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

CONTENTS

SECTION A. General description of the project

A.1. Title of the project:

Benaiciai Wind Power Project
Version: PDD 06
Date: April 2008

A.2. Description of the project:

Benaiciai wind park joint implementation (JI) project is prepared under initiative of *UAB Renerga*[1]. It is foreseen to install 6 wind power plants, each having maximum capacity of 2,75MW at the Benaiciai wind park with the total installed capacity of 16,5 MW. According to wind power production forecast, the wind park is expected to generate 44,4 GWh of electric power per year. Considering technical availability of 96% (specified by VESTAS) and transmission losses at the substations and power lines of 2%, the reasonable annual power production forecast is 41.7GWh.

The project will reduce 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 will help to promote renewable energy resources, 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.

Lithuania's National Energy Strategy states that up to 7% of all electric power, produced in Lithuania, shall be produced using renewable energy resources by 2010. Use of renewable resources is promoted in Lithuania, but still it is often to expensive and not always financially efficient, to be utilised. Benaiciai wind park project is expected to obtain additional income from sale of emission reductions - Emission Reduction Units (ERU) and Assigned Amount Units (AAU). In such a way, the viability and financial efficiency of the project will be improved.

Project objectives:

- Reduction of anthropogenic greenhouse gas emissions;
- Reduction of other pollutants such as SO_2 and NO_x;
- Promotion of wind power utilisation in Lithuania;
- Creation of new jobs.

A.3. Project participants:

Table 1 Project participants

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
Sweden (Investor party)	*Nordic Environment Finance*	No

[1] UAB Achema hidrostotys was renamed to UAB Renerga in 16-07-2007

	Corporation (NEFCO) in its capacity as Fund Manager to the Baltic Sea Region Testing Ground Facility (TGF)	

NEFCO, the Nordic Environment Finance Corporation, is a multilateral risk capital institution financing environmental projects in Central and Eastern Europe, increasingly with an emphasis on the Russian Federation and Ukraine. Its purpose is to facilitate the implementation of environmentally beneficial projects in the neighbouring region, with transboundary effects that also benefit the Nordic region. Today, NEFCO manages funds in an aggregate of approximately €300 million. NEFCO is located in Helsinki, in conjunction with the Nordic Investment Bank (NIB).

The Baltic Sea Region Testing Ground Facility (TGF) was established at the end of December 2003, to provide financial assistance to concrete projects by purchasing emission reduction credits. The TGF was initially set up by the governments of Denmark, Finland, Germany, Icela nd, Norway and Sweden. The TGF is now a Public Private Partnership which acts as a compliance vehicle for its investors' Kyoto and EU Emissions Trading Scheme commitments. From June 2006, it includes the following Nordic and German companies from the energy sector as well as energy intensive industrial consumers: DONG Naturgas A/S (Denmark), Fortum Power and Heat Oy (Finland), Gasum Oy (Finland), Keravan Energia Oy (Finland), Kymppivoima Tuotanto Oy (Finland), Outokumpu Oyj (Finland), Vapo Oy (Finland), Vattenfall Europe Berlin AG & Co. KG (Germany) and Vattenfall Europe Generation AG & Co. KG (Germany). The TGF is currently capitalised at €35 million.

NEFCO is the Fund Manager of the TGF, and has been authorised by the governments investing in the TGF to participate on their behalf in actions leading to the generation, transfer and acquisition of ERUs under Article 6 of the Kyoto Protocol.

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 and Zyneliai, close to Latvian border (Figure 1).

Figure 1 Location of Benaicai wind power park

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):

The project site is situated in the territory of the seacoast. It is the Lithuania's windiest area with the highest wind speeds and prevailing windy days. Characteristics of wind power take a significant role in installation of a wind park, especially in selection of the site location. Referring to long term meteorological data and measurements of wind speed and strength, chosen location is well suited for project implementation.

The planned location of Benaiciai wind power park is in Kretinga district in the territory of villages Benaiciai and Zyneliai. Territory for location of the park is leased under long term agreements. Total

rented area is 115.3 ha. One wind power plant occupies 0.1 ha and transformer substation occupies 0.3 ha.

Detailed layout of wind power-plants in the territory is shown in Figure 1.

