JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM
Version 01 - in effect as of: 15 June 2006

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SECTION A. General description of the project

A.1. Title of the project:

The title of the project: Benaiciai-1 Wind Power Project
The sectoral scope(s) to which the project pertains: (1) Energy industries (renewable/non-renewable sources)
The version number of the document: PDD 07
The date of the document: 9 March 2010

A.2. Description of the project:

a) Situation existing prior to the starting date of the project;
Even after closure of Ignalina nuclear power plant there is an overcapacity of the installed power in Lithuania, so only very few new power plants are built or planned. Lietuvos Elektrine, power plant with the largest installed capacity in Lithuania (after Ignalina nuclear power plant, which is closed now) is operating on the electricity grid as a marginal plant. It covers all electricity demand which is remaining after all other electricity producers have supplied their quota electricity to the grid. The producers may also supply the excessive electricity at a lower price. The difference in the national demand for electricity and the total production thereof (quotas and over-quotas) is covered by electricity produced at power plant Lietuvos elektrine using fossil fuel, i.e. natural gas, heavy fuel oil or orimulsion.

The feed-in-tariff scheme for green electricity production in Lithuania is established. The feed-in-tariff for wind electricity is set at 0.30 Lt/MWh (0.087 EUR/MWh). The feed-in-tariffs are valid until 2021, it is not clear which support mechanisms will be applied later.
The National Energy Strategy determines the main trends of energy development in Lithuania. It is provided that the share of renewable energy sources (RES) has to be 20% in the total primary energy balance by 2025. The RES usage action plan has to be presented to the European Commission by Lithuania for the purpose to increase the share of RES to 23% in the final consumption of energy by 2020. At the moment the action plan is under preparation thus it is unclear yet, whether electricity produced at the wind power plants is going to be promoted and whether that promotion is going to be valid for the planned power plants.
Obstacles for implementation of wind power projects show the fact, that only 31 wind plants (wind power parks) were connected to the grid until December 2009, and only 6 of them were more than 2 MW capacity, and connected to the 110 kV grid. In order to build the wind power park with larger capacity than 250 kW, the project developer has to win a tender for the installed capacity licence in one of the 6 zones in the western part of Lithuania. Each zone has a limit for the installed power capacity, as announced in the tender. Maximum allowed capacity amounts to 200 MW. No matter the tender procedures for the installed wind power capacity were launched about 2 years ago, only 80 MW were connected to the grid (see more on B.2. Step 4. Common practice analysis).

b) Baseline scenario;
In case of additional electricity supply to the grid, the production will be reduced at Lietuvos elektrine. Therefore, in order to calculate GHG emission reductions, resulting from implementation of the Benaiciai-1 Wind Power Project, it is necessary to estavlish the amount of CO_2 released to the atmosphere while producing 1 MWh of electricity at Lietuvos elektrine. It was calculated that Lietuvos elektrine, by generating 1 MWh of electricity, contributes to the pollution of atmosphere with 0.626 tones of CO_2.

c) Project scenario (expected outcome, including a technical description).

Benaiciai-1 Wind Power Project is prepared under the initiative of *UAB Renerga.* It is foreseen to install 17 wind power plants with the total capacity of 34 MW (2MW x 17) in the western part of Lithuania. Wind power park, in a conservative approach, will generate about 86 GWh of electricity per year.

The project will reduce greenhouse gas emissions by partially substituting electricity production in other power plants of Lithuania that run on fossil fuel. Applying baseline ratio 0.626 tCO_2/MWh_e, CO_2 reduction per year is equal to 53 836 tCO_2. Reduction of CO_2 in period 2010-2012 is 107 672 tCO_2 (for years 2011-2012).

In addition, the implementation of this project will help to promote renewable energy sources, stimulate their use and improve environmental quality in the country. Not only the greenhouse gas emissions will be reduced, but also other pollutants, arising from burning of fossil fuel such as SO_2 and NO_x. The project will also serve for promotion of wind power utilisation in Lithuania and for creation of new work places.

A.3. Project participants:

A Joint Implementation project is participated by investing party and a host party. In Benaiciai-1 Wind Power Project Lithuania is participating as the host party while the investing party will be defined later. Information on parties, participating in wind power project, is provided in Table 1.

Table 1 Parties, participating in JI project

Party involved	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Lithuania (Host party)	UAB Renerga	No

The owner of Benaiciai-1 Wind Power Project is *UAB Renerga*. Main business of the enterprise is production of electricity. The enterprise is located in Jonalaukis village Jonava district.

A.4. Technical description of the project:

A.4.1. Location of the project:

Project will be implemented in western part of Lithuania, Kretinga district, near villages of Benaiciai, Zyneliai and Pelekiai (Figure 1).

Figure 1 Project location in Klaipeda county, Kretinga district [http://www.bestcountryreports.com/Political_Map_Lithuania_Provinces.html]

A.4.1.1. Host Party(ies):

Lithuania

A.4.1.2. Region/State/Province etc.:

Klaipeda County

A.4.1.3. City/Town/Community etc.:

Kretinga district

A.4.1.4. Detail of physical location, including information allowing the unique identification of the project (maximum one page):

Planned location of Benaiciai-1 Wind Power Project is in Kretinga district in the territory of villages Benaiciai, Zyneliai and Pelekiai, Darbenai township. The planned activity will be implemented on 16 land parcels in Kretinga district, Klaipeda County. Total project land parcel area is 145,12 ha. Relief of the territory is plain, uncovered from the west side - there are no big forests and buildings. The mainstream wind direction - Northwest.

Unique identification of the land parcels from the detailed plan for construction of 7 wind power plants:

1) 4,68 hectares (cadastral No. 5667/0001:84), Senosios Ipilties village; 2) 7,83 hectares (cadastral No. 5647/0003:26) Laukzemes village; 3) 63,276 hectares (cadastral No. 5647/0003:5) Laukzemes village; 4) 18,07 hectares (cadastral No. 5647/0003:80) Laukzemes village; 5) 3,46 hectares (cadastral No. 5647/0003:2) Laukzemes village.
Unique identification of the land parcels from the detailed plan for construction of 10 wind power plants: 1) 5,9591 hectares (cadastral No. 5667/0001:175), Senosios Ipilties village; 2) 17,2074 hectares (cadastral No. 5667/0001:257), Senosios Ipilties village; 3) 6,28 hectares (cadastral No. 5647/0003:33), Laukzemes village; 4) 14,0702 hectares (cadastral No. 5647/0003:197), Laukzemes village; 5) 1,1750 hectares (cadastral No. 5647/0003:231), Laukzemes village; 6) 2,69 hectares (cadastral No. 5647/0003:131), Laukzemes village; 7) 3,75 hectares (cadastral No. 5647/0003:181), Laukzemes village; 8) 9,5496 hectares (cadastral No. 5647/0003:52), Laukzemes village; 9) 20,89 hectares (cadastral No. 5647/0003:167), Laukzemes village; 10) 6,5 hectares (cadastral No. 5647/0003 :132), Laukzemes village; 11) 16,7107 hectares (cadastral No. 5647/0003 :40), Laukzemes village.

Each land parcel purpose was agricultural land. After detailed plans were prepared, purpose of some land parcels was changed to Other purpose , allowing construction of wind power plants and communications. Purpose of the rest land parcels remained unchanged.

Table 2 Unique identification of the location

No. of wind power plant in the detailed plan	Coordinates in the system LKS94	
	X	Y
1	6222175,91	329891,10
4	6220237,18	329593,78
5	6219497,02	328305,04
6	6219102,57	327977,85
7	6218979,32	327226,27
8	6219047,27	328385,09
9	6218440,12	328706,10
10	6218136,36	328972,64
11	6218339,01	329317,31
12	6217811,68	329529,77
13	6218337,01	329717,19
14	6218628,52	329041,30
15	6218948,30	329621,55
16	6219576,94	329590,05
18	6219929,25	329393,38
19	6221425,08	330213,94
20	6218628,58	328057,9

A.4.2. Technology (ies) to be employed, or measures, operations or actions to be implemented by the project:

It is planned to install 17 Enercon E-82 type wind turbines manufactured by German company Enercon GmbH. Technical data of the turbines is presented in Table 3.

