JOINT IMPLEMENTATION PROJECT

WIND PARK OCHAKOVSKIY

(project name)

Position of the head of organization, institution, facility – document developer

Attorney Global Carbon B.V.		**Richard W. Selby**
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Position of the manager of the business – emission source owner where the joint implementation project is planned to be realized

Director LLC "Vetrianoy park Ochakovskiy"		**Nikitenko E.F.**
(position)	(signature) S.P.	(surname, name and second name)

"ВІТРЯНИЙ ПАРК ОЧАКІВСЬКИЙ"

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

CONTENTS

Annexes

SECTION A. General description of the project

A.1. Title of the project:

"Wind Park Ochakovskiy"

The sectoral scope: (1) Energy industries (renewable/non-renewable sources)

The version number of the document: 3.3

The date of the document: 14th of September 2012.

A.2. Description of the project:

The project is aimed at achieving GHG emission reductions by substituting the carbon intensive electricity from Ukrainian power grid with renewable energy produced by new wind power plant (WPP) which is built as a project activity. The new WPP with planned installed capacity of 300 MW is constructed in Mykolaiv region of Ukraine. It is planned to install in total 120 wind turbines 2.5 MW each. The project is realized in four stages comprised of installation of 10, 5, 9 and 96 wind turbines.

Situation before the project

In Ukraine, thermal power plants (coal, oil, natural gas fired) account for nearly 46% of total electricity production, with nuclear power generating another 47%, while other sources (mainly hydroelectric power plants) make up the remaining 7%[1]. The total installed generation capacity is 53.1GW[2], which is more than enough to satisfy the current demand for electricity, albeit the thermal capacity is old and outdated (around 40 years in operation, on average). Units are in correspondence with the table format

In present the base load of Ukrainian electricity grid is provided by the nuclear power plants. Nuclear plants account for the largest share in electricity generation with 48% of the total electricity production of around 185 TWh in 2008[3]. The following major power generation companies exist in Ukraine at present:

- 5 thermal power generation companies – Centrenergo, Donbasenergo, Dniproenergo, Skhidenergo and Zahidenergo comprising 14 powerful thermal power plants with total installed capacity of 27.3 GW;
- 4 nuclear power plants with total installed capacity of 13.8 GW united in the State Enterprise Energoatom;
- 2 hydro power generation companies - Ukrhydroenergo and Dniester Hydro Power Storage Plant comprising cascades of hydro power plants at Dnieper and Dniester rivers with total installed capacity of 4.6 GW.

Besides there is a number of combined heat & power plants (CHPs). Some of them are being operated by local power distribution companies and other institutions while others became separate enterprises. In addition, small electricity producers (small hydro and wind power plants) operate in Ukraine, but their share of total electricity production is insignificant.

The Ukrainian electricity system is characterized by a large overcapacity mainly in the thermal power plants sector. Expansion plans for generation in Ukraine are based on new nuclear power plants which are part of the low-cost/must-run plants.

First steps into the modern technologies in the field of environmentally friendly electricity production were made in Ukraine in 1997 with implementation of "Comprehensive Programme to build Wind Parks

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[1] Values calculated based on State Statistical Committee data on production of main types of industry products in 2010.

[2]URL: http://www.ukrenergo.energy.gov.ua/ukrenergo/control/uk/publish/article?art_id=87570&cat_id=35061 (last reference 24/02/2012)

[3] URL: www.ebrd.com/downloads/sector/eecc/Ukraine_English.pdf, section 2.1, page 10 (last reference – 24/02/2012)

to 2010" adopted by the Ukrainian Government. As of now the outcome of this Program is represented by 89 MW of installed capacity in Ukraine as of beginning of 2008. In February 2006, the Government approved a fixed annual budget of about 13 million euro. Due to a lack of sufficient funding the goal of this Program – which is 1900 MW of installed capacity by 2010 – is severely and irrevocably delayed. In 2007 the Control and Auditing Service of Ukraine performed a review of this Programme and found it inefficient and failing to achieve any of the identified targets[4].

Baseline scenario

In the baseline scenario it is assumed that the common practice will continue and the most of electricity consumption of Ukraine shall be supplied from the existing generation power plants on the grid. This assumption is supported by the fact that the large overcapacity makes investment into new generation sources unattractive. The introduction of the "green tariff" for electricity produced from renewable sources has attracted investors into this sector of economy. A few utility-scale WPP projects were started in Ukraine.

The project anticipates the installation of 120 advanced wind turbines (with rated capacity of 2.5 MW) including construction of electricity infrastructure (WPP substation, cable lines, overhead transmission lines), maintenance base as well as access roads where required.

The project site in Mykolaiv Region of Ukraine is considered promising for wind energy generation due to favorable wind conditions, nearby interconnection infrastructure and limited environmental impact. Territories that are important for residential purposes, industry and agriculture are located at a sufficient distance to avoid any disturbances from noise and visual influence.

The purpose of the project is to generate environmentally friendly electricity with "zero" GHG emissions. The project will also support the Ukrainian Government's objectives of:

- Facilitating and encouraging the development of new renewable energy sources with one of the key renewable technologies – wind.
- Reducing reliance of electricity and fossil fuel imports and developing indigenous power resources which will have added economic benefits.

Therefore, in the **project scenario** the electricity produced on this WPP will partly substitute the electricity from the Ukrainian electricity grid, decreasing respective carbon dioxide emissions from fossil fuel combustion on thermal power plants.

Overall, the realization of the project is environmentally and socially beneficial. The technological process is environmentally sound and does not require the use of hazardous materials. Operation of the project will lead to creation of new work places which will contribute to economic development of the region.

Brief summary of project history including its JI component

Before project implementation, territories under project boundary were used for cattle pasture. The idea of wind park was under discussion from 2004. Substantial investments needed for wind turbines purchasing and installation disabled project onset. The project has been initiated in 2010. First line of WPO was commissioned in December 2011 and by now second stage of project construction is being in progress. The Joint Implementation mechanism (JI) was one of the drivers for the project from the start and financial benefits provided by the JI mechanism were considered as one of the reasons to start the project and are crucial in the decision to start the operations.

[4]URL:http://www.acrada.gov.ua/control/main/uk/publish/article/934671;jsessionid=68576180BA5028F2BE9205AD224CE19E (last reference – 24/02/2012)

The process of applying for all necessary permits to build, operate and maintain the wind power plant has been initiated by LLC “Vetrianoy park Ochakovskiy” in 2010. Preparation of the business plan has also commenced at that time taking into account JI mechanism as a source of additional project cash-flow.

A.3. 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)
Ukraine (Host Party)	• LLC “Vetrianoy park Ochakovskiy”	No
Netherlands	• Global Carbon B.V.	No

LLC “Vetrianoy park Ochakovskiy” is the owner of the emission source/sink where the Joint Implementation project is implemented. The company was started in 2010 to become one of the leading producers of renewable energy in Ukraine. Its economic activity lies in the fields of energy generation and distribution, construction of power generating facilities and transmission lines. LLC “Vetrianoy park Ochakovskiy” is a project participant.

Global Carbon B.V. is a leading expert on environmental consultancy and financial brokerage services in the international greenhouse emissions trading market under the Kyoto Protocol. Global Carbon has developed the first JI project that has been registered at the United Nations Framework Convention on Climate Change (UNFCCC). The first verification under JI mechanism was also completed for Global Carbon B.V. project. The company focuses on Joint Implementation (JI) project development in Ukraine and Russia. Global Carbon B.V. is responsible for the preparation of the investment project as a JI project including PDD preparation, obtaining Party approvals, monitoring and transfer of ERUs. Global Carbon B.V. is a potential buyer of the ERUs generated under the proposed project. Global Carbon B.V. is a project participant.

A.4. Technical description of the project:

A.4.1. Location of the project:

The project site of the LLC “Vetrianoy park Ochakovskiy”

A.4.1.1. Host Party(ies):

Ukraine

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

Mykolaiv region

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

Dmytrivka village

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

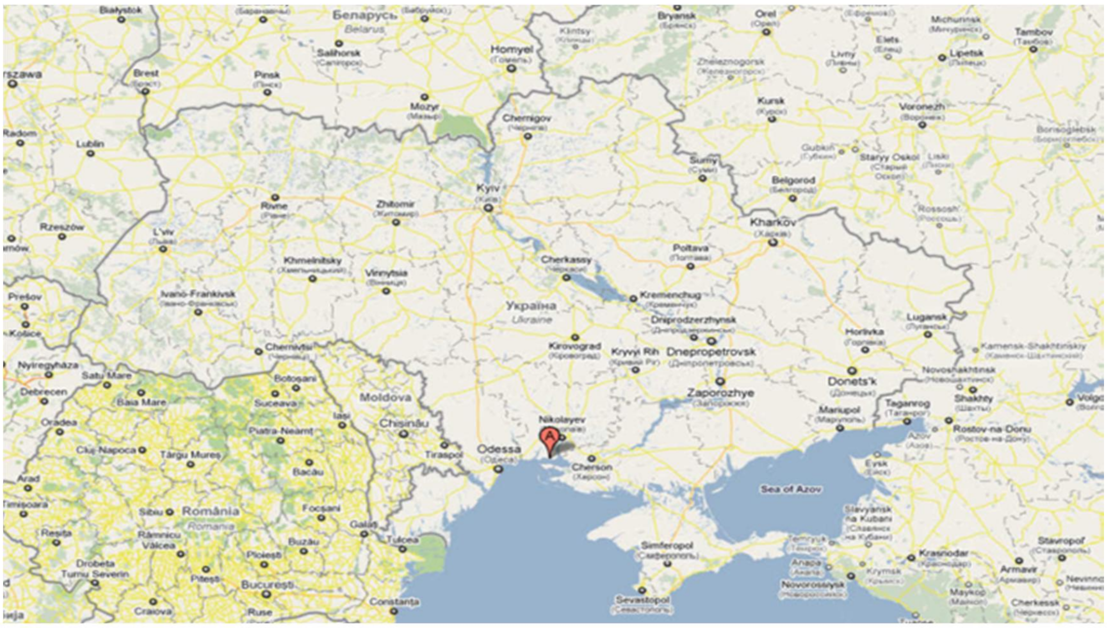

Figure 1. Location of the project site *(Source: GEO-NET Umweltconsulting, Wind and Energy Yield expertise, 2011)*

The wind farm construction site is located near Dmytrivka village in Mykolaiv oblast of Ukraine. Dmytrivka village is the nearest settlement to the proposed project site. Population is 1,193 people. The distance to the city Ochakiv is 16 km. The distance to the region's main city Mykolaiv is 43 km. Geographical coordinates of the project site are: 46°38'35.81"N, 31°46'33.72"E.

