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

CONTENTS

SECTION A. General description of the small-scale project

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

Liepynes Wind Power Park Joint Implementation Project
The sectoral scope - (1) Energy industries (renewable/non-renewable sources)
PDD version 02
16 April 2009

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

Situation existing prior to the starting date of the Project

The renewable electricity produced by the wind power plants would displace carbon intensive electricity produced from fossil fuel sources in the Lithuanian power network. Lithuanian electric power network is being operated by national grid operator - 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 few time lower prices. 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.

Currently only two wind energy parks (Rudaiciai and Benaciai) with total capacity 46MW and several individual wind turbines with total capacity 6,4 MW are under operation in Lithuania. The total installed capacity is 52,3 MW[1].

The proposed JI Project supports Lithuania's objective to increase the share of renewable electricity from current ca. 3,8% to 7% by year 2010.

Baseline scenario

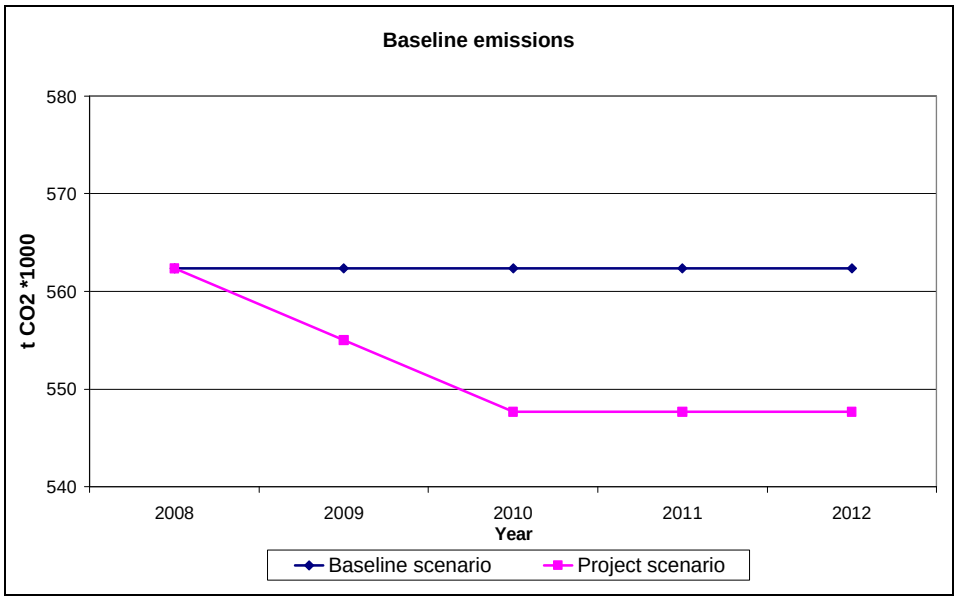
It was calculated that AB Lietuvos Elektrine, by generating 1 MWh of electric power, contributes to the pollution of atmosphere with 0,626 tones of CO2 (See chapter B.1.). In accordance to the baseline scenario, electric power is produced only by AB Lietuvos Elektrine with its average annual emission 562354 tCO2.

Project scenario

Liepynes wind power park would displace carbon intensive electricity produced from fossil fuel sources in the AB Lietuvos Elektrine. It is foreseen to install 6 wind power plants with the total capacity of 9,13MW (2MW x 4, 0,8MW x 1, 0,33MW x 1). Wind turbines Power Park will be manufactured, installed, adjusted and set into action by Enercon GmbH staff. After Wind Park's commissioning it is planed to sign additional agreement on turbines maintenance between companies.

The Wind power park, in a conservative approach, will generate about 24,2 GWh of electric power per year. Such wind park's generation will lead 14711 tCO2/year emission reductions on AB Lietuvos Elektrine side (1 figure).

[1] Data of Lithuanian wind energy association www.lwea.eu 2009 03 23



1 Figure. Baseline and Project scenario comparison

History of the Project

Current Project stage – technical designing (selection of contractors).

Company Vejo gusis, UAB launched of Project activities on 12.12.2006 from board decision on preparation business plan for Project development including with JI project development. During business plan preparation it was explored suitable for wind energy sites, analyzed different types of wind turbines technology use possibilities, visited few turbine manufacturers, analyzed project financing prospective and sources, introduced with JI scheme, solved other related questions. After preparation of business plan it was decided to develop wind energy project nearby Liepynes village (Kretingos district).

Following actions were related with detailed planning, technical designing, and project financing procurement. It was agreed on project financing (local banks), signed contracts on turbine delivery (with Enercon Gmbh), and finalized detail planning procedures. Now the technical design is under finalization and selection of contractors for different constructional works was undertaken.

The timing on all project stages is indicated into Table 3 and Table 4.

A.3. Project participants:

Joint Implementation (JI) project cycle requires to have Host party and Investor party. The Liepynes Wind Power Park Joint Implementation Project's Host party is Lithuania while Investor party – the Netherlands. Information on parties, participating into Project is provided into Table 1.

Table 1. Project participants

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

The Netherlands (Investor party)	Ecocom BG, LTD	No

The Host party company Vejo gusis, UAB was established particularly for implementation of this wind power park project development in Lithuania as pilot project.

Investor party represents company Ecocom BG Ltd that intends to purchase Project Emission Reduction Units. Company Ecocom BG Ltd activities are related with energy efficiency, environmental protection projects development.

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.:

Kretingos district

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

Liepynes village

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

Liepynes wind power park is located in Kretingos district near of village Liepyne.

The park is located approx. 6 km from Baltic Sea. Territory is on open space from all sides without near obstacles. The surrounding areas are used mainly for rural purposes. The closest living area (grange) is 227 m away from the wind power park place. The nearest forest is over 1,5 km from northeast side. Dominant winds are from west and northwest directions. This place may be characterized as high wind speed and windy.

The wind park territory (48 ha) belongs exclusively for Vejo gusis, UAB. Wind power park's connection point will be existing 110/20 kV transformer substation (belongs for Veju spektras, UAB).

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.

Detailed layout of wind turbines is based on Riso laboratory date on area wind speed *(Baltic wind atlas)*. The wind speed data from closely located Rudaiciai wind power park turbines (located over 6,5 km) were used as well. Those turbines have integrated measurement equipment that gives possibility to have real wind data at anytime. The calculations on wind speed parameters were done by German company Enercon GmbH (wind turbine producer).

Project will be implemented in western part of Lithuania, Kretinga district, near village Liepyne (Figures 2-4.).