Table 3 Technical parameters of the wind power plants

Type of wind turbine	Enercon E-82
Number of wind turbines	17
Capacity	2 MW
Rotor diameter	82 m
Number of rotor blades	3
Height of tower	98 m
Total height of wind power plant	140 m

The wind power park will generate approx. 86 GWh electricity per year.
The height of wind turbines towers will be 98 meters and the level of the produced noise is 102.5-104 dBA. According accomplished calculations the planned noise level of the wind power park is in allowable level. Noise level is determined in pursuance to Lithuanian Hygiene Code HN 33-2007 "Acoustic Noise. Allowable Levels in the Residential and Working Environment. General Requirements for Noise Measurements" (according HN 33:2007 permissible level of the noise is: 65dB - 6.00-18.00 h, 60dB - 18.00-22.00 h and 55dB - 22.00-6.00 h).

The Wind Power plants will be connected to the existing 110 kV voltage line. For this purpose the existing Benaiciai wind power plant transformer substation is renovating. Also it is planned to install a second 110 kV voltage 2.9 km length line connecting Benaiciai transformer substation with power transmission line Sventoji - Lenkimai.

It is planned, that wind power plants will be manufactured, supplied, installed, adjusted and set into action by Enercon GmbH.

Benaiciai - 1 Wind Power Project is implemented by UAB Renerga. Staff of the company participates in other similar JI project "Benaiciai Wind Power Park Project". An assumption is made, that the same persons will organise maintenance of Benaiciai - 1 Wind Power Project or transfer their knowledge to other colleagues.

A project implementation schedule is presented in Table 4.

Table 4 Planned project implementation schedule

Project implementation	Deadlines
Business plan	Jul 01, 2008
Technical project	Dec 30, 2009
Building roads	May 31, 2010
Construction and installation works	Dec 03, 2010
Transportation of wind power plants	Jul 19, 2010
Installation of wind power plants	Sept 13, 2010
Renovation of substation	Oct 05, 2010
Laying down the power cables	Jul 02, 2010
Final works	Dec 31, 2010

For construction of wind power plants it is necessary to obtain appropriate permits. Currently all required permits are obtained (Table 5).

Table 5 List of permits

No.	License	Obtained	Valid till:
1.	License to increase power production capacity	20 August, 2008	31 December, 2010
2.	Detailed plan to build 7 wind power plants	30 April, 2009	-
3.	Detailed plan to build 10 wind power plants	29 October, 2009	-
4.	Construction license to build 7 wind power plants	18 June, 2009	18 June, 2019 (ten years)
5.	Construction license to build 10 wind power plants	30 December, 2009	30 December, 2019 (ten years)

A.4.3. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI project, including why the emission reductions would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:

Usage of renewable energy resources for electricity production reduces GHG emissions that are emitted when using fossil fuel. Electricity, generated and supplied to national electricity grid, by wind power plants reduces production of other power plants in Lithuania.

The Lithuanian electricity network is operated by AB Lietuvos energija. Moreover, they purchase power quotas (on the basis of formerly signed contracts) from electricity producers. The producers may also supply the excessive electricity at a lower price. The difference in the national demand for electricity and the total production thereof (quotas and over-quotas) is covered by electricity produced at power plant Lietuvos elektrine. Thus, if the implementation of this project fails, the estimated electricity would be produced by Lietuvos elektrine, using the fossil fuel, i.e. natural gas, heavy fuel oil or Orimulsion. It was calculated that Lietuvos elektrine, by generating 1 MWh of electricity, contributes to the pollution of atmosphere with 0.626 tones of CO_2 (data of the National allocation plan for 2008-2012).

Expertise about the wind potential and the energy output of wind turbines on the site near Benaiciai was performed by the Enercon GmbH Aurich in March 2008. Benaiciai-1 Wind Power Project will generate 86 GWh of electricity per year.

Applying baseline ratio 0.626 tCO_2/MWh_e, CO_2 reduction per year is equal to 53 836 tCO_2. Reduction of CO_2 in period 2010-2012 is 107672 tCO_2 (for years 2011-2012).

The National Energy Strategy determines the main trends of energy development in Lithuania. It is provided that the share of renewable energy sources (RES) has to be 20% in the total primary energy balance by 2025. Also, the strategy states that Lithuania will reach the goal of 7% electricity production from RES by 2010, if the planned power plants are constructed.
The RES usage action plan has to be presented to the European Commission by Lithuania for the purpose to increase the share of RES to 23% in the final consumption of energy by 2020. At the moment the

action plan is under preparation thus it is unclear yet, whether electricity produced at the wind power plants is going to be promoted and whether that promotion is going to be valid for the planned power plants.

In order to build the wind power park, the project developer has to win a tender for the installed capacity licence in one of the 6 zones in the western part of Lithuania. Each zone has a limit for the installed power capacity, as announced in the tender.

The feed-in-tariff scheme for green electricity production in Lithuania is established by the Regulation on the promotion of electricity produced from renewable energy sources, approved by the Lithuanian government's Resolution No. 1474 passed on the 5th of December 2001 (Official Gazette, 2001, No. 104-3713; No. 49-1958; available on http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=342973; in Lithuanian). The regulation obliges the grid operator to purchase green electricity from the licensed grid-connected producers at the feed-in-tariffs set by the resolution of the National Price and Energy Control Commission. The feed-in-tariff for wind electricity is set at 0.30 Lt/MWh (0.087 EUR/MWh) from 2009 by the 21st February 2008 resolution of the National Price and Energy Control Commission No. O3-27 (Information Publication, 2008, No. 16-21; available on http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=315044; in Lithuanian). After introduction of power spot market in Lithuania, the difference of power spot price and the feed-in-tariff will be compensated for green power producers. The regulation envisages the feed-in-tariff scheme to be replaced by green certificate scheme in 2021 hence the feed-in-tariffs are valid until 2021.

For the moment no permanent purchase/sale is ensured for the whole volume of energy produced by the project. In case of high electricity loading, the grid operator is eligible to disconnect the wind power park from the grid. Therefore, if such unfavourable situation occurs, the company will not supply a certain part of the planned electricity to the grid and will loose a respective part of its profit. Hereby, the project payback time will lengthen further leading to reduced attractiveness of the project.

A.4.3.1. Estimated amount of emission reductions over the crediting period:

Table 6 Estimated emission reductions

	Years
Crediting period	**2 (2011-2012)**
Year	**Estimate of annual emission reductions in tonnes of CO_2 equivalent**
2011	53 836
2012	53 836
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	107 672
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	53 836

If agreement will be reached, crediting period may be extended and estimated annual emission reductions in tonnes of CO_2 equivalent equal to 53 836 tonnes each year.

A.5. Project approval by the Parties involved:

The idea of the Benaiciai-1 Wind Power Project was given a preliminary approval (Letter of Endorsement) on 06-11- 2009 by the Communication No (10-7)-D8- 9630 of the Ministry of Environment of the Republic of Lithuania. The evaluation of the Project Idea Note was made in consideration of the provisions set out in the regulation for the JI project Implementation in Lithuania, approved by the Order of the Minister of Environment of the Republic of Lithuania (2010, Nr. 66-3304). Furthermore, the assents from the Ministry of Energy of the Republic of Lithuania and the Lithuanian Environmental Investment Fund were taken into consideration in the decision making procedure.

Letter of Approval has not been issued yet, as according to the Lithuanian National Joint Implementation Project development rules the final Project approval might be issued only after the Project determination report submission to the Lithuanian DFP.

SECTION B. Baseline

B.1. Description and justification of the baseline chosen:

Step 1. Indication and description of the approach chosen regarding baseline setting

Baseline is the amount of GHG that would be emitted to the atmosphere during the crediting period of the project, i.e. in 2010-2012, in case the project was not implemented.

BASREC Regional Handbook on Procedures for Joint Implementation in the Baltic Sea Region indicates three methods of baseline approach:

1. Existing actual or historical greenhouse gas (GHG) emissions, as applicable;
2. Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment;
3. Average emissions of similar projects undertaken in the previous 5 years, in similar social, environmental and technological circumstances, and the performance of which is in the top 20 % of their category.

In the Benaiciai-1 Wind Power Project the baseline is calculated referring to the historic data as this method is the best suited for the Lithuanian electricity market. Approved CDM ACM0002 methodology is not used for the baseline calculation due to the following reasons:

1. Lietuvos Elektrine, power plant with the second largest installed capacity in Lithuania (after Ignalina nuclear power plant –INPP) is operating on the electricity grid as a marginal plant. It covers all electricity demand which is remaining after all other electricity producers have supplied their quota electricity to the grid. Hence, by simply including all these power plants operating on the grid (excl. INPP) would bias the Operating Margin emissions factor.

