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:

Portfolio of Wind Power Plants in the Autonomous Republic of Crimea (WPP-300).

Version 2, May 16, 2007

A.2. Description of the project:

The peninsula of Crimea is a part of special interest to the Ukrainian State as an Autonomous Republic and one of the most important areas for tourism in the country. The local electricity sources within the peninsula are supplemented with electricity imported through OTL connection to the main national power grid ("NPG).

The Project will enable the area to increase its electricity production in order to increase the security of supply for the local population and industry.

The main objective of the Project is to install new capacities (wind farms) to produce electricity in an environmental-friendly manner, which will enable a sustainable growth of the tourism activity as well as other industries.

The scope of the Project is to install a large-scale wind power plant, thus contributing to mitigation of global warming, security of energy supply and sustainable development in the area. The project is divided into two wind farms with a total planned capacity of 300 MW, one in the western side of Crimea (Chernomorskij District) – about 200 MW and one in the eastern side of the peninsula (Leninskij District) – about 100 MW. The sites are considered ideal for wind energy generation due to good wind conditions, nearby interconnection infrastructure and limited environmental impact or other restrictions due to past military activities in the region. The areas of importance to the tourism industry are located at sufficient distance to avoid any disturbances from noise and visual influence. The risks of implementing the project viewed to be low due to local community support, presence of electrical utility for grid connection and lack local electricity production. The consortium leading the development of the Project is headed by Martifer Group (www.martifer.pt). Martifer Group has experience from wind power development as well as production of wind turbines through its own production and license of the well known REPower units. The investment decision is based on the prevailing renewable energy policy in strong support for renewable energy development and the Joint Implementation mechanism, which will enhance the economical benefit to the level that it can sustain this large scale investment.

A.3. Project participants:

Party Involved	Legal Entity	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ukraine (Host Party)	NOVA-ECO LLC	No
Kingdom of Sweden	• Swedish Energy Agency • NEFCO	Yes

The purchasers of the emission reductions from the project

There are two project participants acquiring Emission Reduction Units: the Kingdom of Sweden through the Swedish Energy Agency, which runs the Swedish International Climate Investment Programme and the Nordic Environment Finance Corporation NEFCO in its capacity as Fund Manager to the Baltic Sea Region Testing Ground Facility (TGF).

Swedish Energy Agency (STEM)

The Swedish Energy Agency, STEM, is a Swedish Government Authority, financed over the state budget, which was established in 1998 (organisation No. SE 2021005000-01). The Agency's main task is to implement the national energy policy decided by Government and Parliament. It is also assigned to administer the Swedish International Climate Investment Programme (SICLIP) aiming at implementing projects under the project-based mechanisms, Joint Implementation (JI) and the Clean Development Mechanism (CDM), under the Kyoto Protocol. The Swedish JI and CDM programme gives priority to projects based on renewable energy and energy efficiency measures.

NEFCO Testing Ground Facility (TGF)

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

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

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

A.4. Technical description of the project:

A.4.1. Location of the project:

A.4.1.1. Host Party(ies):

Ukraine

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

Autonomous Republic of Crimea

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

Two sites in Chernomorskij and Leninskij Districts

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

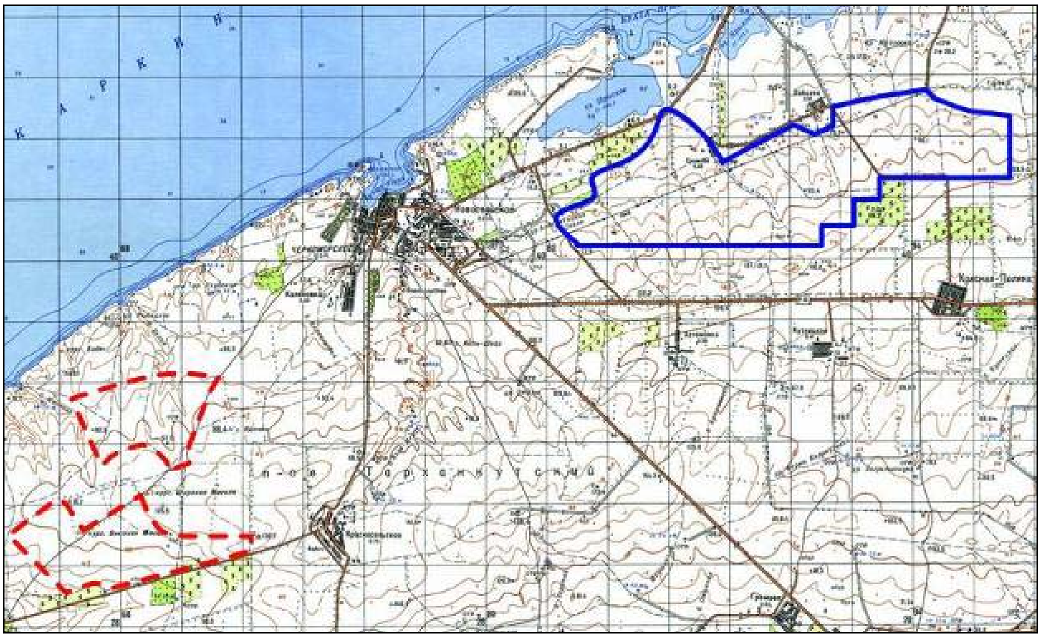
The Project is located in two main sites (Western and Eastern) on the Crimean peninsula, which is located in the southern side of Ukraine. The Crimea is connected to the mainland by the 3-4 mile wide Isthmus of Perekop. At the eastern tip is the Kerch peninsula, which is directly opposite the Taman peninsula on the mainland. Between these two peninsulas lays the 2-9 mile wide Kerch Strait, which connects the Black Sea with the Sea of Azov. The total area of the Crimea is approximately 26 000 sq.km

Picture 1 – Ukraine

The two project sites are located in the Western and Eastern region to take advantage out of the predominate winds.

Picture 2 - Project sites location

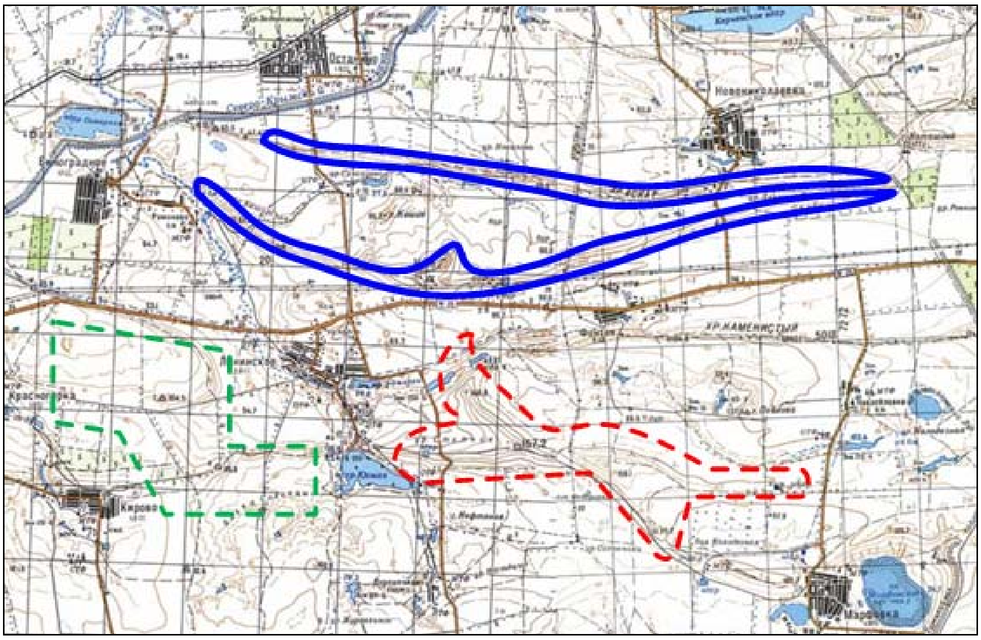
Western Project Area _ the blue contour



Picture 3 – Western Project Area (main and alternative – dotted red line)

The Western Project area is a fairly open flat, where some wind power installations have been made over the past years. The limited population, with only one main area, is a clear advantage but the area requires upgrades to the electrical network (presently 35 kV) in order to transmit the generated electricity to the higher populated areas. The local population consumes about 75 MW in average.

