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:

Didsiliai Wind Power Project
Version: PDD 01
Date: 27 October, 2009
The sectoral scope(s) to which the project pertains: (1) Energy industries (renewable/non-renewable sources)

A.2. Description of the project:

Didsiliai Wind Power Project is prepared under the initiative of *UAB Veju spektras.* It is foreseen to install 12 wind power plants with the total capacity of 21.6 MW (2MW x 10 and 0.8 MW x 2) in the western part of Lithuania. Wind power park, in a conservative approach, will generate about 58.8 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. 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 Didsiliai Wind Power Project Lithuania is participating as the host party while the investing party will Netherlands. SIA "E kvotas", a company based in Latvia intends to purchase Emission Reduction Units (ERU), designated to the project. Information on parties, participating in wind power project, is provided in Table 1.

Table 1 Parties, participating in JI project

Countries/Parties involved	Legal entities, participating in the project	Please indicate, if the Party involved wishes to be considered as project participant (Yes/No)
Lithuania (Host party)	UAB Veju spektras	No
Netherlands (Investing party)	SIA E-Kvotas	No

The owner of Didsiliai Wind Power Project is *UAB Veju spektras*. Main business of the enterprise is production of electricity. The enterprise is located in Kretinga (Dvaro st. 4a) in the western part of Lithuania.

A.4. Technical description of the project:

A.4.1. Location of the project:

Project will be implemented in western part of Lithuania, Silute district, near villages of Didsiliai, Gnybalai and Rudynai (Figure 1).

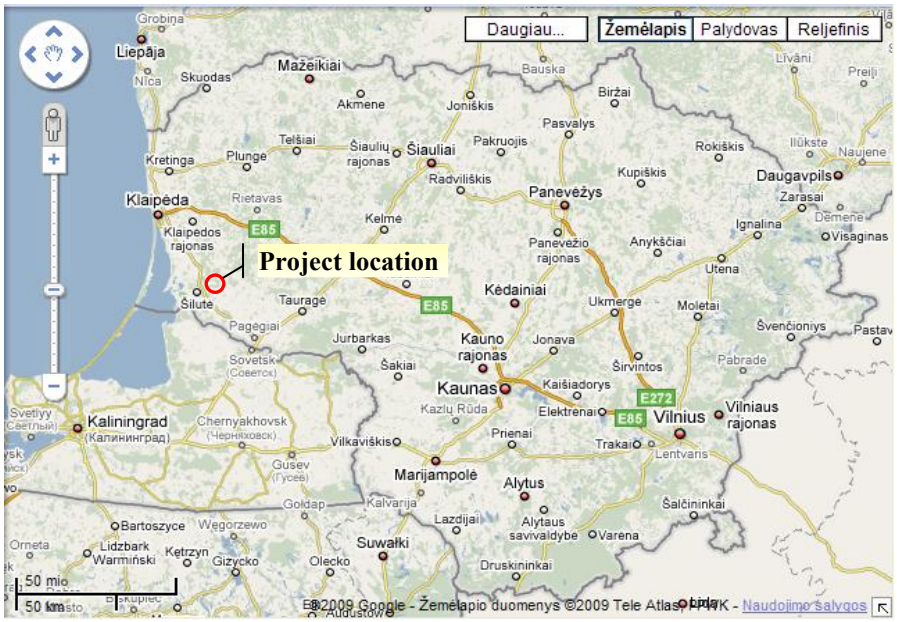

Figure 1 Location of Didsiliai wind power park

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.:

Silute district

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

Planned location of Didsiliai wind power park is in Silute district in the territory of villages Didsiliai, Gnybalai and Rudynai. Detailed layout of wind power plants in the territory is shown in Figure 2.
The Silute district, as all seacoast territory, is the Lithuania's windiest area with highest wind speeds and windy days prevailing. Characteristics of wind take a significant role in installation of wind power park, especially in selection of the location. Referring to long term meteorological data and measurements of wind speed and strength, chosen location is well suited for project implementation.