Figure 2. Location of Liepynes wind power park project-1

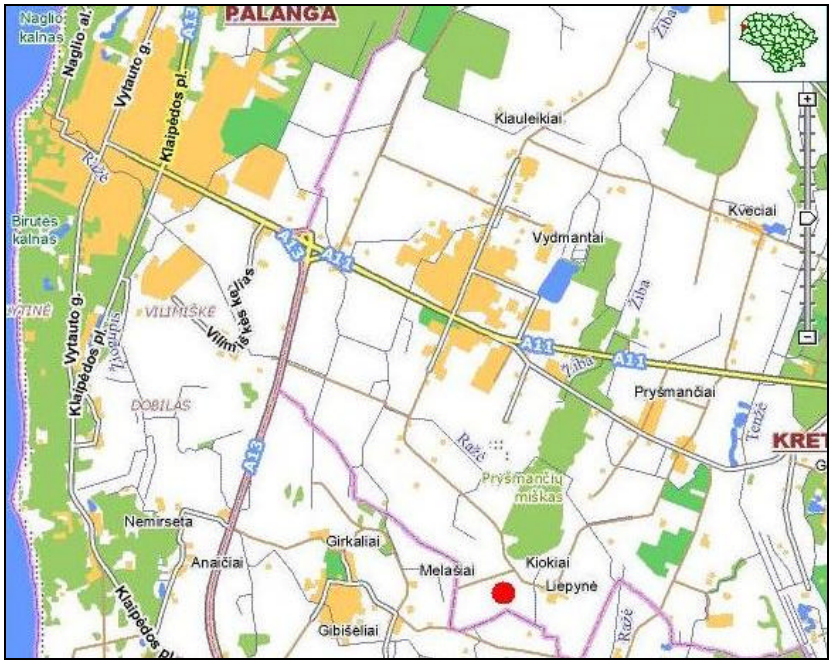


Figure 3. Location of Liepynes wind power park project-2

Detailed layout of Liepynes wind power park territory is shown in Figure 3.

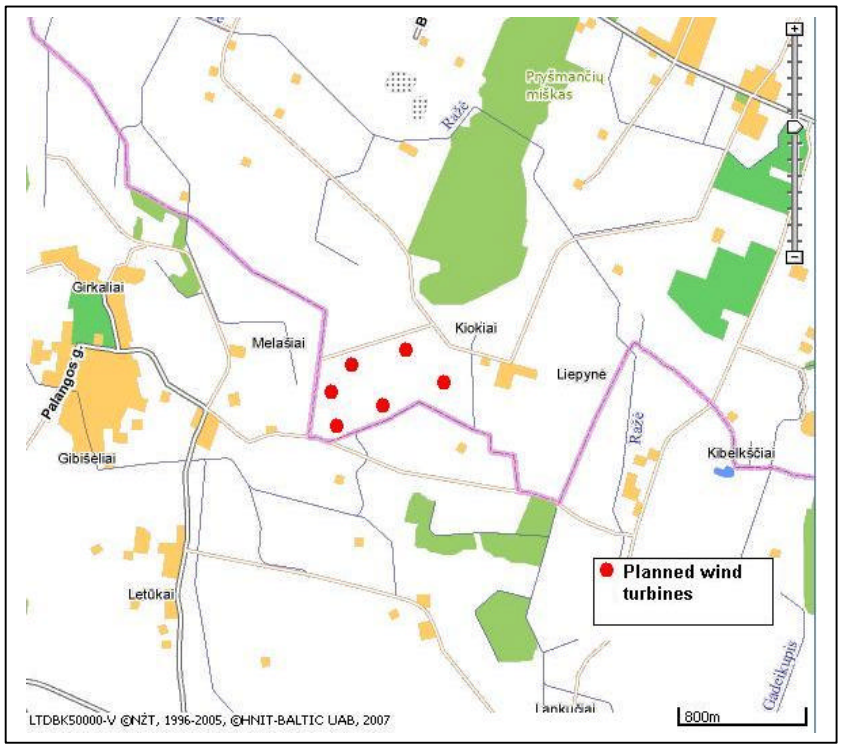


Figure 4. Detailed layout of Liepynes wind power park project

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 the following turbines, manufactured by German company Enercon GmbH: 4 x E82 (2.0 MW), 1 x E53 (0.8 MW), 1 x E33 (0.33 MW) in Liepynes village (total 9.13 MW)

Main technical data of the turbines is presented in **Error! Reference source not found.**.

Table 2. Technical parameters of the wind turbines

Type of wind turbine	E-82	E-53	E-33
Capacity, kW	2000	800	330
Rotor diameter, m	82	53	33,4
Rotor‘s rotation direction	Clockwise	Clockwise	Clockwise
Blade number	3	3	3
Total power plant height, m	78,3	99,7	57,7
Wight of power plant, t	336	85	18,7
Tower diameter at ground, m	4,6	4,5	4,5
Hub height, m	78,3	73,3	49,9
Cut-in wind speed	2,5 m/s	2,5 m/s	3,0 m/s

According to Enercon calculations Liepynes wind power park should generate about 24,2 GWh electric power per year. Wind power park’s connection point will be existing 110/20 kV transformer substation (belongs for Veju spektras, UAB). Wind turbines will be manufactured, installed, adjusted and

set into action by Enercon GmbH staff. After Wind Park's commissioning it is planed to sign additional agreement on turbines maintenance between companies.

A project implementation schedule is presented in Table 3.

Table 3. Project implementation schedule.

Project stage	Works period, day	Deadline
Start of Project activities (decision of the board on preparation business plan for Project development including JI consideration)	Done	12 12 2006
Business plan preparation	Done	02 02 2007
Reception of LoE	Done	27 02 2009
Technical design	90	04 2009
Reception of LoA	150	05 2009
Building of roads	90	06 2009
Constructional works	150	06 2009
Transportation of wind turbines	150	05-06 2009
Installation of wind turbines	60	03-09 2009
Installation of substation	90	03 2009
Laying down the power cables	60	05 2009
Final Determination	90	07-08 2009
Start-up works*	60	07-08 2009

* Planned wind turbines start-up time: 1st, 2nd ,3rd and 4th – 07 2009, 5th and 6th – 08 2009.

The obtained permits on wind power park erection are presented in table 4.

Table 4. The obtained permits on wind power park erection

No.	Permit/license	Date of issuance:	Valid before:
1.	Permit to enhance the energy generation capacity No. LP-0181	21 03 2007	21 09 2009 (may be extended for 6 month)
2.	Detailed plan on wind park and substation location	31 10 2008	term less
3.	Constructional permit on wind turbines and substation erection	Planned till 31 04 2009	-

Based on wind measurement results Project's power production forecast was performed by staff of company Enercon – 24226 MWh/year. It is assumed that transmission and conversion losses usually compose about 3% from energy production level, thus prognosis on energy output supplied into national grid was reduced by this value (Table 5).

