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Rudaiciai wind power park project

MONITORING REPORT

**for the monitoring period from
01/01/2011 until 31/12/2011**

V.02

January 2012

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1 Introduction

Rudaiciai wind power park project has been developed by *UAB Veju spektras* and on the 15.09.2011 has been spun-off and transferred to the newly incorporated company *Vydmantai wind park, UAB*. 15 wind turbines with the total capacity of 30 MW (2 MW x 15) have been installed throughout 2006-2007 in the western part of Lithuania.

Project Design Document (PDD) including baseline and monitoring plan has been prepared by engineering consulting company *UAB COWI Baltic*. The Letters of Approvals (LoA) have been issued by the Ministry of the Environment of the Republic of Lithuania on 05.04.2007 and by the designated focal point of Netherlands SenterNovem on 16.05.2007.

Rudaiciai wind power park project has been approved by an accredited independent entity (AEI) and has been granted final determination. PDD is available on the UNFCCC website under project reference number 0025.

The project reduces greenhouse gas emissions by partially substituting power production in other power plants of Lithuania that run on fossil fuel. In addition, the implementation of this project helps to promote renewable energy and improve environmental conditions in the country. Not only the greenhouse gas emissions are reduced, but also other pollutants, arising from burning of fossil fuel such as SO₂ and NO_x.

2 Description

Rudaiciai wind power park project has been constructed in western part of Lithuania, Kretinga district, near villages of Kiauleikiai, Kveciai and Rudaiciai. The location of the project is presented in Figure 1:



Figure 1. Location of the Rudaiciai wind power park project

Locations of wind turbines are presented in Figure 2:

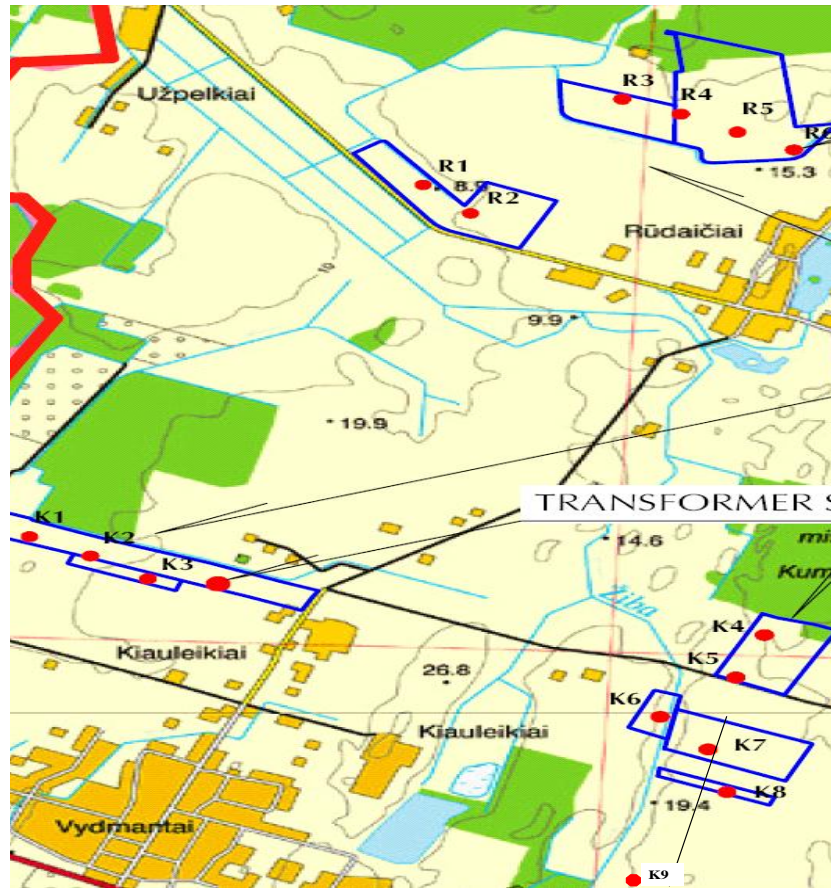


Figure 2. Locations of wind turbines

The wind power park project encompasses installation of 15 Enercon E-70 wind turbines of 2 MW, comprising 30 MW in total.

Table 1. Technical parameters of the wind power plants

Type of wind turbine	Enercon E-70
Capacity	2000 kW
Rotor diameter	71 m
Direction of rotor's rotation	Clockwise
Number of rotor blades	3
Height of the tower	85.4m
Total height of wind power plant	120.5m
Diameter of the tower	2.0-3.9m
Cut-in speed	2.5 m/s

The wind power park is connected to 110 kV power line. A transformer substation with incoming voltage of 20 kV, outgoing voltage of 110 kV and 31.5 MVA capacity has been installed for this purpose.

