JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM FOR SMALL-SCALE PROJECTS
Version 01.1 - in effect as of: 27 October 2006

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SECTION A. General description of the small-scale project

A.1. Title of the small-scale project:

Wind Power Farm in Buciai and Kadariai Villages Joint Implementation Project
Version: 1.4
Date: November 7, 2011
The sectoral scope: (1) Energy industries (renewable/non-renewable sources)

A.2. Description of the small-scale project:

The objective of the Wind Power Farm in Buciai and Kadariai Villages Joint Implementation Project is to establish a wind power farm with a total capacity of 13.8 MW at Buciai and Kadariai villages, located in Silale district in the western part of Lithuania.

The renewable electricity produced by the wind power farm will displace carbon intensive electricity produced from fossil fuel sources in the Lithuanian power network, thus contributing to the lowering of greenhouse gas emissions as well as other pollutants related to fossil fuel based power generation. Lithuania has undertaken to increase the share of renewable energy to 23%[1] by the year 2020.

The set feed-in tariff for wind power generated electricity is unfortunately not sufficient to realize the proposed project on a commercial basis. Additional income from the sale of 'carbon credits' under the Kyoto Joint Implementation scheme is thus required to turn the project attractive for the investors.

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)
Republic of Lithuania (Host Party)	UAB Vejo Elektra, UAB Lariteksas	No
The Netherlands	Stichting Carbon Finance (SCF)	No

The project is implemented by UAB Vejo Elektra and UAB Lariteksas, which both are SPVs used for the development/installation and operation of the wind park JI projects. Companies are owned by Freenergy OÜ from Estonia and Vardar Eurus AS from Norway.
Vejo Elektra will own 6 MW of in the Silale park and Lariteksas will own 7.8 MW. Despite that the ownership of the park is split between the SPVs due to licensing reasons, the turbines constitute a single park and are connected via one connection point (substation). The parks will have one commercial meter to measure the production as well. Therefore investors consider the development as one single project and there are plans to merge the companies in 2011 when the project will be finished and legal limitations related to the ownership of the licenses will be not applicable any more.
The PDD was prepared by UAB 4energia in cooperation with Nelja Energia OÜ and LHCarbon OÜ.
Contact: UAB 4energia Tel: +370 685 21249, e-mail: tadas.navickas@4energia.ee

[1] http://www.enmin.lt/lt/activity/veiklos_kryptys/atsinaujantys_energijos_saltiniai/aei_more.php

A.4. Technical description of the small-scale project:

A.4.1. Location of the small-scale project:

A.4.1.1. Host Party(ies):

Republic of Lithuania

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

Silale district

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

Buciai and Kadariai villages

A.4.1.4. Detail of physical location, including information allowing the unique identification of the small-scale project:

The proposed JI project will be located in Buciai and Kadariai villages in Silale district in the western part of Lithuania. The wind farm will be located in the hilly area (140 m – 180 m above sea level), near the A1 highway and next to the intersection of the road 162. Wind turbines will be situated in the leased land plots with the total area of 90 hectares (Figures 1 and 2). Coordinates of the turbines provided in the Figure 3

The project site (land plots) was carefully selected based on the site conditions such as landscape, direction of prevailing winds, as well as existing infrastructure (possibility to connect to the grid and existing road network). The site location was also evaluated in respect of residential area, area protected for historical, cultural and archeological value. The chosen location is well suited for wind power generation.