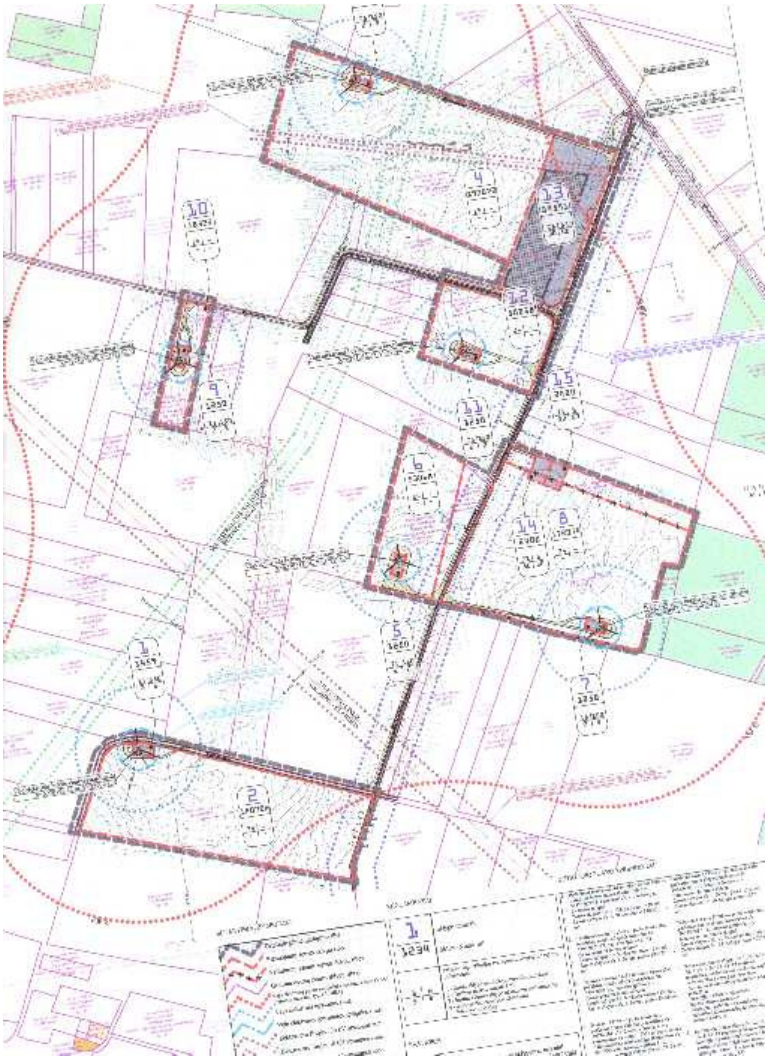

Figure 2 Detailed layout of wind power park

Detailed layout of wind power park is based on a one year study of wind speed and pressure, conducted by Vestas. Wind parameters were measured at height of 70 meters in 16th and 69th kilometres of Klaipėda-Vilnius highway. For long term forecasting ten years data of Palanga meteorological station were used.

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

It is planned to install 6 V-100 type wind power-plants produced by Danish company Vestas. The technical data is presented in Table 2.

Table 2 Technical data of wind turbines

Type of wind turbine	Vestas V-100
Capacity	2750 kW
Rotor diameter	100 m
Direction of rotor's rotation	Clockwise
Number of rotor blades	3
Weight of gondola	70t
Height of tower	100m
Area occupied by a tower	7.850 m2
Cut-in speed	4 m/s

The conducted study shows, that when average wind speed is 6.8 m/s, wind power park will generate about 41.7 GWh of electric power per year.

A wind power plant produces noise of 45 dBA in 300 m radius around the plant, and it is equal to the permissible level in residential and lower than permissible level in working environment. Noise level is determined in pursuance to Lithuanian Hygiene Code HN 33-2003 Acoustic Noise. Allowable Levels in the Residential and Working Environment. General Requirements for Noise Measurements.

It is planned to install a transformer substation with incoming voltage of 20kV, outgoing voltage of 110 kV and capacity of 31,5 MVA. Modular substation is made of 6 cells. These cells contain voltage transformer of opening separator 1000/5-1-1A, wind power plant's conjunctions 3x2x2, 75MV 300/5 - 1A and transformer of their dealings SRT-11 20/0,4kV 63 kVA. Constructed substation is Vestas Business online SCADA system's part.

According to the equipment supply contract, the wind power-plants will be produced, supplied, installed, adjusted and commissioned by Vestas. Also Vestas agreed on service and maintenance of wind power park for the period of 5 years. After the given time period Lithuanian company will be hired for maintenance tasks.

A project implementation schedule is presented in Table 3.

Table 3 Project implementation schedule

Project implementation	**Working days provided**	**Deadlines**
Detailed plan	159	Mar 07, 2006
Technical project	111	Mar 24, 2006
Electro technical part	134	Mar 29, 2006
Internal networks	113	Mar 29, 2006
Connection to 110 kV line	134	Mar 29, 2006
Construction works	191	Nov 31, 2006
Electrical Part - Internal networks	174	Nov 06, 2006
Electrical Part - Connection to 110 kV	134	Nov 06, 2006
Wind power-plant	87	Oct 30, 2006

For construction of wind power-plants it is necessary to obtain appropriate permits. Currently all required permits have been obtained (Table 4).

Table 4 permits

No.	**License**	**Obtained**	**Valid till:**
1.	License to increase electric power generation	8 October 2004	8 October 2006
2.	Detailed plan to build 6	1 March 2006	

	wind power plants and transformer		
3.	Construction license to build 6 wind power plants and transformer substation	11 May 2006	
4.	Construction of 20 kV transformer substation	26 June 2006	

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 electric power production reduces GHG emissions that are emitted when using fossil fuel. Electric power, generated and supplied to national power grid, by wind power plants reduces production of other power plants in Lithuania. *UAB Renerga* - the owner of Benaiciai wind power park, has signed the contract with *AB Lietuvos energija* for the supply of electric power, produced by the wind power park, to the power grid.

The Lithuanian electric power network is being operated by *AB Lietuvos energija.* Foremost, they purchase power quotas (on basis of the prior signed contracts) from electric power producers. The producers may also supply electric power, exceeding the quotas, at lower price. The difference in national demand for the electric power and total production thereof (quotas and over-quotas) is being covered by power produced by Lietuvos elektrine. Thus, if the implementation of this project fails, the estimated electric power would be produced by Lietuvos elektrine, using fossil fuel – natural gas, heavy fuel oil and orimulsion. It was calculated that Lietuvos elektrine, by generating 1MWh of electric power, contributes to the pollution of atmosphere with 0.626 tones of CO_2 (data of 2002-2005).

Adjusted measurements, conducted by Vestas in 2004, indicate that Benaiciai wind power park will generate 41.7 GWh of electric power per year. Applying baseline ratio 0.626 tCO_2/MWh_e (see A.4.3.1.Estimated amount of emission reductions over the crediting period), CO_2 reduction per year is equal to 26,127 tCO_2. Total reduction of CO_2 in period of 5 years (2008-2012) is 130,634 tCO_2, and when the year 2007 is included the total reduction of CO_2 during 6 years (2007-2012) is 156,760 tCO_2.

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

The feed-in-tariff scheme for green power production in Lithuania is established by the Regulation on promotion of electric power produced from renewable energy sources, approved by the Lithuanian government's decision No. 1474 on 5th December 2001. The regulation obliges the grid operator to purchase all green power from licensed grid connected producers at feed-in-tariffs set by the decision No.7 of the National Price and Energy Control Commission approved on 11th February 2002. The feed-in-tariff for wind power is set at 0,22Lt/KWh (0.064 EUR /MWh). The decision also states that the feed-in-tariff can be differentiated by the agreement between a producer and the grid operator.
After the 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 that the feed-in-tariff scheme will be replaced by green certificate scheme in 2021, hence the feed-in-tariffs are valid until 2021.