2. There is an overcapacity of the installed power in Lithuania, so only very few new power plants are built or planned. Because of that, it is impossible to calculate properly the Built Margin emissions factor.

The chosen baseline approach is similar to the approaches already taken in comparable cases (wind power plant JI projects in Lithuania).

GHG emissions from electricity production depend on the type of fuel used and the efficiency of installations in which the fuel is combusted. Thus, for the baseline calculation it is important to know, which power plants will reduce production due to the supply of additional electricity, generated in the JI project. This can be easily determined knowing the structure of the Lithuanian electricity network. When the manufacturers of electricity supply all quota-based electricity to the integrated Lithuanian electricity network, the rest of power demand is covered by the electricity produced at Lietuvos elektrine. Besides, variable costs of electricity production at Lietuvos elektrine are the highest, compared to other power plants in Lithuania. Taking this into consideration, we can say that in case of additional electricity supply to the grid, the production will be reduced at Lietuvos elektrine. Therefore, in order to calculate GHG emission reductions, resulting from implementation of the JI projects related to production of electricity, it is necessary to know the amount of CO_2 released to the atmosphere while producing 1 MWh of electricity at Lietuvos elektrine.

Step 2. Application of the approach chosen

The amount of CO_2 released to the atmosphere while producing 1 MWh of electricity at Lietuvos elektrine was calculated in mid 2006 by a consulting company Ekostrategija in the process of preparation of the National allocation plan of the EU Allowances for 2008-2012. Calculations are performed on the basis of historical data. For better reliability the data of a 4-year period have been used for the calculations.

For determination of the baseline consumption and production efficiency, the data were provided by AB Lietuvos elektrine as well as production of electricity and heat at Lietuvos elektrine in 2002-2005 (Table 7). For evaluation of the emission reductions we also use forecasts of electricity production at the Benaiciai-1 Wind Power Project, provided by UAB Renerga.

Table 7 Energy production and fuel consumption in Lietuvos elektrine

Year	Electricity produced (MWh)	Heat produced (MWh)	Natural gas (1000nm3)	Heavy fuel oil (t)	Orimulsion (t)
2002	736 604	202 060	199 104	7355	52 534
2003	723 858	195 553	225 813	5241	21 238
2004	745 372	212 399	207 690	2750	55 50
2005	1 072 814	199 383	280 559	1815	86 160

The amount of the consumed fuel is transferred to oil equivalents using such factors: natural gas – 0.800 toe/1000nm3, heavy fuel oil – 0.955 toe/t, orimulsion – 0.660 toe/t[1] (Table 8).

Table 8 Fuel consumption at Lietuvos elektrine, expressed in oil equivalents

Year	Natural gas (toe)	Heavy fuel oil (toe)	Orimulsion (toe)
2002	159 289	7025	34 675
2003	180 657	5005	14 018
2004	166 158	2626	36 633
2005	224 455	1733	56 869

Hereafter, the percentage is calculated for each type of fuel consumed every year (Table 9).

Table 9 Proportion of fuels consumed at Lietuvos elektrine

Year	Natural gas (%)	Heavy fuel oil (%)	Orimulsion (%)

[1] Ratios are from Annex 4 of the Fuel and Energy Balance Technique (Official Gazette 2004, No. 172-6363)

2002	79.25%	3.49%	17.25%
2003	90.47%	2.51%	7.02%
2004	80.89%	1.28%	17.83%
2005	79.30%	0.61%	20.09%

In order to estimate the total emissions from fuel combustion the total tCO_2 emission factors are estimated for fuel, expressed in tons of oil equivalents (Table 10).
The total emission factor [tCO_2/toe] = net calorific value [TJ/t] * emission factor [tCO2/TJ] * oxidation factor. Key information on the data used for the establishment of the baseline is presented in **Table 15**.

Table 10 Total CO_2 emission factors

Natural gas	Heavy fuel oil	Orimulsion
1.8960531 tCO2/1000 nm3	3.1028478 tCO2/t	2.2268399 tCO2/t
0.8000287 toe/1000 nm3	0.9550656 toe/t	0.6600416 toe/t
2.3699814 tCO_2/toe (EF_{Gas})	3.2488322 tCO_2/toe (EF_{HFO})	3.3737873 tCO_2/toe (EF_{Orm})

The total annual amount of CO_2 emitted by Lietuvos Elektrine is calculated by multiplying the amount of each type of fuel consumed annually (expressed in toe) by the corresponding total emission factor tCO_2/toe (Table 11).

$$\mathbf{T_{CO2} = (F_{Gas} \times EF_{Gas}) + (F_{HFO} \times EF_{HFO}) + (F_{Orm} \times EF_{Orm}) [1]}$$

T_{CO2} - total annual amount of CO_2 emitted by Lietuvos elektrine;
F_{Gas} – annual consumption of Natural gas at Lietuvos elektrine, 1000 m^3
F_{HFO} – annual consumption of Heavy Fuel Oil at Lietuvos elektrine, tons
F_{Orm} – annual consumption of Orimulsion at Lietuvos elektrine, tons
EF_{Gas} - CO_2 emission factor for Natural gas, tCO_2/toe
EF_{HFO} - CO_2 emission factor for Heavy fuel oil, tCO_2/toe
EF_{Orm} - CO_2 emission factor for Orimulsion, tCO_2/toe

Table 11 shows the emissions from each type of fuel at Lietuvos elektrine.

Table 11 Fuel specific CO_2 emissions at Lietuvos elektrine

Year	Natural gas, tCO_2	Heavy fuel oil, tCO_2	Orimulsion, tCO_2	**Total: tCO_2**
2002	377 512	22 821	116 985	517 318
2003	428 153	16 262	47 294	491 709
2004	393 791	8533	123 592	525 916
2005	531 955	5632	191 865	729 451

The amount of CO_2 emissions, released while producing heat at Lietuvos elektrine, is calculated as follows:

$$H_{CO2} = \sum \frac{H_{LE}}{E_h \cdot K_{toe}} \cdot R_{\%} \cdot K_{tCO2/toe};$$

[2]

H_{CO2} – CO_2 emissions, generated while producing heat;
H_{LE} – Annual amount of heat produced;
E_h - Average efficiency of heat production in Lithuania[2];
K_{toe} – Coefficient for transfer of heat to conditional fuel (toe - tons of oil equivalents). It is equal to 11.63;
$R_{\%}$ - Percentage of each type of fuel within the annual fuel consumption;
$K_{tCO2/toe}$ – Emission factor for one unit of conditional fuel (tne - tons of oil equivalents) of different fuel types.

Results of calculations are presented in **Table 12**.

Table 12 Emissions attributable to heat production at Lietuvos elektrine

	Natural gas, tCO_2	Heavy fuel oil, tCO_2	Orimulsion, tCO_2	CO_2 emissions (t)
2002	38 528	2329	11 939	52 796
2003	42 566	1617	4702	48 885
2004	41 335	896	12 973	55 204
2005	38 039	403	13 720	52 161

CO_2 emissions released for production of electricity are calculated by deducting the amount of CO_2 attributable to heat production from the total CO_2 amount released by Lietuvos elektrine.

$$\mathbf{P_{CO2} = T_{CO2} - H_{CO2}} \quad \mathbf{[3]}$$

P_{CO2} – annual CO_2 emissions attributable to electricity production at Lietuvos elektrine, tCO_2
T_{CO2} - total annual amount of CO_2 emitted by Lietuvos elektrine;

H_{CO2} – annual CO_2 emissions attributable to heat production at Lietuvos elektrine, tCO_2

To calculate emissions factor, CO_2 emissions attributable to electricity production were divided by annual electricity production. The results are presented in **Table 13**.

Table 13 Emissions attributable to electricity production at Lietuvos elektrine

Year	Electricity production, MWh	Emissions, t CO2	$tCO2/MWh_e$
2002	736 604	464 522	0.631
2003	723 858	442 824	0.612
2004	745 372	470 712	0.632
2005	1 072 814	677 290	0.631
Average	819 662	513 837	0.626

[2] Efficiency rate of 84.7% was used while preparing the National allocation plan for 2002-2005, Rudaiciai and Benaiciai Wind Power Joint implementation projects. Both Joint implementation projects have passed the Final determination. Hence, efficiency rate of 84.7% was used for the benaicia-1 Wind Power Project.