Figure 1. Location map

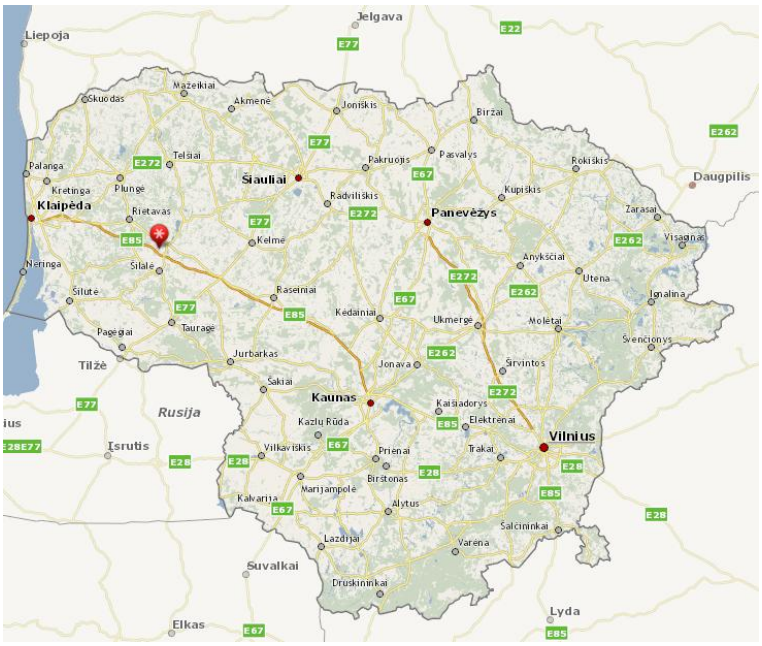

Figure 2. Wind farm layout with renovated and new built roads

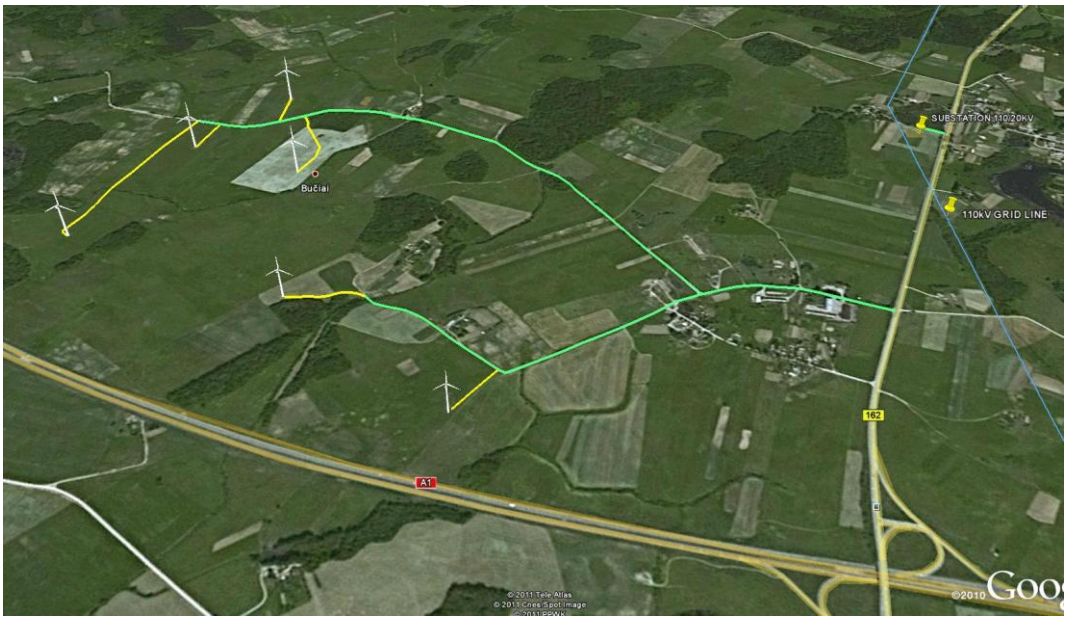

Figure 3. Coordinates

Land plot No	Turbine No.	Center Coordinates (LKS94 system)
8757/0001:282	VJ2	6161727.31, 386213.96
8757/0001:291	VJ3	6161267.78, 386307.67
8757/0001:278	VJ4	6161424.06, 385950.99
8757/0001:286	VJ5	6160953.12, 385694.08
8757/0001:288	VJ7	6160205.50, 386832.32
8757/0001:271	VJ8	6160656.86, 386362.73

A.4.2. Small-scale project type(s) and category(ies):

Type I JI SSC project: Renewable energy project with a maximum output capacity of less than 15 MW(e).

A.4.3. Technology(ies) to be employed, or measures, operations or actions to be implemented by the small-scale project:

It is planned to install six Siemens SWT-2.3-101 type wind turbines at the project site. The power generation of these wind farms will displace carbon-intensive generation from the Lithuanian power plant.

Technology

The technical data of the planned wind farm is presented in Table 2.

Table 2. Technical data of wind turbines

Type of wind turbine	Siemens SWT-2.3-101
Capacity	2300 kW
Height of tower	99,5 m
Rotor diameter	101 m
Number of rotor blades	3
Cut-in wind speed	4m/s
Cut-out wind speed	25 m/s
Nominal rotation speed	16 rpm
Generated voltage	690V
Voltage frequency	50Hz

An energy production estimate has been carried out by EMD using measurements from a 99 m meteorological mast located on the site 13-month measurement period (12-2009-12-2010). Data from the site has been calibrated to represent long term conditions using the Measure-Correlate-Predict (MCP) tools in the software WindPRO. As basis for the long term correction data from NCAR/NCEP re-analysis data has been used. As result of the analysis the wind farm is conservatively estimated to generate 35,957 MWh of electric power per year over a period of 20 years, which results in an average load factor of 29,32 %.

The wind power park will be connected to a 110kV power line via a 20/110kV transformer.

History, key permits and contracts

The development of Wind Power Farm in Buciai and Kadariai Villages Joint Implementation Projectstarted in 2008when the project companies received a letter from Ministry of Economy offering the companies possibility to develop new wind parks.

In 2008 the companies started the spatial planning works and once the detailed plans where adopted in Q2 2010, companies paid the connection fees and on the 06-05-2010 licenses to expand the generating capacities from renewable energy sources have been issued by the Ministry of Energy (license LP -0349 for Vejo Elektra and LP-0350 for Lariteksas.

On 12thof October 2010 Wind Power Farm in Buciai and Kadariai Villages Joint Implementation Project received a Letter of Endorsement from the Ministry of Environment of Lithuania. This provided the certainty with regard to the cash-flows from the sale of carbon credits and thus enabled the developer to proceed with the project financing and implementation.

Besides the low feed-in tariff, the main development barrier to wind projects in Lithuania is the securing of grid connection rights and planning permits. This barrier has been effectively removed for this project. UAB Vejo Elektra and UAB Lariteksas won 2 tenders for grid connection 6 MW and 8 MW and received energy generation capacity enhancement permits from the Ministry of Energy for development of the wind farm, No. LP-0349 (6MW) and LP-0350 (8 MW) on 2010-05-06. The permits are prolonged every 6 months. The grid connection fees have already been paid.

The local municipality has agreed to the establishment of the wind farm and approved the respective detailed land use plan on February23, 2010. The project detailed technical design has been completed andBuilding Permits No. LNS-72-100909-00130 obtained on September 9, 2010 and No. LNS-72-100913-00131 obtained on September 13, 2010.

The Klaipeda Regional Department of Environment Protection of Lithuanian Ministry of Environmenthas decided that full EIA procedure is not required (letter of 2009-05-26 No. (9.14.5.)-LV4-2625).

Table 3. Key permits

No.	Permit	Approval
1.	Grid connection permit	2010-05-06– 6MW 2010-05-06 - 8 MW
2.	Detailed plan	2010-02-23
3.	Building permit	2010-09-09 2010-09-13
4.	EIA /screening	2009-05-26

The Power Purchase Agreement (PPA) has been signed 2011-09-09.

It is planned that the wind farm will be supplied by Siemens Wind Power AS.Siemens Osakeyhtio Lithuanian branchwill take care of technical maintenance during the first five years.

Milestones, time schedule and current status of implementation

The project is currently in the advanced development phase with feasibility analysis completed and key permits obtained. Project financing (anticipating also carbon financing) has been completed. The time-line for project physical implementation is planned as following:

- construction of roads and hard stands will be completed in June, 2011
- construction of substation and cabling works at 110 kV, will be completed in June, 2011
- construction of foundationswill be completed in June, 2011
- erection of wind turbines is scheduled for August, 2011
- commissioning of wind turbines July-August, 2011

Emission reductions would thus begin to be generated from September 2011 onwards.