Eastern Project Area_ the blue contour



Picture 4 – Eastern Project Area (main, alternative – dotted red line and canceled – dotted green line)

Eastern project area has a more hilly relief. A set of ridges stretching for more than 20 kilometers from west to east form an interesting location for the wind park. Limited population in the area is caused by military installations in the region and old plans to construct a nuclear power plant here that have been abandoned after 1986. Activities on military installations have gone down since 1991.

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

Project purpose:

The technical purpose of the project is to install and operate two wind power plants that will not only strengthen the environmentally friendly domestic electricity production and assure the security of supply but also establish wind power for as a viable future alternative for large scale power generation projects in the Autonomous Republic of the Crimea.

Description of technology employed and associated risks:

The project is divided into two separate wind power plant sites with a total planned capacity of 300 MW.

- Western Project Area in Crimea (Chernomorskij District): The intended size of the installation is up to 200 MW or between 96 to 100 wind turbines (unit size between 2 to 2.1 MW) depending on the selected manufacturer and wind turbine designs. Installation of interconnection transmission line 330 kV to the substation Ostrovskaya, owned by Crimean Power System Ukrenergo, as well as WPP substation and some rehabilitation of the substation equipment are needed.

- Eastern Project Area in Crimea (Leninskij District): The intended size of the installation is up to 100 MW or between 48 to 50 wind turbines (unit size between 2 to 2.1 MW) depending on the selected manufacturer and wind turbine designs. Installation of interconnection transmission line 220 kV to the substation NS-3, owned by Crimean Power System Ukrenergo, as well as WPP substation and some rehabilitation of the substation equipment are needed.

Wind Turbine Technology:

REPower MM92

	Rated Power	2000 kW
	Rotor diameter	90 m
	Hub height	80 m
	Generator Concept	Asynchronous double-fed generator with rotor power recovery to the grid via the frequency convertor. The stator winding is synchronised to the low-voltage side, and is connected directly to the grid with a soft cut-in.
	Nominal power / speed:	P_{el} = ~2040 kW at n=1800 RPM (±30 kW depending on the manufacturers)
	Speed range:	n=900 to 1800 RPM (dynamic to 2100 RPM) There is a specific maximum power value associated with each rotational speed, and this power value must not be exceeded on average for design reasons.
	Type	Four pole, 3 phase asynchronous slip-ring generator
	Size	500
	Protection	IP 54
	Cooling	Surface mounted air-air heat exchanger. External airflow is generated by external fan. Cooling air is drawn from inside the nacelle.
	Sensors	PT100 for monitoring bearings PT100 for monitoring coils Brush wear warning

Power curve

wind speed	Air density in [kg/m³]								
v [m/s]	1.225	1.06	1.09	1.12	1.15	1.18	1.21	1.24	1.27
3	20	14	15	16	17	18	19	21	23
4	94	77	80	84	87	90	93	96	100
5	205	174	180	185	191	197	202	209	217
6	366	312	322	332	342	352	361	373	388
7	615	517	535	554	572	589	606	626	647
8	934	791	818	844	870	896	921	949	978
9	1314	1122	1158	1194	1229	1263	1297	1331	1366
10	1708	1486	1528	1569	1610	1649	1689	1722	1749
11	1989	1815	1848	1880	1912	1943	1974	1990	1991
12	2000	1993	1994	1995	1997	1998	1999	2000	2000
13	2000	2000	2000	2000	2000	2000	2000	2000	2000
14	2000	2000	2000	2000	2000	2000	2000	2000	2000
15	2000	2000	2000	2000	2000	2000	2000	2000	2000
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21	2000	2000	2000	2000	2000	2000	2000	2000	2000
22	2000	2000	2000	2000	2000	2000	2000	2000	2000
23	2000	2000	2000	2000	2000	2000	2000	2000	2000
24	2000	2000	2000	2000	2000	2000	2000	2000	2000

Connection to the power grid:

The upgrading and interconnection to the National Power Grid (NPG) will be supplied by ABB. The tender documentation has been developed in cooperation with Pöyry Energy Oy, Helsinki (technical consultant) and Latham&Watkins (legal) and nepers AG.

Key permits and expected date of approval

The process of applying for all necessary permits to build, operate and maintain the wind power plants has been initiated and is managed by Krim-Irey LLC which has experienced from the permitting of more than 30 MW of wind power in Crimea.

Nova-Eco has received exclusive development permits from both Leninskij and Chernomorskij District State Authorities in May 2006. In many cases direct negotiation with private owners must take place to secure land.

Key contracts and expected date of signing

Engineering, Procurement and Construction (EPC) Contract Term Sheet for the wind park is expected to be signed July 1, 2007. The term sheet contains the more important legal issues and specifically developed for a project finance transaction. Latham&Watkins has been selected for the legal support because the law firm is one of the most experienced project finance firms. The term sheet can in many cases be compared to a normal EPC Contract. The final contract will be negotiated during the finance phase when the lenders legal counsels may require changing in order to approve the contract for project finance. In addition, all material permits and licenses must be obtained in order to introduce them as requirements in the EPC contract. The final EPC contract is expected in third quarter of 2007.

Operation and Maintenance Contract will be developed in the same way as the EPC Contract. The O&M Term Sheet will be developed during the negotiation with the selected wind turbine manufacture.

Loan Agreement will be developed together with the selected lender and is expected to be signed in the second quarter of 2007.

The project has received letters of interest from EBRD, Raiffeisen and the Nordic Investment Bank.

Risks during project implementation and operation

Technology risks:

Modern wind turbines are proven to be a very reliable technology. A small number of wind power turbines are already operating close to the project sites, thereby demonstrating that the proposed technology is viable and relevant technology know how is locally present.

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.

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.

Construction risks:

Normal construction related risks exist, but are not related to the technology employed. Constructing the wind power plants at two separate sites drastically reduces the overall scale of organizational, logistical and infrastructure demands.

The main parts of the wind turbines are essentially pre-assembled and only need to be mechanically mounted and electrically connected on sites.

Operational risks:

The wind power plants will be constructed at different sites and will therefore allow for natural fluctuations in local wind patterns. Wind measurements have proved that the considered sites are suitable.

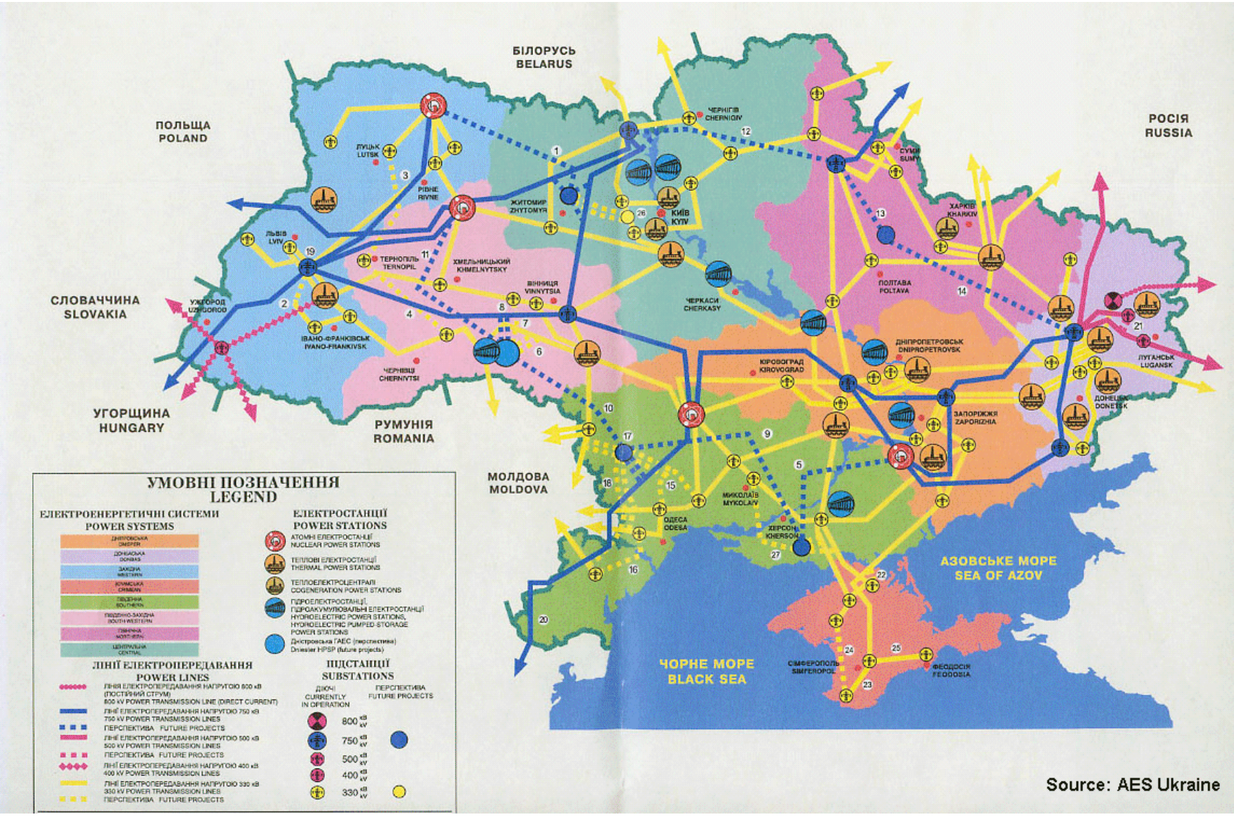
Operational risks will be reduced by the employment of a permanently employed maintenance crew to perform any tasks according to the manufactures specifications. Due to the project size it is likely that the wind power plant maintenance sector will become a sustainable industry sector.