In order to check the emission factor, we have performed the same methodology as described above, using publicly available data of Lietuvos elektrine for the recent years (2006, 2007 and 2008). The following data were available publicly: amount of electricity supplied to the electricity network (column No. 1 in **Table 14**), amount of heat supplied to the district heating network (column No. 2 in **Table 14**), verified total CO_2 emissions (column No. 4 in **Table 14**),

Table 14 Results of emissions factor recalculations

Year	Electricity sold, MWh	Heat production, MWh	Total energy production, MWh	Emissions, tCO_2 (total)	Emissions, tCO_2/ MWh	Emissions, tCO2 (heat)	Emissions, tCO_2 (electricity)	tCO_2/ MWhe (sold)	tCO_2/ MWhe (produced)
	1	2	3	4	5	6	7	8	9
2005	970.850	199.383	1.272.197	715.073	0,562	48.625	666.448	0,686	0,621
2006	883.754	194.731	1.166.752	638.523	0,547	47.491	591.032	0,669	0,608
2007	865.680	187.447	1.141.393	624.616	0,547	45.714	578.902	0,669	0,607
2008	779.708	190.147	1.058.121	600.126	0,567	46.373	553.753	0,710	0,638
Average	**874.998**	**192.927**	**1.159.616**	**644.585**	**0,556**	**47.051**	**597.534**	**0,684**	**0,619**

Column No. 4. Verified total emissions, available on http://ec.europa.eu/environment/climat/emission/citl_en.htm
Column No. 9. The total electricity production at Lietuvos elektrine is a sum of electricity supplied to the electricity network and electricity consumed for own needs. Data on the electricity supplied to the electricity network is available publicly. Electricity consumption for own need was calculated based on the assumptions derived from the actual data available for 2002-2005.

Actions of Lietuvos elektrine and announcements in the press show that Lietuvos elektrine will continue the use fuel with high emissions factor (heavy fuel oil or emulsified fuel). Lietuvos elektrine has installed equipment allowing the use of heavy fuel oil for energy production in consistency with the environmental requirements regarding sulphur content. Lietuvos elektrine has performed tender procedures for the purchase of heavy fuel oil for 2009-2010[3]. Besides, Lietuvos elektrine has successfully completed the trial test of emulsified fuel, the new product of oil refinery plant. Excellent results of the trial test of Lietuvos Elektrine prove the adequacy of Mazeikiu Nafta oil refinery product and the readiness of Lietuvos Elektrine to use it for energy production.[4] As emulsified fuel is produced from residual products of oil refinery, the price might be competitive comparing to other fuels.

In the Schedule for Use of the Special Programme for Climate Change (Official Gazette, 2010, No. 42-2040) baseline emission factor for electricity is suggested to be 0.707 t CO_2/MWh_e.

Considering the facts described above we assume that the use of emissions factor of 0.626 tCO_2/MWh_e would represent a conservative approach to the baseline.

[3] http://www.orlenlietuva.lt/en/main/news/news?id=107564

[4] http://www.orlenlietuva.lt/en/main/news/news?id=5469

Table 15 Key information on data used to establish the baseline

Data/Parameter	**Calorific value of fuel: natural gas**
Data unit	TJ/t
Description	Calorific values are used to establish total CO_2 emissions factors
Time of determination/monitoring	24 November 2004
Source of data (to be) used	Annex 4 of the Fuel and Energy Balance Technique, approved by the Order No. DĮ-228 of the Managing Director of Department of Statistics to the Government of the Republic of Lithuania of November 24, 2004 (Official Gazette 2004, No.172-6363)
Value of data applied (for ex ante calculations/determinations)	Naturals gas 0.0339
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Public available reliable data, approved by the Department of Statistics
QA/QC procedures (to be) applied	Department of Statistics applies its internal QA/QC procedures before issuing documents publicly
Any comment	
Data/Parameter	**Emission factor of fuel: natural gas**
Data unit	t CO_2/TJ
Description	Emission factors of fuels are used to establish total CO_2 emissions
Time of determination/monitoring	2009
Source of data (to be) used	Annex 1 of the National Greenhouse gas emission inventory report of the Republic of Lithuania, 2008
Value of data applied (for ex ante calculations/determinations)	Naturals gas 56.9
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Public available reliable data, National Greenhouse gas emission inventory report prepared in accordance with the requirements and using QA/QC procedures
QA/QC procedures (to be) applied	QA/QC procedures are applied in accordance with the requirements for preparation of National Greenhouse gas emission inventory. QA/QC procedures are explained in the Section 2.6 of the National Greenhouse gas emission inventory report for 2008
Any comment	
Data/Parameter	**Oxidation coefficient of fuel: natural gas**
Data unit	
Description	Oxidation coefficient is used to establish total CO_2 emissions factors
Time of determination/monitoring	29 January 2004
Source of data (to be) used	Commission decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse

	gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council
Value of data applied (for ex ante calculations/determinations)	Naturals gas 0.995
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Public available reliable data
QA/QC procedures (to be) applied	
Any comment	
Data/Parameter	Calorific value of fuel: heavy fuel oil
Data unit	TJ/t
Description	Calorific values are used to establish total CO2 emissions factors
Time of determination/monitoring	24 November 2004
Source of data (to be) used	Annex 4 of the Fuel and Energy Balance Technique, approved by the Order No. DĮ-228 of the Managing Director of Department of Statistics to the Government of the Republic of Lithuania of November 24, 2004 (Official Gazette 2004, No.172-6363)
Value of data applied (for ex ante calculations/determinations)	Heavy fuel oil 0.03998
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Public available reliable data, approved by the Department of Statistics
QA/QC procedures (to be) applied	Department of Statistics applies its internal QA/QC procedures before issuing documents publicly
Any comment	
Data/Parameter	Emission factor of fuel: heavy fuel oil
Data unit	t CO2/TJ
Description	Emission factors of fuels are used to establish total CO2 emissions
Time of determination/monitoring	2009
Source of data (to be) used	Annex 1 of the National Greenhouse gas emission inventory report of the Republic of Lithuania, 2008
Value of data applied (for ex ante calculations/determinations)	Heavy fuel oil 78.0
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Public available reliable data, National Greenhouse gas emission inventory report prepared in accordance with the requirements and using QA/QC procedures
QA/QC procedures (to be) applied	QA/QC procedures are applied in accordance with the requirements for preparation of National Greenhouse gas emission inventory. QA/QC procedures are explained in the Section 2.6 of the National Greenhouse gas emission

	inventory report for 2008
Any comment	
Data/Parameter	Oxidation coefficient of fuel: heavy fuel oil
Data unit	
Description	Oxidation coefficient is used to establish total CO2 emissions factors
Time of determination/monitoring	29 January 2004
Source of data (to be) used	Commission decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council
Value of data applied (for ex ante calculations/determinations)	Heavy fuel oil 0.995
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Public available reliable data
QA/QC procedures (to be) applied	
Any comment	
Data/Parameter	Calorific value of fuel: orimulsion
Data unit	TJ/t
Description	Calorific values are used to establish total CO2 emissions factors
Time of determination/monitoring	24 November 2004
Source of data (to be) used	Annex 4 of the Fuel and Energy Balance Technique, approved by the Order No. DĮ-228 of the Managing Director of Department of Statistics to the Government of the Republic of Lithuania of November 24, 2004 (Official Gazette 2004, No.172-6363)
Value of data applied (for ex ante calculations/determinations)	Orimulsion 0.02763
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Public available reliable data, approved by the Department of Statistics
QA/QC procedures (to be) applied	Department of Statistics applies its internal QA/QC procedures before issuing documents publicly
Any comment	
Data/Parameter	Emission factor of fuel: orimulsion
Data unit	t CO2/TJ
Description	Emission factors of fuels are used to establish total CO2 emissions
Time of determination/monitoring	2009
Source of data (to be) used	Annex 1 of the National Greenhouse gas emission inventory report of the Republic of Lithuania, 2008
Value of data applied (for ex	Orimulsion 81.0

ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Public available reliable data, National Greenhouse gas emission inventory report prepared in accordance with the requirements and using QA/QC procedures
QA/QC procedures (to be) applied	QA/QC procedures are applied in accordance with the requirements for preparation of National Greenhouse gas emission inventory. QA/QC procedures are explained in the Section 2.6 of the National Greenhouse gas emission inventory report for 2008
Any comment	
Data/Parameter	Oxidation coefficient of fuel: orimulsion
Data unit	
Description	Oxidation coefficient is used to establish total CO2 emissions factors
Time of determination/monitoring	29 January 2004
Source of data (to be) used	Commission decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council
Value of data applied (for ex ante calculations/determinations)	Orimulsion 0.995
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Public available reliable data
QA/QC procedures (to be) applied	
Any comment	
Data/Parameter	Data on electricity production
Data unit	MWh
Description	Values are used to establish CO2 emissions
Time of determination/monitoring	24 November 2004
Source of data (to be) used	Actual data provided by Lietuvos elektrine
Value of data applied (for ex ante calculations/determinations)	See **Table 7**
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Actual data obtained directly from the company
QA/QC procedures (to be) applied	Data was provided by Lietuvos elektrine, and cross checked with public available statistical data
Any comment	
Data/Parameter	Data on heat production
Data unit	MWh
Description	Values are used to establish CO2 emissions
Time of	24 November 2004

determination/monitoring	
Source of data (to be) used	Actual data provided by Lietuvos elektrine
Value of data applied (for ex ante calculations/determinations)	See **Table 7**
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Actual data obtained directly from the company
QA/QC procedures (to be) applied	Data was provided by Lietuvos elektrine, and cross checked with public available statistical data
Any comment	
Data/Parameter	Data on natural gas consumption
Data unit	nm3
Description	Values are used to establish CO2 emissions
Time of determination/monitoring	24 November 2004
Source of data (to be) used	Actual data provided by Lietuvos elektrine
Value of data applied (for ex ante calculations/determinations)	See **Table 7**
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Actual data obtained directly from the company
QA/QC procedures (to be) applied	Data was provided by Lietuvos elektrine, and cross checked with public available statistical data
Any comment	
Data/Parameter	Data on heavy fuel oil consumption
Data unit	tones
Description	Values are used to establish CO2 emissions
Time of determination/monitoring	24 November 2004
Source of data (to be) used	Actual data provided by Lietuvos elektrine
Value of data applied (for ex ante calculations/determinations)	See **Table 7**
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Actual data obtained directly from the company
QA/QC procedures (to be) applied	Data was provided by Lietuvos elektrine, and cross checked with public available statistical data
Any comment	
Data/Parameter	Data on orimulsion consumption
Data unit	tones
Description	Values are used to establish CO2 emissions
Time of determination/monitoring	24 November 2004
Source of data (to be) used	Actual data provided by Lietuvos elektrine
Value of data applied (for ex	See **Table 7**

ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Actual data obtained directly from the company
QA/QC procedures (to be) applied	Data was provided by Lietuvos elektrine, and cross checked with public available statistical data
Any comment	

B.2. Description of how the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the JI project:

Step 1. Indication and description of the approach applied

Calculation of the baseline is presented in Section B.1. Table 13 shows that production of additional 1 MWh of electricity reduces emissions to the environment by 0.626 tCO_2 in average. It is foreseen to produce 86 GWh of electricity per year from the Benaiciai-1 Wind Power Project, thus every year CO_2 emissions will be reduced by 53836 tones.

In addition the JI project indicates the GHG reduction after implementation of the JI project in comparison to the baseline. Usually the financial efficiency of JI projects is low, thus ERUs help to promote their development and implementation. This economic promotion also reduces the payback time of the project. Besides, project implementation as the JI project helps to overcome the local institutional barriers. The CDM Methodological Tool "Tool for the demonstration and assessment of additionality" (version 05.2) is used to demonstrate the additionality of the Benaiciai-1 Wind Power Project.

Step 2.Application of the approach chosen

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a. Define alternatives to the project activity:

A) The proposed project activity to be undertaken as non-JI project activity;
This alternative is identical to the project activity but without JI initiative.

B) Power is produced by new cogeneration power plants.

Sub-step 1b. Consistency with mandatory laws and regulations:

Even after the closure of Ignalina NPP in 2009, Lithuania has a sufficient number of the existing power plants to cover power demand. Maximal power demand amounted to 2050 MW in 2008. Including the necessary long term reserve Lithuania still had surplus of power capacity in 2008. This shows that even after the closure of Ignalina NPP (capacity of Ignalina NPP amounts to 1300 MW) Lithuania will have sufficient existing power plants to cover power demand. This situation creates strong limitations for the installation of new power plants, and is not in favour either for alternative A, or B.

Table 16 Lithuanian power balance, MW[5]

The disposition of Lithuanian power plants capacity, at all	4650
Maximal necessary capacity of the system (gross)	2050
Necessary long term reserve	1300
Power balance (surplus)	1300

The existing legal and regulatory requirements in Lithuania are in favour of alternative B - power production at the existing or new cogeneration power plants and are not in favour of alternative A - the proposed project activity not undertaken as a JI project activity. The regulation on supporting renewable energy does not promote wind power enough to make it financially attractive (Sub-step 2c).

Construction of new cogeneration power plants is usually performed near the existing boiler houses. It is much easier to perform all necessary territorial planning, public consultation, land acquisition, environment and health impact assessment procedures, especially for natural gas based power plants, because they do not require additional territory for fuel storage. The existing laws and procedures on territorial planning, grid connection and others create barriers and support alternative B and are not in favour of alternative A.

The outcome of Step 1:

- Both alternatives are in compliance with mandatory laws;
- The existing regulatory requirements are more favourable to t alternatives B.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

Simple cost analysis (option I) is not applicable for the project as the income from ERU's are not the only source of revenues for the project.

The *investment comparison analysis (option II)* is not used because alternative B is based on the investment that is out of control of the Project developer, i.e. the project can be developed by a different entity. Nevertheless the project IRR is compared to the IRR of cogeneration power plants projects, the authors of the PDD of which had reliable and comparable data.

Benchmark analysis (option III) is applied.
There is no specific investment benchmark for the Lithuanian power sector that currently exists. Thus the needed interest rate for that analysis will be derived from the economic indicators that are standard for the country and are publicly available.

Sub-step 2b. – Option III. Apply benchmark analysis

Interest of bank deposits is used for benchmark analysis. The decision on the project development was made in July 2008. The average interest for deposits in Lithuania for the next 12 months (evaluating deposits within the period from 6 months to 1 year) was 8.16%[6]. The data for the interest of bank

[5] Report "Security of electricity supply in Lithuanian market", Ministry of Energy, 2009, table 1.2.2, on page 8, available on http://www.ukmin.lt/lt/veiklos_kryptys/energetika/elektra/doc/Monitoringas_2009.pdf

[6] Public data available on the web-site of the central bank of the Republic of Lithuania: http://www.lb.lt/stat_pub/statbrowser.aspx?group=7280&lang=lt

deposits were taken from the archives of the Lithuanian Bank information system. The system's archives present the statistical data on deposits and loan interest provided by financial institutions to households and non-financial corporations. The data are calculated applying the average weigh method. While establishing benchmark this value shall be increased by a suitable risk premium that would attract private investment.

Sub-step 2c. Calculation and comparison of financial indicators

IRR for the Benaiciai-1 Wind Power Project without revenues from ERUs is estimated to be 7.52 %[7]. Planned investments will be covered by 12% from the owner's equity and another 88% from the loans (credit interest rate - 5.96 %). Additional revenues from ERU sales increase IRR of the Benaiciai-1 Wind Power Project up to 7.74 % (ERU price considered to be 12 €/tCO_2e).

Table 17 Basic parameters of the project

Parameter	Value	Dimension
Total installed power	34	MW
Total investment costs	61930.1 (without VAT)	1000 EUR
Annual operation and maintenance costs	893 (year 2011-2015) 1 409 (year 2016-2030)	1000 EUR
Annual electricity production	86 000	MWh/year
Feed-in tariff	0.087	EUR/kWh
Project lifetime	20	years
ERU Crediting period	**2** (01.01.2011 – 31.12.2012)	years

The calculations are based on the current feed-in tariff, applied for the electricity produced from RES since the 1st of January 2010. It is estimated, that the same tariff will be applied for the entire project period. Though there is an uncertainty regarding the tariff, because its application is ensured only till 2020. Thus it can be expected that afterwards electricity will have to be sold on the market. Currently the electricity price on the market is lower than the applied feed-in tariff.

Average IRR for new cogeneration power plants is approx. 10%. Additionally, the EU structural funds are available in Lithuania for new cogeneration power plants, but not for the wind power projects. Due to the EU structural support the IRR of new cogeneration plants increase to approx. 15 %[8]. This fact makes the cogeneration option (alternative B) more attractive to investors compared to the wind power.