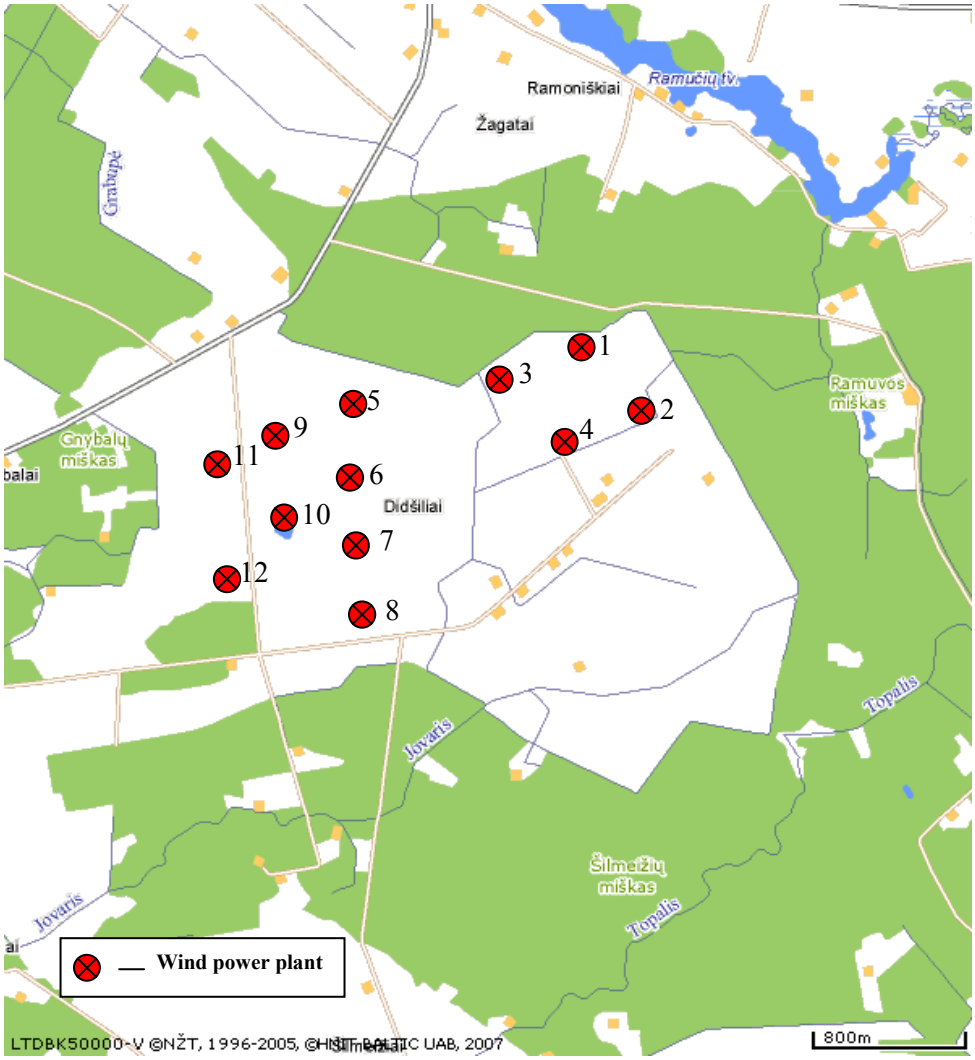

Figure 2 Detailed layout of Didsiliai Wind Power Park

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

It is planned to install 10 Enercon E-82 and 2 Enercon E-53 type wind turbines manufactured by German company Enercon GmbH. Technical data of the turbines is presented in Table 2.

Table 2 Technical parameters of the wind power plants

Type of wind turbine	Enercon E-82	Enercon E-82	Enercon E-53
Number of wind turbines	2	8	2
Wind turbine No. (figure 2)	3, 4	5, 6, 7, 8, 9, 10, 11, 12	1, 2
Capacity	2 MW	2 MW	800 kW
Rotor diameter	82 m	82 m	53 m
Number of rotor blades	3	3	3
Height of tower	78.3 m	108 m	73.25 m
Total height of wind power plant	119.3 m	149 m	99.75 m

The wind power park will generate approx. 58.8 GWh electricity per year.
The height of wind turbines towers will be 73 - 108 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).
It is planned to install a transformer substation with incoming voltage of 20kV, outgoing voltage of 110 kV and 30 MVA capacities.

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

A project implementation schedule is presented in Table 3.

Table 3 Planned project implementation schedule

Project implementation	Deadlines
Business plan	May 05, 2009
Technical project	Jan 15, 2010
Building roads	Feb 15, 2010
Construction and installation works	Dec 31, 2010
Transportation of wind power plants	Nov 30, 2010
Installation of wind power plants	Dec 31, 2010
Installation of substations	March 30, 2010
Laying down the power cables	Nov 31, 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 4).