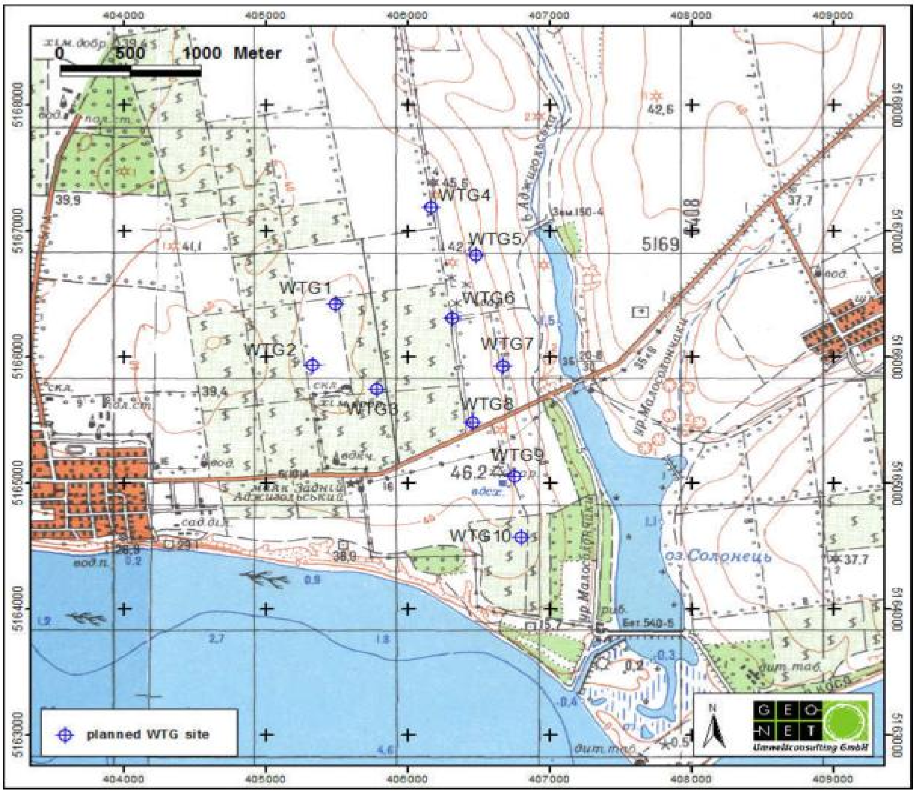

Figure 2. Location of the first ten wind turbine generators (WTG) of the WPP *(Source: GEO-NET Umweltconsulting, Wind and Energy Yield expertise, 2011)*

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

In the year of 2010 wind energy continued the worldwide success story as the most dynamically growing energy source demonstrating the rate of 23.6%. In 2010 it reached 196 630 MW of installed capacity, the turnover of the wind sector worldwide reached 40 billion euro. Based on accelerated development and further improved policies World Wind Energy Association "sees a global capacity of 600 000 Megawatt as possible by the year 2015 and more than 1 500 000 Megawatt by the year 2020."[5]

Unfortunately, Ukraine's input in this progress was not very noticeable. "Comprehensive Programme to build Wind Parks to 2010", adopted by the Ukrainian Government in 1997, has resulted only in 89 MW being installed in Ukraine as of beginning of 2008. Also one should mention that WTs (wind turbines) installed in Ukraine are quite old from technological point of view – WTs of 107,5 kW and 600 kW capacity produced by "WindEnergo" Ltd. These machines turned out to be inefficient in Ukrainian wind conditions, showing WT capacity factor lower than those of the modern WTs.

Capacity of modern WTs ranges between 1,5 to 3 MW. Moreover, there are some pilot WTs of 5-6 MW capacity for offshore wind farms that are under testing and approvals. International wind experts consider WTs of 2–3 MW capacity to remain the most popular and of high demand at least for a couple of years. It is unlikely that technology will be replaced by other or more efficient technologies within the project period.

The technical purpose of the project is to install and operate appropriate amount of wind turbines and supportive infrastructure to serve as a single WPP with at least 300 MW of installed capacity. The project will utilize advanced wind turbines of 2.5 MW capacity produced by the German wind turbine manufacturer Fuhrländer AG. This technology will not be changed during the project period.

Final choice of WTs considers option of Fuhrländer FL 2500 2.5 MW wind turbine. Considered manufacturer – Fuhrländer is the well-known technology provider in wind turbine manufacturing, installation and operation.

The project activity is planned to be implemented in four stages:

First stage:	It is planned to install 10 wind turbines 2,5 MW each. Total installed capacity 25 MW. Commissioning performed in December 2011.
Second stage:	It is planned to install 5 wind turbines 2,5 MW each. Total installed capacity 12,5 MW. Expected commissioning in May 2012
Third stage	It is planned to install 9 wind turbines 2,5 MW each. Total installed capacity 22,5 MW. Expected commissioning in October 2012
Fourth stage:	It is planned to install 96 wind turbines 2,5 MW each. Total installed capacity 240 MW. Expected commissioning is during 2013-2014.

Technical data of WT

The advanced 2.5 MW turbine FL 2500 with variable speeds is reliable, modern and easy to maintain: due to the possible rotor diameters of 80, 90 and 100 m, it can cater to all locations and wind conditions in the best way possible. Tubular towers of 65, 85 and 100 m as well as lattice towers of up to 160 m form the prerequisite for a very economic efficient and reliable production of wind power. As a reward for the high hub heights, inland locations like woodland can be utilized even more.

[5] URL: http://www.wwindea.org/home/images/stories/pdfs/worldwindenergyreport2010_s.pdf (last reference – 24/02/2012)

FL 2500 meets the latest grid connection requirements and is therefore compatible with international power grids. The unique drive unit concept with its large rotor bearing, the shaft coupling and the compact gearbox provides for even more safety and longer service life. That is also valid for the specially designed hub with its enclosed service area. With its service crane concept the FL 2500 facilitates the replacement of all main components without the need for an expensive mobile crane – greatly reducing the time and expense of repairs.

The rotor bearing is a triple row roller bearing optimally designed for the prevailing load conditions. The shaft coupling to the flange ring of the gearbox is provided by 24 elastomer elements. It provides good structure-borne noise isolation while also absorbing drive train impacts. In endurance tests the elastic elements have reached a twelvefold service life without incurring any damage. If necessary, they can be very easily replaced.

The FL 2500's unique drive train concept has many objectives: It allows for a smaller and quieter system. Instead of a heavy main shaft, a new hardened slipless rotor bearing is used between rotor hub and machine carrier. Cross and thrust forces of the rotor are directly transferred over the strengthened machine carrier to the tower and do not load the gearbox bearing. This positively affects the service life of the gearbox. Rotor torque is transferred over a shaft coupling (weighing about 1.9 tons) to the gearbox.

Table 1. Specifications of wind turbine Fuhrländer FL 2500 2.5 MW

Rated power	2.5MW
Rotor	
Rotor diameter	100 m
Number of rotor blades	3
Swept area	7854 m^2
Tower	
Hub height	100 m
Operating data	
Cut-in speed	3.5 m/s
Rated power speed	11.5 m/s
Cut-out speed	25 m/s
Generator	
Type	Asynchronous with slip-ring rotors
Nominal output	2.5 MW
Frequency	50 Hz
Control	
Speed regulation	electronic pitch system

The complete 360° bolting of the gearbox to the machine carrier provides optimal torque support at its center of gravity. This torsional resistant design minimizes the misalignment of the gearbox under extreme loads, such as strong gusts of wind. The reaction forces on the generator coupling and bearing are also reduced. This also allows service personnel to access the hub without leaving the turbine house – the turbine house and hub form a single air-conditioned service room.

Figure 3. Wind power turbine FL 2500 installed at project site

The pitch system of the FL 2500 uses an intelligent control method to reduce the typical peak load-producing windward-tipping of the tower head that occurs during quick, positive blade adjustment processes. The process also reduces the stress produced during braking procedures and during reaction to gusts. The "Pitch Logic Unit" (PLU) located in the hub allows early detection of overspeed situations as well as avoiding high turbine thrusts. All pitch functions are combined in the PLU. Adaptation to different bus systems is possible. A few simple interfaces lead to robust standard industrial units. Capacitors guarantee a highly available, durable and maintenance-free backup over a wide range of temperatures. In contrast to standard systems brake choppers or connecting units are required. The very good energy weight ratio permits high safety and availability in the event of power failure.

The FL 2500 offers a new type of safety system. For the first time the safety concept was designed on the basis of a risk analysis in order to increase the safety of both personnel and system. The design meets category 3 of the European Machine Directive. The safety system reacts selectively to equipment and signal triggering such as emergency off, vibration switch, performance and speed limit relays, overload protection, switched wiring, pitch system and operational defects, transformer and fire protection. An event-driven, differentiated triggering at the actuator level reduces the stresses and torques of extreme loads, which results in significantly lower mechanical wear of assemblies such as brakes and gearbox. This provides a longer service life as well as cost savings.