Rudaiciai wind power park started operating in October 2006. Wind turbines were installed and started operating gradually. Installation was finished in February 2007.

Maintenance of the wind power park is performed by Enercon GmbH.

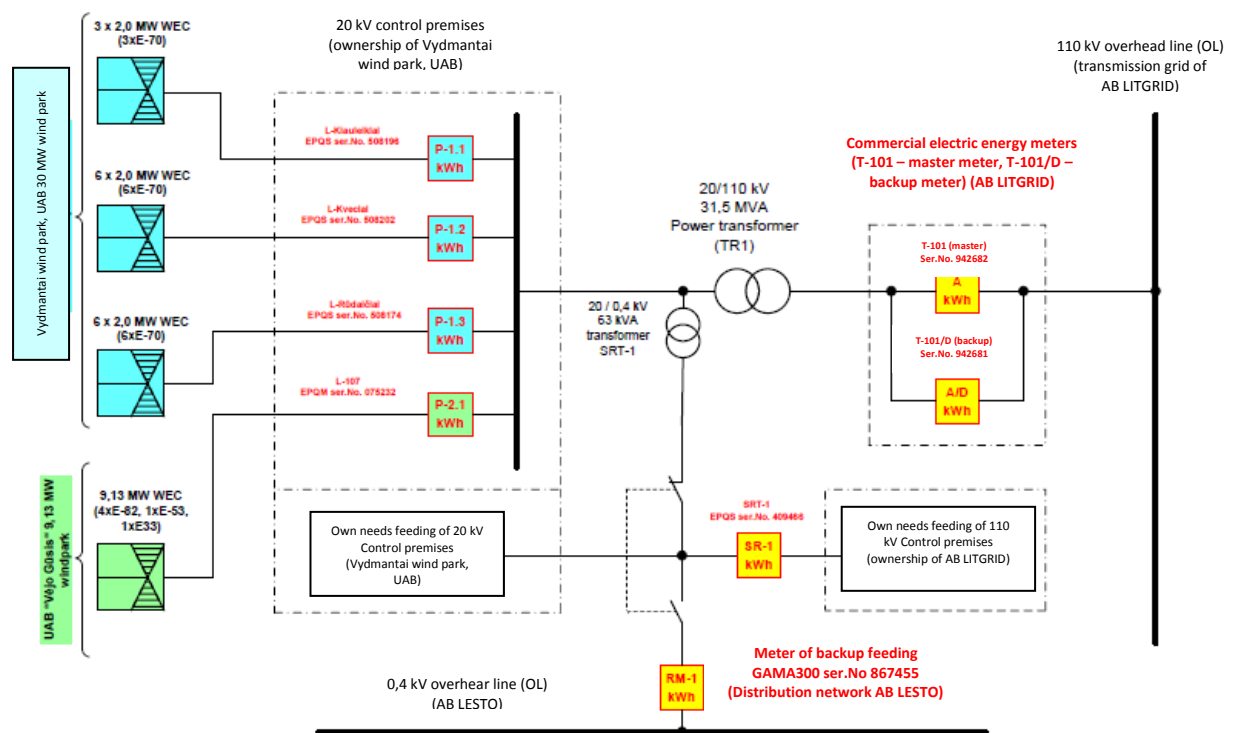


Figure 3. Positions of electric energy meters in Vydmantai wind park, UAB 110/20kV substation „Vejas-1”

New 9,13 MW wind park Liepyne operated by UAB Vejo gđasis was connected to the transmission grid through UAB Veju spektras transformer station in December 2009. Due to reason that Rudaiciai wind power park and Liepynes wind power park are connected to the same substation with one commercial power metering device it is necessary to separate each park energy generation/consumption. Rudaiciai wind power park operations are controlled by common commercial meter (excluding its duplicate) and a control meter. Other wind park's operations are controlled by common commercial meter (excluding its duplicate) and 3 control meters. All meters are connected to SCADA system and monitored remotely.

Second commercial meter is necessary in the case of main commercial meter's failure.

Control meters indicate commercial meter's deviations and helps evaluate energy consumption for own purposes (difference between generated and supplied to the grid values).

All metered data is double checked by receipts of electricity sales with SCADA system as backup.

All commercial electric energy meters are installed in substation territory.