Table 4 List of permits

No.	License	Obtained	Valid till:
1.	License to increase power production capacity (for 5.8 MW capacity)	3 December, 2008	26 October, 2009
2.	License to increase power production capacity (for 16 MW capacity)	3 December, 2008	31 December, 2010
2.	Detailed plan to build wind power plants and a transformer substation	Final stage, planned till December, 2009	-
3.	Construction license to build wind power plants	Planned till December, 2009	-

	and a transformer substation		

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. *UAB Veju spektras* - the owner of Didsiliai wind power park, has signed the contract with *AB Lietuvos energija* for the supply of electricity, produced by the wind power park, to the electricity grid.

The Lithuanian electricity network is being operated by *AB Lietuvos energija*. Foremost, they purchase power quotas (on basis of the prior signed contracts) from electricity producers. The producers may also supply electricity, exceeding the quotas, at lower price. The difference in national demand for the electricity and total production thereof (quotas and over-quotas) is being covered by electricity produced by power plant Lietuvos elektrine. Thus, if the implementation of this project fails, the estimated electricity would be produced by Lietuvos elektrine, using fossil fuel – 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 National allocation plan for 2008-2012).

Calculations indicate that Didsiliai wind power park will generate 58.8 GWh of electricity per year (conservative scenario). Applying baseline ratio 0.626 tCO_2/MWh_e, CO_2 reduction per year is equal to 36 809 tCO_2. Reduction of CO_2 in period 2008-2012 is 73 618 tCO_2 (2 years).

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 planned power plants will be constructed.
Lithuania have to present to the European Comisions the RES usage action plan on purpose to increase the share of RES to 23% in final consumption of energy by 2020. For the moment the action plan is under preparation, for that reason it is unclear, whether electricity produced in the wind power plants will be promoted and whether that promotion will be valid for planned power plants.

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 electricity production in Lithuania is established by the Regulation on promotion of electricity 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 green electricity from licensed grid connected producers at feed-in-tariffs set by the decision 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. 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.

For the moment all produced by the project energy permanent purchase/sale is not ensured. In case of high electricity loading, grid operator is eligible to disconnect wind power park from the grid. Therefore, if such unfavourable situation occurs, company will not supply some part of the planned electricity to the grid and will lose the part of profit. Hereby, project payback time will lengthen and for that reason project will become less attractive.

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

Table 5 Estimated emission reductions

	Years
Crediting period	**3 (2010-2012)**
Year	**Estimate of annual emission reductions in tonnes of CO_2 equivalent**
2011	36 809
2012	36 809
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	73 618
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	36 809

If agreement will be reached, crediting period may be extended and estimated annual emission reductions in tonnes of CO_2 equivalent equal to 36 809 tones each year.

A.5. Project approval by the Parties involved:

Didsiliai wind power JI project idea was given preliminary approval (Letter of Endorsement) on 6 November 2009 by the Communication No (10-7)-D8-9629 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 of the Minister of Environment of the Republic of Lithuania (Official Gazette, 2005, No. 50-1671; 2007, No. 109-4473). Also 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.

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, 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 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 % of their category.

In Didsilai wind power project baseline is calculated referring to historic data as this method is best suited for 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 gird 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 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 production of electricity 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 electricity, generated in a JI project. This can be easily determined, knowing the structure of Lithuanian electricity network. When the manufacturers of electricity supply all quota electricity to integrated Lithuanian electricity network, the rest of power demand is covered by electricity produced in Lietuvos elektrine. Besides, variable costs of production of electricity in Lietuvos electrine are the largest, compared to other Lithuanian power plants. Taking this into consideration, we can say that in case of additional electricity 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 electricity, it is necessary to know the amount of CO_2 released to the atmosphere while producing 1 MWh of electricity in Lietuvos elektrine.

The amount of CO2 released to the atmosphere while producing 1 MWh of electricity in Lietuvos elektrine was calculated in mid 2006 by a consulting company Ekostrategija preparing the National allocation plan of EU Allowances for 2008-2012. Calculations are performed on historical data. In order to increase reliability data of 4 years were used for calculations.

For determination of the baseline consumption and production efficiency data was provided by AB Lietuvos elektrine as well as production of electricity and heat in Lietuvos elektrine in 2002-2005 (Table 6). For evaluation of the emission reductions we also use forecasts of electricity production in Didsiliai wind power park, provided by *UAB Veju spektras*.