The FL 2500 is equipped with a sophisticated Condition Monitoring System. The acceleration values of the components are recorded and evaluated by means of broadband audible sensors on the rotor bearing, gearbox and generator. This provides for comprehensive system monitoring.

The data above show that WT proposed for the project reflects state of the art technology; its technical and operating characteristics are much better compared to the commonly used wind technologies in Ukraine.

The internal electricity network will use 35 kV cable connections. Energy is delivered into the 110 kV grid via the transformer substation. Automated electronic alarm and monitoring system will be used to control and operate the wind farm with information delivery to the wind farm control station.

The domestically available workforce is in general well trained and the necessary civil, mechanical and electrical engineering knowledge and skills needed are domestically or locally available. The project doesn't require extensive initial training and maintenance efforts in order to work as presumed during the project period. Wind turbine producer will provide operational training for the owner of the wind farm. They will also provide full service and maintenance for the operating period of the wind park. Operational risks will be reduced by the establishment of a permanently employed maintenance crew to perform any tasks according to the manufactures specifications. Due to the project size it is likely that the wind power plant maintenance sector will become a sustainable industry sector. A maintenance base will be set up in the vicinity of the site and local staff employed and suitably trained.

There is no inherent risk to humans or the environment connected to the technology employed and wind turbine design related risks will be assessed and appropriate action taken.

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

The anthropogenic greenhouse gas emission reductions will be generated by this project due to the fact that greenhouse gas emissions that would occur in the absence of the proposed project, i.e. in the baseline scenario are higher than greenhouse gas emissions associated with the project scenario.

The **baseline scenario** for this project assumes that electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. The project boundary includes the project power plant and all power plants connected physically to the electricity system that the JI project power plant is connected to and is in fact the Ukrainian electricity grid. Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. Please, refer to section B of this PDD for details on baseline setting.

In the **project scenario**, electricity is produced by the grid-connected wind power plant. Electricity produced by the wind power plant is considered to cause no emissions of greenhouse gases.

Emission reductions, therefore, are generated by the project through the displacement of grid electricity that is associated with the CO2 emissions in fossil fuel fired power plants by the greenhouse gas emissions-free electricity generated by the wind power plant.

The project scenario is not likely to occur in the business-as-usual practice as the investment into the construction of a large scale industrial wind power plant in Ukraine cannot be supported by the electricity tariffs and general investment climate. Such project also faces prohibitive barriers. Please, refer to section B.2. of this PDD for details. Therefore, the emission reductions similar to the project ones would not occur in the absence of the proposed project.

A.4.3.1. Estimated amount of emission reductions over the crediting period[6]:

Table 2. Estimated amount of emission reductions during the part of the crediting period within the first commitment period

	Years
Length of the crediting period	2[7]
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
Year 2011	2 202
Year 2012	115 891
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	118 093
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	109009

Table 3. Estimated amount of emission reductions for the part of the crediting period after the end of first commitment period

	Years
Period after 2012, for which emission reductions are estimated	27[8]
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
Year 2013	192 929
Year 2014	192 929
Year 2015	964 643
Year 2016	964 643
Year 2017	964 643
Year 2018	964 643
Year 2019	964 643
Year 2020	964 643
Year 2021	964 643
Year 2022	964 643
Year 2023	964 643
Year 2024	964 643
Year 2025	964 643
Year 2026	964 643
Year 2027	964 643
Year 2028	964 643
Year 2029	964 643
Year 2030	964 643
Year 2031	964 643
Year 2032	964 643
Year 2033	964 643

[6] All values in this section were rounded to integer.

[7] Length of the period is 1 year and 1 month.(13 months). Units are in correspondence with the table format.

[8] Length of the period is 26 years and 11 months (323 months). Units are in correspondence with the table format.

Year 2034	964 643
Year 2035	964 643
Year 2036	962 441
Year 2037	848 752
Year 2038	771 715
Year 2039	771 715
Total estimated emission reductions over the period indicated (tonnes of CO_2 equivalent)	23 997 984
Annual average of estimated emission reductions over the period indicated (tonnes of CO_2 equivalent)	891 196

A.5. Project approval by the Parties involved:

The project obtained Letter of Endorsement (#2583/23/7 dated 14/09/2012) from State Environmental Investment Agency of Ukraine. Due to the Netherlands legislation, no LoE from the Netherlands is needed.

The project obtained Letter of Approval from Netherlands (#2012JI05 dated 20/02/2012). After receiving Determination Report from the Accredited Independent Entity the project documentation will be submitted to the Ukrainian Designated Focal Point (DFP) which is State Environmental Investment Agency of Ukraine, for receiving a Letter of Approval.

SECTION B. Baseline

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

A baseline for the JI project has to be set in accordance with Appendix B to decision 9/CMP.1 (JI guidelines)[9], and with further guidance on baseline setting and monitoring developed by the Joint Implementation Supervisory Committee (JISC). In accordance with the Guidance on Criteria for Baseline Setting and Monitoring (version 3)[10] (hereinafter referred to as Guidance), the baseline for a JI project is the scenario that reasonably represents the anthropogenic emissions by sources or anthropogenic removals by sinks of GHGs that would **occur in the absence of the proposed project**. In accordance with the Paragraph 9 of the Guidance the project participants may select either: an approach for baseline setting and monitoring developed in accordance with appendix B of the JI guidelines (JI specific approach); or a methodology for baseline setting and monitoring approved by the Executive Board of the clean development mechanism (CDM), including methodologies for small-scale project activities, as appropriate, in accordance with paragraph 4(a) of decision 10/CMP.1, as well as methodologies for afforestation/reforestation project activities. Paragraph 11 of the Guidance allows project participants that select a JI specific approach to use selected elements or combinations of approved CDM baseline and monitoring methodologies or approved CDM methodological tools, as appropriate.

Description and justification of the baseline chosen is provided below in accordance with the "Guidelines for users of the Joint Implementation Project Design Document Form", version 04[11], using the following step-wise approach:

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

Project participants have chosen the following approach regarding baseline setting, defined in the Guidance (Paragraph 9):

- An approach for baseline setting and monitoring developed in accordance with appendix B of the JI guidelines (JI specific approach).

The Guidance applies to this project as the above indicated approach is selected as mentioned in the Paragraph 12 of the Guidance. The detailed theoretical description of the baseline in a complete and transparent manner, as well as a justification in accordance with Paragraph 23 through 29 of the Guidance should be provided by the project participants.

The project participants decided to use to the extent possible within this JI specific approach elements of the approved CDM baseline and monitoring methodology "Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" Version 12.2.0"[12] which is the latest version at the time of setting the baseline for this project. Project participants used all the elements of this methodology in order to establish the baseline, demonstrate additionality and establish the monitoring plan for this project except for the use of "Tool to calculate the emission factor for an electricity system"[13]. The emission factor for Ukrainian electricity grid has been selected based on the analysis of available carbon dioxide emission factors studies for Ukraine.

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[9] URL: http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=2 (last reference – 24/02/2011)

[10] URL:http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf (last reference – 24/02/2011)

[11] URL:http://ji.unfccc.int/Ref/Documents/Guidelines.pdf (last reference – 24/02/2011)

[12]URL: http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L(last reference – 24/02/2011) Hereinafter referred to as "ACM0002"

[13] URL:http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.1.0.pdf (last reference – 24/02/2011)

The use of the elements of the ACM0002 methodology is justified through the assessment of the methodology's applicability criteria presented in the table below:

Table 4. Applicability criteria of the ACM0002

Applicability criteria of the ACM0002	Application in the context of the project
This methodology is applicable to grid-connected renewable power generation project activities that: (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); (d) involve a replacement of (an) existing plant(s).	The proposed project activity is installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant)
The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: - hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), - wind power plant/unit, - geothermal power plant/unit, - solar power plant/unit, - wave power plant/unit or tidal power plant/unit	The project activity is the installation of the wind power plant.
In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity	The project activity is the installation of the new wind power plant.
In case of hydro power plants, one of the following conditions must apply: - The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or - The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; or	The project activity is the installation of the new wind power plant.

- The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	
The methodology is not applicable to the following: - Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; - Biomass fired power plants; - Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m2.	The project activity is the installation of the new wind power plant.
In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”	The project activity is the installation of the new wind power plant.

The conclusion from the table above is that elements of the ACM0002 methodology can be used in order to identify and describe the baseline.

Detailed theoretical description of the baseline methodology in a complete and transparent manner can be found at URL http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L (last reference – 24/02/2012) .

According to the ACM0002 if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

Justification of the baseline chosen in accordance with the Guidance is provided below:

1) The baseline covers **emissions from all gases, sectors and source categories** listed in Annex A and anthropogenic removals by sinks, within the project boundary and is established in accordance with the Appendix B of the JI guidelines. Section B.3 of this PDD provides information on the coverage of emissions within the project boundary by the baseline of this project.
2) The baseline is established using **multi-project emission factor.** The emission factor selected to describe the baseline of this project is based on analysis of the available baseline carbon dioxide emission factor studies for the Ukrainian electricity grid.
3) The baseline is **established in a transparent manner with regard to the choice of approaches, assumptions, methodologies, parameters, data sources and key factors.** The

project participants use elements of the approved CDM baseline and monitoring methodology ACM0002 to establish the baseline. All assumptions, parameters, data sources and key factors are referenced by the reputable sources.