A.4.4. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed small-scale project, including why the emission reductions would not occur in the absence of the proposed small-scale project, taking into account national and/or sectoral policies and circumstances:

The renewable electricity produced by the wind power farms would displace carbon intensive electricity produced from fossil fuel sources in the Lithuanian power network.
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 a lower price. The difference in national demand for the electric power and total production thereof (quotas and over-quotas) is being covered by AB Lietuvos Elektrine. Thus, if the implementation of this JI Project fails, the estimated electric power would be produced by AB Lietuvos Elektrine using fossil fuels – natural gas, heavy fuel oil and orimulsion. It was calculated that AB Lietuvos Elektrine, by generating 1 MWh of electric power, contributes to the pollution of atmosphere with 0.626tonnes of CO2.
See chapter B.1. for more details of baseline calculation and chapter B.2 for estimation of the GHG emission reductions of the JI Project which have been calculated conservatively on basis of the above carbon emission factor of 0.626tCO2e/MWhe and the expected power production.

The proposed JI Project supports Lithuania's objective to increase use of renewable energy sources in energy sector to 23% in 2020[2].
The Law of the Republic of Lithuania on Energy[3] points out promotion of consumption of renewable energy resources as one of the principal objectives of regulation of state energy sector activities. The law provides that the state encourages the producers to generate electricity from renewable energy sources by imposing the "must carry" obligations. The Resolution on the promotion of electricity produced from renewable energy sources declares that grid operator obliges to purchase green electricity from the licensed grid-connected producers at the fixed feed-intariffs.[4]

[2]The National Renewable energy sources development strategy (Official Gazette, 2010, No. 73-37250 and Action Programme (Official Gazette, 2010, No. 78-4030)
[3] Law No. IX-884 of the Republic of Lithuania on Energy, dated 16 May 2002.

[4]2001-12-05 Resolution on the promotion of electricity produced from renewable energy sources No. 1474

http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_1?p_id=342973

In order to provide incentives for wind power development the government has issued legislation regulating obligatory purchase of wind power at a price of 0,30 LTL per kWh (0.087 EUR)[5]. Such feed-in tariff scheme is expected to remain until year 2020. In order to obtain the mentioned feed-in tariff the wind power farm must be built in one of the six zones for which tenders for grid connection are organised by Litgrid AB - the electricity Transmission System Operator in Lithuania.
The above feed-in tariff for wind power is unfortunately not sufficient for commercial development of the wind power sector. Thus all recent wind power developments are being carried out under the JI scheme.

After the introduction of power spot market in Lithuania, the difference of power spot price and the feed-intariff will be compensated for green power producers. The regulation envisages that the feed-intariff scheme will be replaced by green certificate scheme in 2021, hence the feed-intariffs are valid until 2021.

A.4.4.1. Estimated amount of emission reductions over the crediting period:

Table 4. Estimated emission reductions

Length of the crediting period	1 year and 4 months
Year	**Estimate of annual emission reductions in tonnes of CO2 equivalent**
2011	7,503
2012	22,509
Total estimated emission reductions over the crediting period (tonnes of CO2 equivalent)	30,012
Annual average of estimated emission reductions over the crediting period (tonnes of CO2 equivalent)	22,509

Estimate of annual emission reductions after year 2012 is 22,509 tonnes of CO2 equivalent.

A.4.5 Confirmation that the proposed small-scale project is not a debundled component of a larger project:

Wind Power Farm in Buciai and Kadariai Villages Joint Implementation Project with a combined capacity of 13.8 MW(e) is not a debundled component of a larger project due to the following reasons:
- The project boundaries of the nearest operating wind farms and wind power development projects are located at a minimum distance of 40 km from the project boundary of the proposed JI Project (at the closest point).
- The project participants of the closest wind power development projects are different.

A.5. Project approval by the Parties involved:

The project idea (Project Idea Note) was approved by Lithuanian DFP (Ministry of Environment of the Republic of Lithuania) and the Letter of Endorsement (LoE) No. (10-2)-D8-9588 was issued on October 12, 2010. The evaluation of the Project Idea Note was made in consideration of provisions settled out in

[5]2008-02-28 Resolution of the national price and energy control commission No. 03-27

http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_1?p_id=315044

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 April 1, 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.

According to national Joint Implementation Project development rules[6], the final Project approval or Letter of Approval (LoA) might be issued only after draft Project Determination Report submission to Lithuanian DFP (during 60 days period). After LoA issuance project proponent should give it to the Independent Accredited Entity to be able to complete Project Determination.

Due to the reason that Lithuanian energy generators are covered under EU Emission Trading Scheme, for double counting avoidance reason new installations under JI scheme have a special reserve in the National Allocation Plan 2008-2012. After LoA issuance the estimated amount of ERUs will be reserved for particular JI project proponent.[7]

Written approval by the Host Party involved, including the necessary authorisations, will be attached to the final PDD.

Investor Country Approval

The Investor Country approval will be issued by a selected Investor Country by latest prior to the first verification of the project.

[6] 2010-06-03 Order of Ministry of Environment No. D1-470

http;//www3.lrs.lt/pls/inter3/dokpaieska.showdoc_1?p_id=374514

[7] Lithuanian Environment Investment Fund information http;//www.laaif.lt/index.php?1413169444

SECTION B. Baseline

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

The baseline is the amount of GHG that would be emitted to the atmosphere during the crediting period of the project, i.e. during 2011-2012, in case the project was not implemented.

Project baseline was chosen in accordance with Appendix B of the JI guidelines and the Guidance on criteria for baseline setting and monitoring, using the following stepwise approach:

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

Paragraphs 1.3 of Appendix B of the JI guidelines define criteria for baseline setting a baseline shall be established:

i. On a project-specific basis and/or using a multi-project emissions factor;
ii. In a transparent manner with regard to the choice of approaches, assumptions, methodologies, parameters, data sources and key factors;
iii. Taking into account relevant national and/or sectoral policies and circumstances, such as sector reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector;
iv. In such a way that ERUs cannot be earned for decreases in activity levels outside the project or due to force majeure; and
v. Taking account of uncertainties and using conservative assumptions.