Table 6 Energy production and fuel consumption in Lietuvos elektrine

Year	Electricity produced (MWh)	Heat produced (MWh)	Natural gas (1000nm3)	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 fuel consumed is transferred to oil equivalents using such factors: natural gas – 0.800 toe/1000nm3, 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	7025	34 675
2003	180 657	5005	14 018
2004	166 158	2626	36 633
2005	224 455	1733	56 869

Hereafter, the percentage of each type of fuel, being consumed in every year is calculated (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
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 (Table 100).

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

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	8533	123 592	525 916
2005	531 955	5632	191 865	729 451

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

Results of calculations are presented in **Table 11**1.

Table 11 Emissions attributable to heat production at Lietuvos elektrine

	Natural gas, tCO_2	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.

$P_{CO2} = T_{CO2} – H_{CO2}$

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 12**.

Table 12 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

Considering that 4 years of historic data is used for calculation of emission factor, we think, that using emissions factor of 0.626 tCO_2/MWh_e would represent a conservative approach to the baseline.

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 electricity reduces emissions to the environment in average by 0.626 tCO_2. It is foreseen to produce 58.8 GWh of electricity per year from the Didsiliai Wind Power project, thus every year CO_2 emissions will be reduced by 36 809 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. Besides, project implementation as JI project helps in overcome 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 Didsiliai Wind Power project.

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 or new cogeneration power plants. Even after closure of Ignalina NPP on 2009, Lithuania will have enough existing power plants in order to cover power demand.

Sub-step 1b. Consistency with mandatory 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). 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.

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 used for this project as it is the only applicable method.

Benchmark analysis (option III) 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 market price differ on a case by case basis.

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 Didsiliai wind power project is estimated to be 5.07 %[1] (the feed in tariff of 0.30 Lt/KWh was used for estimations according to existing regulation for supporting renewable energy).

[1] Project financial calculation tables included in the Anexes

Average IRR for new cogeneration power plants is higher - approx. - 10%. Additionally, EU structural funds are available for new cogeneration power plants, but not for wind power projects in Lithuania. With the EU structural support IRR of new cogeneration plants jumps up to approx. 15 %[2]. This fact makes cogeneration option more attractive for the investors compared to the wind power.

Additional revenues from ERU sales increase IRR of Didsiliai project up to 5.23 % (ERU price considered to be 12 €/tCO_2e).

Sub-step 2d. Sensitivity analysis

IRR sensitivity to electricity production and ERU price is analyzed. As conservative electricity production level is used, only positive sensitivity margin is applied. The results are presented in the tables below:

Production Margin	0%	10%	20%	30%
Production, MWh	58 800	64 680	70 560	76 440
IRR (incl ERUs)	5.23%	6.39%	7.47%	8.47%

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)	5.18%	5.20%	5.21%	5.23%	5.25%	5.26%	5.28%

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 the proposed project activity:

Investment barriers

1. 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 either. Hence, there are no any investment subsidies available for wind power projects in Lithuania.

2. 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 wind power business a less attractive option.

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

4. Purchase of electricity, 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 electricity, can disconnect the wind power park from the electricity

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

network in case of the system overload.

5. Having in mind the above described conditions banks are not willing in providing loans for wind power projects.

Technological barriers

6. 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. This barrier is not considered as significant, as the project developer is already implementing other wind power project, also as JI activity, thus enabling overcome this barrier.

Other barriers

7. Wind power parks normally are planed on agricultural lands. In order to get permission to build wind power park detailed territorial plan shall be prepared and land use purpose changed from agricultural to infrastructure. Procedures of the detailed planning may take up to few years. New cogeneration power plants often are built near the existing boiler plant, thus using the same land, and land use purpose procedures are not performed, or performed easily.

8. Environmental impact procedures or Public health impact procedures are insufficiently long. Representative of the related institutions often do not have enough knowledge and are afraid to take a decisions.

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):

- Any of the listed barriers are not applicable for existing power plants.
- 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.
- New cogeneration power plants often are built near the existing boiler plant, thus using the same land, and land use purpose procedures are not performed, or performed easily.
- Combustions installations environmental procedures are common in Lithuania, thus usually there are no major problems in preparation and confirmation of the Environmental impact procedures or Public health impact procedures.