Incidentals, e.g. gear box oil or simple mechanical spare parts, are available or can be manufactured domestically.

The project is a pioneer project, in the sense that these will be the first large scale and privately owned wind power plant in Ukraine. It is important to set a positive precedent for future similar project developments, both from the point of view of the state of Ukraine and from the point of view of foreign investors. Hence, the modalities and relations need to be carefully crafted, clear and transparent, in order to encourage future developments.

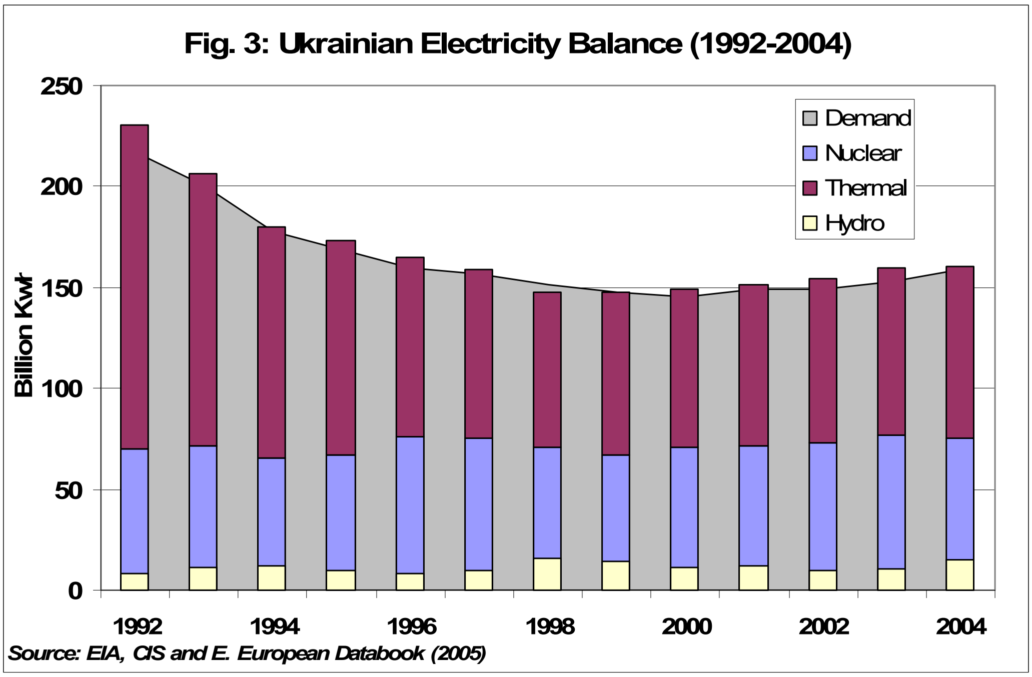
A.4.3. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI project, including why the emission reductions would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:

In the Crimea Peninsula, the electricity demand is covered, for the moment; mainly by the NPG with electricity produced in the mainland Ukraine.



Picture 5 – Ukrainian NPG

The historical electricity production structure at NPG level and by sources is given in the chart below:



Picture 6 – Ukrainian Electricity Balance

Source: EIA, http://www.eia.doe.gov/emeu/cabs/ukraine.html

The electricity produced by the wind power plants will replace electricity produced in the thermal plants (which produce the marginal electricity).

The annual average amount of electricity delivered by the wind park to the NPG is about 827 GWh/yr.

At the current structure of electricity production in the NPG, the annual average amount of GHG emissions reductions (associated with the production of electricity) is 738831 tCO2/yr taking into account the additional GHG emissions reductions associated with the reduced losses of electricity during transport (while the electricity consumption of the Peninsula is covered mainly by import from the mainland _ which means also transport losses). (The amount of losses for transport and distribution of the electricity in the Ukrainian NPG is assessed at about 17.7% in 2005 _ Ukraine Energy Report _ ENERDATA or 14.7 %, as per 2005 _ "Introduction of energy efficiency measures at ISTIL mini steel mill, Ukraine" PDD 0018 submitted to JISC)

The total amount of emissions reduction to be achieved by the project is about: 2955323 t_{CO2eq}.

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

Please indicate the length of the crediting period and provide estimates of total as well as annual emission reductions. Information shall be provided using the following tabular format.

	Years
Length of the crediting period	4
Year	**Estimate of annual emission reductions in tones of CO_2 equivalent**
2009	738831
2010	738831
2011	738831
2012	738831
Total estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	2955323
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2 equivalent)	738831

A.5. Project approval by the Parties involved:

WPP-300 has received the Letter of Endorsement (LoE) from the Ukrainian Authorities on 17th of August 2006.

LoA can be received in 30 days after submission of final PDD with the determination report.

The investor country approval will be issued by the Kingdom of Sweden, both in its capacity as a direct purchaser of ERUs and in its capacity as one of the investors to the Baltic Sea Region Testing Ground Facility (TGF).

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

SECTION B. Baseline

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

According to the recommendations of the JI Supervisory Committee regarding baseline setting ("Guidance on criteria for baseline setting and monitoring", Annex 1, Additionallity, 2.(b).(iv)), in respect for the work done by the CDM EB and the AIEs under JI, if a determined PDD (and its baseline) exists for the type of project under discussion, the baseline may be used in other PDDs as well.

The methodology used in the case of WPP300 is CDM Methodology ACM0002 modified, "**Consolidated baseline methodology for grid-connected electricity generation from renewable sources"**, as used for the calculation of the "Standardized carbon emission factors for the Ukrainian NPG" (baseline of PDD 0018_ "Introduction of energy efficiency measures at ISTIL mini steel mill, Ukraine").

The choice for this approach was done as for the CDM grid-connected electricity generation from renewable sources there is a methodology already approved and as for the Ukrainian NPG, with its characteristics, there is already a baseline analysis done and studied by an AIE. The electricity production and transport emission factors in the Ukrainian NPG level are the same.

For further justifying our choice, we underline the fact that the Project is a grid-connected zero-emission renewable power generation activity and has the following characteristics relevant to baseline emission determination:

- The Project supplies electricity from the construction of a wind power source;
- The Project is not an activity that involves switching from fossil fuels to renewable energy;
- The electricity grid is clearly identified (as Ukraine grid) and information is mostly and roughly available on the characteristics of the grid.

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:

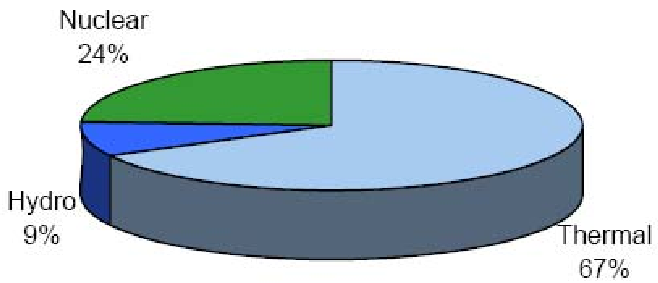
The project activity is: *grid-connected electricity generation from renewable energy sources* (wind).