Taking into consideration the specifics of the Lithuanian power market, the methodology based on historical data is most suitable for country's baseline estimation. Furthermore, the usage of described methodology allows to have united country's baseline scenario and baseline emissions (tone CO2 per MWh of electricity). Based on this fact it was chosen to use JI specific approach by using a multi-project emissions factor adopted by the Ministry of Environment of the Republic of Lithuania.

Step 2: Application of the approach chosen

The country's baseline scenario and baseline emissions factor have been described by Ministry of Environment of the Republic of Lithuania during National Allocation Plan (NAP) preparation for First commitment period (2008-2012). The European Commission during supervision on NAP did not reject country's baseline methodology. The NAP indicates that Lithuanian baseline emission factor is 0.626 tCO2/MWhe[8].
The Baseline methodology that is indicated in the NAP is based on historic data of Lietuvos Elektrine and this method is best suited for Lithuanian power market. Approved CDM ACM0002 and AMS I.Q methodologies are not used for the baseline calculation due to the following reasons:

- Lietuvos Elektrine, power plant with the largest installed capacity in Lithuania (after closure of Ignalina nuclear power plant –INPP) is operating on the power grid 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.

[8] Lithuanian National Allocation Plan 2008-2012 (18.04.2007 version), section 6.3.

http://www.am.lt/VI/files/0.127744001228738706.pdf

- 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.

Hence, the current emission factor – **0.626 tCO2/MWhe** is considered to be conservative and will be used to calculate CO2 reductions from Wind Power Farm in Buciai and Kadariai Villages Joint Implementation Project.

Key information and data used to establish the baseline scenario:

Data/Parameter	CO2 emission factor for electricity
Data unit	tCO2/MWh
Description	Emissions from fossil fuel burning
Time of determination/monitoring	Period 2002-2005
Source of data (to be) used	Lithuanian National Allocation Plan 2008-2012 (18.04.2007 version)
Value of data applied (fox ex ante calculations/determinations)	0.626 tCO2/MWhe (average value)
Justification of the choice of data or description of measurement methods and procedures (to be applied)	Presented emission factor is widely used for other Lithuanian JI wind projects
QA/QC procedures (to be) applied	Used official publicly available data
Any comment	Presented emission factor is widely used for other Lithuanian JI wind projects[9]

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 small-scale project:

Additionality of the project is proven using version 05.2.1 of the CDM Tool for the Demonstration and Assessment of Additionality as approved by the CDM Executive Board.

Baseline calculation presented in Section B.1 shows that production of an additional 1 MWh of electric power reduces CO2 emissions at average by 0.626 tCO2. With an estimated annual power production of 35,957 MWh the wind farm of the proposed JI Project would thus reduce CO2 emissions annually by 22,509 tonnes.

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

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

- Alternative A – the proposed project activity not undertaken as JI project activity;
- Alternative B – the electric power in the Lithuanian network will be produced by new modern cogeneration power plants.

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

The both alternatives are in compliance with mandatory legislation and regulations.

[9]UNFCCC website, JI Project registration numbers: 0025, 0034, 0163, 0178, 0200, 0229

Although existing legal environment is in favour of production of electricity from renewable energy sources, the factual regulatory enforcement (i.e. established renewable energy promotion schemes) is not strong enough for motivation of investment into production of renewable energy. Therefore the existing conditions are in favour of alternative B - continuation of the current situation and are not in favour of alternative A - proposed project activity not undertaken as a JI project activity.

The obligatory purchase tariff for wind power established by the governmental regulation on promotion of electric power produced from renewable sources is not sufficient for commercial development of the wind power sector. (Sub-step 2c).

Result: Pass

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 sale of 'carbon credits' is not the only source of revenues for the project.

*Investment comparison analysis (option II)*is not applicable for the project as the alternative "A" is the project itself but without a JI incentive and on the other hand the alternative "B" is based on investment that is out of control of the project developer, i.e. project could be developed by a different entity (as described in paragraph 15 in the Annex of the *Tool for the demonstration and assessment of additionality v.05.2*).

Benchmark analysis (option III) will be used for this project as it is the only applicable method.
Because there exists no specific investment benchmarks for the Lithuanian power sector the needed benchmark value for the analysis is derived from the financial and economic indicators that are standard for the country and are publicly available. The benchmark analysis has been adopted wherein the Internal Rate of Return (IRR) of the project activity serves as a benchmark to assess the financial attractiveness of the project activity. Option III assesses if the project returns are sufficient for investors to make the initial investment and further bear the associated costs of successfully operating the project activity over the crediting period of the project.

Sub-step 2b. Option III. Apply Benchmark analysis

In order to apply a benchmark comparable to the project IRR the project participant selected to use average value of the interest rate (AVIR)on loans for non-financial corporations published by the central Bank of Lithuania (LB). The AVIR is the benchmark interest rate at which Lithuanian commercial banks and other financial institutions (unions, funds and etc.) lend money to their customers (http://www.lb.lt/stat_pub/statbrowser.aspx?group=7279&lang=lt).
Typically, projects in Lithuania would be borrowing money at a rate equal to or higher that the AVIR. Hence, for any project to be financially attractive, the IRR of the project must be higher than the debt rate (i.e. higher that the AVIR). Accordingly, if any project's IRR does not exceed the AVIR, it could be considered a financially unattractive project.
The use of the AVIR is consistent with the *Tool for the demonstration and assessment of additionality v.05.2* which suggests that "*...benchmarks for IRR, NPV, etc. Can be derived from...Estimates of the cost of financing and required return on capital (e.g.* ***commercial lending rates*** *and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects."*

The AVIR that was taken for consideration in the PDD (9.93 %) is based on the official decision making time's data (December 2008) (Figure 3). For comparison the VILIBOR (Vilnius Interbank Offered Rate) value (for 1 year period) was added. VILIBOR is based on the quotes of no less than 5 local commercial banks, designated by the Bank of Lithuania, that are most active in Lithuanian money market. Banks by lending money to their clients use VILIBOR values as basis. Moreover banks always add their fixed margin (%).