Other available indicator is the interest of bank deposits. The average interest rates for deposits for the next 12 months (6 to 12 months period) after the decision has been taken was equal to 8.16% (risk premium is not included). The project has poor economic viability, mainly due to high project risk. The low equity IRR does not stimulate private investments.

The project will be insured in order to overcome emergency cases, such as failure of the project activities or encountering of financial problems.

Sub-step 2d. Sensitivity analysis

The main variables on which the project costs and project revenues depend are as follows: investments, electricity production, electricity price, ERU price, interest rate and income tax rate. The investments

[7] Project financial calculation tables are included in the excel sheet

[8] UAB COWI Lietuva performed business plans for natural gas based cogeneration plant in Panevezys in 2005, biomass based cogeneration plants in Utena and Siauliai in 2009

shall not fluctuate a lot as they are already figured, proposals are obtained, and in some cases agreements are signed. IRR sensitivity to electricity production and ERU price is analyzed. None of other variables constitute more than 20% of either the total project costs or the total project revenues. Electricity price (feed-in tariff) is assured till the year 2020, and it is not clear if the feed-in tariff is going to be applied afterwards. Thus electricity price might decrease to the market level having negative impact on the project revenues. The power production is variable and the decrease might negatively impact project revenues also.

The results of IRR sensitivity to electricity production, ERU price and electricity price are presented in the tables below:

Production Margin	-30%	-20%	-10%	0%	10%	20%	30%
Electricity production, MWh	60 200	68 800	77 400	86 000	94 600	103 200	111 800
IRR (incl ERUs)	3.37%	4.98%	6.41%	7.74%	9.01%	10.25%	11.45%
IRR (without ERUs)	3.21%	4.80%	6.21%	7.52%	8.76%	9.96%	11.13%

Margin	-30%	-20%	-10%	0%	10%	20%	30%
ERU price, EUR	8.4	9.6	10.8	12.0	13.2	14.4	15.6
IRR (incl ERUs)	7.67%	7.69%	7.71%	7.74%	7.76%	7.78%	7.80%

Margin	-30%	-20%	-10%	0%	10%	20%	30%
Electricity price, EUR/kWh	0.061	0.070	0.078	0.087	0.096	0.104	0.113
IRR (incl ERUs)	2.73%	4.64%	6.26%	7.74%	9.14%	10.48%	11.78%
IRR (without ERUs)	2.51%	4.42%	6.04%	7.52%	8.91%	10.25%	11.54%

The outcome of Step 2:

- The proposed project activity, without the additional revenues from the sale of the ERUs is unlikely to be economically and financially attractive to investors.
- Due to high sensitivity of electricity production, additional revenues from the sale of the ERUs increase the creditability of the project.

Step 3. Barrier analysis

This Step is not applied, because Step 2 concludes, that the proposed project activity without the additional revenues from the sale of the ERUs is unlikely to be economically and financially attractive to investors.

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:

Good evidence of the presence of implementation barriers for the wind power projects in Lithuania is the fact that only 31 wind plants (wind power parks) were connected to the grid until December 2009[9], and only 6 of them were more than 2 MW capacity, and connected to the 110 kV grid. The data on the largest wind power parks is presented the table below. All of them are developed as JI projects. It is also ascertained that wind power is one of the most expensive types of electricity generation.

Table 18. Extract from the guarantees of origin data base

Producer	Producer No. in the Registry	Power park address	Capacity, MW
UAB „Vėjų spektras“	KG-G-003	Rūdaičių vlg., Kvecių vlg., Kiauleikių vlg., Kretingos distr.	30
Kreivėnų VE grupė	KG-G-118	Kreivėnų vlg., Griežpelkių II vlg., Gilangviršių vlg., Tauragės distr.	20
Laukžemės VE	KG-G-094	Benaičių vlg. and Žynelių vlg. Darbėnų l.a. Kretingos distr.	16
Sūdėnų VE	KG-G-115	Sūdėnų vlg., Kretingos distr.	8
Lendimų VE	KG-G-116	Lendimų vlg., Kretingos distr.	6

According to the regulation the commercial scale wind power parks are currently allowed only in the defined zones in the western part of Lithuania. Maximum allowed capacity amounts to 200 MW. No matter the tender procedures for the installed wind power capacity were launched about 2 years ago, the table reflects the connection of only 80 MW to the grid.

The above described situation shows that there are significant barriers for construction of the wind power parks.

The outcome of Sub-step 4a .

- All larger scale wind power parks in Lithuania are developed as JI projects

Sub-step 4b. Discuss any similar options that are occurring:
Sub-step 4b is not applicable, as there are no similar wind power projects in Lithuania, developed as non JI activity (see more under the Sub-step 3).

The outcome of Step 4:

- All larger wind power parks in Lithuania are implemented as JI project activity.

Step 3. Provision of additionality proofs

All relevant additionality proofs are discussed in the Steps above.

B.3. Description of how the definition of the project boundary is applied to the project:

The BASREC regional handbook describes project boundaries as theoretical boundaries, determining the scope of project's impact on GHG emissions. The sources of GHG involved in project boundaries represent the sources involved in baseline calculations.

The boundaries of the project are shown in Figure 2.

[9]Guarantees of origin data base available on http://www.lietuvosenergija.lt/lt/main/klm/Duombaze/Gamint_d

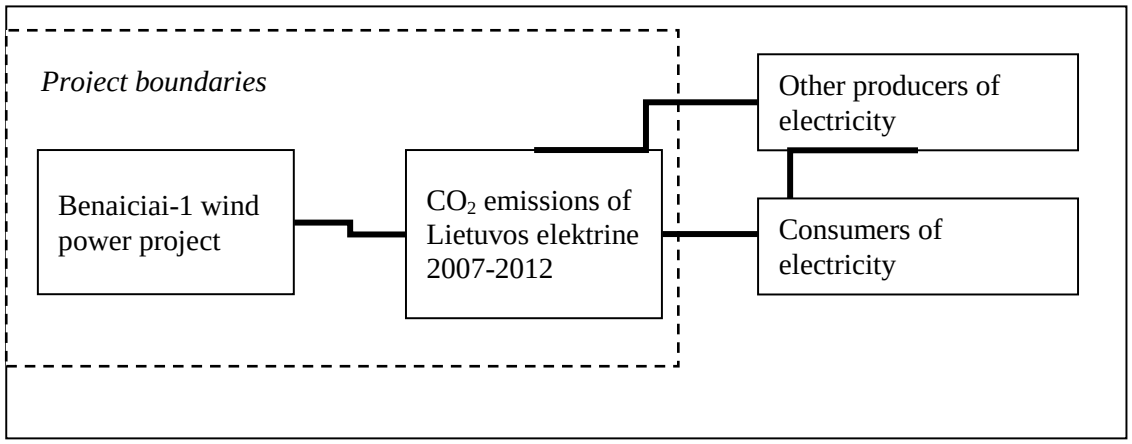

Figure 2 Project boundaries

Boundaries of Benaiciai-1 Wind Power Project encompass wind power park and Lietuvos elektrine. Other producers as well as consumers of electricity are not included into project boundary due to the structure of Lithuanian electricity network (see section B1).

B.4. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:

Date of baseline setting: 6 April 2010.
Project organizer: *UAB COWI Lietuva*. Contact information is presented in Table 19**Klaida! Nerastas nuorodos šaltinis.**. The person/entity is not a project participant listed in Annex 1.

Table 19 Contact information of project organiser

Company name	*UAB COWI Lietuva*
Street	Ukmerges
Building No	369A
State/Region/City	Vilnius
Post code	LT-06327
Country	Lithuania
Telephone number	+370 5 2107610
Fax number	+370 5 2124777
E-mail	info@cowi.lt
Website	www.cowi.lt
Representative	Inga Valuntiene
Position	Head of Energy division
Salutation	Ms
Surname	Valuntiene
Second name	-
First name	Inga
Subdivision	-
Telephone number (direct)	-
Fax number (direct)	-
Mobile phone number	+370 655 70743

E-mail (personal)	inva@cowi.com

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

30/04/2009 - the first detailed plan (7 wind power plants) approval date by the Council of Kretinga district Municipality

C.2. Expected operational lifetime of the project:

20 years 0 months.

C.3. Length of the crediting period:

Crediting period of the project is 2 years – lasting from January 1, 2011 to December 31, 2012.
In case agreement will be reached, crediting period may be extended, but not longer than the operational life time of the project.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

The monitoring plan is attached as Annex 2.