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 only 25 wind plants (wind power parks) were connected to the grid on October 2009[3] , and only 5 of them were more than 250 kW capacity. 2 of these 5 are with 630 kW and 2 MW capacity. The other 3 are developed as JI projects. It is also ascertained that wind power is one of the most expensive types of electricity generation. These barriers prevent wind power projects from being implemented in Lithuania.

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

Registry of all wind power parks (single plants), which are connected to the grid in Lithuania is available on AB Lietuvos energija web-site. Most wind power parks are small scale - less than 250 kW. The reasons for that are: comparably lower first investments, granted purchase of all electricity, supplied to the grid, lower environmental requirements, and lower land use requirements.
All larger scale wind power parks in Lithuania are developed as JI projects.

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 3.

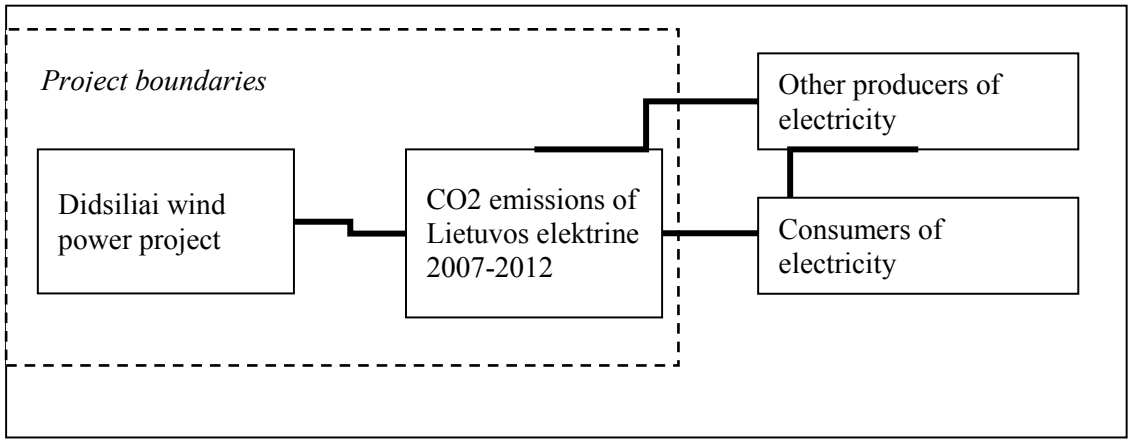

Figure 3 Project boundaries

Boundaries of Didsiliai 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: July, 2006.
Project organizer: *UAB COWI Lietuva*. Contact information is presented in Table 1717. The person/entity is not a project participant listed in Annex 1.

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

Table 17 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:

Installation of wind power plants shall start on 2010. Operation starts in January 2011.

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 prepared with reference to the CDM monitoring methodology AM0019 "Renewable energy projects replacing part of the electricity production of one single fossil fuel fired power plant that stands alone or supplies to a grid, excluding biomass projects" (Version 02, 19 May 2006).

This methodology is applicable to projects generating power by renewable energy sources under the following condition: proposed project activities where electricity production from the zero-emission renewable energy sources: wind, geothermal, solar, run-of-river hydro, wave and/or tidal projects that displace electricity production from an identified, individual, plant.

The methodology requires monitoring of the electricity generation from the proposed project activity. The project needs to monitor its electricity production following standard practices of electricity metering. The net electricity generated by the project need to be monitored through the use of on site metering equipment at the substation (interconnection facility connecting the facility to the grid). The meter reading records will have to be readily accessible for auditors and calibration tests records will be maintained for the auditors.

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

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 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 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.1.1.4. 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.

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

Where:
E_B - baseline emissions
P_{WPP} – Net annual electricity production at Didsiliai Wind Power park. P_{WPP} is the difference between produced and consumed power at Didsiliai wind power park in MWh.
EF_{LE} – emission factor for electricity 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 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):

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

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

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:

Not applicable.

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 done by Enercon under agreement with *UAB Veju spektras*.

The monitoring report will be compiled by an engineer from *UAB Veju spektras*. Monitoring of electricity production will be performed by the director of *UAB Veju spektras*. Monitoring of electricity production will be combined with the commercial accounting of the produced electricity. Once a month, an inspector from *AB Lietuvos energija* together with a representative from *UAB Veju spektras* 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 Veju spektras* will write down 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 Veju Spektras* 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 Veju spektras* for later reference for the proof of the monitoring results. *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 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:

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} - 58 800 MWh
EF_{LE} - 0.626 tCO_2/MWh

E_B - annual baseline emissions = 36 809 t CO2.