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

Table 5 Estimated emission reductions

	Years
Crediting period	**5 (2008-2012)**
Year	**Estimate of annual emission reductions in tonnes of CO_2 equivalent**
2008	26,127
2009	26,127
2010	26,127
2011	26,127
2012	26,127
Estimated emission reductions over the crediting period – 2008-2012 (tonnes of CO_2 equivalent)	130,634
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	26,127

In the event that the Government of Lithuania agrees to transfer of Assigned Amount Units, these will be purchased by the TGF as well. Up to one year's GHG emission reductions of early credits may be generated, depending on the commissioning of the project.

A.5. Project approval by the Parties involved:

Benaiciai wind power park JI project idea was given preliminary approval (Letter of Endorsement) on 19 September 2006 by the Communication No (10-5)-D8-7537 of Ministry of Environment of the Republic of Lithuania. The evaluation of the Project Idea Note was made in consideration of provisions settled out in the regulation for JI project Implementation in Lithuania, approved by the ordinance No D1-183 of the Minister of Environment of the Republic of Lithuania on 01 April 2006 (Official Gazette, 2005 No 50-1671). Also the assents from the Ministry of Economy of the Republic of Lithuania and the Lithuanian Environmental Investment Fund were taken into consideration in the decision making procedure.

In the Communication No (27.6-51)-3-5190 of 01 September 2006 on Joint Implementation Project, Ministry of Economy has made its conclusions upon the implementation of Benaiciai wind power park project. The communication states that the concept of the wind power park project is in compliance with:

- ✓ Conditions set out in Article 13 of JI Project Allocation Rules, approved by the Order No D1-183 of the Minister of Environment of the Republic of Lithuania of April 1, 2005 (Official Gazette, 2005 No 50-1671);

- ✓ Criteria of the projects eligible to underlying joint implementation, listed in Strategic Guidelines for Implementation of Joint Implementation Mechanism set force under Kyoto Protocol to the United Nations Frameworks Convention on Climate Change and approved by the Order No D1-279/4-193 of the Minister of Environment and the Minister of Economy of the Republic of Lithuania of May 19, 2004 (Official Gazette, 2004 No 86-3146);

- ✓ Provisions of National Energy Strategy, concerning the Procedures for Promotion of Manufacture and Purchase of Renewable Energy Resources, approved by Seimas of the Republic of Lithuania by Resolution No IX-1130 of October 10, 2002 (Official Gazette, 2004 No 9-228).

By the same Communication Ministry of Economy informs that in accordance to provisions of the Procedures for Promotion of Production and Purchase of electricity produced from Renewable and Waste Energy Resources (Official Gazette, 2004 No 9-228), permits to enhance electric power production capacity by installing wind power-plants are issued in result of tendering. In 2004 *UAB Renerga* was invited to tender, organised in respected to the enhancement of electric power production capacity by installing wind power plants in area No 4, and was awarded. On a basis of the results of tendering Ministry of Economy has issued a permit No LP-0062 to *UAB Renerga* to enhance electric power production capacity.

Once the draft determination report is available, the necessary request to issue a host country Letter of Approval will be made to the relevant Lithuanian authorities.

Investor Country Approval

The investor country approval will be issued by one of the investor countries to the TGF prior to submission of the PDD and Determination Report to the JI Supervisory Committee.

SECTION B. Baseline

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

Baseline is the amount of GHG that would be emitted to the atmosphere during the crediting period of the project in case the project was not implemented.

BASREC Regional Handbook on Procedures for Joint Implementation in the Baltic Sea Region (Version 2 – June 2006) indicates tree 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 whose performance is in the top 20 per cent of their category.

In Benaiciai wind power project baseline is calculated referring to historic data as this method is best suited for Lithuanian power market. Aproved 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 power gird as a marginal plant. It covers all power demand which is remaining after all other power producers have supplied their quota power 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 installed power in Lithuania, so only very few new power plants are built. Because of that, it is impossible to calculate properly the Build Margin emissions factor.

Taking into consideration the specifics of the Lithuanian power market, the methodology based on historical data was developed in mid 2006 by a consulting company *Ekostrategija*. The methodology is described below. Detailed baseline justification is presented in Annex 2.

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

For determination of the baseline we use fuel consumption and production efficiency data provided by *AB Lietuvos elektrine* as well as production of electric and thermal power in Lietuvos elektrine in 2002-2005 (Table 6). For evaluation of the emission reductions we also use forecasts of power production in Benaiciai power park, provided by *UAB Renerga*.

Table 6 Energy production and fuel consumption in Lietuvos elektrine

Year	Electric power produced (MWh)	Thermal power produced (MWh)	Natural gas (1000nm^3)	Fuel oil (t)	Orimulsion (t)
2002	736,604	202,060	199,104	7,355	52,534
2003	723,858	195,553	225,813	5,241	21,238
2004	745,372	212,399	207,690	2,750	55,501
2005	1,072,814	199,383	280,559	1,815	86,160

The amount of fuel consumed is transferred to oil equivalents using such factors: natural gas – 0.800 toe/1000n m^3, fuel oil – 0.955 toe/t, orimulsion – 0.660 toe/t (Table 7).

Table 7 Fuel consumption at Lietuvos elektrine, expressed in oil equivalents

Year	Natural gas (toe)	Fuel oil (toe)	Orimulsion (toe)
2002	159,289	7,025	34,675
2003	180,657	5,005	14,018
2004	166,158	2,626	36,633
2005	224,455	1,733	56,869

Hereafter, we calculate the percentage of each type of fuel, being consumed in every year (Table 8).