Table 5. Enercon's forecast on Liepynes wind power park power production

Project	Energy output, MWh/year

Liepynes wind power park	23499

The approach on 23499 MWh/year power production will be used in Liepynes project further calculations.

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 plants 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 0,626 tones of CO2.

The chapter B.1. describe baseline calculation details. The chapter B.2. includes estimation of the GHG emission reductions of the JI Project which have been calculated conservatively on basis of the above carbon emission factor of 0,626 tCO2e/MWh and the expected power production.

The proposed JI Project supports Lithuania's objective to increase the share of renewable electricity from current ca. 3,8%[2] to 7% by year 2010[3]. To comply with this undertaking Lithuania would need to achieve 450 GWh electricity production from renewable energy sources and mainly from wind energy. This would amount to ca. 200 MW of installed wind power capacity.

The Law of the Republic of Lithuania on Energy 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 Rules for Imposing the Public Interest Service Obligations provide that supply license holders are under the obligation to buy up electricity generated by producers (connected to the transmission system) by using renewable and spare energy resources, and to sell it to their customers.

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). Such a feed-in tariff is expected to remain until year 2020. In order to obtain the mentioned feed-in tariff the wind power plant must be built in one of the six zones for which tenders for grid connection are organized by Lietuvos Energija 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 (e.g. Rudaiciai wind power plant of UAB Veju Spektras) 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-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.

[2] Official edition "Lietuvos energetika" year 2007

[3] COM 2001/77/EC: Directive on Electricity Production from Renewable Energy Sources

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

Table 6. Estimated emission reductions

Crediting period	**3 years and 6 months**
Year	**Estimate of annual emission reductions in tones of CO2 equivalent**
2009	6025
2010	14711
2011	14711
2012	14711
Total estimated emission reductions over the crediting period (tones of CO2 equivalent)	**50157**
Annual average of estimated emission reductions over the crediting period (tones of CO2 equivalent)	12539

After year 2012 by following year estimated annual emission reduction – 14711 tones of CO2 equivalent.

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

The Liepynes Wind Power JI Project with a combined capacity of 9,13 MW(e) is not a debundled component of a larger project due to the following reasons:
- The project boundaries of all existing wind power parks in Lithuania is different (including the nearest wind power park project developed by UAB Veju spektras which is located at distance of 6,5 km from the Project boundary of the proposed JI Project (at the closest point));
- All existing large wind parks in Lithuania are covered under JI scheme already;
- The project owners of large wind power parks that are under operation in Lithuania 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) was issued on 31.03.2009 No.(10-7)-D8-2753.

According to national Joint Implementation Project development rules, the final Project approval or Letter of Approval might be issued only after draft Project determination report submission to Lithuanian DFP.

SECTION B. Baseline

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

Baseline - the amount of GHG that would be emitted to the atmosphere during the crediting period of the project, i.e. in 2009-2012, in case the Project was not implemented.

According BASREC Regional Handbook on Procedures for Joint Implementation in the Baltic Sea Region (Version 3 – June 2007) currently there are no approved methods for developing JI baselines, and baselines can be developed either on the project specific basis or on a more standardized basis. It states that a baseline shall be established:

- On a project-specific basis and/or using a multi-project emissions factor;
- In a transparent manner with regard to the choice of approaches, assumptions, methodologies, parameters, data sources and key factors;
- Taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector;
- In such a way that ERUs cannot be earned for decreases in activity levels outside the project or due to force majeure; and
- 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 (tonne CO_2 per MWh of electricity).

The country's baseline methodology was developed by consulting company COWI Baltic (2006) and it was used by Lithuanian Environment Ministry as baseline scenario and with baseline emissions factor in field JI during National Allocation Plan (NAP) preparation for First commitment period (2008-2012). The European Commission that supervised NAP didn't rejected country's baseline methodology. The NAP indicates that Lithuanian baseline emissions factor is 0,626 tCO2/MWhe and it should be used for all home country's JI projects.

Based on this Baseline methodology the JI PDD of Rudaiciai Wind Power Park (Reg. No. 0025) was developed. The used methodology was approved by AIE (issued final Determination report) and national DNA when the LoA was issued on 05 04 2007. JI PDD of Rudaiciai Wind Power Park project was published at the UNFCCC website during the Global Stakeholder Process (11 Jan 2007 – 09 Feb 2007) but no comments were received. This project passed final Determination at JISC as well.

The Baseline methodology is calculated referring to historic data as this method is best suited for Lithuanian power market. Approved CDM ACM0002 methodology is not used for the baseline calculation due to the following reasons:

- Lietuvos Elektrine, power plant with the second largest installed capacity in Lithuania (after Ignalina nuclear power plant –INPP) is operating on the power gird as a marginal plant. It covers all power demand which is remaining after all other power producers have supplied their quota

power to the grid. Hence, by simply including all these power plants operating on the grid (excl. INPP) would bias the Operating Margin emissions factor.

- 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.

The used Baseline methodology is described below.

GHG emissions from production of electric power depend on type of fuel used and the efficiency of installations in which fuel is combusted. Thus, for baseline calculation it is important to know which power plants will reduce production due to the supply of additional electric power, generated in a JI project. This can be easily determined knowing the structure of Lithuanian power network. When the manufacturers of electric power supply all quota power to integrated Lithuanian power grid, the rest of power demand is covered by power produced in Lietuvos elektrine (Lithuanian Power Plant). Taking this into consideration, we can say that in case of additional power supply to the grid, the production will be reduced in Lietuvos elektrine. Therefore, in order to calculate GHG emission reductions, resulting from implementation of JI projects related to production of electric power, it is necessary to know the amount of CO2 released to the atmosphere while producing 1 MWh of electric power in Lietuvos elektrine.

For determination of the baseline it was used fuel consumption and production efficiency data as well as production of electric and thermal power in Lietuvos elektrine during 2002-2005[4] (Table 7).

Table 7. Energy production and fuel consumption in Lietuvos elektrine

Year	Electric power produced (MWh)	Thermal power produced (MWh)	Natural gas (1000nm3)	Fuel oil (t)	Orimulsion (t)
2002	736604	202060	199104	7355	52534
2003	723858	195553	225813	5241	21238
2004	745372	212399	207690	2750	55501
2005	1072814	199383	280559	1815	86160

The amount of fuel consumed is transferred to tons oil equivalent (toe) using such factors: natural gas – 0,800 toe/1000nm3, fuel oil – 0,955 toe/t, orimulsion – 0,660 toe/t (Table 8).