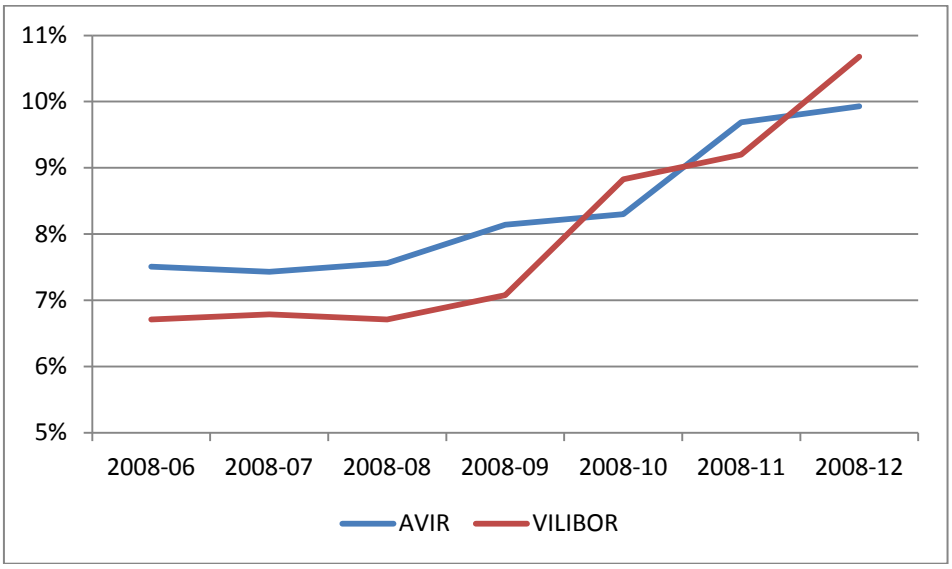

Figure 3. Loan interest rate in Lithuania

In order to keep this benchmark conservative no risk premium associated with the project type or the project developer was added to it. Further, AVIR is a conservative benchmark itself as it does not take into account the commercial lending rates of individual private sector banks that are typically higher than AVIR (because VILIBOR+bank margin).

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

1) Parameters needed for calculation of key financial indicators:

Table 5. Parameters for calculation of key financial indicators

Parameter	Value	Unit
Total investment cost	27,585	th. EUR
Annual service and maintenance cost	12	EUR/MWh
Annual electricity production	35,957	MWh
Feed-in tariff	86,89	EUR/MWh
Project life time	20	Years
ERU main crediting period	16	Months
ERU price	11	EUR/ERU

2) Comparison of IRR for the project and the benchmark

In accordance with benchmark analysis (Option III), if the financial indicators of the proposed project, such as the project IRR, are lower than the benchmark, the proposed project is not considered to be financially attractive.

Table 6 shows the comparison of the project IRR with benchmark value. In both cases the project IRR is lower than the benchmark value. It means that project is financially unattractive on present market conditions. Additional revenues from ERUs sale increase project IRR by from [4.66%] (Alternative A) to [4.78%].

Table 6. Project IRR in two scenarios

	Project IRR
Without ERUs	4.66%
With ERUs	4.78%
Benchmark value	9.93%

For comparison – the average IRR on new natural gas based cogeneration power plants is about 8-10%. However, EU structural funds are available for new cogeneration plants (up to 50% from all investments) but not for wind power projects in Lithuania. With the EU structural support IRR of new cogeneration plants jumps up to around 15%. This fact makes cogeneration option more attractive for the investors compared to the wind power.As concrete example may be used the new erected CHP plant (Panevezys CHP) where the project IRR is 16,2%[10](Alternative B).

Sub-step 2d. Sensitivity analysis

The sensitivity analysis shall show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions.

For the Project, two parameters were selected as sensitive factors to assess the financial attractiveness:
1) Total Investment
2) Annual Electricity Output

There aren't variables which constitute less than 20% and have a material impact on the sensitivity analysis.

Table 7. Project sensitivity analysis

Investment variation range	-10%	-5%	0%	5%	10%
Investments, € th	24 827	26 206	27 585	28 964	30 344
Project IRR	5,41%	5,26%	4,78%	4,13%	3,53%

Energy production variation range	-10%	-5%	0%	5%	10%
Energy output, MWh/year	32 361	34 159	35 957	37 755	39 553
Project IRR	3,33%	4,06%	4,78%	5,26%	5,42%

[10] UNFCCC webpage, JI Project – Rudaiciai wind power park, PDDs supporting documentation Enclosure 3 – IRR for cogeneration plant Panevezys

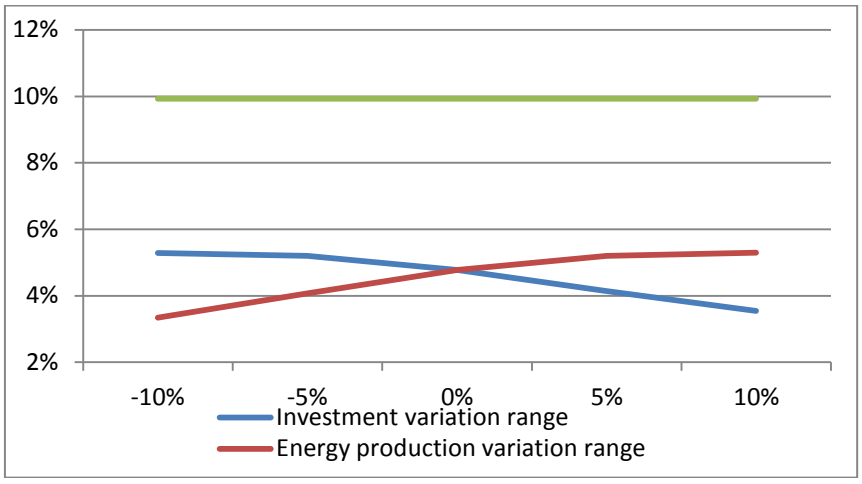

Figure 4. Project IRR sensitivity

It can be seen from the analysis that the project IRR does not exceed the benchmark IRR when the total investment drops by 10 percent, or annual electricity output increases by 10 percent.
The sensitivity analysis shows that the annual power production and total investment size is crucial factors for project economic feasibility. The power production is variable and depends from on site wind conditions and wind turbines technical characteristics. The used power generation approach gives for project the capacity factor –29,32%. The probability that project financial figures may vary into negative side is higher then into positive side and it shall turn the project less financially attractive than is assumed.
Total investment cost depends on the labour and material market price. The real project investments will be known only after project implementation.