Table 8 Proportion of fuels consumed at Lietuvos elektrine

Year	Natural gas (%)	Fuel oil (%)	Orimulsion (%)
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%

According to calorific values of fuel (based on Fuel and Energy Balancing Technique, approved by the Order No DĮ-228 of Managing Director of Department of Statistics to the Government of the Republic of Lithuania of November 24, 2004 (Official Gazette 2004, No172-6363), CO_2 emission factors are estimated for fuel, expressed in tones of oil equivalents (Table 9).

Table 9 CO_2 emission factors

Natural gas	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

Natural gas	Fuel oil	Orimulsion
2.3699814 tCO_2/toe (EF_{Gas})	3.2488322 tCO_2/toe (EF_{HFO})	3.3737873 tCO_2/toe (EF_{Orm})

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 emission factor tCO_2/toe (see Table 9).

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

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, tonnes
F_{Orm} – annual consumption of Orimulsion at Lietuvos elektrine, tonnes
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 10 shows the emissions from each type of fuel at Lietuvos elektrine.

Table 10 Fuel specific CO_2 emissions at Lietuvos elektine

Year	Natural gas, tCO_2	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	8,533	123,592	525,916
2005	531,955	5,632	191,865	729,451

Amount of CO_2 emissions, released while producing thermal power in Lietuvos elektrine, is calculated as follows:

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

H_{CO2} – CO_2 emissions, generated while producing thermal power;
H_{LE} – Annual amount of thermal power produced;
E_h - Average efficiency of thermal power production in Lithuania.(In 2002-2005 average thermal power production efficiency rate among power production units, participating in EU ETS trading scheme, was 84.7%);
K_{toe} – Coefficient for transfer of thermal power to conditional fuel (toe - tones 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 (toe - tones of oil equivalents) of different fuel types.

Results of measurements are presented in Table 11.

Table 11 Emissions attributable to thermal power production at Lietuvos elektrine

	Natural gas, tCO_2	Fuel oil tCO_2	Orimulsion, t CO_2	CO_2 emissions (t)
2002	38,528	2,329	11,939	52,796
2003	42,566	1,617	4,702	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 electric power are calculated by deducting the amount of CO_2 attributable to heat production from the total CO_2 amount released by Lietuvos elektrine.

$P_{CO2} = T_{CO2} - H_{CO2}$

P_{CO2} – annual CO_2 emissions attributable to power 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 power production were divided by annual power production. The results are presented in Table 12.

Table 12 Emissions attributable to power production at Lietuvos elektrine

Year	Power production, MWh	Emissions, tCO_2	tCO_2/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

To evaluate the correctness of the results obtained, we compared them to the results obtained and provided by *AB Lietuvos elektrine*. Calculations made by the technicians of *AB Lietuvos elektrine* gave such results: 0.667 tCO_2/ MWh_e for 2005 and 0.726 tCO_2/ MWh_e for the period before 2012 forecast.

To evaluate our results even further, we have considered the data for consumption of conditional fuel per 1 MWh of heat energy produced, presented by *AB Lietuvos elektrine.* These figures were obtained by using an internal enterprise's methodology and are presented in Table 13.

Table 13 Consumption of conditional fuel to produce 1 MWh of heat energy at Lietuvos elektrine

Year	tce/ MWh_e
2002	0.136
2003	0.141
2004	0.141
2005	0.140

Fuel consumption was transferred to the efficiency of thermal power production (Table 14).

Table 14 Efficiency of thermal power production at Lietuvos elektrine

Year	Efficiency of thermal power production
2002	90.5%
2003	87.1%
2004	87.1%
2005	87.6%
Average	**88.1%**

As it can be seen from the table, the average thermal power production efficiency rate in Lietuvos elektrine is 88%. If using thermal power production efficiency rate of 88% in our formula, CO_2 baseline factor would be equal to 0.629 tCO_2/ MWh_e.

Considering the results of our calculation and ones presented by *AB Lietuvos elektrine* it is possible to draw the conclusion that using emissions factor of 0.626 tCO_2/ MWh_e (described previously) would represent a conservative approach to the baseline as it would result in fewer CO_2 reductions compared to the one calculated by *AB Lietuvos elektrine* methodology.

Lithuania's National allocation plan for 2005-2007 forecasts an increase in Orimulsion share from 20% (56.9 Ktoe) in 2005 to 40% by 2008 in the fuel mix of Lietuvos elektrine. The forecasted increase in the Orimulsion share, would definitely increase baseline emissions factor. Hence, the current emissions factor - 0.626 tCO_2/ MWh_e is considered to be conservative and will be used to calculate CO_2 reductions from Benaiciai wind power project.

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:

Calculation of baseline is presented in Section B.1. Table 12 shows that production of additional 1 MWh of electric power reduces emissions to the environment in average by 0.626 tCO_2. It is foreseen to produce 41,7 GWh of electric power per year from the Benaiciai wind power project, thus every year CO_2 emissions will be reduced by 26,127 tonnes.

JI project's additionally indicates the GHG reduction after implementation of JI project in comparison to the baseline. Usually financial efficiency of JI projects is low, thus ERUs help to promote their development and implementation. This economic promotion also reduces project's payback time. The CDM Tool for the demonstration and assessment of additionality (version 02) is used to demonstrate the additionality of Benaiciai project.

Step 0. Preliminary screening based on the starting date of the project activity

Not applicable

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) Proposed project activity not undertaken as a JI project activity;

B) Continuation of the current situation (no project activity or other alternatives undertaken);
In this alternative, power is produced in existing and new cogeneration power plants.

Sub-step 1b. Enforcement of applicable laws and regulations:

The existing legal and regulatory requirements in Lithuania are in favour of alternative B - continuation of the current situation and is not in favour of alternative A - 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).

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 ERUs are not the only source of revenues for the project.

Benchmark analysis (option II) is not applicable either as no investment benchmarks for power sector exist in Lithuania. The power market in Lithuania is still partly regulated. Power producers are given quotas to deliver power at a certain price. Over-quota power is delivered at the market price (lower than the quota price). Both, quota and the power price differ on a case by case basis.