The approach, "Existing actual or historical emissions, as applicable", seems to be appropriate for this project in Ukraine, due to the high installed electricity capacity of the country compared to the relatively low consumption.

The country's installed capacity is 54.6 MW, of which 67% is thermal, 24% is nuclear and 9% is hydro. In 2005, 186 TWh were generated, of which 48% from nuclear.

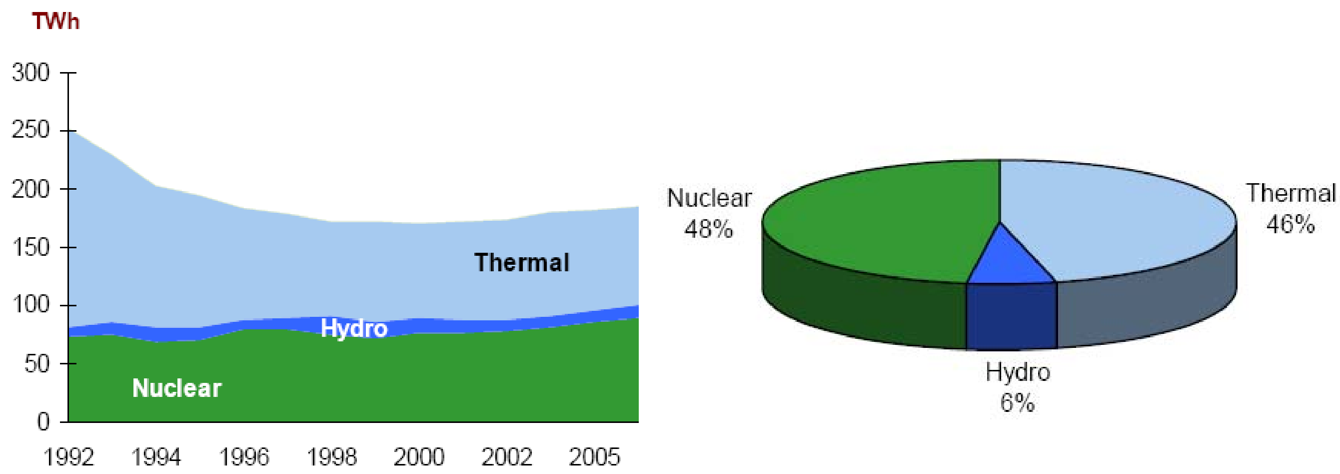
The country has 15 nuclear reactors that use the Russian VVER technology, on five sites: Zaporozhe (6000 MW), South Ukraine (3000 MW), Rovno (1818 MW) and Khmelnitskii (1000 MW). The last reactor of the Chernobyl nuclear power plant (925 MW) was shut down in December 2000. For a long time the future of nuclear power seemed to be jeopardised by the Chernobyl accident, despite the fact that the hydrocarbon supply problems have obliged Ukraine to keep its nuclear power stations running. The reactors of Rivne (R4) and Khmelnitski (K2), with a capacity of 1000 MW each, were completed in 2004. For safety reasons, the aforementioned reactors were co-financed by the European Bank for Reconstruction and Development (EBRD). (Source: ENERDATA)

Ukraine has sufficient generating capacity to supply more than twice its electricity needs. Renewable energy sources, other than hydro, represented mostly by wind farms account for 0,0048% of annual electricity production.



Picture 7 – Installed Electric Capacity by Source (2005)
Source: Ukraine Energy Report, ENERDATA

There is no stimulus for investments in the power system while the country has such a high available installed capacity, even if the equipment is out dated and the efficiency of electricity generation is low. And, as a consequence, there are no significant investments in the energy generation, especially in respect for the environment. The electricity generation by source in year 2005 is shown in the picture below:



Picture 8 – Electricity production by Source (2005)
Source: Ukraine Energy Report_ 2006, ENERDATA

The baseline scenario is the amount and type of electricity that would have otherwise been generated by the operation of grid-connected power plants.

The Project will displace electricity produced by thermal plants and transported from the mainland Ukraine. Emissions reductions will be claimed based on total CO2 emission mitigated by the Project.

In order to demonstrate the project additionallity, the CDM Additionally Tool has been used, as follows:

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

Decision for the implementation of the project has been taken in respect for the electricity production from RES, considering the wind potential of the region, while the price of electricity produced from renewable energy sources did not benefit from support on the market; therefore the ERUs have a very important role in balancing the economy of the project, they being included in the financial calculations from the very beginning.

The project activity will begin during year 2009, while the project will be commissioned.

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

Substep 1a. Define alternatives to the project activity

Alternative 1	**Continuing operation in the actual NPG structure** In Ukraine, thermal power plants (oil, natural gas, coal) account for nearly 50% of generation, with nuclear power generating another 48%, and hydroelectric generation accounting for approximately 10%. Due to the high difference between the installed capacity of the Ukrainean Power Grid and the current electricity consumption, it is possible for it to continue its operation, as it is.
Alternative 2	**Installing wind parks** Ukraine has a significant potential of wind resources, either so far there is no significant wind project development.
Alternative 3	**Installing coal fired power plants** As Ukraine has significant reserves of coal, the option of installing coal fired power plants in order to cover the electricity demand in Crimea area is possible. Still the coal reserves are situated on the mainland and that would involve additional costs related to the fuel supply.

In the current situation, Ukraine has an overcapacity for the production of electricity. Therefore there is no incentive for improvement of the electricity production units related to the environmental protection. Currently, Ukraine has sufficient generating capacity to supply more than twice its electricity needs.

Continuing operation in the actual NPG structure or *Alternative 1* is the most likely one possibility.

Generation by the Project is claimed for the electricity exported to the grid due to wind parks operation. (identified in the Project boundary).

Substep 1b. Enforcement of applicable laws and regulations:

All the defined variants comply with the regulation in force in Ukraine; therefore the project activity is additional.

STEP 2. Investment Analysis

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 simple cost analysis is not applicable. Either investment comparison analysis or benchmark analysis has to be applied in case of proposed activities.

As it is a private investment, the investors did not consider as alternatives the use of coal as they are interested in renewable energy projects and no mature technology for Carbon Capture and Storage is in place so far. Therefore, a benchmark analysis shall be used.

Sub-step 2b. Application of the benchmark analysis

The investment analysis identifies the project financial indicators, such as IRR and NPV without ERU sales. The analysis took in consideration an investment execution period of 2 years and an investment operation period of 20 years.

Total project cost includes amongst others:

- material (wind turbines, generators, foundations, electricity networks rehabilitation works, electrical works, mechanical works and an initial set of spare parts),
- services during the development of the project (such as construction permit, other permits),
- services during construction (such as installation, supervision, and commissioning).

Access to the international and domestic financial market for a project similar to the proposed JI activity in Ukraine is very limited. Investment climate in Ukraine in general is still considered as rather low, especially in comparison to the neighbouring countries. An example of Fitch sovereign credit ratings for Ukraine compared to some other countries of Eastern Europe:

- Ukraine	BB
- Poland	BBB+
- Hungary	A-
- Slovak Republic	A-

Domestic financial market opportunities for project financing are limited. A common practice for the commercial bank financing can be a BAN (Bond Anticipation Note) up to maximum 3 years at 18-24% interest rate in the national currency. Although it is difficult to get hard evidence of the required maximum maturity of the domestic financial sector, it is generally accepted that project finance in Ukraine is virtually absent.

The investment is to be done by raising the needed financial resources from different private investors and creditors, while access to international and domestic financing for this kind of projects in Ukraine is very difficult. The renewable energy market has still no incentives in place, although green tariff coming into force in 2007 can be such incentive.

The project is estimated to reach an internal rate of return of about 12.5% without the ERU sales. In order to increase the chances of the project to get financed it needs an IRR of about 14%.

STEP 3. Barrier Analysis

The most important technical barrier is the size of the project as Ukraine has no experience in operating wind power project of 300 MW.