The sensitivity analysis confirms the fact that the project without carbon revenue is not enough financially attractive.File with sensitivity analysis of the JI project (Silale sensitivity.xls) has been made available to the Independent Entity during determination.

Result: Pass

Step 3. Barrier analysis

According to Tool for the Demonstration and Assessment of Additionality methodology *"If after the sensitivity analysis it is concluded that : (1) the proposed CDM project activity is unlikely to be the most financially/economically attractive (as per step 2c para 11a) or is unlikely to be financially/economically attractive (as per step 2c para 11b), then proceed to Step 4 (Common practice analysis)".*

Step 4. Common practice analysis

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

Currently wind energy parks with total capacity of 172.13MW and individual wind turbines with total capacity of 12.83 MW are under operation in Lithuania[11].

[11] According to data of national grid operator AB LITGRID http://www.litgrid.eu/litgrid/doc/KGR/Tech_duom.php

No commercial scale wind farms exist in Lithuania and all new projects are being implemented under the Joint Implementation scheme[12]. The JI projects would be excluded from the common practice analysis.

The Wind Power Farm in Buciai and Kadariai Villages Joint Implementation Project is not related to the existing wind farms and has been developed as a separate project.

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

The practice shows that there are several obstacles for wider development of wind energy sector in Lithuania:

- Long wind energy project pay back period. Due to the big upfront investment demand and increasing cost of wind power technology, the wind energy projects are financially unattractive.
- Based on the above mentioned reason the debt funding is complicated
- No financial support for wind electricity generation is foreseen under the EU structural funds or any other multilateral or bilateral sources.
- Tender rules for the grid connection in dedicated zones require a significant initial down-payment.
- Approval of dedicated zones means that only limited areas might be used for wind energy projects. Such reason influenced the rising of prices and scarcity of land for availability of such project development.
- There is insecurity regarding purchase of wind power when trading on hourly basis comes into effect after the establishment of the spot market. Lietuvos Energija has the right to disconnect the wind power park from the power network in case of the system overload.

Based on the above mentioned reasons the JI revenue has been considered since the early stages of development of Wind Power Farm in Buciai and Kadariai Villages Joint Implementation Project and is an integral part of financing the project. As explained in Step 2, the fixed price offered for wind power is not high enough to make the project activity financial viable. If the project developer will be able to sell the ERUs from the project activity, then the additional revenue from these sales would improve the financial viability and shall make the project more attractive.

Result: Pass

B.3. Description of how the definition of the project boundary is applied to the small-scale 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 project boundary is drawn around the physical boundary of the wind power farm (i.e. the wind turbines and generators) and the power plants of AB Lietuvos Elektrine, the power generation of which the wind power farm would replace. Other producers as well as consumers of electric power are not included into the project boundary due to the structure of Lithuanian power grid (see section B1).

The boundaries of the project are shown in Figure .

[12] http://www.laaif.lt/index.php?-383419492

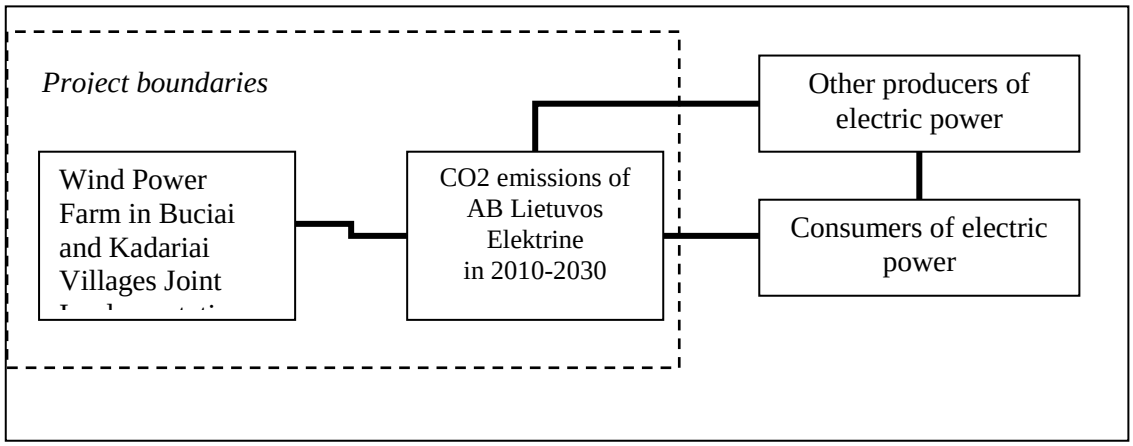

Figure 5 Project boundaries

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

Baseline Study date: 05.07.2011
Conducted by: UAB 4energia in cooperation with Nelja Energia OÜ and LHCarbon OÜ, Contact: UAB 4Energia Tel: +370 685 21249, e-mail: tadas.navickas@4energia.ee

SECTION C. Duration of the small-scale project / crediting period

C.1. Starting date of the project:

December 21, 2010 (signing of the contract for delivery of wind turbines)

C.2. Expected operational lifetime of the small-scale project:

20 years 0 months.

C.3. Length of the crediting period:

First crediting period: 1 year, 4 months (2011-2012).
Starting date: September 1, 2011.

Pending decisions on the framework for generation and transfer of emissions reduction credits post 2012, the project developer will seek the right to earn carbon credits for the post 2012 crediting period in addition to emission reductions units (ERUs) generated under the first commitment period of the Kyoto Protocol.

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.