The *investment comparison analysis (option III)* will be used for this project as it is the only applicable method.

Sub-step 2b. – Option II. Apply investment comparison analysis

IRR(Internal rate of return), as one of the most common financial indicators will be used for investment comparison analysis.

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

IRR for Benaiciai wind power park project is estimated to be 6.2 % (the feed in tariff of 0.22 Lt/KWh was used for estimations according to existing regulation for supporting renewable energy[2]). Average IRR for new natural gas based cogeneration power plants normally is 8-10% Moreover EU structural funds are available for new cogeneration plants but not for wind power projects in Lithuania. With the EU structural support IRR of new cogeneration plants increases up to 15%[3]. This fact makes cogeneration option more attractive for the investors compared to the wind power.

Sub-step 2d. Sensitivity analysis

IRR sensitivity to power production and ERU price is analyzed. The results are presented in the table below:

[2] Financial calculation tables of Benaiciai project

[3] IRR calculation for Cogeneration plant in Panevezys

Margin	-15%	-10%	-5%	0%	5%	10%	15%
Production, MWh	35,476	37,562	39,649	41,736	43,823	45,910	47,996
IRR (without ERUs)	4.04%	4.79%	5.52%	6.23%	6.92%	7.60%	8.26%
Payback time (without ERUs)	13.57	12.71	11.96	11.29	10.69	10.15	9.66

As it can be seen from the sensitivity analysis, IRR is much more sensitive to power production than to ERU price.

Step 3. Barrier analysis

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:

Investment barriers

- Lithuania's recent economic growth has led to stricter terms for foreign financial assistance, so no bilateral financial support from other EU countries are possible anymore. EU structural funds are not available for wind power projects in Lithuania[4] either. Hence, there are no investment subsidies available for wind power in Lithuania.

- The commercial scale wind power parks, according to the regulation, are allowed only in one of the six zones in the western part of Lithuania – Klaipeda and Kretinga regions. The price of land in these regions has increased very much during the past years. For the project developer it is very difficult to buy or lease a land in these regions at a reasonable price, which makes the wind power business a less attractive option.

- Financial efficiency of the wind power projects has dropped due to significant increase in prices for construction materials, equipment and construction works in comparison to the initial estimate[5]. This issue is applicable for both wind farms (Rudaiciai and Benaiciai). Prices of construction services and building materials were lower by in average 40 per cent at the initial project planning stage, compared to the prices at the projects' detailed planning stage. JI mechanism gave good opportunity to make a go decision after price increases, taking into consideration additional revenues from ERU.

- Tender rules for installed wind power capacity in dedicated zones, requires a significant initial deposit. With the JI mechanism, a project developer is more confident taking risks (e.g. limited construction time allowance) associated with sunk capital in form of the deposit.

- Purchase of electric power, produced during the life time of the project, is not guaranteed in a sense of the fact that until trading on hour basis comes into effect, *AB Lietuvos energija*, having signed the contract for the supply of electric power, can disconnect the wind power park from the power network in case of the system overload

[4] Consultancy agreement with A.Abišala & Co, for preparation of EU structural funds application, Nr. 05/22, 04.05.04

[5] Letter from contractor Zilinskio ir Ko, UAB

Technological barriers

- There has been limited know-how on wind power available in Lithuania until recently. The project developer has also to provide education and capacity building for operational staff with the assistance of the plant suppliers in stages of operation, management and maintenance of a wind power park.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

- EU structural funds are available for new cogeneration power plants and for modernization of existing ones. It gives opportunity for subsidies up to 50%.

- Alternative B either does not require purchase/leasing of land in the western region of Lithuania.

- There is more know how available for cogeneration than for wind power in Lithuania

Step 4. Common practice analysis

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

Good evidence that the wind power projects have various barriers for implementation in Lithuania is the fact that, there were no operating wind farms on a commercial scale in Lithuania so far. The first two wind farms (Benaiciai and Rudaiciai) are developed as JI projects. It is also ascertained that wind power is one of the most expensive types of electricity generation. Even in new EU countries like Lithuania, governmental subsidies are necessary to enable commercial operation. These barriers prevent wind power projects from being implemented in Lithuania.

Sub-step 4b. Discuss any similar options that are occurring:

The only wind farm that was built as not a JI activity Lithuania (near Kretingale), is still not in operation, although it was built few years ago. Institutional and legal barriers prevented the wind farm from operation.

Step 5. Impact of JI registration

Sales of ERUs improve project's financial viability. Additional revenues from ERU sales increase IRR by 0.4% from 6.2 % to 6.6% (ERU price considered to be €7/tCO_2e).

JI activity helps to attract equity and financing for the wind power projects, as investors are more confident with the project risks.

Baseline scenario

In accordance to the baseline scenario, electric power is produced only by Lietuvos elektrine. Forecasted production of electric power and CO_2 emissions are presented in Table 15.

Table 15 Forecasted power production and CO_2 emissions in 2008-2012 in baseline scenario

Year	Lietuvos elektrine		Benaiciai wind power park	
	Production of electric power (MWh)	Emissions, tCO_2	Production of electric power (MWh)	Emissions, tCO_2
2008	1,831,000	1,146,206	0	0
2009	1,818,000	1,138,068	0	0
2010	1,549,000	969,674	0	0
2011	4,974,000	3,113,724	0	0
2012	5,730,000	3,586,980	0	0

Project scenario:

A part of electric power that in the case of baseline scenario is produced by Lietuvos elektrine, is produced and supplied to the power grid by Benaiciai wind power park Table 16.