Regarding the other barriers, financial barriers are very important, as it can be noticed, for example, from the "Country Limitation Schedule" (February 2007) **(Special Conditions Pertaining to Ex-Im Bank Loan & Guarantee Programs, Export Credit Insurance, and Working Capital Guarantee Program)**, of **EXPORT-IMPORT BANK OF THE UNITED STATES:**

"Discretionary Credit Limits under Short-Term Insurance Policies are withdrawn. Cover not available unless specified in a Special Buyer Credit Limit endorsement, an Issuing Bank Credit Limit endorsement, or a Country Limits of Liability endorsement.

Ex-Im Bank cover/support for short- and medium-term private sector transactions is typically limited to transactions with a commercial bank as obligor or guarantor. Coverage under the WCGP for private sector transactions requires that the transaction be supported by an irrevocable Letter of Credit.

Ex-Im Bank cover/support for public sector transactions is typically limited to transactions which commit the full faith and credit of the government."

STEP 4. Common Practice Analysis

Ukraine has the experience of operating wind turbines. Still, the biggest wind turbine installed in the Ukrainian NPG is 600 kW, the most part of them being 100 kW and below; therefore, as mentioned in STEP 3, the project is not common practice.

STEP 5. Impact of JI Registration
The Registration of the project as a JI project would help the project developer to find the financial resources needed to raise and to consolidate financing and mitigate the risks on a market.

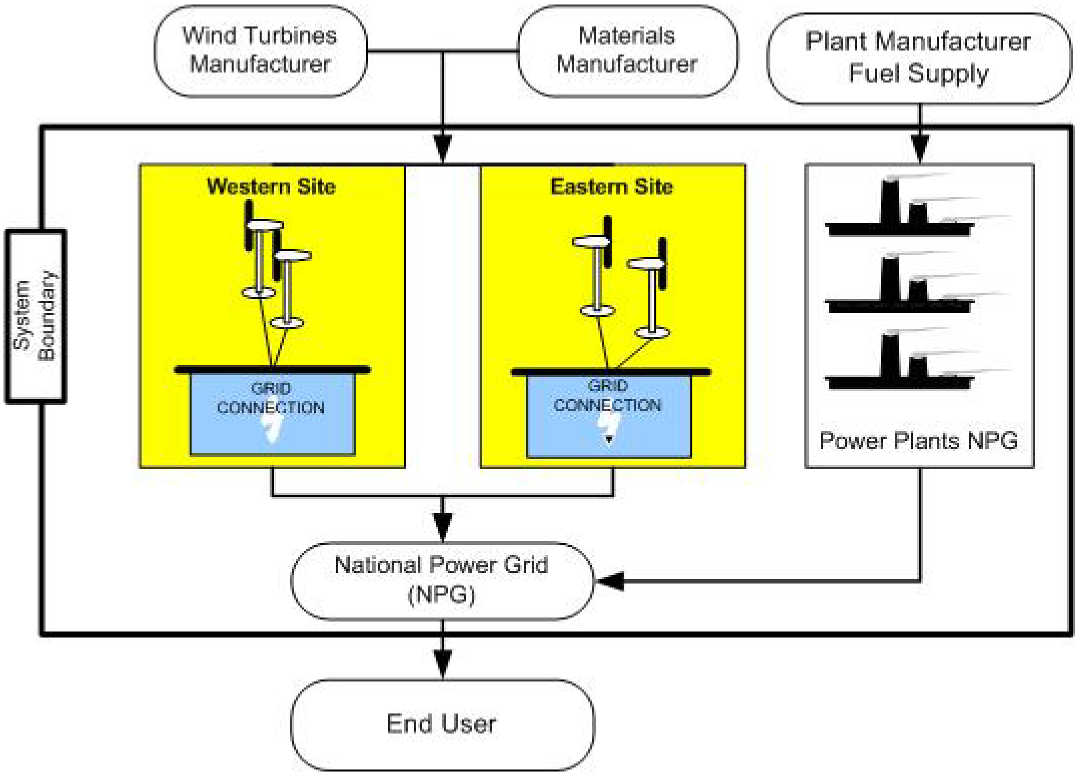
Therefore, based on the requirements of the tool for the demonstration of additionally, the proposed project is additional to what would occur otherwise.

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

According to the JISC04 "Guidance on Criteria for Baseline Setting and Monitoring". Version 01, 11.(b), the project boundary is set up in respect for ACM0002.

"The **spatial** extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the CDM 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.



Picture 9 – Project Boundary

The power grid of the Autonomous Republic of Crimea is part of the NPG of Ukraine and it is a net importer of electricity. As the wind power plants will be connected to the NPG and will replace energy produced in the NPG, the Project Boundary should be the NPG.

All the CO2 emissions resulted from the production and transport of the electricity in the Ukrainian NPG, used to supply the Crimea area are included as indirect offsite. According to the Methodology (ACM0002) and due to the conservative reasons, the CH4 and N2O emissions are excluded from the baseline calculation.

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

The date for the completion of Baseline Study is March 2007.

The baseline study has been conducted by **nepers AG, Switzerland**.

According to the JISC04 "Guidance on criteria for baseline setting and monitoring", Annex 1, Additionallity, 2.(b).(iv), in order to justify the baseline chosen and the Additionallity of the project, for the purposes of this PDD the Ukrainian NPG emission factors from PDD0018 submitted to JISC, have been used (**Standardized Carbon Emission Factors for the Ukrainian NPG**).

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

year 2007

C.2. Expected operational lifetime of the project:

1 year and 6 months construction period

20 years or more operational period

C.3. Length of the crediting period:

2009-2012 or 4 years. The starting date of the crediting period is January 1, 2009

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

According to JISC "Guidance on criteria for baseline setting and monitoring", if a CDM approved methodology is used, all explanations, descriptions and analysis should be made in accordance with the selected methodology.

For the proposed project, the adopted monitoring methodology is a modified CDM approved methodology: **"Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources", ACM0002.** (see UNFCCC website). Still, this methodology cannot be applied as it is, for the moment, due to the lack of information regarding the Ukrainian NPG.

"This methodology is applicable to grid-connected renewable power generation project activities under the following conditions:

- Applies to electricity capacity additions from:
    - Run-of-river hydro power plants; hydro power projects with existing reservoirs where the volume of the reservoir is not increased.
    - Wind sources;
    - Geothermal sources;
    - Solar sources;
    - Wave and tidal sources.
- This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available; and

- Applies to grid connected electricity generation from landfill gas capture to the extent that it is combined with the approved "Consolidated baseline methodology for landfill gas project activities" (ACM0001)."

"The methodology requires monitoring of the following:

- Electricity generation from the proposed project activity;
- Data needed to recalculate the operating margin emission factor, if needed, based on the choice of the method to determine the operating margin (OM), consistent with "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM0002);
- Data needed to recalculate the build margin emission factor, if needed, consistent with "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM0002);
- For geothermal power projects, data needed to calculate fugitive carbon dioxide and methane emissions and carbon dioxide emissions from combustion of fossil fuels required to operate the geothermal power plant".

The MP will be updated, if needed, during the discussions with the AIE.

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

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

The section is left blank on purpose. There are no Project emissions.

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

The section is left blank on purpose.
There are no Project emissions.

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

Baseline development is using an ex-ante method.

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 JISC04 "Guidance on criteria for baseline setting and monitoring", Annex 1, Aditionallity, 2.(b).(iv), in order to justify the baseline chosen and the additionality of the project, for the purposes of this PDD a part of the PDD0018 JISC was used (Standardized Carbon Emission Factors for the Ukrainian NPG).

Consequently, the baseline CO2 emissions factor for the electricity replaced in the NPG by the electricity produced by the WPP300 is: 0.893 t_{CO2}/MWh.

Steps taken for GHG calculation:

1) Determining the electricity exported from the wind power plant (from the measurement equipment): [E_{ex}] [MWh/year]

2) Determining electricity imported consumption: [E_{im}] [MWh/year] (from the measurement equipment)

3) Determining the net electricity delivered to the NPG (electricity exported – electricity imported), on a yearly basis:

$$E_{net} = E_{ex} - E_{im} \quad \text{[MWh/year]}$$

The baseline emissions are calculated as:

$$EM_{BL} = 0.893 * E_{net}$$

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

Not Applicable.

D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1	Electricity exported	Registries of the company	MWh	m	monthly	100%	Electronic and paper form	Data are registered for the normal operation requirements of the wind power plants, as they are the base for the commercial relationships.
2	Electricity imported	Registries of the company	MWh	m	monthly	100%	Electronic and paper form	Data are registered for the normal operation requirements of the wind power plants, as they are the base for the commercial relationships.