D.1.1. Option 1 – Monitoring of the emissions in the project scenario and the baseline scenario:

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

The wind power park itself does not emit any kind of pollutants. Some GHG emissions are released due to transportation of wind turbines and other equipment as well as from the construction works but these emissions are negligible compared to the project emission reductions. Some CO_2 will be released to the atmosphere while performing the maintenance (transportation, etc.) of the wind turbines, however the amounts will be minute. These GHG sources can be considered as insignificant and should not be taken into consideration.

D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Not applicable.

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:								
ID number *(Please use numbers to ease cross-referencing to*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.)								

Not applicable.

D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Baseline emissions will be monitored using the following formula.

$E_B = P_{WPP} \times EF_{LE}$ [4]

Where:
E_B - baseline emissions
P_{WPP} – Net annual electricity production at Benaiciai-1 Wind Power Project. P_{WPP} is the difference between electricity supplied to the grid and electricity purchased from the grid at Benaiciai-1 Wind Power Project in MWh.
EF_{LE} – emission factor for electricity production at Lietuvos elektrine, 0.626tCO_2/MWh

Electricity production is measured directly. Electricity metering devises are installed, directly measuring electricity, purchased from the grid, produced electricity and electricity, supplied to the grid.

$EF_{LE} = P_{CO2} / P_{LE}$ [5]

Where:
EF_{LE} - emission factor for power production at Lietuvos elektrine, tCO_2/MWh
P_{CO2} - Emissions attributable to power production at Lietuvos elektrine, tCO_2
P_{LE} - Annual power production at Lietuvos elektrine, MWh

For the formula on how P_{CO2} is calculated, please refer to chapter B1.

D. 1.2. Option 2 – Direct monitoring of emission reductions from the project (values should be consistent with those in section E.):

Not applicable.

D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.1.2.2. Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

Not applicable.

D.1.3. Treatment of leakage in the monitoring plan:

Leakage does not occur.

D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Not applicable.

D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO_2 equivalent):

Not applicable.

D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

$E_R = P_{WPP} \times EF_{LE}$ [6]

Where:
E_R – project emission reductions
P_{WPP} – Net annual power production at Benaiciai-1 Wind Power project. P_{WPP} is the difference between electricity supplied to the grid and electricity purchased from the grid at Benaiciai-1 Wind Power Project in MWh.
EF_{LE} – emission factor for power production at Lietuvos elektrine, 0.626tCO_2/MWh

Electricity production is measured directly. Electricity metering devises are installed, directly measuring electricity, purchased from the grid, produced electricity and electricity, supplied to the grid.

D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project:

It is planned to perform noise level monitoring in accordance with Article No. 11 of the Law on Health Impact Monitoring (Official Gazette, 2002, No. 72-3022).

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data *(Indicate table and ID number)*	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
P_{WPP} (D1.1.3)	*Low*	QA/QC procedures are not necessary as P_{WPP} will be monitored via the commercial power metering device that is regularly calibrated.

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;
Project Manager - supervision of the project;
Site Manager - daily supervision of the construction;
Business coordinator - daily office work, documentation, paper work, cash flows;
Chief accountant - accounting.
Maintenance of wind power park should be performed by Enercon under agreement with *UAB Renerga*.

The monitoring report will be compiled by an engineer from *UAB Renerga*. Monitoring of electricity production will be performed by the director of *UAB Renerga*. Monitoring of electricity production will be combined with the commercial accounting of the electricity supplied to the grid. Once a month, an inspector from *AB Lietuvos energija* together with a representative from *UAB Renerga* will check the commercial electricity metering device and will write down the dispatched electricity quantity on the dispatch confirmation document. After electricity dispatch document is signed by both parties, the director of *UAB Renerga* will make an entry of the figure of dispatched electricity into the monitoring sheet. Other monitored factors will be collected and CO_2 reductions will be calculated by an engineer from *UAB Renerga* in January each year.

For the quality assurance, a consulting company will be contracted to revise the monitoring reports. Revision will include verification of the data sources and calculations. Power dispatch documents will be archived at *UAB Renerga* for later reference for the proof of the monitoring results. *AB Lietuvos energija* is responsible for the calibration of the commercial power metering device. In case of emergency (for example, in case of commercial metering device failure), the power dispatched to the grid will be monitored using an emergency power metering device.

Copies of calibration and maintenance documents for commercial power devises, electricity production accounting documents and compiled monitoring reports will be collected by the business coordinator and will be stored by *UAB Renerga* for 2 years after the end of the crediting period.

D.4. Name of person(s)/entity(ies) establishing the monitoring plan:

The person/entity is not a project participant listed in the Annex 1.

Company name	COWI Lietuva
Street	Ukmerges
Building No	369A
State/Region/City	Vilnius
Post code	LT-06327
Country	Lithuania
Telephone number	+370 5 210 7610
Fax number	+371 5 212 4777
E-mail	info@cowi.lt
Website	www.cowi.lt
Representative	Inga Valuntiene
Position	Head of Energy division
Salutation	Mrs.
Surname	Valuntiene
Second name	-
First name	Inga
Subdivision	BU Energy and Environment
Telephone number (direct)	-
Fax number (direct)	-
Mobile phone number	+370 655 70743
E-mail (personal)	inva@cowi.lt

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Consumed amount of electricity is already computed in the formula [1].

Project emissions are considered to be equal to 0

E.2. Estimated leakage:

Leakage is not present Ly = 0

E.3. The sum of E.1. and E.2.:

E1 + E2 = 0

E.4. Estimated baseline emissions:

$E_B = P_{WPP} \times EF_{LE}$ (variables explained in D.1.1.4) [7]

P_{WPP} - 86 000 MWh
EF_{LE} - 0.626 tCO_2/MWh

E_B - annual baseline emissions = 53 836 t CO2.

Calculation of EF_{LE} is presented in B1 and monitoring in D.1.1.4.

Total baseline emissions for 2011-2012 are 53 836 t CO_2 x 2 = 107 672 tCO_2.

E.5. Difference between E.4. and E.3. representing the emission reductions of the project:

Annual emission reductions - 53 836 t CO_2. Total emission reductions for crediting period – 107 672 tCO_2.

E.6. Table providing values obtained when applying formulae above:

Table 18 Project emission reductions

Year	Estimated project emissions (tonnes of CO_2equivalent)	Estimated leakage (tonnes of CO_2equivalent)	Estimated baseline emissions (tonnes of CO_2equivalent)	Estimated emission reductions (tonnes of CO_2equivalent)
2011	0	0	53 836	53 836
2012	0	0	53 836	53 836
Total	0	0	107 672	107 672

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts of the project, including transboundary impacts, in accordance with procedures as determined by the host Party:

According to the Klaipeda Regional Department of Environment conclusion No. (9.14.5) – LV4 – 5097 of 27 July, 2007 and No. (9.14.5) - LV4 – 2557 of May 22, 2009, the environmental impact assessment (EIA) of the planned economic activity is not required.

According to the Environmental Impact Assessment program and reports preparation guidelines, Health Impact Assessment screening was prepared. By Klaipeda Public Health Centre decision No. E5-47 for planned economic activity given out on July 16, 2009, the Health Impact Assessment is required and it was prepared and approved.

Potential environmental impacts are described below.

Atmosphere

The project is considered to result not only in reduction of GHG but also in reduction of other pollutants such as SO_2 and NO_x. These pollutants are released to the atmosphere while generating electricity at Lietuvos elektrine. To calculate reductions of SO_2 and NO_x, the following formulas are used:

$E_{SO2} = P_{MWh} \times EF_{SO2}$ [8]

Where:
P_{MWh} - is the electricity produced in the park annually, MWh;
EF_{SO2} – is the emissions factor, defining how many tones of SO_2 is emitted to the atmosphere while producing 1 MWh of electricity.

$E_{NOx} = P_{MWh} \times EF_{NOx}$ [9]

Where:
P_{MWh} - is the electricity produced in the park annually, MWh;
EF_{NOx} - is the emissions factor, defining how many tones of NO_x emerge, while producing 1 MWh of electricity.

The results of projected SO_2 and NO_x reduction are given in Table 19.