4) The baseline is established **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**. Key factors have been assessed and their impact is summarized below:
   a. *Sectoral reform policies and legislation*. On the 28th of September, 2008, the Ukrainian parliament passed laws[14] introducing "green tariff" in Ukraine. "Green tariff" was defined as a special tariff at which electricity produced from the alternative sources of energy must be purchased. This tariff exceeded several times the purchase price for electricity produced from traditional sources of energy. The introduced legislation, however, was vague and lacked the practical mechanisms for implementation. The suggested level of "green tariff" also did not allow for the reasonable return on possible investment. Therefore, on April, 1, 2009 the changes in the "green tariff" legislation were adopted[15]. The changes introduced state guarantees by 2030 for power plants utilizing the "green tariff" and mandatory adjustment of the "green tariff" as a result of the fluctuation of the euro exchange rate. Also it was prohibited to deny the access to transmission and distribution grid for "green electricity producers". The changes also fixed the amounts of minimal "green tariff" for electricity produced from certain types of alternative energy which varies depending on the source of energy, power capacity of equipment and other factors. However, certain key regulations which shall govern the following issues of green tariff projects implementation are still missing:
      i. the procedure of the access of electricity generating plants to the grid;
      ii. the compensation of expenses incurred during construction, reconstruction, and grid modernization to get the access to the grid;
      iii. the procedure on conclusion of electricity purchase contract with the respective state company other practical aspects for project implementation.
   b. Economic situation/growth and socio-demographic factors in the relevant sector as well as resulting predicted demand. Demand for electric energy in Ukraine is expected to grow significantly according to the Energy Strategy of Ukraine for the period until 2030[16]. However, main investments required to meet this demand will be channeled into the upgrades of transmission lines and rehabilitation of the thermal power plants and nuclear power plants.
   c. Availability of capital (including investment barriers). Ukraine has been always considered a high-risk country for investments and doing business. Table below summarizes key indicators of business practices in Ukraine.

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[14]Law of Ukraine On Changes To Some Laws of Ukraine About The Introduction of "Green" Tariff URL:http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=601-17 (last reference – 24/02/2011)

[15]Law of Ukraine On Changes To The Law of Ukraine On Electric Energy About The Incentives To Use Alternative Energy Sources .URL: http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1220-17 (last reference – 24/02/2011)

[16] Energy Strategy of Ukraine for the period until 2030, Section 2. URL: http://mpe.kmu.gov.ua/fuel/control/uk/doccatalog/list?currDir=50505 (last reference – 22/02/2012)

Table 5. International ratings of Ukraine[17]

Indicators	2006	2007	2008	2009	Note
Corruption index of Transparency International	99 position from 163	118 position from 180	134 position from 180	-	Index of corruption
Rating of business practices of The World Bank (The Doing Business)	124 position from 155	118 position from 179	139 position from 178	145 position from 181	Rating of conduct of business (ease of company opening, licensing, staff employment, registration of ownership, receipt of credit, defense of interests of investors)
The IMD World Competitiveness Yearbook	46 position from 55	46 position from 55	54 position from 55	56 position from 57	Research of competitiveness (state of economy, efficiency of government, business efficiency and state of infrastructure)
Index of Economic Freedom of Heritage Foundation	99 position from 157	125 position from 161	133 position from 157	152 position from 179	Determination of degrees of freedom of economy (business, auction, financial, monetary, investment, financial, labor freedom, freedom from Government, from a corruption, protection of ownership rights)
Global Competitiveness Index of World Economic Forum	69 position from 125	73 position from 131	72 position from 134	-	Competitiveness (quality of institutes, infrastructure, macroeconomic stability, education, development of financial market, technological level, innovative potential)

Risks of doing business in Ukraine significantly impact the availability of capital in the country. Commercial loan rates in EURO in Ukraine for the period of over 5 years fluctuated in March – October 2010 between 8% and 10,4% according to the official statistics of the National Bank of Ukraine[18]. For the reference similar rates in Germany for this period fluctuated between 2,3% to 3,1% according to the European Central Bank[19]. Cost of debt financing in Ukraine is at least twice as high than in the Eurozone. The risks of investing into Ukraine are additionally confirmed by the country ratings

[17] Data by the State Agency of Ukraine for Investments and Innovations URL: http://www.in.gov.ua/index.php?lang=en&get=225&id=1990 (last reference – 22/02/2012)

[18] Statistical Release. Archive, Interest Rates, 2010. URL: http://www.bank.gov.ua/doccatalog/document?id=66258 (last reference – 22/02/2012)

[19] Germany, Harmonised long-term interest rates for convergence assessment purposes URL: http://sdw.ecb.europa.eu/browse.do?node=bbn642 (last reference – 22/02/2012)

provided by the Moody's international rating agency and the associated country risk premium. The table below compares country risk premiums for Russia and Ukraine[20]:

Total Risk Premium, %	2008	2009	2010
Russia	6,52	8	6,9
Ukraine	10,04	14,75	12,75

As it is demonstrated by this table, Russia, while offering a comparable set of investment opportunities, is a significantly less risky country for investing than Ukraine. High interest rates and shortness of the resources of financial institutions make it hard to finance any big infrastructure projects. Such projects are looking upon direct public financing or partnerships between private investors, international financial organizations and government. Large scale privately financed infrastructure projects in Ukraine are hard to come by.

d. *Local availability of technologies/techniques, skills and know-how and availability of best available technologies/techniques in the future.* The proposed wind turbine generators of 2.5 MW scale have never before been installed in Ukraine. Most of the country's installed wind power is based on the 107.5 kW an 600 kW wind turbines that were produced locally under licenses from American and European manufacturers. Local production covered the needs of the governmental wind power development program that directly financed construction of the wind parks in Ukraine. Production of the larger single capacity wind turbines was attempted but never got out of the conceptual planning phase. However, Ukraine has significant industrial potential for the production of conventional thermal power technologies and nuclear power technologies. General electric networks technologies, transformer production, cabling manufacturing is present in the country.

e. *Fuel prices and availability.* In terms of fuel, Ukraine's primary energy consumption pattern has been historically dominated by natural gas 41% (39% in 2005) compared to the average of 21% for other world economies; Ukraine's average oil consumption has made up 19%, coal - 19%, uranium - 17%, and the consumption of hydro- and other renewable energy sources has totaled 4%. Over the period from 2000 to 2005, the energy dependence of Ukraine on imports of organic fuels, including conventionally primary nuclear fuel, was 60.7% compared with an average of 51% for the EU countries[21]. Only supply of coal is not dependent on foreign sources, all other fuels are mostly imported. Prices are on the international level for oil and oil products and in the recent year the price of the natural gas imported from Russia has been pushed to the level of average European prices. The price of coal in Ukraine is low and does not compensate production costs in most of the cases[22].

f. *National and/or subnational expansion plans for the energy sector, as appropriate.* The Energy Strategy of Ukraine for the period until 2030[23] does not emphasize the expansion

[20] Data from Aswath Damodaran, Ph.D., Stern School of Business NYU URL:http://pages.stern.nyu.edu/~adamodar/ (last reference – 24/02/2011)

[21] The Energy Strategy of Ukraine for the period until 2030, Section 1.4. URL: http://mpe.kmu.gov.ua/fuel/control/uk/doccatalog/list?currDir=50505 (last reference – 22/02/2012)

[22] According to the Report of the Ministry of Coal Industry of Ukraine the price of 1 ton of coal produced by the state enterprises in October 2009 was 442,3 UAH while production costs where 717,25 UAH URL:http://www.mvp.gov.ua/mvp/control/uk/publish/article?art_id=79920&cat_id=52294(last reference – 05/02/2011)

[23] The Energy Strategy of Ukraine for the period until 2030. Section 5.4. URL: http://mpe.kmu.gov.ua/fuel/control/uk/doccatalog/list?currDir=50505 (last reference – 22/02/2012)

of alternative energy and wind energy use in particular as the key growth and development area. The increasing demand for electric energy will be met by the commissioning of new and capacity improvements on the existing nuclear and thermal power plants mostly according to this document.

g. *National and/or subnational forestry or agricultural policies, as appropriate.* According to Ukrainian Fifth National Communication on Climate Change[24], land distribution by types of land-use in Ukraine is the following: agricultural land (71%), forests (17.5%), built areas (4.1%), territories covered with water (4%), open wet lands (1.6%) and other (1.8%). Main regulatory documents in this field in Ukraine are Forestry Reformation and Development Concept, State Program "Forests of Ukraine"; Strategy for land-use and land-distribution in Ukraine is absent[25]. The project is realized at numerous small plots of land, allocation of which was approved by the appropriate governmental institutions.

5) The baseline is established **in such a way that ERUs cannot be earned for decreases in activity levels outside the project activity or due to force majeure.** The project activity suggests that emission reductions will be earned only for the amount of electricity generated and delivered to the grid from the renewable source such as wind energy.
6) The baseline is established **taking account of uncertainties and using conservative assumptions**. The project participants followed all of the elements of the approved CDM baseline and monitoring methodology ACM0002 to establish the baseline. All data necessary to establish the baseline where taken from open and publicly available sources. The emission factor chosen to establish the baseline is calculated based on conservative assumptions:
   - Specific CO_2 emission factor for electricity generation is calculated based on actual activity data of the thermal power plants, grid operator and electricity supply companies
   - Simple operating margin (OM) calculation method has been used for emission factor calculation;
   - The emissions of methane and nitrous oxide have not taken into consideration, which is in line with ACM0002. This is conservative.

Specific CO_2 emission factor for electricity generation:

The following studies on the baseline carbon dioxide emission factor for the Ukrainian electricity grid are available:

1) *Operational Guidelines for Project Design Documents of Joint Implementation Projects. Ministry of Economic Affairs of the Netherlands, May 2004*[26] *(ERUPT Baseline)*. The ERUPT baseline was based on the following main principles: based mainly on indirect data sources for electricity grids (i.e. IEA/OECD reports); inclusion of grid losses for reducing JI projects; an assumption that all fossil fuel power plants are operating on the margin and in the period of 2000-2030 all fossil fuel power plants will gradually switch to natural gas. The weak point of this approach is the fact that the date sources are not specific. For example, the Net Calorific Value (NCV) of coals was not determined on installation level but was taken from IPCC default values. Furthermore the IEA data included electricity data until 2002 only. ERUPT assumes that Ukraine would switch all its fossil-fuel plant from coal to natural gas. In Ukraine such an assumption is unrealistic as the tendency is currently in the opposite direction. This study is very conservative and is outdated. It has been used only for the most early of JI projects and generally is not accepted for verification of emission reductions.