The responsibility for collecting and archiving the data comes to the Production Department, in close cooperation with the Quality Assurance Department.

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):

Baseline emissions – Project emissions = emission reductions

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

No leakage has been identified.

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

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

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

>>

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

Emission Reductions (for each year in the period 2009-2012) = **Baseline Emissions** (for each year in the period 2009-2012) **- Project Emiss**ions (for each year in the period 2009-2012)

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:

No special requirements are in place.

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.
#1,2 Table D.1.2.1.	Low	The quantity of electricity exported and the quantity of electricity imported will be measured by specific equipment, mainly for commercial purposes. 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. Setting up QA/QC procedures for this data for the purpose of CO2 transactions is not needed; the data measured is used for the commercial transactions of the company, therefore they are well verified.

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

The process of monitoring consists in the following main actions:

1. Collecting
2. Documenting
3. Archiving
4. GHG emission reduction calculation
5. Verification

The actions are the responsibility of the operational and controlling staff.

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

nepers AG is the entity determining the monitoring methodology and participates in the project as advisor.
The contact data:

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CH - 8044 Zurich
Switzerland

Tel: +41 44 269 50 00
Fax: +41 44 269 50 01

Email: info@nepers.com

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Electricity produced from wind sources is considered to have no emissions of GHGs.

E.2. Estimated leakage:

No leakage identified.

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

Electricity produced from wind sources is considered to have no emissions of GHGs.

E.4. Estimated baseline emissions:

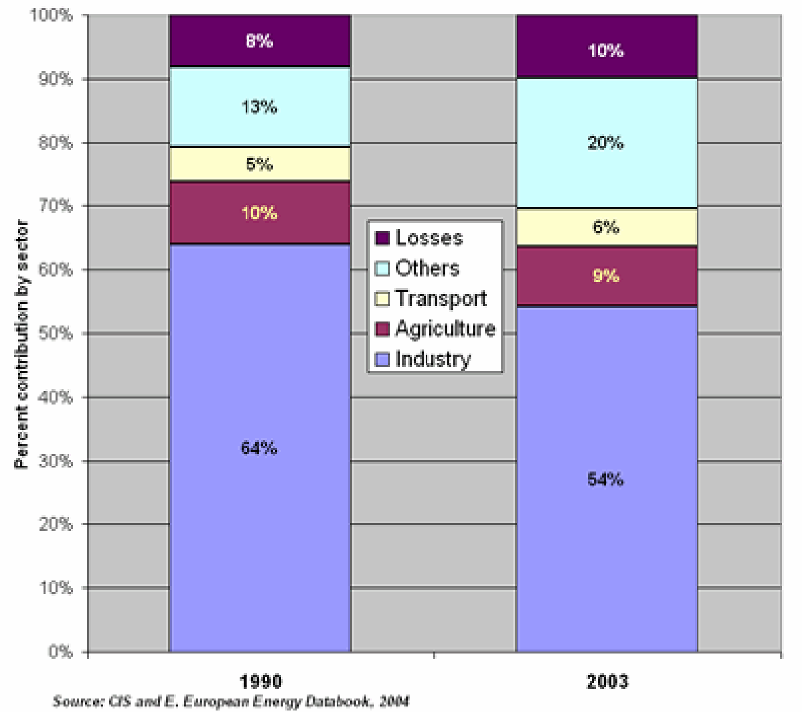
Two types of Baseline Emissions were identified within the project:

a) Source: Fossil fuel power plants in the Ukrainian NPG will produce the amount of electricity produced by the wind parks.

Type of emission: GHGs (CO2e)

b) Source: Due to the distance to the Crimea Peninsula and the configuration of the system, the fossil fuel power plants in the Ukrainian NPG will produce also the electricity needed for covering the losses in the grid.

Type of emission: GHGs (CO2e)



Picture 10 – Ukraine Electricity Consumption Composition (%) *Source: EIA*, http://www.eia.doe.gov/emeu/cabs/ukraine.html

According to the Energy Information Agency (EIA) of the USA Government, there is a high level of transmission losses in the Ukrainian NPG; in recent years, these have increased from 8% to 10% (compared to around 3% in the United States). As provided in the "Standardized carbon emission factors for the Ukrainian electricity grid" (PDD0018), the grid losses are about 10%.

Baseline emissions are determined based on the carbon emission factors calculated in the "Standardized carbon emission factors for the Ukrainian electricity grid" and on the amount of electricity generation/consumption by the Project. Estimated emission reductions for each year of the Project up until 2012 are displayed in section E.6.

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

E.4. – E.3. = 738831 – 0 = 738831 t_{CO2}/yr (average for 5 years)

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

The result of the application of the formulae above shall be indicated using the following tabular format

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 emission reductions (tonnes of CO_2 equivalent)
2009	0	0	738831	738831
2010	0	0	738831	738831
2011	0	0	738831	738831
2012	0	0	738831	738831
Total (tonnes of CO_2 equivalent)	0	0	2955323	2955323

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:

A full scale EIA was carried out following the strict environmental guidelines of EBRD[1] and the Ukrainian State Construction Standard DBN A.2.2.-1-95 amended 2003 (Title: "Structure and Contents of the Environmental Impact Assessment Report (EIR) for Designing and Construction of Production Facilities, Buildings and Structures").
In the Ukrainian EIA Standard, WPP 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 particulate or liquid emissions to the environment, and does not result in non-reversible or critical changes in the atmo-, hydro-, or lithospheres.
In the following the most important environmental effects of the Project are described. All anticipated environmental effects and mitigation measures are described in EIA.

Constructional period

Geology and Geomorphology

One of the most important impacts is the road construction. In order to mitigate this impact, the project owner will try to take maximum use of the existing roads. If needed, the new roads will be built in such a manner so that the geology and geomorphology of the sites will suffer minimum damages.
Another possible impact is produced by the excavations. An important volume of soil will be excavated. Part of it (the most fertile) will be combined with fertile soil and used to cover the WTs foundations. The other part will be used for the rehabilitation of the sites from where the material used for building the foundations is extracted or for the rehabilitation of other damaged sites in the area. The excavation will be made taking into consideration the directions of the WTG manufacturer and the local underground conditions so that the safety of the WT will be assured while minimizing the impact on the environment.

Flora

In the process of construction considerable areas will be withdrawn for erection facilities for temporal usage (cranes, auxiliary equipment), turbine sites parts etc. These areas will be temporally covered by concrete or asphalt-macadam surfacing.
Collection grid will be carried out by cable lines, i.e. these cables will be laid at the depth of 1 meter. The primary soils structure will not be damaged, since soil depth is larger. In any case, the upper layer of soil will be taken off with the purpose of later restoration and in order to reestablish vegetation.

Fauna

Some birds species, related to the group at risk of WPP influence, namely bustard and demoiselle crane, are nesting on the ground. Therefore, there is a risk of disturbance that will cause these birds to abandon the nests.

[1] http://www.ebrd.com/about/policies/enviro/policy/policy.pdf

Visual impact
As any other construction, the construction of the Project (material storage sites, road development, ground disturbance, etc.) will temporarily change the landscape.

Noise
The construction phase includes a wide range of activities, including access road construction, grading, drilling and blasting (for tower foundations), construction of ancillary structures, cleanup, and re-vegetation. The noise levels generated by construction equipment vary significantly, depending on such factors as type, model, size, and condition of the equipment; operation schedule; and condition of the area being worked. In addition to daily variations in activities, major construction projects are accomplished in several different stages. Each stage has a specific equipment mix, depending on the work to be accomplished. Most construction activities occur during the day, when noise is tolerated better because of the masking effect of background noise. Night time noise levels probably would drop to the background levels of the project area. Construction activities last for a short period (1 to 2 years at most) compared with operation of the wind turbines, and, accordingly, their potential impacts would be temporary and intermittent in nature.

Cultural heritage
There may be an impact on the cultural heritage produced by the vibrations generated through the construction activity. The mitigation measures can be taken only by the construction company in the sense of reducing the vibrations of the equipment and using vibration absorbers while installing the WTs.

Project Lifetime

Visual impact.
Due to the large dimension, the turbines will be visible at a distance Visual evidence of wind turbines cannot be avoided, reduced, or concealed, owing to their size and exposed location; therefore, effective mitigation is limited. In any case turbine arrays and the turbine design would be integrated with the surrounding landscape.