Table 19 SO2 and NOx emission reductions

Pollutant	kg of pollutant/MWh	Amount of pollutant saved during one year
SO_2	0.45	49.5 t
NO_x	0.95	104.5t

Water

There are no open water pools within the project area. There is no risk to pollute the surface and/or ground water during the maintenance of the wind power park project. Water is not used for technological purposes in the wind power park so the wastewater will not be formed.

Soil

There will not be any significant impact on soil. The project area mainly consists of farmlands. During the construction process, in the power plant fundament areas, road construction areas and cable laying areas the upper layer of the soil which is 0.2-0.3m thick, will be separated and stored apart from other soil layers. After construction works are finalised, the loam will be re-cultivated and planted according to projects plans in order to avoid soil erosion.

Flora / Fauna

There are no protected and Europe-wide network Natura 2000 territories near planned project site. One place where are protected sorts of plants and animals is more than 1 km away from the project site.

Protected areas

There are no protected areas within or nearby the project site. There are no protected species of flora or fauna within or close to the project site.
Sudenai botanical-zoological reservation there is protected Sventoji valley stretch is more than 1 km away from the project site.

Cultural heritage

There is no historical important cultural heritage in planned territory. The nearest cultural heritage: "Aukuro" stone, Pelekiu mitological stone, Auksudzio castle hill, "Laumes lova", "Kuliu bobele" are more than 450 meters away from the project site.

Waste

Waste in wind power park is minimal. Waste in wind power park can comprise only in period of wind power plant operation - used oil lubricants waste and spare parts that will be substituted with new ones during the operation and maintenance period of wind power park. Comprised waste will be arranged according to the Laws and Regulations of the Republic of Lithuania.

Physical impact

Electromagnetic field

According to the technical data, wind power plants generators produce low voltage power, generators work in the low frequency regime (50 Hz). In accordance with the data, the power produced in the wind power plant will be transported to the transformer substation by underground cables and the electromagnetic field will be not formed on the surface of the ground. The power from transformer substation will be transported by overhead lines.

Electromagnetic field is formed around high voltage air power lines, at the transformer substations and other open power installations. Electromagnetic field is measured by the intensity of electric field (E, V/m) and by the intensity of magnetic field (H, A/m). Permissible intensity of electric field in residential (building) areas is up to 0,5 kV/m and up to 1,0 kV/m in territories around residential areas (HN 104: 2000).

The intensity of electric and magnetic fields are lower than the permissible level for residential areas (1kV/m). Electro-technical equipment of wind power plants are mounted in 80 m height from the surface

in the metal, connected to earth baskets, which perform as electromagnetic shields. Zone of electromagnetic impact is not present in wind power park territory or in neighbouring areas.

Noise

According to the performed calculations, existing wind power plants noise level will not exceed allowed level (55 dBA) already on the distance 150 - 170 m from noise source, planned wind power plants - on the distance 90 m and planned to build - 55 - 85 m.

Visual impact

The relief of the territory is conditionally notionally plain with faintly expressed hills. According to the Lithuanian natural frame landscape formation direction, the Benaiciai village surrounding areas landscape disengagement shouldn't be protected.
Planned wind power plant will change the landscape, but will not deface it. The towers of wind power plants are painted into bright grey colour which will fade them in the sky background.
The combination of nature and tower construction will create new landscape quality. The more defacing landscape is high voltage overhead lines pylons - it is usual element.
Also, wind power plants, like all tall buildings cast shadow on the neighbouring areas when the sun is visible. It also causes a blinking effect due to rotation of wind turbine wings. According to the preliminary calculations – shadows will be cast not more than 490 m from the wind power plants. The nearest residential homestead is 410 meters away. In order to get shadow on the house the sun should shine from southwest, practically it is impossible. One more homestead is 430 meters away, but this homestead is not residential, therefore the impact of wind power plant is not relevant.

F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to supporting documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

The environmental impacts are not considered as significant.

SECTION G. Stakeholders' comments

G.1. Information on stakeholders' comments on the project, as appropriate:

While preparing the detailed plan compulsory public consideration procedures were undertaken where all stakeholders may participate. Stakeholders have not expressed any objections.

The following steps were made during the stakeholder process:

Table 20 Stakeholders process

	First planning stage, 7 wind power plants, with 2 MW capacity each, at all 14 MW
12-08-2008	Beginning of preparation of project's detailed plan was announced in newspaper „Pajurio naujienos".
21-08-2008	Beginning of preparation of project's detailed plan was announced in Darbenai township.
21-08-2008	Beginning of preparation of project's detailed plan was announced in Kretinga District Municipality website www.kretinga.lt.

21-08-2008	Beginning of preparation of project's detailed plan was announced on the stand in the planned territory.
25-08-2008	Information letters about beginning of preparation of the project's detailed plan was sent to land owners having property of neighbouring territories.
17-12-2008	Announcement of the last stage of public consideration of the project detailed plan was published in the newspaper „Svyturys".
17-12-2008	Announcement of the last stage of public consideration of the project detailed plan was published in Darbenai township
17-12-2008	Announcement of the last stage of public consideration of the project detailed plan was published on the stand in the planned territory.
17-12-2008	Announcement of the last stage of public consideration of the project detailed plan was published in Kretinga District Municipality website.
18-12-2008	Information letters about the last stage of public consideration of the project detailed plan was sent to land owners having property of neighbouring territories.
From 08-01-2009	Interested persons could get acquainted with prepared project in company "Vakaru projektai".
From 19-01-2009 to 05-02-2009	Public exposition of the project's detailed plan was performed in the company "Vakaru projektai" premises, Darbenai township premises and Kretinga District Cultural centre at Senoji Ipiltis.
06-02-2009	Detailed plan project public consideration in Kretinga District Cultural centre at Senoji Ipiltis. Minutes and public consideration report are prepared. *Second planning stage, 10 wind power plants, with 2 MW capacity each, at all 20 MW*
18-02-2009	Beginning of preparation of project's detailed plan was announced in Darbenai township.
19-02-2009	Beginning of preparation of project's detailed plan was announced in Kretinga District Municipality website www.kretinga.lt.
21-02-2009	Beginning of preparation of project's detailed plan was announced in the newspaper „Svyturys".
21-02-2009	Beginning of preparation of project's detailed plan was announced on the stand in the planned territory.
25-02-2009	Information letters about beginning of preparation of the project's detailed plan was sent to land owners having property of neighbouring territories.
12-06-2009	Announcement of the last stage of public consideration of the project detailed plan was published in Darbenai township
13-06-2009	Announcement of the last stage of public consideration of the project detailed plan was published in the newspaper „Svyturys".
15-06-2009	Announcement of the last stage of public consideration of the project detailed plan was published in Kretinga District Municipality website.
15-06-2009	Announcement of the last stage of public consideration of the project detailed plan was published on the stand in the planned territory.
15-06-2009	Information letters about the last stage of public consideration of the project detailed plan was sent to land owners having property of neighbouring territories.
From 01-07-2009	Interested persons could get acquainted with prepared project in company "Vakaru projektai".
From 13-07-2009 to 30-07-2009	Public exposition of the project's detailed plan was performed in the company "Vakaru projektai" premises, Darbenai township premises and Kretinga District Cultural centre at Senoji Ipiltis.
31-07-2009	Detailed plan project public consideration in Kretinga District Cultural

	centre at Senoji Ipiltis. Minutes and public consideration report are prepared.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Annex 2

MONITORING PLAN

Emission reductions from the project will be calculated by multiplying annual amount of electricity dispatched to the grid by emissions factor:

$E_R = P_{WPP} \times EF_{LE}$ [10]

Where:
E_R – annual emission reductions, tCO_2
P_{WPP} – Net annual power production at Benaiciai-1 Wind Power project. P_{WPP} is the difference between electricity supplied to the grid and electricity purchased from the grid at Benaiciai-1 Wind Power project in MWh.
EF_{LE} – emission factor for electricity production at Lietuvos elektrine, 0.626 tCO_2/MWh

E_R will be calculated for a previous year, starting in 2011 (using annual electricity dispatch data from previous year). The following monitoring form will be used to monitor dispatched electricity. Monitoring procedures are described in D3.

Year _____

Month	Electricity dispatch confirmation document No.	Date of signature of electricity dispatch confirmation document	ID of the electricity metering device	Indication of the produced electricity by the metering device, MWh	Indication of the consumed electricity by the metering device, MWh	Amount of electricity dispatched to the grid, MWh	Date of the entry	Name of the person in charge	Signature
January									
February									
March									
April									
May									
June									
July									
August									
September									
October									
November									
December									
TOTAL									