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[24] Ukrainian Fifth National Communication on Climate Change, p.33 URL: http://unfccc.int/resource/docs/natc/ukr_nc5rev.pdf

[25]URL: http://www.uceps.org/ukr/files/category_journal/NSD107_ukr_1.pdf (last reference – 22/02/2012)

[26]URL: http://ji.unfccc.int/CallForInputs/BaselineSettingMonitoring/ERUPT/GuidVol1.doc (last reference – 22/02/2012)

2) *Standardized emission factors for the Ukrainian electricity grid, Version 5, 2007, Global Carbon B.V. (Global Carbon Baseline).* This study has been developed for the specific purpose of the baseline setting in JI projects. It has been based on quite a few conservative assumptions such as fixing the grid emission factor when it has been actually expected to grow due to the tendency to switch from gas to coal; hydro power plants have been included in the OM. TUV SUD has conducted the assessment of the approach outlined in this study and has found it acceptable for the determination of carbon dioxide emission factor in JI projects. This emission factor has been used in a number of JI projects approved by Ukraine and whose determination has been deemed final and accepted by the JISC: project 0104 "Improvement of the Energy efficiency at Energomashspetsstal (EMSS), Kramatorsk, Ukraine"[27], project 0035 "Utilization of Coal Mine Methane at the Coal Mine named after A.F. Zasyadko"[28];
3) *Development of the electricity carbon emission factors for Ukraine[29], 2010, Lahmeyer International, (EBRD Baseline)* A study to develop the electricity carbon emission factors for Ukraine was finalized in October 2010. The results of the study were based on a power system simulation model that was specifically developed to incorporate the expected changes in efficiency and carbon emissions on a year to year basis for the period of 2009 – 2020. TUV SUD, an accredited independent entity under the Joint Implementation Supervisory Committee (JISC) reviewed the study and the underlying model and confirmed their conformity with relevant UNFCCC methodology. This study has been based on a more recent set of data and balances conservativeness with reasonableness. It has not been used in JI projects whose determination has been deemed final by the JISC;
4) *Calculation methodology for specific carbon dioxide emissions from electric energy production at thermal power plants and its consumption, National Environmental Investment Agency of Ukraine (NEIA) 2011, (DFP Baseline)*[30]. This methodology and the resulting carbon dioxide emission factor have been developed by the DFP of Ukraine for the application in JI projects. Carbon dioxide mission factors for the years 2008, 2009, 2010 and 2011 estimate are available[31]. It is established that actual ex-post emission factors will be calculated and published every year for the previous year before the 1st of March. Calculation is based on actual power plant data. Results of this study correlate closely with the results calculated according to the EBRD Baseline.

The most recent carbon dioxide emission factor for this project has been selected (DFP Baseline). This emission factor is accepted by the DFP and is based on actual power plants data. For ex-ante estimations in this project design document the most recent available carbon dioxide emission factor is used for the whole estimation period. Ex post emission factor will be used if available for the calculation of emission reductions. If such carbon dioxide emission factor is not available the most recent available factor will be used instead.

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27 URL:http://ji.unfccc.int/JI_Projects/DB/VY889VYDTR7YGFRYTY9TXLB4AWBLUR/Determination/Bureau%20Veritas%20Certification1246891334.73/viewDeterminationReport.html (last reference – 24/02/2012)

28 URL: http://ji.unfccc.int/UserManagement/FileStorage/1E3ZT7ZUJQ04TYPH3SBEY8BTBDLF1L (last reference 22/02/2012)

29 URL:http://www.ebrd.com/downloads/sector/eecc/Ukraine_English.pdf(last reference – 24/02/2012)

30 URL: http://www.neia.gov.ua/nature/doccatalog/document?id=125381(last reference – 24/02/2012)

31 URL: http://www.neia.gov.ua/nature/doccatalog/document?id=127171 (last reference 22/02/2012);
URL: http://www.neia.gov.ua/nature/doccatalog/document?id=127172 (last reference 22/02/2012);
URL: http://www.neia.gov.ua/nature/doccatalog/document?id=126006 (last reference – 22/02/2012);
URL: http://www.neia.gov.ua/nature/doccatalog/document?id=127498 (last reference – 22/02/2012)

Step 2. Application of the approach chosen

Theoretical approach described above supports the use of ACM0002 to identify the baseline. As per this approach the baseline for the project activity in question is:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The project participants will draw baseline emissions factor from the study "Calculation methodology for specific carbon dioxide emissions from electric energy production at thermal power plants and its consumption", National Environmental Investment Agency of Ukraine as substantiated above.

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,produced,y}, \quad \text{(Equation 1)}$$

Where:

BE_y - Baseline emissions in period y (tCO_2);

$EG_{PJ,y}$ - Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the JI project activity in period y, MWh;

$EF_{grid,produced,y}$ - specific CO_2 emission factor for grid-connected thermal power plants electricity generation, tCO_2/MWh;

Key information and data used to establish the baseline (variables, parameters, data sources etc.) is provided here in tabular form

Data/Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the JI project activity in period y
Time of determination/monitoring	Continuous measurement and at least monthly recording
Source of data (to be) used	Project activity site
Value of data applied (for ex ante calculations/determinations)	As provided by the estimation of electricity generation.
Justification of the choice of data or description of measurement methods and procedures (to be) applied	Measured for the commercial purposes by the electricity meters on site.
QA/QC procedures (to be) applied	Cross check measurement results with records for sold electricity.
Any comment	No

Data/Parameter	$EF_{grid,produced,y}$
Data unit	tCO_2/MWh
Description	Specific CO_2 emission factor for grid-connected thermal power plants electricity generation
Time of determination/monitoring	Ex-post as provided by the DFP of Ukraine on the annual basis
Source of data (to be) used	NEIA estimate for 2011: URL:http://www.neia.gov.ua/nature/doccatalog/document?id=127498 (last reference – 24/02/2012)
Value of data applied (for ex ante calculations/determinations)	1.063
Justification of the choice of data or description of measurement methods and procedures (to be) applied	This emission factor is the latest carbon dioxide emission factor for Ukrainian electricity grid approved by the DFP of Ukraine.
QA/QC procedures (to be) applied	Check on the updates of the emission factor.
Any comment	In the NEIA Order this parameter is provided in $kgCO_2/kWh$ measurement units that are equivalent to tCO_2/MWh.

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

The following step-wise approach is used to demonstrate that the project provides reductions in emissions by sources that are additional to any that would otherwise occur:

Step 1. Indication and description of the approach applied

As suggested by paragraph 2 (c) of the Annex 1 of the Guidance *and* by the ACM0002 the most recent version of the "Tool for the demonstration and assessment of additionality" approved by the CDM Executive Board is used to demonstrate additionality. The applicability of the ACM0002 is assessed in the section B.1. of this PDD. At the time of this document completion the most recent version of the "Tool for the demonstration and assessment of additionality" approved by the CDM Executive Board is version 05.2[32] and it is used to demonstrate additionality of the project activity.

Step 2. Application of the approach chosen

The following steps are taken as per "Tool for the demonstration and assessment of additionality" version 05.2

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

We will define realistic and credible alternatives to the project activity through the following Sub-steps:

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

[32] URL:http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf (last reference – 24/02/2012)

Table 6. Alternatives to the project activity

Alternative 1	**Continuation of the current situation** In Ukraine, thermal power plants (oil, natural gas, coal) account for nearly 46% of total electricity production, with nuclear power generating another 48%, while other sources, mainly hydroelectric power plants, make up the remaining 6.0%. The total installed generation capacity is 53,1 GW, which is more than enough to satisfy the current demand for electricity, albeit a big share of the thermal capacity is old and outdated (around 40 years in operation, on average) and is to be replaced rather in the nearest future. However, for some time, the Ukrainian power system may see no major changes in terms of new capacity being installed since the large overcapacity of thermal power plants is still operating in the system. This alternative suggests that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants
Alternative 2	**The proposed project activity undertaken without being registered as a JI project activity** Ukraine has a significant wind potential which is currently barely exploited. This alternative suggests that the proposed wind park will be constructed without developing it as a JI project
Alternative 3	**Construction of a new coal-fired power plant** As Ukraine has substantial coal deposits, it is possible to replace existing fossil fuel plants with the new ones. However, the Ukrainian coal is costly to extract. It also requires transportation and preparation of coal. Coal fired power plant will also experience pressure from environmental groups as the large overcapacity of coal power plants exists in Ukraine. This alternative suggests that a new coal fired power plant will be constructed to produce electricity generated by the proposed project activity.

Outcome of Step 1a: We have identified three realistic and credible alternative scenarios to the project activity.

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

All of the alternatives identified above are consistent with mandatory laws and regulations of Ukraine. The conventional power plants are operating within the legal framework of Ukraine. Pursuant to the article 5 of the Law of Ukraine «On Electrical Power Industry»[33], the state policy in the sphere of wind energy is as follows: support of development of wind energy industry as ecological and fuel-free energy sub-industry through purchase by power plants of all produced electricity with monetary payment without application of any offsets of debts as to payments for electricity. Further information on tariff policy is provided in the section B.1. of this PDD.

Outcome of Step 1b: We have identified three realistic and credible alternative scenarios to the project activities that are in compliance with mandatory legislation and regulations taking into account the enforcement in the Ukraine.

Step 2. Investment Analysis

The purpose of the investment analysis in the context of additionality is to determine whether the proposed project activity is not:

a) The most economically or financially attractive; or
b) Economically or financially feasible, without the revenue from the sale of emission reductions.