Noise

During operation, the wind turbines will generate some noise. All the requirements on location, necessary sanitary zone and turbine equipment will be met and the noise will be kept below the legally permitted limits.

Land use impact.

The acres will be withdrawn for turbines erection, auxiliary erection sites for a small crane, transmission line towers, drive ways, WPP substations and interconnection substation on the eastern site for the permanent use.
To minimize Land Use impact WT are designed to include transformers inside of it, also cable connection will be used to collect electricity within the wind field in order to avoid too many overhead transmission lines installations. All land procedures conducted by Nova-Eco will strictly follow the Ukrainian legislation and provide required compensation.

Biodiversity

Wind turbines, transmission lines and electrical substations will impact birdlife, wildlife and flora of the regions. Teams of scientists have conducted ornithological, theriological (mammals) and botanical investigations to assess the ecological impacts and the results of their efforts will be made public and reviewed carefully to avoid or to compensate any adverse impacts.

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

The Environmental Impact Assessment was carried out during the procedure of the local plan amendment and obtaining building permit.

Based on the information collected during the elaboration of the EIA and associated procedures, it was concluded that there no issues that have significant impact on environment.

SECTION G. Stakeholders' comments

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

In respect for the public consultation policy of the company, Nova-Eco has undertaken following steps:

- PCDP is compiled and presented on the company's web page www.nova-eco.kiev.ua
- Series of meetings with local governmental organization are conducted.
- Round Table discussions with representatives of local communities have been held. Protocol of these discussion is available at company's web page www.nova-eco.kiev.ua
- Information in form of newspapers' articles, leaflets, posters and summaries has been distributed at local settlements.
- Preliminary discussions of Public Meetings program with local communities have been held.
- Public Meetings preparation is currently ongoing. Meetings are planned to be conducted in March 2007.

Nova-Eco LLC has been satisfying all information requests on the Project as well as communicating Project information in an open and transparent way.

A series of meetings have been held during year 2006; part of those meetings has been held with the identified stakeholders as follows:

Identity of stakeholders	
Name	State Administration of Chernomorskij District of AR Crimea, Ukraine
Type of organisation	X Authorities: local ○ Private Enterprise ○ NGO ○ Individual Person ○ Other:
Description of the effects of the project on the stakeholder	The proposed Wind Park in the Western Area will be located on the lands of Chernomorskij District.
Address	96400 Chernomorskoe Town Kirova st. 16 Ukraine
Phone/fax	Phone: +38 06558 21331 Fax: +38 06558 91245
E-mail	-
Contact person	Larisa Tuisuzova Head of State District Administration
Brief description of how comments by (local) stakeholders have been invited and compiled	Meetings and discussions with local district administrations - are a pre-requisite of obtaining special exclusive permit for developing a wind park on a given territory. Local state administrations protect interests of local population and carry out preliminary assessment of proposed project idea. On this stage they can give proposals that must be taken into consideration during development. These comments are fixed in official letters.
Summary of the comments received	State administration does not object development of a wind park on the proposed territory. It will contribute to electricity supply in the region and create a certain amount of jobs for local people. Agricultural and tourism activities in the area will not be harmed as proposed land is not used for any of these occupations.
Report on how due account was taken of any comments received	NOVA-ECO has provided further information to the authorities in response to their questions.

Identity of stakeholders	
Name	State Administration of Leninskij District of AR Crimea, Ukraine
Type of organisation	X Authorities: local ○ Private Enterprise ○ NGO ○ Individual Person ○ Other:
Description of the effects of the project on the stakeholder	The proposed Wind Park in the Eastern Area will be located on the lands of Chernomorskij District.
Address	98200 Lenine Town Pushkina st. 22 Ukraine
Phone/fax	Phone: +38 06557 60554
E-mail	-
Contact person	Nadezhda Sokol Head of State District Administration
Brief description of how comments by (local) stakeholders have been invited and compiled	Meetings and discussions with local district administrations - are a pre-requisite of obtaining special exclusive permit for developing a wind park on a given territory. Local state administrations protect interests of local population and carry out preliminary assessment of proposed project idea. On this stage they can give proposals that must be taken into consideration during development. These comments are fixed in official letters.
Summary of the comments received	State administration does not object development of a wind park on a proposed territory taking into account the need for renewable energy production. All legal requirements regarding this project must be fulfilled.
Report on how due account was taken of any comments received	NOVA-ECO has obliged to fulfill all legal requirements of Ukrainian law and also EU regulations for wind power projects.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Salutation:	
Last name:	
Middle name:	
First name:	
Department:	
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First name:	
Department:	
Phone (direct):	
Fax (direct):	
Mobile:	
Personal e-mail:	

Annex 2

BASELINE INFORMATION

The following baseline study was used: “**Standardized carbon emission factors for the Ukrainian electricity grid”, prepared by** Global Carbon B.V, Version 3, **PDD0018, “Introduction of energy efficiency measures at ISTIL mini steel mill, Ukraine”**. (20 December 2006)**:**

Standardized carbon emission factors for the Ukrainian electricity grid

Introduction
Many Joint Implementation (JI) projects have an impact on the CO2 emissions of the regional or national electricity grid. Given the fact that in most Economies in Transition (IET) an integrated electricity grid exists, a standardized baseline can be used to estimate the amount of CO2 emission reductions on the national grid in case of:

a) Additional electricity production and supply to the grid as a result of a JI project (= producing projects);
b) Reduction of electricity consumption due to the JI project resulting in less electricity generation in the grid (= reducing projects);
c) Efficient on-site electricity generation with on-site consumption. Such a JI project can either be a), b), or a combination of both (e.g. on-site cogeneration with partial on-site consumption and partial delivery to the grid).

So far most JI projects in EIT, including Ukraine, have used the standardized Carbon Emission Factors (CEFs) of the ERUPT programme. In the ERUPT programme for each EIT a baseline for producing projects and reducing projects was developed.

The ERUPT approach is generic and does not take into account specific local circumstances. Therefore in recent years new standardized baselines were developed for countries like Romania, Bulgaria, and Estonia. In Ukraine a similar need exist to develop a new standardized electricity baseline to take the specific circumstances of Ukraine into account. The following baseline study establishes a new electricity grid baseline for Ukraine for both producing JI projects and reducing JI projects.

This new baseline has been based on the following guidance and approaches:

- The "Guidance on criteria for baseline setting and monitoring" for JI projects, issued by the Joint Implementation Supervisory Committee[2] ;
- The "Operational Guidelines for the Project Design Document", further referred to as ERUPT approach or baseline[3]*;*
- The approved CDM methodology ACM0006 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"[4] ;
- Specific circumstances for Ukraine as described below.

ERUPT

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[2] Version 01, Joint Implementation Supervisory Committee, ji.unfccc.int

[3] Operational Guidelines for Project Design Documents of Joint Implementation Projects. Ministry of Economic Affairs of the Netherlands, May 2004

[4] Consolidated baseline methodology for grid-connected electricity generation from renewable sources, version 6, 19 May 2006

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 is not determined on installation level but taken from IPCC default values. Furthermore the IEA data included electricity data until 2002 only. The assumption that Ukraine would switch all its fossil-fuel plant from coal to natural gas is unrealistic in Ukraine as the tendency is currently in the opposite direction.

ACM0002
The ACM0002 methodology was developed in the context of CDM projects. The methodology takes a combination of the Operating Margin (OM) and the Build Margin (BM) to estimate the emissions in absence of the CDM project activity. To calculate the OM four different methodologies can be used. The Build Margin in the methodology assumes that recent built power plants are indicative for future additions to the grid in the baseline scenario and as a result of the CDM project activity construction of new power plants is avoided. This approach is valid in electricity grids in which the installed generating capacity is increasing, which is mostly the case in developing countries. However, the Ukrainian grid has a significant overcapacity and many power plants are either operating below capacity or have been moth-balled.

Nuclear is providing the base load in Ukraine
In Ukraine nuclear power plants are providing the base load of the electricity in Ukraine. To reduce the dependence on imported fuel the nuclear power plants are running at maximum capacity where possible. In the past five years nuclear power plants provide almost 50% of the total electricity:

Year	2001	2002	2003	2004	2005
Share of AES	44%	45%	45%	48%	48%

Share of nuclear power plant in the annual electricity generation

All other power stations, including hydro power plants, are operating on the margin.