Electric energy meter on diagram	T-101 (till 26.10.2011)*	T-101 (since 26.10.2011)*	T-101/D (till 26.10.2011)*	T-101/D (since 26.10.2011)*	AB LESTO backup
Producer	Elgama-Elektronika Ltd. (Lithuania)	Elgama-Elektronika Ltd. (Lithuania)	Elgama-Elektronika Ltd. (Lithuania)	Elgama-Elektronika Ltd. (Lithuania)	Elgama-Elektronika Ltd. (Lithuania)
Item description	Electronic multitariff meter of electric energy	Electronic multitariff meter of electric energy	Electronic multitariff meter of electric energy	Electronic multitariff meter of electric energy	Electronic multitariff meter of electric energy
Serial No.	289135	942682	289203	942681	867455
Type	EPQS 113.09.04	EPQS 114	EPQS 113.09.04	EPQS 114	EPQS 132.16.6
Measurement limits	3*57,7/110V; 1(1,25)A	3*57,7/110V; 1(1,25)A	3*57,7/110V; 1(1,25)A	3*57,7/110V; 1(1,25)A	3*220/380V; 5(80)A
Class	0,5s	0,5s	0,5s	0,5s	1.0

Electric energy meter on diagram	LN KIAULEIKIAI	LN KVECIAI	LN RUDAICIAI	L-107
Producer	Elgama-Elektronika Ltd. (Lithuania)	Elgama-Elektronika Ltd. (Lithuania)	Elgama-Elektronika Ltd. (Lithuania)	Elgama-Elektronika Ltd. (Lithuania)
Item description	Electronic multitariff meter of electric energy	Electronic multitariff meter of electric energy	Electronic multitariff meter of electric energy	Electronic multitariff meter of electric energy
Serial No.	508196	508202	508174	75232
Type	EPQS 113.09.04	EPQS 113.09.04	EPQS 113.09.04	EPQS 113.21.29
Measurement limits	3*57,7/110V; 1(1,25)A	3*57,7/110V; 1(1,25)A	3*57,7/110V; 1(1,25)A	3*57,7/110V; 1(1,25)A
Class	0,5s	0,5s	0,5s	0,2s

Table 2. Technical parameters of the electric energy meters

* AB LITGRID commercial electric energy meters were changed on 26th of October, 2011 by AB LITGRID. The commercial electric energy meters were changed as preventive maintenance (working deed No. 000336-368 and 000335-368. Annex 2)

3 Power production

The monitoring of power production is performed by the director of *Vydmantai wind park, UAB*. Monitoring of power production is combined with the commercial accounting of the produced power. Commercial accounting is used to settle the contractual obligations between LITGRID AB – the power dispatch grid operator and *Vydmantai wind park, UAB*. Every month the representative of

LITGRID AB, representative of *UAB Vejo gusis* and representative of *Vydmantai wind park, UAB* are signing the monthly power dispatch confirmation form stating the data from the commercial power metering device within 5 working days after the end of a month. After the signing the power dispatch forms by all parties, a representative of *Vydmantai wind park, UAB* writes down the figures of dispatched power into the monitoring sheet. Both agreements with LITGRID AB were transferred to *Vydmantai wind park, UAB*. The tripartite agreements between LITGRID AB, *UAB Veju sprektas and Vydmantai wind park, UAB* according to the transfer of agreements were signed on 2011.10.24 (No. SUT-389-11, SUT-388-11).

New 9,13 MW wind park Liepyne operated by *UAB Vejo gusis* was connected to the transmission grid through *Vydmantai wind park, UAB* transformer station in December 2009. Since then the main commercial meter T-101 is used to account the amount of power produced and consumed jointly for RUDAICIAI and LIEPYNE wind power parks (the producers). The amount of power produced and consumed by each company is calculated and divided by special algorithm set in the Electric Energy Purchase-Sales Agreement with AB Lietuvos energija No. 104-10, dated February 26, 2010, i.e. according to the total data of the 4 control meters the proportion (%) of each producer is calculated; then according to these proportions the power production and consumption data of the main commercial meter T-101 is divided between the producers. The Electric Energy Purchase-Sales Agreement with AB Lietuvos energija No. 104-10, dated February 26, 2010 was transferred to *Vydmantai wind park, UAB* after the spin-off.

Due to the connection of Liepyne wind park to *Vydmantai wind park, UAB* transformer station in December 2009 and the changes in the company, the Monitoring plan described in PDD sections D2, D3 were updated (see Annex 1).

CO₂ emission reduction calculation of year 2011 is performed by *Vydmantai wind park, UAB*, in January 2012. Power production data quality is assured by AB LITGRID who is responsible for the calibration of the commercial power metering devices.

