from Benaiciai[1] wind power park
Source of data	Onsite power metering device and monthly reports on electric power produced using renewable energy resources
Description of measurement methods and procedures applied	A commercial onsite power metering device measures power production and consumption 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 Lietuvos Energija, which keeps records in their databases. Once a month, UAB Renerga submit reports on electric power produced using renewable energy resources, which list recorded data, to AB Lietuvos Energija. Monthly values of electricity supplied to the grid are then calculated based on power generation and power consumption by Benaiciai wind power park.

[1] Laukzemes wind power-station – as a power producer in the integrated power network in Lithuania

	Energy for on-site use is taken from own generation when the wind power park is working and from the grid when the park is not operational. Energy taken from the grid has to be subtracted from the energy for on-site use and the result, i.e. the energy for park's internal purposes taken only from park's own generation, is subtracted from energy generation to get net electricity supplied to the grid, which will displace power production in AB Lietuvos Elektrine. The figures of net hourly electricity supply to the grid are also given in monthly reports on electric power produced using renewable energy resources, where the energy for park's internal purposes taken only from park's own generation is calculated under the method listed above. Monthly values of net hourly electricity supply to the grid are given in the table below, and underlying monthly data on power generation and own use is given in Annex I.

Table 3. Data on electricity supplied by Benaiciai wind power park to the grid in 2008:

Month	Electricity supplied to the grid, MWh
January	6,862.82
February	5,751.24
March	3,300.84
April	1,893.30
May	1,535.57
June	2,607.99
July	2,144.73
August	3,842.74
September	2,007.72
October	5,387.58
November	5,054.61
December	3,174.08
Total over the monitoring period	**43,563.22**

2.2.4. Data on leakage

No sources of leakage have been identified.

2.3. Special event log

No special events occurred during 2008 that would affect monitoring activities or monitored data.

3. Quality assurance and quality control measures

Power supplied to the grid is monitored by a commercial power metering device, and monitoring of power production is combined with the commercial accounting of the produced power. 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 Lietuvos Energija together with the representative from UAB Renerga checks the readings of the power metering device. UAB Renerga monthly submits renewable energy resources based electric power reports, which list recorded data, to AB Lietuvos Energija. Data for the purpose of calculating emission reductions is taken from these reports. 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.

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} – power supplied to the grid from Benaiciai wind power park, MWh
EF_{LE} – emission factor for power production at AB Lietuvos Elektrine, determined ex ante (0.626 tCO_2/MWh)

There are no project activity emissions. 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 electricity supply to the grid and is reflected in the values of monthly net power supply to the grid. Therefore:

$$PE = 0 \quad (3)$$

No sources of leakage are identified:

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

Therefore emission reductions are calculated as baseline emissions:

$$ER = BE \quad (5)$$

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	Electricity supply to the grid, MWh	Emission reductions, tCO_2e
January	6,862.82	4,296.13
February	5,751.24	3,600.28
March	3,300.84	2,066.33
April	1,893.30	1,185.21
May	1,535.57	961.27
June	2,607.99	1,632.60
July	2,144.73	1,342.60
August	3,842.74	2,405.56
September	2,007.72	1,256.83
October	5,387.58	3,372.63
November	5,054.61	3,164.19
December	3,174.08	1,986.97
Total over the monitoring period	**43,563.22**	**27,271**

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	27,271
Leakage	0
Emission reductions	**27,271**

Annex I

Data on electricity supply to the grid, in kWh:

Month	Electricity generation by Benaiciai WPP	On-site energy use	Net hourly electricity supplied to the grid
	A	B	A-B*
January	6,915,505	52,681	6,862,824
February	5,797,741	46,501	5,751,240
March	3,330,952	30,115	3,300,837
April	1,913,048	19,744	1,893,304
May	1,554,342	18,776	1,535,566
June	2,634,031	26,044	2,607,987
July	2,168,122	23,390	2,144,732
August	3,877,657	34,922	3,842,735
September	2,017,747	10,025	2,007,722
October	5,390,715	3,135	5,387,580
November	5,092,935	38,325	5,054,610
December	3,198,637	24,557	3,174,080
Total over the monitoring period	**43,891,432**	**328,216**	**43,563,216**

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