Development of the Ukrainian electricity sector

The National Energy Strategy sets the approach for the overall energy complex of Ukraine and the electricity sector in particular. The main priority of Ukraine is to reduce the dependence of imported fossil fuels. The strategy sets the following priorities:[5]

- increased use of local coal as a fuel;
- construction of the new nuclear power plants;
- energy efficiency and energy saving.

Due to the sharp increase of imported natural gas prices a gradual switch from natural gas to coal at the power plants is planned in the nearest future. Ukraine possesses a large overcapacity of the fossil-powered plants of which many are mothballed. These moth-balled plants might be connected to the grid in case of growing demand. New nuclear power plants will take significant time to be constructed and are not expected to get on-line before the end of the second commitment period in 2012. So the overall tendency of the Ukrainian electricity emissions is increasing.

[5] http://mpe.energv.gov.ua/minenergo/control/uk/archive/docview?tvpeld=l0000117912

Methodology chosen

In the selected approach of the new Ukrainian baseline the BM is not a valid approach as has been argued above. Strictly applying BM in accordance with ACM0006 would result in a BM of zero as the latest additions to the Ukrainian grid were nuclear power plants. New nuclear reactors will not become on-line before 2012. There is no nuclear reactor construction site at such an advanced stage remaining in Ukraine, it is unlikely that Ukraine will have enough resources to commission any new nuclear units in the foreseeable future (before 2012). Even if nuclear reactors will come on-line, they will be meeting the base load of the Ukrainian grid. Therefore applying BM to the Ukrainian circumstances would result in an unrealistic and distorted picture of the CEF. Therefore the Operating Margin only will be used to develop the baseline in Ukraine.

The following assumptions from ACM0002 will be applied:

1) The grid must constitute of all the power plants connected to the grid. This assumption has been met as all power plants have been considered;
2) There should be no significant electricity imports. This assumption has been met in Ukraine as Ukraine is only exporting electricity;
3) Electricity exports are not accounted separately and are not excluded from the calculations.

ACM0002 offers several choices for calculating the OM. Dispatch data analysis cannot be applied, since the grid data is not available at the level of detail necessary for this approach. Simple adjusted OM approach is not applicable for the same reason. The average OM calculation would not present a realistic picture and distort the results, since nuclear power plants always work in the base load due to the technical limitations (and therefore cannot be displaced) and constitute up to 48% of the overall electricity generation during the past 5 years.

Therefore, the simple OM approach is used to calculate the grid emission factor. In Ukraine the low-cost must-run power plants are nuclear power stations. Their total contribution to the electricity production is half of the total electricity production. The remaining power plants, all being the fossil-fuel plants and hydro power plants are used to calculate the Simple OM.

%	2001	2002	2003	2004	2005
Nuclear power plants	44.23	45.08	45.32	47.99	47.92
Thermal power plants	38.81	38.32	37.24	32.50	33.22
Combined heat and power	9.92	11.02	12.28	13.04	12.21
Hydro power plants	7.04	5.58	5.15	6.47	6.65

Share of power plants in the annual electricity generation of Ukraine

The individual data for power generation and fuel properties was obtained from the individual power plants[6]. The majority of the electricity (up to 95%) is generated centrally and therefore the data is comprehensive[7].

The simple OM is calculated using the following formula:

[6] Ukrainian Ministry of Fuel and Energy, December 2006

[7] The data for small units (usually categorized in the Ukrainian statistics as 'CHPs and others') is scattered and was not always available. As it was rather unrealistic to collect the comprehensive data from each small-scale power plant, an average CO2 emission factor was calculated for the small-scale plants that provided the data. For the purpose of simplicity it was considered that all the electricity generated by the small power plants has the same average emission factor obtained.

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum GEN_{j,y}}$$

Where:

$F_{i,j,y}$ is the amount of fuel / (in a mass or volume unit) consumed by relevant power sources/ in year(s).y (2001-2005);

j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid;

$COEF_{i,j,y}$ is the CO2 emission coefficient of fuel *I* (tCO2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources *j* and the percent oxidation of the fuel in year(s) *y*;

$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source *j*.

The CO2 emission coefficient *COEFi* is obtained as:

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i$$

where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel *i*;

$OXID_i$ is the oxidation factor of the fuel;

$EF_{CO2,i}$ is the CO2 emission factor per unit of energy of the fuel *i*.

The Net Calorific Value (NCV) of fossil fuel can change considerably, in particular when using coal. Therefore the local NCV values of individual power plants for natural gas and coal were used. For heavy fuel oil, the IPCC[8] default NCV was used. Local CO2 emission factors for all types of fuels were taken for the purposes of the calculations. In the case of small-scale power plants some data regarding the fuel NCV is missing in the reports. For the purpose of simplicity, the NCV of similar fuel from a power plant from the same region of Ukraine was used.

Reducing JI projects

The Simple OM is applicable for additional electricity production delivered to the grid as a result of the project (producing JI projects). However, reducing JI projects also reduce grid losses. For example a JI project reduces on-site electricity *consumption* with 100,000 MWh and the losses in the grid are 10%. This means that the actual reduction in electricity *production* is 111,111 MWh. Therefore a reduction of these grid losses should be taken into account for reducing JI projects to calculate the actual emission reductions.

The losses in the Ukrainian grid are given in the table below and are based on the data obtained directly from the Ukrainian power plants through the Ministry of Energy.

Year	Technical losses %	Non-technical losses %	Total %
2001	14,2	7	21,2
2002	14,6	6,5	21,1
2003	14,2	5,4	19,6
2004	13,4	3,2	16,6

[8] IPCC 1996. Revised guidelines for national greenhouse gas inventories

2005	13,1	1,6	14,7

Grid losses in Ukraine

As one can see grid losses are divided into technical losses and non-technical losses. For the purpose of estimating the CEF only technical losses[9] are taken into account. As can been seen in the table the technical grid losses are decreasing. The average decrease of grid losses in this period was 0.275% per annum. Extrapolating these decreasing losses to 2012 results in technical grid losses by 2012 of 12%. However, in order to be conservative the grid losses *over the full period 2006-2012* have been taken as 10%.

Further considerations

The "Guidance on Criteria of Baseline Setting and Monitoring" for JI projects requires baselines to be conservative. The following measures have been taken to adhere to this guidance and to be conservative:

- The grid emission factor is actually expected to grow due to the current tendency to switch from gas to coal. This effect has not been taken into account by making an ex-ante baseline;
- Hydro power plants have been included in the OM. This is conservative;
- With the growing electricity demand, out-dated mothballed fossil fired power plants are likely to come on-line as existing nuclear power plants are working on full load and new nuclear power plants are unlikely to come on-line before 2012. The emission factor of those moth-balled power plants is higher. This effect has not been taken into account to be conservative;
- The technical grid losses in Ukraine are high, though decreasing. With the current pace the grid losses in Ukraine will be around 12% in 2012. To be conservative the losses have been taken 10%;
- The emissions of methane and nitrous oxide have not taken into consideration, which is in line with ACM0002. This is conservative.

Conclusion

An average CO2 emission factor was calculated based on the years 2003-2005. The proposed baseline is ex-ante meaning that the average constitutes a fixed emission factor of the Ukrainian grid for the period of 2006-2012. The following result was obtained:

Type of project	CEF (tCO2/MWh)
JI project producing electricity	0.804
JI projects reducing electricity	0.893

Carbon Emission Factors for the Ukrainian grid 2006 - 2012

Monitoring

This baseline requires the monitoring of the following parameters:

- Electricity produced by the project (in MWh) and delivered to the grid in year i;
- Electricity produced by the project (in MWh) and consumed on-site in year i;
- Electricity consumption reduced by the project (in MWh);

As this baseline is an ex-ante baseline, no monitoring of the Ukrainian grid is required.

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[9] Ukrainian electricity statistics gives two types of losses – the so-called ‘technical' and ‘non-technical'. ‘Non-technical' losses describe the non-payments and other losses of unknown origin.

Ministry of Energy for supplying the data and the Ministry of Environmental Protection for their support. This baseline study can be used freely in case of proper reference.

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Annex 3

MONITORING PLAN

Please refer to section D.