D.2. Data to be monitored:

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)
1	EG_y – Net electricity supplied to the grid	Project proponent	kWh	Calculated; EGy = Esup - Econ Where: Esup = Electricity supplied to the grid by the project (kWh/year) Econ = Electricity consumed from the grid by the project (kWh/year).	Monthly	100%	Electronic and in paper form
2	Esup - Electricity supplied to the grid by the project	Deeds of transfer and acceptance from Lietuvos energija.	kWh	Measured. The data of commercial power meter on electricity supplied to the grid and double checked with receipt of sales and with the SCADA system as back-up	Monthly	100%	Electronic and in paper form
3	Econ - Electricity consumed from the grid by the project	Deeds of transfer and acceptance from Lietuvos energija.	kWh	Measured. The data of commercial power meter on electricity supplied to the grid and double checked with receipt of sales and with the SCADA system as back-up	Monthly	100%	Electronic and in paper form

The monitored data will be kept for two years after the end of the crediting period.

D.3. 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.
1. EG_y	Low. The accuracy of voltage measuring transformer at 110kV is 0,2%	Data will be directly measured with metering equipment at the connection point tothe national electricity transmission system operatorAB Litgrid (TSO) at the 110kV side of the transformer. A separate back-up meter will be installed.This equipment will be sealed, calibrated and checked periodically for accuracy. In addition, all metered data will be double checked with the readings of a separate power meters at the 20 kV side on transformer and with SCADA system as a back-up.
2. Esup	Low. The accuracy of voltage measuring transformer at 110 kV is 0,2%	Data will be directly measured with metering equipment at the connection point to the national electricity transmission system operatorAB Litgrid (TSO) at the 110 kV side of the transformer. A separate back-up meter will be installed. This equipment will be sealed, calibrated and checked periodically for accuracy. In addition, all metered data will be double checked with the readings of a separate power meters at the 20 kV side on transformer and with SCADA system as a back-up.
3. Econ	Low. The accuracy of voltage measuring transformer at 110 kV is 0,2%	Data will be directly measured with metering equipment at the connection point to the national electricity transmission system operatorAB Litgrid (TSO) at the 110 kV side of the transformer. A separate back-up meter will be installed. This equipment will be sealed, calibrated and checked periodically for accuracy. In addition, all metered data will be double checked with the readings of a separate power meters at the 20 kV side on transformer and with SCADA system as a back-up.

D.4. Please describe the operational and management structure that the small-scale project operator will apply in implementing the monitoring plan:

The basic guidelines of the Monitoring Plan are as follows:

The project proponent will measure only the net electricity output of the wind power farm. All other data has already been collected at the beginning of the project, and has been presented in the Baseline Study and PDD.

In order to ensure a successful operation of the project and the credibility and verifiability of the emission reductions (ERs) achieved, UAB Vejo Elektra and UAB Lariteksas recognize that the project must have a well defined management and operational system. The management and operation of the project is the responsibility of UAB Vejo Elektra and UAB Lariteksas i.e. ensuring the environmental credibility of the project through accurate and systematic monitoring of the project's implementation and operation for the purpose of achieving trustworthy ERs. UAB Vejo Elektra and UAB Lariteksas will outsource the daily monitoring and verification tasks to 4energia which will as earlier described also be responsible for operating the wind turbines.

Data handling and quality assurance:
Data will be entered on a monthly basis to the MS Excel worksheet on basis of information provided by the power purchaser AB Lietuvos energija and AB LITGRID (purchaser of the public obligation services (POS)) on kWh delivered to the grid on basis of the installed bi-directional power meter (incl. a back-up meter).
Litgrid issues electric power dispatch reports monthly and provides them for review and approval of UAB Vejo Elektra and UAB Lariteksas. On the basis of these reports Litgrid and Lietuvos energija issues invoices for purchased (by UAB Vejo Elektra and UAB Lariteksas) electricity. Recpectively UAB Vejo Elektra and UAB Lariteksas issues invoices for purchased (by Lietuvos Energija and Litgrid) electricity.Data will be double-checked with the readings of a separate power meters at the 20 kV side on transformer and the wind farm's SCADA system that will be calibrated with the meter. The power purchaser will also be asked to report on scheduled repair/replacement of the power meter.

UAB 4energia manager Tadas Navickas will be in charge of and accountable for the generation of ERs including monitoring, record keeping, computation of ERs and verification. He will officially sign-off on all monitoring reports that are prepared by UAB 4energia. Regular back-ups of the monitoring and SCADA databases will be made.

Reporting:
UAB Vejo Elektra and UAB Lariteksas in cooperation with UAB 4energia will prepare an annual monitoring report which will be provided to the verifier and if required also to the Lithuanian JI focal point on an regular basisfor verification of the generated emission reductions.

Training:
UAB 4energia will be responsible for initial and periodic operational staff training on the power accounting and control activities defined in the Monitoring Plan. Initial staff training will be provided by UAB 4energia before the project starts operating and generating ERs.

Corrective Actions:
UAB Vejo Elektra and UAB Lariteksas/UAB 4energia will periodically undertake performance reviews as part of its ongoing operation and management. Where corrective actions are required by the Lithuanian authorities or the verifiers, these will be acted upon within a reasonable timescale as dictated by relevant authorities.

Data collection:

ID number	Data variable	Responsible person	
		Name	Position and department
MP1	EGy – Net electricity supplied to the grid (kWh)	Tadas Navickas	Member of the Management Board

D.5. Name of person(s)/entity(ies) establishing the monitoring plan:

Tadas Navickas, UAB Vejo Elektra. UAB Vejo Elektra is a project participant as listed in Annex 1.

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions and formulae used in the estimation:

Wind power does not create any anthropogenic greenhouse gas emissions in operation, so project emissions are zero.

E.2. Estimated leakage and formulae used in the estimation, if applicable:

There are no direct or indirect emissions outside the project boundary attributable to the project activity.