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

Total baseline emissions for 2011-2012 are 36 809 t CO_2 x 2 = 73 618 tCO_2.

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

Annual emission reductions - 36 809 t CO_2. Total emission reductions for crediting period - 73 618 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	36 809	36 809
2012	0	0	36 809	36 809
Total	0	0	73 618	73 618

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 - 7365 and No. 9.14.5 - LV4 - 7364 of December 4, 2008, 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. E4-46 for planned economic activity given out on March 24, 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:

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

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.

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

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	26.46 t
NO_x	0.95	55.86 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 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

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

Didsiliai 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.

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 ES 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, Didsiliai 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.
The nearest protected areas are within sufficient range away from the project site:

Nemunas Delta regional park (6.1 km);
Norkaiciai reservation (5.7 km)

Cultural heritage

There is no historical important cultural heritage in planned territory. The nearest cultural heritage is: Didsiliai village old Evangelical Lutheran Cemetery (200m), Kalininkai village first Evangelical Lutheran Cemetery (2300m).

Waste

Waste in wind power park is minimal. Waste in wind power park can comprise only in period of wind power plant operation, that is one time in 20 years - 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 (60 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 10kV/m without limitations for allowed exposure time and up to 0,5 kV/m in "green" zones (parks, gardens etc.) without limitation for exposure time (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 90m 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, wind power plant noise level will not exceed allowed level (55 dBA) already on the distance 80 - 150 m from noise source. The noise zones of all wind power plants stay on the planned site border. The proposed Sanitary Protection Zone borders: wind power plant No. 1, 2, 8, 12 - 80 m, No. 3, 4 - 150 m, No. 5, 7, 9, 10, 11 - 100 m, No. 6 - 120 m. (Figure 2)

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 Didsiliai 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. The shadowing effect is not relevant for the project. According to the preliminary calculations – shadows will be cast not more than 420 m from the wind power plants. Bearing in mind that the closest living areas are 540-600 meters away – the shading effect is not considered as an 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 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 130 Stakeholders process

11-12-2009	Beginning of preparation of project's detailed plan was announced in Silute District Municipality website.
15-12-2008	Beginning of preparation of project's detailed plan was announced in newspaper „Silutes naujienos".
27-01-2009	Information letters about beginning of preparation of the project's detailed plan was sent to 27 land owners having property of neighbouring territories.
12-02-2009	Announcement of the last stage of public consideration of the project detailed plan was published in the newspaper „Silutes naujienos".
12-02-2009	Information letters about the last stage of public consideration of the project detailed plan was sent to 27 land owners having property of neighbouring territories.
17-02-2009	Announcement of the last stage of public consideration of the project detailed plan was published in Silute District Municipality website.
From 16-03-2009 to 31-03-2009	Public exposition of the project's detailed plan was performed
31-03-2009	Detailed plan project public consideration in Silute District Municipality. Minutes and public consideration report are prepared.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organisation:	UAB Veju spektras
Street/P.O.Box:	Razes
Building:	15
City:	Vydmantai, Kretinga
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Postal code:	LT-97011
Country:	Lithuania
Phone:	+370 373 21583
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URL:	
Represented by:	Vidmantas Kniuksta
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URL:	
Represented by:	Arturas Strolia
Title:	Chairman
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Last name:	Strolia
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Fax (direct):	
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Personal e-mail:	a.strolia@e-energija.lt

Annex 2

BASELINE INFORMATION

Table 14 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 factortCO2/MWhe
2002	736 604	202 060	199 104 000	7355	52 534	517318.01	52796.436	464521.57	0.631
2003	723 858	195 553	225 813 000	5241	21 238	491709.09	48884.851	442824.24	0.612
2004	745 372	212 399	207 690 000	2750	55 501	525915.94	55203.746	470712.19	0.632
2005	1 072 814	199 383	280 559 000	1815	86 160	729450.95	52160.995	677289.96	0.631
						566098.5	**52261.507**	**513836.99**	**0.626**

Annex 3

MONITORING PLAN

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

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

Where:
E_R – annual emission reductions, tCO_2
P_{WPP} – Net annual power production at Didsiliai wind power park. P_{WPP} is the difference between produced and consumed power at Didsiliai wind power park 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 2010 (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									