[33] URL: http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=575%2F97-%E2%F0(last reference – 24/02/2012)

Sub-step 2a: Determine appropriate analysis method

The proposed alternatives will, apart from the JI benefits, generate economic benefits through the improvement of generation efficiency (Alternative 3) or will avoid investment costs (Alternative 1); therefore the simple cost analysis is not applicable. Either investment comparison analysis or benchmark analysis has to be applied in case of proposed activities.

Option III – benchmark analysis – has been chosen to conduct the investment analysis. The data necessary to make a careful and comparable estimation of the indicators for the Alternative 3 are not available to the project participants. Therefore, it is not feasible to conduct investment comparison analysis as per Option II. Besides, Alternative 3 cannot be regarded as realistic and credible due to the pressure of environmental regulations and government policy that may restrict construction of new coal fired power plants in the system with large overcapacity of such units, low tariffs that are available to electricity producers from conventional sources etc.

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

The proposed project which is the construction of the modern large-scale wind park is implemented by LLC "Vetrianoy park Ochakovskiy". For the benchmark analysis of the project the indicator of Net Present Value (NPV) was used. The goal of analysis will be to show that the project activity not undertaken as a joint implementation project (Alternative 2) will not be financially attractive and will lead to negative value of NPV. This benchmark has been selected for a number of reasons:

1. The project owner does not have formalized internal benchmark that is systematically applied during project evaluation;
2. No governmental approved benchmark is available for projects of this kind in Ukraine;
3. Positive/negative NPV is a generally accepted project evaluation benchmark. Its use is encouraged by many project finance professionals, while IRR is considered to be controversial and is not recommended as the single benchmark for project evaluation[34].

The analysis took in consideration the following assumptions:

1) Initial (1st stage) investment execution period is 2011.
2) Date of investment decision taking is October 2010.
3) Analysed operation period is 10 years.
4) Calculations have been done in EUR.
5) Fair value of the assets has been calculated for the last year of analysed operation period and applied as a positive cash flow.
6) Depreciation and any taxes (except for mandatory overhead payments) have not been taken into account.
7) Financing for the project is provided by equity investors 100%.
8) Calculation of the cash flows has been performed in constant prices using real discount rate.
9) Revenue from sales of assets is assumed to be equal to depreciated value of project equipment in the end of the analysed operation period.

The project investment costs include, inter alia:

- Purchase price for wind turbines;
- Reconstruction of electrical networks on site and upgrade of transformer capacity;
- Construction of tower fundaments and cable laying;
- Design, planning and supervisory expenses.

The project operating costs include, inter alia:

- Employee salaries;
- Mandatory overhead costs;

[34] *Principles of Corporate Finance* 7th edition, Richard A. Brealey, Stewart C. Myers, McGraw-Hill Higher Education, 2003 – p. 105

- General operating expenses (e.g. office expences etc.);
- Maintenance expenses.

As an appropriate discount rate for the NPV calculation in this case the cost of equity was used. The discount rate is set at a level of 21,41% for the NPV calculation in case of equity financing for this project[35]. The project cash-flow modelling has been performed in order to calculate project's indicator and compare it with the benchmark.

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

The NPV for the operational period of ten (10) years of the proposed project activity has been calculated and produced results as follows:

Table 7. Financial indicators

Base case financing structure	**NPV, EUR** thousands
NPV	-27 036
Benchmark NPV	>0

In this case the NPV does not reach the positive value. Therefore, the investment to the proposed project activity cannot be justified.

Sub-step 2d: Sensitivity analysis

The NPV values for the change in total investment cost and electricity production estimates which are the most important variables that influence the final results are shown in the table below. Changes in the electricity tariff are not included into the analysis as it is fixed by the law and as such it cannot vary. Changes in electricity production influence the same cash flow and this influence is analysed instead.

Table 8. Sensitivity analysis

Scenario	**NPV, EUR thousand**
Base Case	-27 036
Scenario 1 (Investment cost -10%)	-1 667
Scenario 2 (Electricity production +10%)	-4 256
Scenario 3 (Investment cost +10%)	-52 394
Scenario 4 (Electricity production -10%)	-49 815

Sensitivity analysis demonstrates that in every case NPV of the project does not reach the benchmark. Considering such NPV calculation listed in table above, it can be concluded that the results of financial analysis stated above are robust.

Outcome of Step 2: After the sensitivity analysis it is concluded that the proposed JI project activity is unlikely to be financially/economically attractive.

Step 3: Barrier analysis

According to the “Tool for the demonstration and assessment of additionality” (Version 05.2) this step is optional and can be omitted.

[35] See Annex 4

Step 4: Common practice analysis

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

The proposed project activity is the second large scale modern wind power development in Ukraine to enter construction stage. The first WPP of such kind is being built in Novoazovsk, Donetsk region; this activity is realized under JI mechanism and according to “Tool for the demonstration and assessment of additionality” (Version 05.2) cannot be considered a part of common practice. PDD of the project “Wind Park Novoazovskiy in Ukraine” is published at UNFCCC web-page[36] and has received a positive determination opinion.

Small scale wind power has been developed in Ukraine through the direct financing from the state. Under this initiative the largest wind turbine so far being connected to Ukrainian NPG is 600 kW capacity, while the majority of wind turbines being only of 107,5 kW and below, all of them being produced in Ukraine. Total wind potential of Ukraine is estimated at 30-42 TWh (16000 MW installed capacity), while the total installed capacity of wind power comes close to 90 MW (in 2008 they produced 6.7 million kWh).

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

Other, comparable to this project activity, projects have been developed in Ukraine only through the utilization of JI mechanism – like the "Portfolio of Wind Power Plants in the Autonomous Republic of Crimea (WPP-300)"[37]. Most of the projects, however, did not proceed with construction. Ukraine has no experience in operating large wind turbines or large wind parks. All wind power plants were constructed as state-owned enterprises; while the main goal was to carry out conversion of the former military production existed in the Soviet Union. From this perspective proposed project activity will be the first private investment in Ukraine into such a large wind power project (over 100 MW), therefore, the project is not regarded as a common practice. Similar projects are not widely observed and commonly carried out.

Both sub-steps 4a and 4b are satisfied.

Therefore, based on the requirements of the "Tool for the demonstration and assessment of additionality" version 05.2, the proposed project is additional.

[36]URL:http://ji.unfccc.int/JI_Projects/DB/ZRW4ODNCBPRNPTMKBTHODJNIUAKVDD/PublicPDD/VJWRWVD1TM0UOSHOZ7GC44P8SE897T/view.html (last reference – 24/02/2012)

[37]URL:http://ji.unfccc.int/JI_Projects/DB/ZYXHPSBM2ZDNCD22JT73V6KWD8UL7Q/PublicPDD/C34A1HSSBI85SLR5F9EXZ6HR7RGJ0Z/view.html (last reference – 24/02/2012)

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

The project boundary for this particular project is defined in line with the approach chosen regarding the baseline setting. Elements of the ACM0002 were used to define the project boundary. Applicability of the ACM0002 is discussed in the section B.1. of this PDD. According to ACM0002 the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the JI project power plant is connected to.

In accordance with the recommendations of ACM0002, the project boundary is the Ukrainian Power Grid, as shown in figure below.

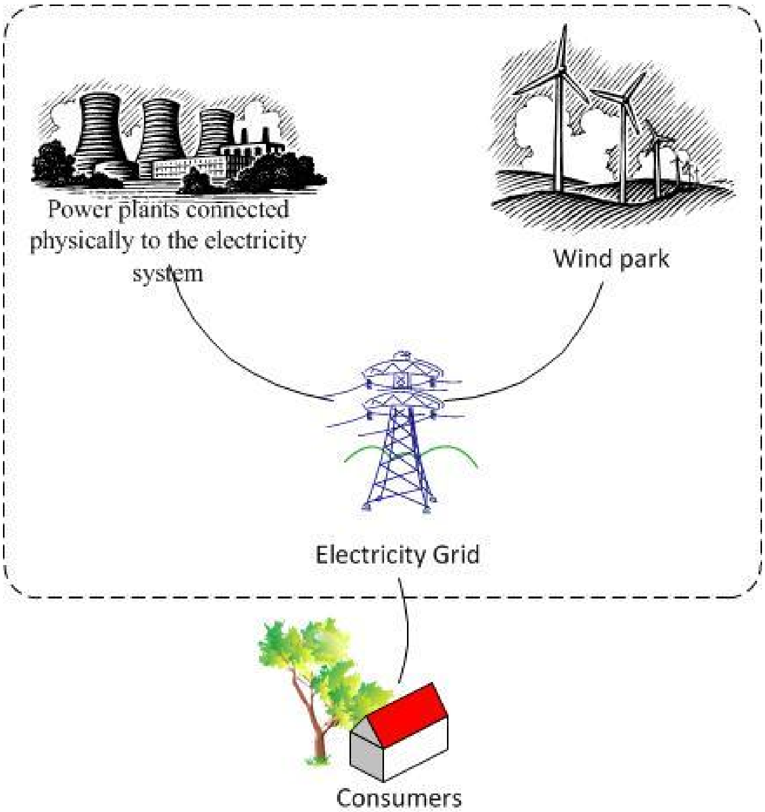

Figure 4. Project Boundary

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in the table below.

Table 9. Emissions sources included in or excluded from the project boundary

Source		Gas	Included	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded as minor emission source per ACM0002.
		N_2O	Excluded	Excluded as minor emission source per ACM0002.
Project scenario	No sources.	-	-	There are no sources of project emissions for the wind power plants according to ACM0002.

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

Date of baseline setting: 14/10/2011

Name of person/entity setting the baseline: Natallia Belskaya JI Consultant Global Carbon B.V.
Phone: +38 050 410 26 79
E-mail: belskaya@global-carbon.com

Global Carbon B.V. is the project participant and contact details are available in Annex 1.