Table 16 Forecasted power production and CO_2 emissions in 2008-2012 in project scenario

Year	Lietuvos elektrine		Benaiciai wind power park	
	Production of electric power (MWh)	Emissions, tCO_2	Production of electric power (MWh)	Emissions, tCO_2
2008	1,757,148	1,018,412	41,736	0
2009	1,744,148	1,110,274	41,736	0
2010	1,475,148	941,880	41,736	0
2011	4,900,148	3,085,930	41,736	0
2012	5,656,148	3,559,186	41,736	0

GHG emissions of baseline scenario will exceed the emissions of the project baseline scenario by 26,127 tCO_2 per year due to the additionality of the project. During the period of 2008-2012 the difference between GHG emissions of baseline and project scenarios will be 130,634 tCO_2e, and when the year 2007 is included the difference between GHG emissions of baseline and project scenarios during the period 2007-2012 will be 156,760 tCO_2e.

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

The BASREC JI Project Guidelines 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 3.

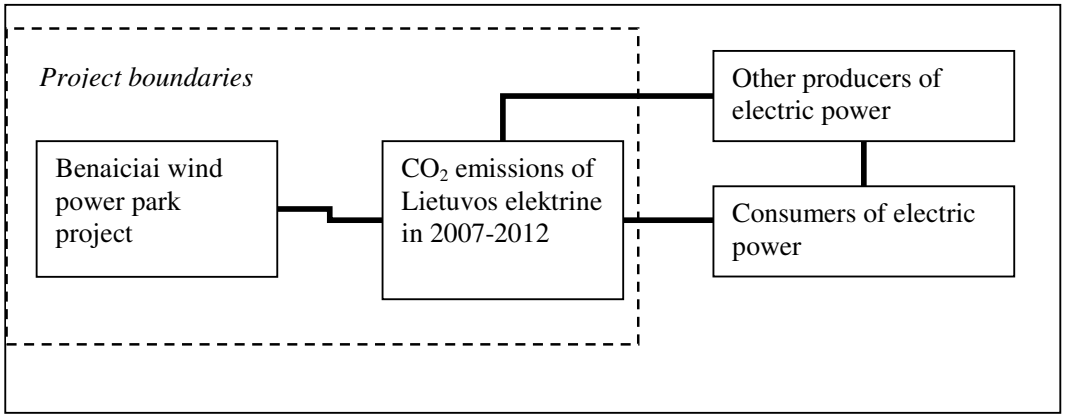

Figure 3 Project boundaries

Boundaries of Benaiciai wind power park project encompass wind power park and Lietuvos elektrine. Other producers as well as consumers of electric power are not included into project boundary due to the structure of Lithuanian power grid (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: July, 2006.
Project organizer: COWI Baltic (not a project participant). Baseline setting was prepared by UAB Ekostrategija, which was acquired by UAB COWI Baltic in November 2007.
Contact information is presented in Table 17.

Table 17 Contact information of project organizer

Company name	*COWI Baltic*
Street	Lukiskiu
Building No	3
State/Region/City	Vilnius
Post code	LT-01108
Country	Lithuania
Telephone number	+370 5 2107610
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Website	www.cowi.lt
Representative	Vaidotas Kuodys
Position	Project manager
Salutation	
Surname	Kuodys
Second name	-
First name	Vaidotas
Subdivision	-
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E-mail (personal)	vaku@cowi.com

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Project construction has started in October 2006. Operation starts in January 2007.

C.2. Expected operational lifetime of the project:

20 years 0 months (2007-2027).

C.3. Length of the crediting period:

Crediting period of the project is 5 years – January 1, 2008 to December 31, 2012. Early credits as AAUs are claimed for ,2007 (January 1 – December 31). ERUs are claimed for 2008-2012.
Starting date: For early credits (AAUs): January 1, 2007
For ERUs: January 1, 2008

In case of additional international treaties between the parties of Kyoto protocol are signed, the crediting period may be extended for additional 5 years, i.e. for the period of 2013-2017.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

The main requirements, being imposed on the monitoring plan, are pointed out in the Annex B of Chapter 6 of the Kyoto protocol (Decision 9/CMP.1, "Decisions adopted by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol"). The following points have to be considered in the monitoring plan:

- All the data necessary to the evaluation or the collection and storage of the data from all the sources of anthropogenic emissions and/or leakage. These data are being collected and stored during all the crediting period;
- The collection and storage of all the data necessary for the calculation of the baseline from all the anthropogenic sources and leakage during all the crediting period;
- The determination of all the potential sources, the collection of information about them and storage of it in case of increasing GHG emissions from the anthropogenic sources as well as leakage that have intense and significant impact on the project during its crediting period and that are outside the project boundaries. The project boundaries must involve all the sources and leakage of anthropogenic pollution under the maintenance of the participants of the project;
- The storage of the information about the state of environmental protection according to the requirements of the hosting country;
- The assurance of the quality of the monitoring and the procedures of control;
- The periodic calculation of the saved GHG, according to all the sources and leakage, if such are present.

The monitoring plan is attached as the Annex 3.

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 amount of the electric power, transferred to the network, will be calculated by ELGA counters of commercial record. It is planned to install one main counter for the whole park. Counter stores all information on produced energy in it's inner memory from it's start of operation. While exercising the commercial record, once per month the special registry books will be used. The record in them will be coordinated with the entity, purchasing the electric power (*AB Lietuvos Energija*) and in accordance to the periodic reports about the work of the power plant, set by compulsory applicable legislation. Also data will be stored electronically in counter's EPROM memory.

Monitoring will be performed by a commercial onsite power metering device, which is capable to count power two ways (produced and consumed) and store historical data in the memory. Once a month, the difference between produced and consumed power will be recorded in the monitoring journal by a power engineer, one of the wind power park operators. The data form the metering device is automatically transferred via internet to *AB Lietuvos energija* (grid operator) who will keep records in their databases. Simultaneously, data is supplied to the Lithuanian renewable energy registry which will also keep records. The monitoring reports will be prepared by a consulting company, contracted for this purpose.

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

Project emissions are equal to 0, because wind power park 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 project emission reductions. Also 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. Hence, according to BASREC JI project guidelines these GHG sources can be considered as insignificant and should not be taken into consideration.