Power dispatch documents are archived at *Vydmantai wind park, UAB* for later reference as a proof of the monitoring results. The following data was collected and saved during the monitoring period from 01/01/2011 to 31/12/2011:

Table 3. Power supplied to the grid (balance) in the year 2011

2011	Electricity sold to the grid kWh	Electricity used from the grid kWh	Balance kWh
January	6.450.953	580	6.450.373
February	7.032.853	1.365	7.031.488
March	6.620.776	1.002	6.619.774
April	4.540.118	2.338	4.537.780
May	4.253.762	1.421	4.252.341
June	3.479.167	1.218	3.477.949
July	2.471.822	1.607	2.470.215
August	5.151.868	801	5.151.067
September	5.845.909	434	5.845.475
October	7.147.187	1.594	7.145.593
November	5.646.705	16.273	5.630.432
December	11.605.320	4.785	11.600.535
TOTAL	70.246.440	33.418	70.213.022

4 Emission reductions

Baseline is described in detail in Rudaiciai wind power park project design document (PDD). The project has been approved by an accredited independent entity (AEI) and has been granted the final determination. PDD is available on the UNFCCC website under project reference number 0025.

An estimated baseline emission factor is – 0,626 tCO₂/MWh.

According to the monitoring plan of the project, emission reductions are calculated in the following way:

$$E_R = P_{WPP} \times EF_{LE}$$

Where:

E_R – annual emission reductions, tCO₂

P_{WPP} – net annual power production at Rudaiciai wind power park. P_{WPP} is the difference between produced and consumed power at Rudaiciai wind power park in MWh.

EF_{LE} – emission factor for power production at Lietuvos elektrine, 0.626 tCO₂/MWh

The results of emission reduction calculation are presented below:

Table 4. Emission reductions in year 2011

2011	t CO_{2e}
January	4.038
February	4.402
March	4.144
April	2.841
May	2.662
June	2.177
July	1.546
August	3.225
September	3.659
October	4.473
November	3.525
December	7.262
TOTAL	43.954

ANNEX 1

SECTION D. Monitoring plan

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitoring:

The over-all Quality Management Manual was put together in the end of 2008 (after initial verification) and finalized in January 2009. However the individual procedures existed before and were followed by the personnel. The procedures were updated on 2012.01.02.

The responsibilities and roles for monitoring and reporting are stated in detail in the following Quality Assurance procedures:

- KP-GM-01: Power Production-Consumption Document Signature Procedure with LITGRID AB
- KP-GM-02: Power Production-Consumption Document Signature Procedure with AB LESTO
- KP-GM-03: CO₂ Emission Reduction Calculation

The procedures are being updated depending on situation changes.

D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan:

The following management structure is in place:

Director – managing the company.

Daily supervisory on the site is done by V.Trutnevis under agreement with *V.Trutnevis research design and assembly company Aras*.

Accounting is done by the accountant of *UAB IRL Wind* under the agreement for accounting services with *UAB IRL Wind*.

Maintenance of wind power park is done by Enercon GmbH under agreement with *UAB Veju spektras*, that after a spin-off was transferred to *Vydmantai wind park, UAB*.

The monitoring of power production is performed by an employee in charge and approved by the director of *Vydmantai wind park, UAB*. Monitoring of power production is combined with the commercial accounting of the produced power. Commercial accounting is used to settle the contractual obligations between LITGRID AB – the power dispatch grid operator and *Vydmantai wind park, UAB*. The representative of LITGRID AB, representative of *UAB Vejo gusis* and representative of *Vydmantai wind park, UAB* sign the monthly power dispatch confirmation form stating the data from the commercial power metering device within 5 working days after the end of a

month. After power dispatch document is signed by all parties, a representative of *Vydmantai wind park*, *UAB* writes down the figures of dispatched power into the monitoring sheet.

New 9,13 MW wind park Liepyne operated by *UAB Vejo gusis* was connected to the transmission grid through *Vydmantai wind park*, *UAB* transformer station in December 2009. Since then the main commercial meter T-101 is used to account the amount of power produced and consumed jointly for RUDAICIAI and LIEPYNE wind power parks (the Producers). The amount of power produced and consumed by each Producer is calculated and divided by special algorithm set in the Electric Energy Purchase-Sales Agreement with *AB Lietuvos energija* No. 104-10, dated February 26, 2010, i.e. according to the total data of the 4 control meters (P-1.1., P-1.2. and P-1.3 meters are used for Rudaiciai wind park; and P-2.1. for Liepyne wind park) the proportion (%) of each Producer is calculated; then according to these proportions the power production and consumption data of the main commercial meter T-101 is divided between the Producers.

Other monitored factors are collected and CO₂ reductions are calculated as well as the Monitoring report is prepared by the director of *Vydmantai wind park*, *UAB* in January each year.

Power dispatch documents are archived at *Vydmantai wind park*, *UAB* for later reference for the proof of the monitoring results. *AB LITGRID* is responsible for the calibration of the commercial power metering device.