# Benaiciai Wind Power Park Project

## 3rd Monitoring Report

**Monitoring period: 1 January 2009 to 31 December 2009**

**Version 1.1**

**1 February, 2010**

**Prepared by:**

UAB RENERGA

KONCERNO „ACHEMOS GRUPĖ" NARĖ

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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 Wind Power Project during the period from the 1st of January, 2009 to the 31st of December, 2009.

# 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:

UAB Renerga
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### 1.3. Monitoring period

1st of January 2009 – 31st of December 2009

### 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 authorized 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.

*Table 2. Monitoring equipment technical data*

| **Position No.** | T-101D | T-101 *(before breakdown)* | T-101 *(new)* |
|---|---|---|---|
| **Meter type** | EPQM 312.01.534 | EPQS 113.09.04 | EPQS 113.09.04 |
| **Product No.** | 109160 | 508171 | 379419 |
| **Check date** | 5 June 2006 | 21 August 2007 | 03 June 2008 |
| **Breakdowns and other events** | No | Meter breakdown on 16 July 2009. Broken meter replaced with a new one on 21 July 2009. | 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 and Annex I |
| Description | Annual net power supply to the grid from Benaiciai[1] wind power park |
| 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 Lietuvos Energija, which keeps records in their databases. Once a month, power dispatch confirmation documents, which list electricity bought from UAB Renerga and AB Lietuvos Energija, are signed between UAB Renerga and AB Lietuvos Energija.<br><br>Energy for on-site use is taken from the grid when the park is not operational, i.e. UAB Renerga buys electricity from AB Lietuvos Energija<br><br>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.<br><br>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 Wind Power Park to the grid in 2009:*

| Month | Net hourly electricity supplied to the grid, MWh |
|---|---|
| January | 2.619,776 |
| February | 1.827,839 |
| March | 2.356,753 |
| April | 2.221,191 |
| May | 2.753,883 |
| June | 2.677,599 |
| July | 2.145,111 |
| August | 2.586,417 |
| September | 3.592,027 |
| October | 3.680,428 |
| November | 4.653,248 |
| December | 3.141,652 |
| **Total over the monitoring period** | **34.255,924** |

### 2.2.4. Data on leakage

No sources of leakage have been identified.

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

### 2.3. Special event log

Automatic energy meter breakdown occurred in T-101 position on the 16th of July 2009. Broken meter was replaced with a new one on the 21st of July 2009. Energy supply was not stopped. According to the 21st of July, 2009, the Act On Accounting Of Consumed Electric Energy (In Case Of Metering Device Breakdown) №. 09-118 accounting of electricity stood from the 16th of July, 2009 01:00 to the 21st of July, 2009 10:45 due to automatic energy meter breakdown and consumed electric energy in this period was calculated based on 16th -21st of July, 2009, readings of redundant meter in position T-101D.

## 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 Lietuvos Energija 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.

## 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 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 net hourly electricity supply to the grid and is reflected in the values of monthly net power supply to the grid. Therefore:

$PE = 0$ (3)

No sources of leakage are identified:

$L = 0$ (4)

Therefore emission reductions are calculated as baseline emissions:

$ER = BE$ (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 | Net hourly electricity supply to the grid, MWh | Emission reductions, $tCO_2e$ |
|---|---|---|
| January | 2.611,401 | 1.634,737 |
| February | 1.817,634 | 1.137,839 |
| March | 2.339,972 | 1.464,822 |
| April | 2.212,153 | 1.384,808 |
| May | 2.744,746 | 1.718,211 |
| June | 2.671,832 | 1.672,567 |
| July | 2.131,841 | 1.334,532 |
| August | 2.581,323 | 1.615,908 |
| September | 3.586,216 | 2.244,971 |
| October | 3.675,185 | 2.300,666 |
| November | 4.650,021 | 2.910,913 |
| December | 3.132,430 | 1.960,901 |
| **Total over the monitoring period** | **34.154,754** | **21.380,876** |

#### 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 | 21,381 |
| Leakage | 0 |
| **Emission reductions** | **21,381** |

# 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* |
| January | 2.619,776 | 8,375 | 2.611,401 |
| February | 1.827,839 | 10,205 | 1.817,634 |
| March | 2.356,753 | 16,781 | 2.339,972 |
| April | 2.221,191 | 9,038 | 2.212,153 |
| May | 2.753,883 | 9,137 | 2.744,746 |
| June | 2.677,599 | 5,767 | 2.671,832 |
| July | 2.145,111 | 13,270 | 2.131,841 |
| August | 2.586,417 | 5,094 | 2.581,323 |
| September | 3.592,027 | 5,811 | 3.586,216 |
| October | 3.680,428 | 5,243 | 3.675,185 |
| November | 4.653,248 | 3,227 | 4.650,021 |
| December | 3.141,652 | 9,222 | 3.132,430 |
| **Total over the monitoring period** | **34.255,924** | **101,170** | **34.154,754** |

* - 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.