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 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
P_{WPP}	Net annual power production at Benaiciai wind power park	Commercial onsite power output metering device	MWh	Measured	Monthly	100%	Electronic/paper	

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 formulae.

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

Where:
E_B - baseline emissions
P_{WPP} – Net annual power production at Benaiciai wind power park. P_{WPP} is the difference between produced and consumed power at Benaiciai wind power park in MWh.
EF_{LE} – emission factor for power production at Lietuvos elektrine, 0.626tCO_2/MWh

$EF_{LE} = P_{CO2} / P_{LE}$

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 formulae 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.):

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):

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

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

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):

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:

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.
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 monitoring report will be compiled by a consulting company contracted for this purpose. The monitoring of power production will be performed by an engineer from *UAB Renerga*. Monitoring of power production will be combined with the commercial accounting of the produced power. Once a month, an inspector form *AB Lietuvos energija* together with the representative from *UAB Renerga* will check the commercial power metering device and will write down the dispatched power quantity on the dispatch confirmation document. After power dispatch document is signed by both parties, an engineer from *UAB Renerga* will write down the figure of dispatched power into the monitoring sheet. A contracted consulting company will collect data on all monitored factors and will compile the monitoring report.

For the quality assurance, a quality management scheme will be provided by a contracted consulting company. *AB Lietuvos energija* is responsible for the calibration of the commercial power metering device.

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

The developer of the monitoring plan for Benaiciai wind power park project is *COWI Baltic* (not a project participant). Initially the monitoring plan was prepared by UAB Ekostrategija, which was acquired by COWI Baltic in November 2007. The contact information is given in Table 18

Table 18. Contact information of monitoring plan organizer.

Company name	COWI Baltic
Street	Lukiskiu
Building No	3
State/Region/City	Vilnius
Post code	LT-01108

Country	Lithuania
Telephone number	+370 5 2107610
Fax number	+370 5 2124777
E-mail	info@cowi.lt
Website	www.cowi.lt
Representative	Vaidotas Kuodys
Position	Project manager
Salutation	
Surname	Kuodys
Second name	-
First name	Vaidotas
Subdivision	-
Telephone number (direct)	+370 5 2191307
Fax number (direct)	+370 5 2124777
Mobile phone number	+370 655 04365
E-mail (personal)	vaku@cowi.com

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

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)

P_{WPP} - 41,736 MWh
EF_{LE} - 0.626 tCO_2/MWh

E_B - annual baseline emissions = 26,127t CO_2.

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

Total baseline emissions for 2008-2012 are 26,127 tCO_2 x 5 = 130,634 tCO_2, and for 2007-2012 the total baseline emissions are 26,127 tCO_2 x 6 = 156,760 tCO_2.

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

Annual difference between E.4 and E.3 equals 26,127 t CO_2. Total difference in 2008-2012 equals 130,634 tCO_2 and in 2007-2012 156,760 tCO_2.

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

Table 19 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)
2008	0	0	26,127	26,127
2009	0	0	26,127	26,127
2010	0	0	26,127	26,127
2011	0	0	26,127	26,127
2012	0	0	26,127	26,127
Total in 2008-2012 (tonnes of CO_2 equivalent)	0	0	130,634	130,634

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 Communications No (9.14.5.)-V4-3167 of Klaipeda Regional Department of Environment of Lithuanian Ministry of Environment of September 6, 2005, the conclusion, concerning the environmental impact of the planned economic activity, was drawn that the environmental impact assessment (EIA) of the planned economic activity of *UAB Renerga* – installation and maintenance of wind power-plants – is not required.

The above stated conclusion was drawn because (the extract from the above mentioned documents):

- The planned economic activity is scheduled to execute in conditionally large territories, thus there is possibility to project the positioning of such wind power plants so that the maintenance of impact zones will not condition the residential environment and the requirements, set for the protection zones of the immovable culture valuables in special conditions of the usage of land and forest, would be met;

- There are no residential areas near the location of planned economic activity;

- National Energy Strategy approved by the resolution No.IX-1130 of Seimas of the Republic of Lithuania of October 10, 2002 (Official Gazette., 2002, No 99-4397) schedules, that aiming to the best use local resources, including wind energy, and at the same time to reduce the import of fuel and to establish new work places as well as to improve the state of environmental protection, the State will promote the implementation of the projects on use of wind, water and sun power and the experience of installation and maintenance will be collected;

- In the territory of planned economic activity it is not forbidden to install and maintain the equipment of planned economic activity.

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 electric power at Lietuvos elektrine. To calculate reductions of SO_2 and NO_x, the following formulas are used:

$E_{SO2} = P_{MWh} \times EF_{SO2}$

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

$E_{NOx} = P_{MWh} \times EF_{NOx}$

Where:
P_{MWh} - is the electric power 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 electric power.

The results of projected SO_2 and NO_x reduction are given in Table 20.

Table 20 SO_2 and NO_x emission reductions

Pollutant	kg of pollutant/MWh	Amount of pollutant saved during the crediting period
SO_2	0.45	106.8 t
NO_x	0.95	225.4 t

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 wastewaters are not produced.

Soil

There will not be any significant impact on soil quality. The project area mainly consists of farmlands. During the construction process, in the power plant foundation areas, road construction areas and cable laying areas the loam (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.

In case of wind power park liquidation after the forecasted operation time of the project it is planned to dismantle all wind power park including foundations and re-cultivate loam. If road accesses are not used for other purposes they will also be deconstructed and loam re-cultivated in their place.

Flora / Fauna

Based on data of operating wind power plants, there is no evidence of the impact of wind power plants on biological diversity. Hence, measures to recreate environmental biodiversity are not necessary.

There are no envisaged tree cuttings or relocation in the project area. A grass-plot will be set in the area.

There are no wild animal accumulation, feeding, mating, wintering of migration points in the project area that should be protected.