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

Starting date of the project is 15/12/2010. This is the date when the contract for development of project documentation was signed.

C.2. Expected operational lifetime of the project:

The operational lifetime of the project is 28 years or 336 months.

C.3. Length of the crediting period:

Start of the crediting period: 01/12/2011.

End of the crediting period: 01/12/2039.

Length of the crediting period: 28 years or 336 months.

Length of the part of crediting period within the first commitment period of the Kyoto Protocol: 1 year and 1 month or 13 months in total.

Length of the part of crediting period after the first commitment period of the Kyoto Protocol: 26 years and 11 months or 323 months.

The status of emission reductions or enhancements of net removals generated by JI projects after the end of the first commitment period of the Kyoto Protocol may be determined by any relevant agreement under the UNFCCC.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

This monitoring plan is established in accordance with appendix B of the JI guidelines and further guidance on baseline setting and monitoring developed by the JISC. The description of the monitoring plan chosen is provided using the following step-wise approach:

Step 1. Indication and description of the approach chosen regarding monitoring
Project participants have chosen to apply the elements of the monitoring methodology contained in the ACM0002. The applicability of the ACM0002 to this project activity is discussed in the section B.1. of this PDD. The monitoring plan will provide for, inter alia:

- The collection and archiving of all relevant data necessary for estimating or measuring anthropogenic emissions by sources of GHGs occurring within the project boundary during the crediting period;
- The collection and archiving of all relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary during the crediting period;
- The identification of all potential sources of, and the collection and archiving of data on increased anthropogenic emissions by sources of GHGs outside the project boundary that are significant and reasonably attributable to the project during the crediting period.
- Quality assurance and control procedures for the monitoring process;
- Procedures for the periodic calculation of the reductions of anthropogenic emissions by sources by the proposed JI project, and for leakage effects, if any;

Step 2. Application of the approach chosen
The monitoring methodology contained in ACM0002 requires that all data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data should be monitored if not indicated otherwise in the sections below. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

In Ukraine all large scale electricity producers are obliged to have Automated System for Commercial Metering of Electricity (ASCME). This system allows for metering of all electricity delivered to the grid and consumed from the grid allowing for transparent calculation of the net amount of electricity delivered to the grid. Detailed specifications of this system are provided by the Main Operator of the Wholesale Electricity Market of Ukraine – State Enterprise "Energorynok"[38].

The project activity will use Option I - Monitoring of the emissions in the project scenario and the baseline scenario. See sub-sections below for the further information on monitoring approach application.

[38] URL:http://www.er.energy.gov.ua/doc.php?c=1228 (last reference – 24/02/2012)

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

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	PE_y - Project emissions in period y	According to ACM0002	tCO_2e	e	Fixed ex-ante	100%	Electronic and Paper.	According to the ACM0002 for the wind power generation project activities, $PE_y = 0$

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

According to the ACM0002 for the wind power generation project activities,

$$PE_y = 0, \qquad \text{(Equation 2)}$$

Where:

PE_y - Project emissions in period y (tCO_2e).

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
2	$EG_{PJ,y}$ - Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the JI project activity in period y	Project activity site	MWh	m	Continuous wit monthly recording	100%	Electronic and Paper.	This parameter is used in the normal commercial activity of the facility.
3	$EF_{grid,produced,y}$ - Specific CO_2 emission factor for grid-connected thermal power plants electricity generation	Official information of Ukrainian DFP	tCO_2/MWh	e	Ex-post as provided by the Ukrainian DFP on the annual basis	100%	Electronic and paper	This emission factor is the latest carbon dioxide emission factor for Ukrainian electricity grid approved by the DFP of Ukraine.

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

According to the ACM0002 for the wind power generation project activities the baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,produced,y}, \quad \text{(Equation 3)}$$

Where:

BE_y - Baseline emissions in period y, tCO_2e;

$EG_{PJ,y}$ - Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the JI project activity in period y, MWh;

$EF_{grid,produced,y}$ - Specific CO_2 emission factor for grid-connected thermal power plants electricity generation, tCO_2/MWh.

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

This section is left blank on purpose.

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

This section is left blank on purpose.

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

This section is left blank on purpose.

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

According to the ACM0002 no leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected.

D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project:

ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Not applicable.

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

Not applicable.

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

According to the ACM0002 emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \, . \qquad \text{(Equation 4)}$$

Where:

ER_y - Emission reductions in period y (tCO_2e);

BE_y - Baseline emissions in period y (tCO_2e);

PE_y - Project emissions in period y (tCO_2e).

Results of the emissions calculations above are presented in metric tons of carbon dioxide equivalent (tCO_2e). The metric ton of carbon dioxide equivalent is equal to the metric ton of carbon dioxide (tCO_2). Therefore 1 tCO_2e = 1 tCO_2.

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

The procedures to collect and archive information on the environmental impacts of the project will be established by the final environmental impact assessment report in accordance with The State Construction Norms[39] which will be reviewed and approved by the relevant authorities of Ukraine.

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:

Data *(Indicate table and ID number)*	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
#1, Table D.1.1.1.	Low	Fixed ex-ante as per ACM0002
#2, Table D.1.1.3.	Low	The quantity of electricity exported and the quantity of electricity imported will be measured by electric meters. The transmission of the amount of electricity exported/imported to the control room shall be made online. Registration shall be made monthly, by the operator in charge. The data measured are used for the commercial transactions of the company, therefore they are well verified. Cross check measurement results with records for sold electricity will be done periodically.
#3, Table D.1.1.3.	Low	The emission factor is calculated by Ukrainian DFP on the annual basis and made public.

D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan:

The monitoring plan will be executed within the existing operational and management structure of the company. The monitored parameters will be cross-checked with the data from the automated system of commercial accounting of the facility - ASCME. Data from the Supervisory Control And Data Acquisition system will also be used to check the results.

The overall operational and management structure that the project operator will apply in implementing the monitoring plan is provided in the figure below:

[39] *State Construction Standard DBN A.2.2.-1-2003 :"Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures"* State Committee Of Ukraine On Construction And Architecture, 2004

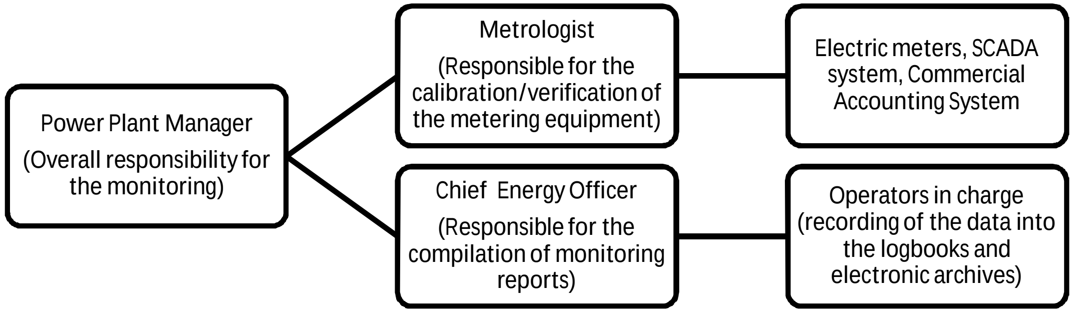

Figure 5. Operational and Management structure

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

Date of establishing the monitoring plan: 14/10/2011

Name of person/entity establishing the monitoring plan: Natallia Belskaya JI Consultant Global Carbon B.V.
Phone: +38 050 410 26 79
E-mail: belskaya@global-carbon.com

Global Carbon B.V. is the project participant and contact details are available in Annex 1.

SECTION E. Estimation of greenhouse gas emission reductions[40]

E.1. Estimated project emissions:

According to the ACM0002 for the wind power generation project activities project emissions are equal to zero.

E.2. Estimated leakage:

No leakage identified as per ACM0002. Please, refer to Section D.1.3. for details.

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

This sum is equal to zero.

E.4. Estimated baseline emissions:

Table 10. Estimated baseline emissions during the crediting period

Parameter	Unit	2011	2012	Total
Baseline Emissions due to grid connected power generation	tCO_2e	2 202	115 891	**118 093**
Total Baseline emissions during the crediting period	tCO_2e	2 202	115 891	**118 093**

Table 11. Estimated baseline emissions for the part of the crediting period after the end of 2012

Parameter	Unit	2013	2014	2015-2035	2036	2037	2038-2039	Total
Baseline Emissions due to grid connected power generation	tCO_2e	192 929	192 929	964 643	962 441	848 752	771 715	**23 997 984**
Baseline emissions after the crediting period	tCO_2e	192 929	192 929	964 643	962 441	848 752	771 715	**23 997 984**

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

Table 12. Estimated emission reductions during the crediting period

Parameter	Unit	2011	2012	Total
Emission reductions during the crediting period	tCO_2e	2 202	115 891	**118 093**

Table 13. Estimated emission reductions for the part of the crediting period after the end of 2012

Parameter	Unit	2013	2014	2015-2035	2036	2037	2038-2039	Total
Emission reductions after the crediting period	tCO_2e	192 929	192 929	964 643	962 441	848 752	771 715	**23 997 984**

[40] All values in this section are rounded to integer.