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

Year	Natural gas (toe)	Fuel oil (toe)	Orimulsion (toe)
2002	159289	7025	34675
2003	180657	5005	14018
2004	166158	2626	36633
2005	224455	1733	56869

Hereafter, we calculate the percentage of each type of fuel, being consumed in every year (Table 9).

Table 9. 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%

[4] Official edition “Lietuvos energetika“ year 2002-2005

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 D-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), CO2 emission factors are estimated for fuel, expressed in tones of oil equivalents (Table 10).

Table 10. CO2 emission factors

Natural gas	Fuel oil	Orimulsion
1.8960531 tCO2/1000 nm3	3,1028478 tCO2/t	2,2268399 tCO2/t
0,80002867 toe/1000 nm3	0,955065574 toe/t	0,660041566 toe/t
2,369981446 tCO2/toe	3,24883221 tCO2/toe (EF_{HFO})	3,373787295 tCO2/toe (EF_{Orm})

Total annual amount of CO2 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 tCO2/toe (see Table 11).

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

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} - CO2 emission factor for Natural gas, tCO2/toe
EF_{HFO} - CO2 emission factor for Heavy fuel oil,, tCO2/toe
EF_{Orm} - CO2 emission factor for Orimulsion, tCO2/toe

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

Table 11. Fuel specific CO2 emissions at Lietuvos elektine

Year	Natural gas, tCO2	Fuel oil, tCO2	Orimulsion, tCO2	Total: tCO2
2002	377512	22821	116985	517318
2003	428153	16262	47294	491709
2004	393791	8533	123592	525916
2005	531955	5632	191865	729451

Amount of CO2 emissions, released while producing thermal power in Lietuvos elektrine, is calculated as follows:

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

H_{CO2} – CO2 emissions, generated while producing thermal power;
H_{LE} – Annual amount of thermal power produced;
E_h - Average efficiency of thermal power production in Lithuania.(In 2002-2005 average thermal power

production efficiency rate among power production units, participating in EU ETS trading scheme, was 84,7%);
K_{toe} – Coefficient for transfer of thermal power to conditional fuel (toe - tones of oil equivalent). It is equal to 11.63;
$R_{\%}$ - Percentage of each type of fuel within the annual fuel consumption;
$K_{tCO2/toe}$ – Emission factor for one unit of conditional fuel (toe - tones of oil equivalent) of different fuel types.

Results of measurements are presented in Table 12.

Table 12. Emissions attributable to thermal power production at Lietuvos elektrine

Year	Natural gas, tCO2	Fuel oil, tCO2	Orimulsion, tCO2	CO2 emissions, (t)
2002	38528	2329	11939	52796
2003	42566	1617	4702	48885
2004	41335	896	12973	55204
2005	38039	403	13720	52161

CO2 emissions released for production of electric power are calculated by deducting the amount of CO2 attributable to heat production from the total CO2 amount released by Lietuvos elektrine.

$$P_{CO2} = T_{CO2} – H_{CO2}$$

P_{CO2} – annual CO2 emissions attributable to power production at Lietuvos elektrine, tCO2
T_{CO2} - total annual amount of CO2 emitted by Lietuvos elektrine;
H_{CO2} – annual CO2 emissions attributable to heat production at Lietuvos elektrine, tCO2

To calculate emissions factor, CO2 emissions attributable to power production were divided by annual power production. The results are presented in Table 13.

Table 13. Emissions attributable to power production at Lietuvos elektrine

Year	Power production, MWhe	Emissions, tCO2	tCO2/MWhe
2002	736604	464522	0,631
2003	723858	442824	0,612
2004	745372	470712	0,632
2005	1072814	677290	0,631
Average:	**819662**	**513837**	**0,626**

To evaluate the correctness of the results obtained, we compared them to the results obtained and provided by AB Lietuvos Elektrine. Calculations made by the technicians of AB Lietuvos Elektrine gave such results: 0,667 tCO2/MWhe for 2005 and 0,726 tCO2/MWhe for the period before 2012 forecast.

To evaluate our results even further, we have considered the data for consumption of conditional fuel per 1 MWh of heat energy produced, presented by AB Lietuvos Elektrine. These figures were obtained by using an internal enterprise's methodology and are presented in Table 14.

Table 14. Consumption of conditional fuel to produce 1 MWh of heat energy at Lietuvos elektrine

Year	tce/MWhe

2002	0,136
2003	0,141
2004	0,141
2005	0,140

Fuel consumption was transferred to the efficiency of thermal power production (Table 15).

Table 15. Efficiency of thermal power production at Lietuvos elektrine

Year	Efficiency of thermal power production
2002	90,5%
2003	87,1%
2004	87,1%
2005	87,6%
Average:	**88,1%**

As it can be seen from the table, the average thermal power production efficiency rate in "Lietuvos elektrine" is 88,1%. If using thermal power production efficiency rate of 88,1% in our formula, CO2 baseline factor would be equal to 0,629 tCO2/MWhe.

Considering the calculation results that were presented by AB Lietuvos Elektrine it is possible to draw the conclusion that using emissions factor of 0,626 tCO2/MWhe (described previously) would represent a conservative approach to the baseline as it would result in fewer CO2 reductions compared to the one calculated by AB Lietuvos Elektrine methodology.

Hence, the current emissions factor – 0,626 tCO2/MWhe is considered to be conservative and will be used to calculate CO2 reductions from Liepynes Wind Power JI Project.