Impacts on birds

Benaiciai wind power park is far away from bird migration routes. The probability of birds colliding with the wind power plants is very low. Therefore the impacts on birds are considered negligible. A study from the Danish Ministry of the Environment states that high voltage power lines is much greater danger to birds than the wind turbines themselves (ref: http://www.windpower.org/en/tour/env/birds.htm).

According to results of the studies performed by Danish and German scientists – wind power plants have no impacts on migration routes of birds. The studies in EU show that the risk of bird collisions with wind power plants is much smaller compared to the risks of bird collision with high voltage air power lines, cars, skyscraper, glass facades of buildings. After long term observations, the conclusions were drawn that birds have changed their migration routes according to new obstructions evolved on their way. The research also shows that wind power parks have smaller impacts on birds than the tall single buildings (source: www.iblumweltplanung.de).

Impacts on animals

Noise, shadow and blinking effects and landscape fragmentation effect made by wind power park can disturb natural wildlife. However, Benaiciai wind power park is surrounded by farmlands and rural areas situated away from wild animal habitats. Hence, the impact on wild animals is considered negligible.

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. Among other sources, such data was verified at the State Service for Protected Areas under the Ministry of Environment. Nearest protected area is within a sufficient range away from the project site(15 km)

Cultural heritage

Before starting excavation works, the area was explored for archeological objects in line with the Cultural heritage law of Lithuania. No valuable excavations were found in the project area.

Waste

Waste generation in a wind power park is minimal. Some waste will form from oil lubricants that are used in wind turbines as well as some spare parts that are substituted with new ones during the operation and maintenance period of wind power park. Any this waste will be removed from the project site and recycled by the maintenance service provider.

Physical impact

Electromagnetic field

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 1kV/m without limitations for allowed exposure time and up to 5 kV/m in “green” zones (parks, gardens etc) without limitation for exposure time. (HN 104: 2000).

The potential sources of electromagnetic field in wind power park (generators and transformers) are generating low voltage and up to 100kW power capacity. 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 100 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

The sanitary zone with the radius of 430 m, was set around wind power plants according to the requirements. Maximum allowed noise level in the residential areas is 45dBA at the night time and 50dBA at the daytime. Estimations of the Benaiciai wind power park project noise level gave the following results maximal noise level in 10 meters height at wind speed of 8 m/s 104,2-106,7 dBA. According to calculations noise level will be higher then 45dBA in sanitary zone and lower 45 dBA further than the sanitary zone and

it corresponds to national noise regulations. After installing the wind-power plants the compulsory monitoring of the noise level will be undertaken.

The closest living settlements are 470-530 m away from the wind power park.

Visual impact

Wind power plants make landscape more urbanized. However, if the right planning concept is used – a visual impact can be minimised. The positioning of wind power plants is made optimal to integrate it into the landscape and to make minimal impact to neighbouring territories.

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. The shadowing effect is not relevant for the project. According to the preliminary calculations – shadows will be cast not more than 350 m from the wind power plants. Bearing in mind that the closest living areas are 470-530 meters away – the shading effect is not considered as a significant impact.

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 impact assessment is not required by law, and 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 plans, compulsory public consideration procedures were undertaken where all stakeholders may participate. Compulsory written agreements of residents in surrounding areas were obtained during the process of detailed planning and technical project preparation process. Stakeholders have not expressed any objections.

Pursuant to national law stakeholders were informed about the projects detailed plan preparations planning goals and deadlines in Kretinga regional newspaper "Švyturys" Num. 58(7685), 2005-07-27.

No planning suggestions or objections were received.

Pursuant to national law stakeholders were informed about possibility to participate in detailed planning process, pretence giving order and public exposition and public consideration place and date in Kretinga region newspaper "Švyturys" Num. 65 (7692), 2005-08-20

No planning suggestions or objections were received.

Public exposition of detailed plan took place in 2005-09-19 to 2005-10-03 in Kretinga region culture centre in S. Ipilties village. During the exposition organizers haven't received any suggestions or pretence.

Public consultation took place in 2005-10-04 in Kretinga culture centre in S. Ipilties village. Planning organizers, detailed plan organizer and representatives of the local community participated in the public consultation.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Annex 2

BASELINE INFORMATION

Table 21 Fuel consumption, energy production and CO_2 emissions data for Lietuvos elektrine

Year	Power production, MWh	Heat production, MWh	Natural gas, nm3	Fuel oil, t	Orimulsion, t	CO2 emissions, using fossil fuel	CO2 emissions, resulting from heat production	CO2 emissions, resulting from power production	Emissions factort CO2/MWhe
2002	736,604	202,060	199,104,000	7,355	52,534	517,318	52,796	464,522	0.631
2003	723,858	195,553	225,813,000	5,241	21,238	491,709	48,885	442,824	0.612
2004	745,372	212,399	207,690,000	2,750	55,501	525,916	55,204	470,712	0.632
2005	1,072,814	199,383	280,559,000	1,815	86,160	729,451	52,161	677,290	0.631
						566,098	**52,262**	**513,837**	**0.626**

Annex 3

MONITORING PLAN

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

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

Where:
E_R – annual emission reductions, tCO_2
P_{WPP} – Net annual power production at Benaiciai wind power park. P_{WPP} is the difference between produced and consumed power at Benaiciai wind power park in MWh.
EF_{LE} – emission factor for power production at Lietuvos elektrine, 0.626 tCO_2/MWh

E_R will be calculated for a previous year, starting 2008 for early credits (AAUs) and in 2009 for ERUs (using annual power dispatch data from previous year). The following monitoring form will be used to monitor dispatched power. Monitoring procedures are described in D3.

Year _____

Month	Power dispatch confirmation document No.	Date of signature of power dispatch confirmation document	ID of the power metering device	Amount of power dispatched to the grid, MWh	Indication of the export value by the metering device, Carry over: _____	Indication of the import value by the metering device, Carry over: _____	Meter constant for transforming meter values in 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										