E.3. Sum of E.1. and E.2.:

Since there are no leakages: E.1 + E.2 = E.1 (0)

E.4. Estimated baseline emissions and formulae used in the estimation:

Baseline emissions (BE) are calculated as following:

BE_y (tCO_2) = EG_y (MWh) x EF_y (tCO_2/MWh)
EG_y – Net electricity supplied to the grid
EF_y – Emission factor of the power plant of AB Lietuvos Elektrine

Please refer to Section B for detail on how the emission factor (0.626 tCO2e/MWh) is calculated.

	2011	2012	Σ 2008-2012
Baseline emissions (in t CO2e)	7,503	22,509	30,012

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

	2011	2012	Σ 2008-2012
Baseline emissions = Emission reductions (in t CO2e)	7,503	22,509	30,012

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

Year	Estimated project emissions (tonnes of CO2 equivalent)	Estimated leakage (tonnes of CO2 equivalent)	Estimated baseline emissions (tonnes of CO2 equivalent)	Estimated emission reductions (tonnes of CO2 equivalent)
Year 2011	0	0	7,503	7,503
Year 2012	0	0	22,509	22,509
Total (tonnes of CO2 equivalent)	0	0	30,012	30,012

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 Communication No (9.14.5.)-LV4-2625 of Klaipeda Regional Department of Environment Protection of Lithuanian Ministry of Environment of 26 May 2009, 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 Vejo Elektra and UAB Lariteksas* – installation and maintenance of wind power farm – is not required.

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

- In accordance with the Environment Ministry department of protectedareas letter No. V3-10.7-657, the planned economicactivities will not makea significantimpact onthe "Natura2000" sites,and in this respectis not requiredto carry outthe proposedEnvironmental ImpactAssessment.

- National Energy Strategy approved by the resolution No. X-1046 of Seimas of the Republic of Lithuania of January 18, 2007 (Official Gazette., 2007, No-11-430) 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 gathered.

- The planned economic activity will not result in pollution of any kind, will not be any waste generated, scarce natural resources will not be used. Electricity will be produced using alternative renewable wind energy resources.

- Intendedcompensationand environmentalmitigationmeasures:

  - To reduce the shading effects, wind turbines will be allocated so that shading to the closest homesteads caused by the rotor bladeswill be minimal.Based on thehomesteadowner's consent, it's is planned to plant the plants,that would obscure the wind turbines at the time whentheir shadowsare fallingat the homestead. Aftercompleting the shading simulation using the WindProprogram, it was determined that onlyonehomestead falls into the intense shading area. In order toreduce thezoneof intenseshading, windturbines that cause shadowing to the above mentioned homesteads, will beequippedwitha shading reducing mechanism, whichwill stop therotor bladerotation during intensesunhours.
  - In order toavoid the wind farm noise cause adverse environmental impact, the wind turbineswill belocated sothattheir noiselevel in the residentialarea does not exceed the maximumallowednoiselevels(55 dBA) during the night time. After performing the noise simulation using the WindPro program, it was determinedthatwind farm caused noise level, does not exceed allowablelimits. The sanitary zone for the wind farm will be set, where the wind turbinenoisewill not exceedthe permissiblenoiselevels.
  - Aswindpowergeneratorsare housed innacelles and aresufficientlyhigh above the ground, the electromagneticfieldstrengthwill have noimpact onthe environment as itwill not exceed thelimitand will be below 0.5kV /m.

- Given that there is a possibility of finding an unregistered cultural heritage in the planned land plots, the developer shall undertake archeological studies during the excavation work.

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 4.

Table 4 SO_2 and NO_x emission reductions

Pollutant	kg of pollutant/MWh	Amount of pollutant saved during the crediting period
SO_2	0.45	28.84 t
NO_x	0.95	60.88 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 farm project. Water is not used for technological purposes in the wind farm 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 finalized, the loam will be re-cultivated and planted according to projects plans in order to avoid soil erosion.

In case of wind farm liquidation after the forecasted operation time of the project it is planned to dismantle all wind farm 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

The planned wind farm 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 farms 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 farm can disturb natural wildlife. However, the wind planned wind farm 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 farm 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 farm. 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 farm (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 is mounted at 100 m height from the surface in metal, connected to earth baskets, which perform as electromagnetic shields. Zone of electromagnetic impact is not present in wind farm territory or in neighbouring areas.

Noise

The noise modeling study of the Buciai - Kadariai wind farm was made for so called sanitary area of 350 m around the wind park in pursuance to Lithuanian Hygiene Code HN 33-2003 Acoustic Noise – "Allowable Levels in the Residential and Working Environment. General Requirements for Noise Measurements". The study shows that the allowed 55dB noise level was calculated in a distance from wind turbines which is several times less than distance to the nearest residential house.

Visual impact

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

Also, wind power plants, like all tall buildings cast shadow on the neighboring areas when the sun is visible. It may also cause a blinking effect due to rotation of wind turbine wings. The shadow effect is not relevant for the project as the closest living areas are located beyond 350 m from the wind turbines, except in case of one wind turbine (VJ7) where the closest house is located at a 320 m distance. An agreement has been reached with the house owner to install the wind turbine and if necessary shadow control function can be used for the wind turbine in order to avoid the shadow effect on the house.

Transboundary impact

Due to location of the wind farm in the territory of the Republic of Lithuania and at minimum 20 km distance from the land border of the closest neighboring country (Russia) the wind farm will have no transboundary impacts.

F.2. If environmental impacts are considered significant by the project participants or the host Party, provision of 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:

Compulsory public consultation procedure, that gives opportunity to all stakeholders to participate in decision making procedure, has been undertaken during detailed planning. Information about the start of the detailed planning process has been announced in the local press on the 06-04-2009. No remarks or proposals have been received.

All information on the proposed solutions of the detailed plan has been made public during the period 09/09/2009-07/10/2009. Also date and venue of the stakeholders meeting has been announced in the local newspaper on 10-09-2009.
The stakeholder meeting has been held 08/10/2009 in Silale municipality premises. 8 participants have registered to the meeting. No remarks or suggestion have been rised during the meeting so the detailed plan proceeded with further approvals.
The information about the public hearings of the detailed plan is a part of the detailed planning process and the documents are available for check if needed.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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