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Key information and data used to establish the baseline scenario:

Data/Parameter	Energy production at AB Lietuvos elektine side
Data unit	GWh
Description	Energy generation from fossil fuel
Time of determination/monitoring	Period 2003-2005
Source of data (to be) used	Official edition "Lietuvos energetika", JI PDD of Rudaiciai Wind Power Park (Reg. No. 0025), Lithuanian National allocation plan 2008-2012 (18.04.2007 version)
Value of data applied (for ex ante calculations/determinations)	See Table 7 and Table 13
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Historical official statistical data on AB Lietuvos elektine power output
QA/QC procedures (to be) applied	Used official public available data
Any comment	

Key information and data used to establish the baseline scenario:

Data/Parameter	Fuel consumption at AB Lietuvos elektine side
Data unit	tons, 1000nm3
Description	Natural gas, fuel oil, orimulsion
Time of determination/monitoring	Period 2002-2005

Source of data (to be) used	JI PDD of Rudaiciai Wind Power Park (Reg. No. 0025), Lithuanian National allocation plan 2008-2012 (18.04.2007 version)
Value of data applied (for ex ante calculations/determinations)	See Table 7
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Historical statistical data on AB Lietuvos elektine fuel consumption
QA/QC procedures (to be) applied	Used official public available data
Any comment	

Key information and data used to establish the baseline scenario:

Data/Parameter	CO_2 emissions
Data unit	tonne CO_2 per MWh
Description	Emissions from fossil fuel burning
Time of determination/monitoring	Period 2003-2005
Source of data (to be) used	JI PDD of Rudaiciai Wind Power Park (Reg.No.0025) Lithuanian National allocation plan 2008-2012 (18.04.2007 version)
Value of data applied (for 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	Average annual CO_2 emissions
QA/QC procedures (to be) applied	Used official public available data
Any comment	Described baseline methodology principles are used for all known such type Lithuanian JI projects

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:

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 income from ERU's sale help to promote their development and implementation. This economic promotion also reduces project's payback time.

Additionality of the Liepynes Wind Power project is proven using the *version 05.2* 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 24,2 GWh the wind farm of the proposed JI Project would thus reduce CO2 emissions annually by 14711 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.

The alternative's A development might be considered due to promotion of renewable energy sources use according national legislation. The Lithuania has obligation against EU to increase the share of renewable electricity from current 3,8% to 7% by year 2010[5]. To comply with this undertaking Lithuania would need to achieve ca. 450 GWh electricity production only from renewable energy sources and the wind is first priority. In order to give incentives for business of wind energy parks, the government has issued legislation regulating the obligatory purchase of wind power electricity for fixed feed-in tariff 0,30 LTL per kWh i.e. 8,69 EUR cents per kWh (1 EUR = 3,4528 LTL). Unfortunately the set feed-in tariff is not sufficient to realize the proposed project on a commercial basis. Additional income from the sale of ERUs under the Kyoto Joint Implementation scheme is thus required to turn the project attractive for the investors. It means that Alternative's A development is fully eligible but project payback time without carbon credit revenues become longer (the IRR of the project without ERUs revenues is lower).

The alternative's B development might be considered based on the fact that wind energy projects still are low financial attractive and with long payback period. Usually the power from the wind energy is more expensive comparison with other renewable energy sources (biomass, geothermal, hydro), and it means that expansion of wind energy generation will take negative impact for end users power price (increase of tariff for inhabitants and industry consumers). Furthermore the wind energy power generation is not stable and other generation capacity reserve is necessary always. Such facts influence small support from state side. The state's obligation on 7% "green energy" generation before 2010 might be achieved by supporting usage of biomass and small and medium scale cogeneration (expansion of CHP). The current legislation supports biomass and cogeneration usage. Moreover EU structural funds are available for new cogeneration plants but not for wind power projects in Lithuania. The practice shows that biomass or cogeneration projects has higher IRR and are more financial attractive. It means that Alternative's B development is fully eligible as well.

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.

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 power price differ on a case by case basis.

[5] Communication from the Commission to the Council and the European Parliament. Green Paper follow-up action. Report on progress in renewable electricity. Brussels, 10.1.2007, p.8

The *investment comparison analysis (option II)* will be used for Liepynes wind power park project as it is the only applicable method.

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

IRR (Internal Rate of Return), as the most common financial feasibility indicator will be used for investment comparison analysis. IRR estimates the discount rate used in order to obtain NPV (Net Present Value) equal to 0. IRR is commonly calculated on total investment (disregarding capital structure and depreciation rate) to compare the project with similar projects or on the equity part of investment, which is relevant indicator for investors.

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

According to project investments (52,2 mill.Lt with VAT), planed power generation amount (23,5 GWh/year) and the feed in tariff of 0,30 Lt/kWh it was calculated Liepynes wind power park project's IRR – **5,89%** (without revenue from ERUs sale) (Alternative A).

Additional revenues from ERUs sale during crediting period increasing IRR of Liepynes wind energy park project up to **6,11%** (when ERU sale price is 10€).

For comparison – the average IRR of 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 example (Panevezys CHP) where the project IRR is **16,2%**[6] (Alternative B).

Sub-step 2d. Sensitivity analysis

The Liepynes wind power park project's IRR sensitivity analysis depending on variable power production and ERU sale price is presented in the Tables 16-17.

Table 16. Project IRR variation depending from power production

Production margin	-10%	-5%	0%	5%	10%
Power production, MWh/year	21149	22324	23499	24674	25849
Project IRR (excl. ERUs)	4,96	5,43	5,89	6,34	6,77

Table 17. Project IRR variation depending from ERUs sale price

ERUs sale margin	-20%	-10%	0%	10%	20%
Price of ERUs, €	8,00	9,00	10,00	11,00	12,00
Project IRR (incl. ERUs)	6,07	6,09	6,11	6,12	6,14

The sensitivity analysis shows that the annual power production is crucial factor for project economic. Furthermore the power production is variable and depends from on site wind conditions and

[6] UNFCCC webpage, JI Project - Rudaiciai wind power park, PDDs supporting documentation Enclosure3 – IRR for cogeneration plant Panevezys

wind turbines technical characteristics. The used power generation approach gives for project the capacity factor – 29,4%, that is average result in practice (25-30%)[7]. It means that probability that project financial figures may vary into negative side is higher then into positive side and it shall make Project less financially attractive than is assumed.

The additional revenue from ERUs sale gives more attractiveness and gives positive impact for Project additionallity. The ERUs sale price was estimated based on "carbon credits" market overview.

The sensitivity analysis confirms the fact that the project is not enough financially attractive and revenues from ERUs sale gives the chance to improve its financial figures. Moreover even Liepynes wind power park project will generate 10% more electricity and ERUs revenues shall be based on 12,00 Euro level that shall be lower result in comparison with Alternative's B IRR (7,02% < 16,02%).

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 the proposed CDM project activity is unlikely to be the most financially attractive (as per step 2c para 8a) or is unlikely to be financially attractive (as per step 2c para 8b), 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 only two wind energy parks (Rudaiciai and Benaciai) with total capacity 46MW and several individual wind turbines with total capacity 6,4 MW are under operation in Lithuania. The total installed capacity is 52,3 MW[8]. The Liepynes wind energy park is not related with existing energy parks and will be developed individually. Based on the publications in the press during erection of existing wind energy parks the different legal, social, economical and technological problems raised and that has negative impact on widen wind energy projects development.