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

Table 14. Estimated balance of emissions under the proposed project over the crediting period

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emissions reductions (tonnes of CO_2 equivalent)
2011	0	0	2 202	2 202
2012	0	0	115 891	115 891
Total (tonnes of CO_2 equivalent)	0	0	118 093	118 093

Table 15. Estimated balance of emissions under the proposed project for the part of the crediting period after the end of 2012

Year	Estimated project emissions (tonnes of CO_2 equivalent)	Estimated leakage (tonnes of CO_2 equivalent)	Estimated baseline emissions (tonnes of CO_2 equivalent)	Estimated emissions reductions (tonnes of CO_2 equivalent)
2013	0	0	192 929	192 929
2014	0	0	192 929	192 929
2015	0	0	964 643	964 643
2016	0	0	964 643	964 643
2017	0	0	964 643	964 643
2018	0	0	964 643	964 643
2019	0	0	964 643	964 643
2020	0	0	964 643	964 643
2021	0	0	964 643	964 643
2022	0	0	964 643	964 643
2023	0	0	964 643	964 643
2024	0	0	964 643	964 643
2025	0	0	964 643	964 643
2026	0	0	964 643	964 643
2027	0	0	964 643	964 643
2028	0	0	964 643	964 643
2029	0	0	964 643	964 643
2030	0	0	964 643	964 643
2031	0	0	964 643	964 643
2032	0	0	964 643	964 643
2033	0	0	964 643	964 643
2034	0	0	964 643	964 643
2035	0	0	964 643	964 643
2036	0	0	962 441	962 441
2037	0	0	848 752	848 752
2038	0	0	771 715	771 715
2039	0	0	771 715	771 715
Total (tonnes of CO_2 equivalent)	0	0	23 997 984	23 997 984

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:

First stage of EIA[41] has been done following the strict environmental guidelines of the Ukrainian State Construction Standard DBN A.2.2.-1-2003[42] (Title: "Structure and Contents of the Environmental Impact Assessment Report (EIA) for Designing and Construction of Production Facilities, Buildings and Structures").

Annex E of this standard contains a list of "types of projects or activities which constitute higher environmental risk" for which full EIA is mandatory, and the Ministry of Environmental Protection being the competent authority. Wind power plants with internal electricity transmission cables are not included in the list of types of activities or facilities which present an increased environmental hazard. The operation of WPP with internal electricity transmission lines does not produce waste and does not cause particle or liquids emissions into the environment, and does not result in non-reversible or critical changes in the atmo-, hydro-, or lithospheres.

Transboundary effects

The project does not have any transboundary impact, as this project is implemented only in the Mykolaiv region of Ukraine and does not foresee any impact that can manifest within the area of any other country.

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

The environmental impacts are not considered significant by the host Party. This section describes the most important impact of the project on the environment. All anticipated environmental effects and mitigation measures are described in EIA made by OJSC “Ukrainian Scientific Research Institute of Marine Engineering Technology”[43] which gave a positive conclusion about reasonableness of constructing the WPP on the proposed territories.

Main environmental impacts considered in EIA and mitigation measures are as follows:

1) ***Impact on land use***: plots of land allocated for construction of WPTs cannot be used for agricultural purposes. Three of the project WTGs are to be built in forest zone, which was permitted by Ukrainian State Forest Resources Agency. The area taken by wind turbine is not big and those plots of land are located close to field area, its construction and operation will not lead to significant loss of forestry land. According to EIA land taken for construction needs (access roads, storage places etc.) is to be recultivated. Mitigation measures described in EIA were found satisfactory.
2) ***Noise and infrasound:*** this impact was found within permitted levels regarding remoteness of the WTGs from populated areas and mitigation measures provided for in project design and operation instructions.
3) ***Negative impacts during construction:*** these impacts are to be compensated by mitigation measures provided for in project documentation regarding construction phase, which was developed meeting the requirements of local legislation on sanitary norms and soil recultivation.

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[41] Environmental Impact Assessment

[42] *State Construction Standard DBN A.2.2.-1-2003 :"Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures"* State Committee Of Ukraine On Construction And Architecture, 2004

[43] License AB No 147675.

4) ***Impact on birds:*** In order to minimize collision of birds with wind turbines the latter are painted with reflective paint. During the night time turbines are to be lighted to improve visibility for birds.

SECTION G. Stakeholders' comments

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

Information about plans to launch the project was published in newspaper "Yuzhnaya Pravda" No 131 on 14/09/2010 (p.8). Project participants have also organized meetings with the local stakeholders during the project development period. Specifically, such meeting has been organized on 23.08.2011. Detailed accords of these meetings are available from the project participants.

No negative comments were received during the public hearings. PDD will be made publicly available for the global stakeholder meeting commenting period and any comments received will be taken into account.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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URL:	-
EDRPOU Code (Code in the State Unified Register of Companies and Enterprises of Ukraine):	37097399
Types of operations according to KVED (Classifier of Economic Operations):	40.11.0 Electrical power production 40.12.0 Electrical power delivery 45.21.5 Construction of power generation facilities, extraction and refining industry 45.21.4 Construction of local pipelines, telecommunication and power transmission lines 45.21.3 Construction of long distance pipelines, telecommunication and power transmission lines
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Annex 2

BASELINE INFORMATION

Table containing the key elements of the baseline

#	Parameter	Data unit	Source of data
1	$EG_{PJ,y}$ - Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the JI project activity in period *y*	MWh	Data of project owner based on wind parameters measurement and estimation
2	$EF_{grid,produced,y}$ - Specific CO_2 emission factor for grid-connected thermal power plants electricity generation	tCO_2/ MWh	NEIA estimate for 2011: URL:http://www.neia.gov.ua/nature/doccatalog/document?id=127498 (last reference – 24/02/2012)

Annex 3

MONITORING PLAN

Please, refer to section D of this PDD.

Annex 4

ADDITIONALITY INFORMATION

Discount rate for NPV calculations

An access to the international and domestic financial market for a project similar to the proposed JI activity in Ukraine is very limited. Currently, investment climate is weak in Ukraine, especially in comparison with the neighbouring countries. An example of Fitch sovereign credit ratings for Ukraine compared to some other countries of Eastern Europe:

- Ukraine	B
- Poland	A-
- Hungary	BBB
- Slovak Republic	A+
- Russia	BBB

The benchmark discount rate is based on the cost of equity for comparable projects in the developed economies and can be calculated as follows based on the general approach of the Capital Asset Pricing Model (CAPM). According to this model the discount rate for investment decision can be presented as the return that investors require from it. This expected return is estimated as[44]:

$$ExpectedReturn = RiskFreeRate + \sum_{j=1}^{k} \beta_j (RiskPremium_j)$$

Where:

β_j – is the Beta of investment specifically relative to factor j.

From the point of view of the investor the expected return will consist of the risk-free rate increased by the suitable risk premiums. The risk-free rate taken for this assessment is the minimum cost of equity for comparable projects in the developed economies. The suitable risk premiums in our case will include:

- Country risk premium. This portion of the risk reflects unique risks of investment being made in Ukraine. The additional return (premium) is required to cover political uncertainty, ownership risks, profit repatriation risk etc.

- The equity risk premium. Which is derived from the long-term historical returns on equity in the US market relative to the return of bonds.

- Technological or Expected return risk premium. This risk is associated with failure to reach projected income due to primarily technical, technological and organizational decisions of the project, as well as random fluctuations in production volumes and prices of products and resources. Correction for this kind of risk is determined by taking into account the technical feasibility and merits of the project, detailed design decisions, the availability of the necessary research and state of the proposed technology. This project does carry some unpredictability in production volumes and utilizes first-of-its-kind technology in Ukraine.

Even though it may be argued that on-shore installation of wind turbines of 2,5MW is proven, low-risk and widely employed technology for certain markets and locations it has to be mentioned that it is not the case for Ukraine. The reasons for it are:

[44] Investment Valuation: Tools and Techniques for Determining the Value of Any Asset, Second Edition, A. Damodaran, 992 pages Publisher: Wiley; 2nd edition (January 18, 2002), page 218.

- Risks for the grid stability. Ukrainian power grid is not suited for receiving power from a highly variable large-scale producer (such as a big wind park). This may potentially lead to grid failure and discontinuation of the project.
- O&M unavailability. This project is the first attempt at introduction of the large-scale wind power plant in Ukraine. Required service and maintenance capacity is not readily available in the country. This results in long lead times for spare parts delivery, longer overhaul time periods and potential risk of increased unavailability of the capacity.
- Lack of data and operational history. In Ukraine long-term data on wind conditions are mostly unavailable. Without these data it is not possible to establish reliable long-term production forecast for a wind park. Any forecast will be based on short-term (up to 1 year) wind data thus reducing the reliability of calculations.

On the whole, it also should be taken into account that while on-shore wind turbines of 2+ MW class have been widely installed throughout the world in the few recent years the technology itself is not more than 10 years old (URL:http://www.wind-energy-the-facts.org/en/part-i-technology/chapter-3-wind-turbine-technology/evolution-of-commercial-wind-turbine-technology/growth-of-wind-turbine-size.html , (last reference – 24/02/2012)). Therefore long-term effects associated with its operation have not been studied yet.

Taking this into account, we suggest that this project in Ukraine has a considerably high amount of technological risk associated with it and appropriate risk adjustment factor should be used.

Rate description	Level p.a.	Source:
Risk-free rate (long term returns on US Government bonds)	3.00%	URL:http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf (last reference – 24/02/2012) Appendix Default values for the expected return on equity Para 2
Equity risk premium (long-term historical returns on equity in the US market relative to the return of bonds)	6.50%	URL:http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf (last reference – 24/02/2012) Appendix Default values for the expected return on equity Para 3
Country risk premium for Ukraine	8.25%	URL:http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem09.xls (last reference – 24/02/2012) Value as of January 2010
Expected return risk (introduction of the new technology for Ukraine)	13.00%	URL:http://www.rosteplo.ru/Npb_files/npb_shablon.php?id=329 (last reference – 24/02/2012) Table11.1
Equals to nominal discount rate	23.75%	
Real discount rate for Ukraine can be derived as follows:	(1+23.75%)/(1+1.93%)-1=21.41%	
Where:		
Inflation in Euro Area (Average 1997 - 2010)	1.93%	URL:http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&language=en&pcode=tsieb060&tableSelection=1&footnotes=yes&labeling=labels&plugin=1 (last reference – 24/02/2012)

The figure of 21.41% serves as the discount rate for NPV calculation of the project.