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

The practice shows that there are several main obstacles which have negative impact on widen project development in wind energy sector in Lithuania:

- Long wind energy projects pay back period. Due to big investments demand and constantly raising of prices of wind turbines (for ex. the Enercon turbines prices up approx. by 30% during last two years), raw materials (steel), civil works wages) the wind energy projects still are financially unattractive.
- Based on above mentioned reason the debt funding is complicated (the annual rate is increasing due to instable world economic situation).
- No financial support for wind electricity generation is foreseen under the EU structural funds or any other multilateral or bilateral sources.
- Tender rules for grid connection in dedicated zones require a significant initial down-payment.

[7] The capacity factor calculation http://www.windpower.org/en/tour/wres/annu.htm

[8] Data of Lithuanian wind energy association www.lwea.eu 2009 03 23

- Approval of dedicated zones means that only limited land areas might be used for wind energy projects. Such reason influenced the strong rising of prices and scarcity of land for availability of such projects development;
- The know-how related to wind power technology and such kind of project implementation is still limited;
- There is insecurity regarding purchase of wind power when trading on hourly basis comes into effect after the establishment of the spot market. AB "Lietuvos energija" has the right to disconnect the wind power-plant park from the power network in case of the system overload.

Based on above mentioned reasons the JI revenue has been considered since the early stages of development of Liepynes wind power park 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 make the project more attractive.

The first two wind farms (Rudaiciai and Benaiciai) were developed as JI projects as well. Unfortunately the economical figures from those projects aren't' available publicly.

Moreover, the fact that during last two years no more wind parks were erected proves the fact that wind energy Projects aren't financially attractive and face with different barriers.

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 plants (i.e. the wind turbines and generators) and the power plants of AB Lietuvos Elektrine, the power generation of which the wind power plants would replace. Other producers as well as consumers of electric power are not included into project boundary due to the structure of Lithuanian power grid (see section B1).

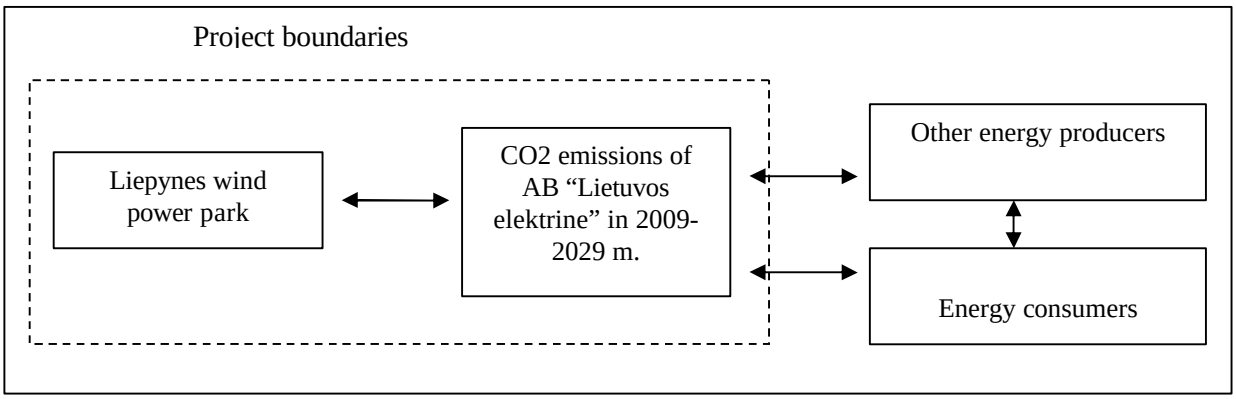

Figure 4. Project boundaries

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

Date of Baseline setting: 06 April 2009
Prepared by: UAB „Vejo gusis“ (Project participant), represented by CEO Egidijus Simutis Tel/Fax. +370 441 47772 E-mail. es@nemo.lt

The baseline methodology was developed by consulting company COWI Baltic. Based on this baseline methodology the few wind power parks JI project were developed and published at the UNFCCC website. Two projects passed final Determination at JISC already (under Track 2).

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

C.1. Starting date of the small-scale project:

The Liepynes Wind Power Park's energy generation is planed from July 2009.

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

Planned operational lifetime of wind power park is 20 years (2009-2029).

C.3. Length of the crediting period:

The starting date of the crediting period is set to 20st July, 2009. First crediting period consist 3 years and 6 months (2009–2012).

In case of additional international treaties between the parties of Kyoto protocol are signed, the crediting period may be extended for additional internationally agreed period.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

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

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

The monitoring plan is attached as the Annex 3.

It was calculated that AB Lietuvos Elektrine, by generating 1 MWh of electric power, contributes to the pollution of atmosphere with 0,626 tones of CO2 (see chapter B.1.). In accordance to the baseline scenario Liepynes wind power park would displace carbon intensive electricity produced from fossil fuel sources in the AB Lietuvos Elektrine. Baseline emissions will be monitored using the following formulae.

$ER = E_{VP} \times EF_{LE}$

Where:
ER - emission reductions, tCO2
E_{VP} – net power dispatched to the grid from Liepynes wind power park (difference between supplied into grid power and consumed from the grid power), kWh
EF_{LE} – emission factor for power production at Lietuvos elektrine, 0,626 tCO2/MWh

See baseline study and methodology for detail on how EF_{LE} is calculated (B.1.)

D.2. Data to be monitored:

Key information and data used for monitoring plan setup:

Data/Parameter	E_{VP}
Data unit	MWhe
Description	Net power dispatched to the grid from Liepynes wind power park (difference between supplied into grid power and consumed from the grid power)
Time of determination/monitoring	Per certain period (for ex. per year)
Source of data (to be) used	Invoices from AB Lietuvos energija
Value of data applied (for ex ante calculations/determinations)	-
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Data will be aggregated monthly (yearly) and double checked with receipt of sales, with the SCADA system as back-up
QA/QC procedures (to be) applied	The data reading from commercial power metering devices will be executed remotely by SCADA. The installed current and voltage transformers will be certified and inspected by accredited companies (for ex. Lithuania and Germany Ltd. FESLA which has calibration and testing laboratory). Commercial power metering devices will be installed and under operation from AB Lietuvos energija side. This company will carry out its periodical supervision, calibration and maintenance. Additional power metering device will be installed on back up line – to be able control power consumption for own purposes from low voltage grid (0,4kV) that is under operation from AB VST side. This company will carry out periodical supervision, calibration and maintenance of low voltage metering device.
Any comment	Data on wind park production will be publicly available at Lietuvos energija website

Key information and data used for monitoring plan setup:

Data/Parameter	ER
Data unit	tCO2
Description	Emission reduction
Time of determination/monitoring	Per certain period (for ex. per year)
Source of data (to be) used	Invoices from AB Lietuvos energija
Value of data applied	0,626 tCO2/MWhe

(for ex ante calculations/determinations)	
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Calculations based on baseline emissions (B.1.)
QA/QC procedures (to be) applied	Public data sources
Any comment	

Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), and that are available already at the stage of determination regarding the PDD:
EF_{LE} – emission factor for power production at Lietuvos elektrine, 0,626tCO2/MWh

Data and parameters that are not monitored throughout the crediting period, but are determined only once (and thus remain fixed throughout the crediting period), but that are not already available at the stage of determination regarding the PDD:
None

Data and parameters that are monitored throughout the crediting period:
E_{VP} – net power dispatched to the grid from Liepynes wind power park (difference between supplied into grid power and consumed from the grid power), kWh

The monitoring plan is attached as the Annex 3

D.3. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:

Table 18. 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.
Evp	*Low*	Data will be directly measured with metering equipment at the connection point to AB Lietuvos Energia grid at the 110 kV side of the transformer. This equipment will be sealed, calibrated and checked periodically for accuracy. In addition, all metered data will be double checked by receipts of electricity sales, with SCADA system as back-up.

D.4. Brief description of the operational and management structure that will be applied in implementing the monitoring plan:

It is planed that the operation and maintenance (O&M) works of Liepynes wind power park will be done by company Enercon Gmbh that will have an agreement on such services with UAB "Vejo gusis". UAB "Vejo gusis" has three employees – CEO, director of economy and chief accountant. The company's director shall perform all Project based supervision works.
The monitoring report based on monitoring plan will be prepared by UAB "Vejo gusis" director based on monthly energy output/input invoices received from national operator's AB Lietuvos energija side. Monitoring of supplied and consumed (for own purposes if necessary) power will be measured by the commercial power meters. The commercial meters data will be transferred to AB Lietuvos energija side by SCADA system (through telemetry way) and based on those reading AB Lietuvos energija will issue invoices to UAB "Vejo gusis". Moreover data on net energy output into national grid will be published officially on AB Lietuvos energija website.
The park's backup feed will be secured from low voltage (0,4kV) network (for own purposes). For this reason it is foreseen to sign electricity sale-purchase agreement between AB "VST" and UAB "Vejo gusis". The park's consumed power will be measured by separate power meter.
The received original invoices will be kept into UAB "Vejo gusis" accountancy.
For the quality assurance, an audit company will be contracted to revise company's financial results including the monitoring reports. Revision will include verification of the data sources and calculations. Power dispatch documents will be archived at UAB "Vejo gusis" for later reference for the proof of the monitoring results. AB Lietuvos energija and VST are responsible for the periodical supervision, calibration and maintenance of the commercial power metering devices.

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

Prepared by: UAB „Vejo gusis" (Project participant), represented by CEO Egidijus Simutis Tel/Fax. +370 441 47772 E-mail. es@nemo.lt

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.:

E.1.+ E.2.= 0

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

Baseline emissions (BE) are calculated as following:

$BE = E_{VP} \times EF_{LE}$

Where,
BE = Baseline emissions in year x (tCO2)
E_{VP} = Net Electricity supplied to the grid by the project during period X (MWh)
EF_{LE} = Emission factor of the power plants of AB Lietuvos Elektrine (0,626 tCO2/MWh)

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

Total baseline emissions for period 2009-2012 are 51599 tCO2.

Year	2009	2010	2011	2012	Total:
Baseline emissions = Project emission Reductions, tCO2	6025	14711	14711	14711	**50157**

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

Because project emissions are zero, the emissions reductions are the same as the baseline emissions.

Year	2009	2010	2011	2012	Total:
Baseline emissions = Project emission Reductions, tCO2	6025	14711	14711	14711	**50157**

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

Table 19. Project emission reductions

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)
2009	0	0	6025	6025
2010	0	0	14711	14711
2011	0	0	14711	14711
2012	0	0	14711	14711
Total 2009-2012	**0**	**0**	**50157**	**50157**

After year 2012 by following year estimated annual emission reduction – 14711 tones of CO2 equivalent.

SECTION F. Environmental impacts

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

According to the Communications No (9.14.5.)-LV4-1908 of Klaipeda Regional Department of Environment of Lithuanian Ministry of Environment of March 27, 2007, the conclusion, concerning the environmental impact of the planned economic activity, was drawn that the environmental impact assessment of the planned economic activity – installation and maintenance of wind power plants – is not required. The above stated conclusion was drawn because (the extract from the above mentioned documents):

- National Energy Strategy approved by the resolution No.IX-1130 of Seimas of the Republic of Lithuania of October 10, 2002 (Official Gazette., 2002, No 99-4397) schedules, that aiming to the best use local resources, including wind energy, and at the same time to reduce the import of fuel and to establish new work places as well as to improve the state of environmental protection, the State will promote the implementation of the projects on use of wind, water and sun power and the experience of installation and maintenance will be collected;
- In the territory of planned economic activity it is not forbidden to install and maintain the equipment of planned economic activity.
- Planned economic activity is based on best available technology sources used in EU countries;
- Planned economic activity place is not faced for natural landscape protection. Planned to install infrastructure corresponds requirements for those kind of activities in certain place.

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 SO2 and NOx. These pollutants are released to the atmosphere while generating electric power at Lietuvos elektrine. To calculate reductions of SO2 and NOx, the following formulas are used:

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

Where:
P_{MWh} - is the electric power dispatched to the national grid annually, MWh;
EF_{SO2} – is the emissions factor, defining how many tones of SO2 is emitted to the atmosphere while producing 1 MWh of electric power.

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

Where:
P_{MWh} - is the electric power dispatched to the national grid annually, MWh;
EF_{NOx} - is the emissions factor, defining how many tones of NOx emerge, while producing 1 MWh of electric power.

The results of projected SO2 and NOx reduction during period 2009-2012 are given in Table 20.

Table 20. SO2 and NOx emission reductions

Pollutant	kg of pollutant/MWh	Amount of pollutant saved during the crediting period
SO2	0,45	23,17 t
NOx	0,95	48,91 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. Surface run-off from the wind power park territory will be drained away. For this purpose, drainage systems are reconstructed within the project area.

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 finalized, 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

Liepynes wind power park is far away from bird migration routes. The probability of birds colliding with the wind power plants is very low. Therefore the impacts on birds are considered negligible. A study from the Danish Ministry of the Environment states that high voltage power lines is much greater danger to birds than the wind turbines themselves[9].
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.

Impacts on animals

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

Protected areas

There are no protected areas within or nearby the project site. There are no protected species of flora or fauna within or close to the project site. Among other sources, such data was verified at the State Service for protected Areas under the Ministry of Environment[10].
All nearest protected areas are within sufficient range away from the project site:

Pajuris regional park (about 3 km);
Šaipiu landscape reservation (about 4,5 km);
Nemirsetos landscape reservation (about 4,5 km);
Karkles ethno cultural reservation (about 6,6 km);
Minijos ichthyologic reservation (about 15 km);
Kursiu Nerija regional park (about 16 km)

Cultural heritage

No valuable cultural heritages are registered in the Project area.

[9] Birds and wind turbines: http://www.windpower.org/en/tour/env/birds.htm

[10] State cadastre of protected areas http://stk.vstt.lt

Waste

Waste in wind power park is minimal. No oil lubricants are used in Enercon turbines as there are no gear boxes in the construction. Any spare parts that are substituted with new ones during the operation and maintenance period of wind power park will be removed from the project site and recycled by the maintenance service provider.

Physical impact

Electromagnetic field

Electromagnetic field is formed around high voltage air power lines, at the transformer substations and other open power installations. Electromagnetic field is measured by the intensity of electric field (E, V/m) and by the intensity of magnetic field (H, A/m). Permissible intensity of electric field in residential (building) areas is up to 1kV/m without limitations for allowed exposure time and up to 5 kV/m in "green" zones (parks, gardens etc.) without limitation for exposure time (HN 104: 2000).
The potential sources of electromagnetic field in wind power park (generators and transformers) are generating low voltage and up to 100kW power capacity. The intensity of electric and magnetic fields are lower than the permissible level for residential areas (1kV/m). Electro-technical equipment of wind power plants are mounted in 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

The sanitary zone with the radius of 80 m, was set around wind power plants according to the requirements. Maximum allowed noise level in the residential areas is 55dB at the night time and 65dB at the daytime (HN 33:2007). Estimations of the Liepynes wind power park project noise level gave the following results depending on the distance from wind power plants: 100m-50dB, 290m-45dB, 440m-40dB, 660m-35dB.
The closest living area (grange) is 227m away from the wind power park.

Visual impact

Wind power plants make landscape more urbanized. However , if the right planning concept is used – a visual impact can be minimized. The positioning of wind power plants is made optimal to integrate it into the landscape. The towers of wind power plants are painted into bright grey color which will fade them in the sky background.
Also, wind power plants, like all tall buildings cast shadow on the neighboring 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 250m from the wind power plants. Bearing in mind that the closest living area are approx. 290 meters away – the shading effect is not considered as an impact.

Transboundary impact

The Project does not have any transboundary impact because the borderline of Latvian Republic is over 23 km from Project location side. Project implementation and operation are fully under regulation of national legal acts.

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 impacts are nor considered as significant.

SECTION G. Stakeholders' comments

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

While preparing the detailed plans, compulsory public consideration procedures were undertaken where all stakeholders may participate. Compulsory written agreements of residents in surrounding areas were obtained during the process of detailed planning and technical project preparation process. Stakeholders have not expressed any objections.
The following steps were made during the stakeholder process (Table 21):

Table 21. Stakeholder process

Date	Description
2007-03-31	Announcement about Klaipeda Regional Department of Environment conclusion concerning the environmental impact assessment (AIE) of the planned economic activity in the newspaper „Svyturys" (No.26 (7854)).
2007-09-04	Announcement about beginning of Project detailed plan preparation on Kretinga Municipality website www.kretinga.lt.
2007-09-05	Announcement about beginning of Project detailed plan preparation in the newspaper „Svyturys" (No.68 (7896)).
2007-09-05	Information about detailed plan preparation sent to all neighbours of the site by post.
2007-09-05	Information about detailed plan preparation placed on the billboard near the site.
2007-11-24	Announcement about Protocol of hygiene examination of the project documentation prepared by Klaipeda centre of public health (Visuomenes sveikatos centras) in the newspaper „Svyturys" (No.91 (7919)).
2008-05-23	Announcement about availability of public opinion impact on the Project detailed plan on the Kretinga Municipality website www.kretinga.lt
2008-05-24	Announcement about availability of public opinion impact on the Project detailed plan in the newspaper „Svyturys" (No.38 (7966)).
2008-06-18	Information about availability of public opinion impact on the Project detailed plan placed in Kretinga Municipality office.
2008-07-23	Announcement about retry availability of public opinion impact on the Project detailed plan on the Kretinga Municipality website www.kretinga.lt
2008-07-25	Announcement about retry availability of public opinion impact on the Project detailed plan in the newspaper "Pajurio naujienos".
2008-07-26	Announcement about retry availability of public opinion impact on the Project detailed plan in the newspaper „Svyturys" (No.55 (7983)).
2008-12-18	Decision of the board of Kretinga Municipality regarding the approval of the Project detailed plan.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Annex 2

BASELINE INFORMATION

For determination of the Baseline it was used fuel consumption and production efficiency data as well as production of electric and thermal power in Lietuvos elektrine during 2002-2005.

Table 22. Fuel consumption, energy production and CO2 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 from heat production	CO2 emissions from power production	Emission factor CO2/MW he
2002	736604	202060	199104	7355	52534	517318	52796	464522	0,631
2003	723858	195553	225813	5241	21238	491709	48885	442824	0,612
2004	745372	212399	207690	2750	55501	525916	55204	470712	0,632
2005	1072814	199383	280559	1815	86160	729451	52161	677290	0,631
						566098	**52262**	**513837**	**0,626**

Annex 3

MONITORING PLAN

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

$ER = E_{VP} \times EF_{LE}$

Where:
ER – emission reductions, tCO2
E_{VP} – Net annual power production at Liepynes wind power park (the difference between produced and consumed power), MWh.
EF_{LE} – emission factor for power production at Lietuvos elektrine, i.e. 0,626 tCO2/MWhe

ER will be calculated for a past period (for ex. previous year), using annual power supplied and consumed data. The following monitoring form will be used to monitor Net annual power production and ER. Monitoring procedures are described in D2.

YEAR:_____

Month	Power dispatch confirmation document No.	Date of issuance of power dispatch confirmation document	Power supplied to the grid (Esup), MWh	Power consumed from the grid (Econ), MWh	Net annual power production (E_{VP}), MWh	Amount of Emission Reduction (ER), tCO_2e	Name of the person in charge	Signature
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								
Total:								

$ER = E_{VP} \times 0,626$

$E_{VP} = Esup-Econ$

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