CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Title of the project activity: Wind Farm Kosava I+II
Current version: 3
Date of completing version 3 of this document: 04/08/2011

A.2. Description of the project activity:

The purpose of the project activity is the generation of green electricity through the construction and operation of wind power turbines with a total capacity of up to approximately 123 MW located in the municipality of Vrsac in the Republic of Serbia. The expected net annual electricity generation of the project activity is approximately 409,442 MWh once fully operational. By replacing fossil fuel based power generation of the national Serbian electricity grid approximately 459,622 tCO_2 will be reduced per year. The project activity is being developed by MK-Fintel Wind AD (the project proponent).

Situation existing prior to the starting date of the project
Same as baseline scenario, see paragraph below.

Baseline Scenario
According to applied CDM methodology *ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" Version 12.1.0* - 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".

Project Scenario
The project activity consists of the construction of a wind farm, implemented in two phases. The first (pilot) phase Kosava I (nicknamed "La Piccolina") consists of 2 turbines of the type Vestas V-112 with a capacity of 3 MW each. In the second phase (Kosava II) additional turbines with a capacity of approximately 117 MW will be erected, resulting in a total installed capacity of approximately 123 MW for the project activity.

The electricity will be fed into the grid at two different points, Kosava I will be connected to the substation Vrsac 1, at the 20 kV level, whereas Kosava II will be feeding into the 110 kV grid through a new transmission line connected between the substations Vrsac 1 and Alibunar.

The proposed project activity reduces greenhouse gas emissions by replacing fossil fuel based power generation of the national Serbian electricity grid. Approximately 459,622 tCO_2 will be reduced per year.

The view of the project participants on the contribution of the project activity to sustainable development:

The proposed project activity will

- reduce greenhouse gas emissions in Serbia compared to a business-as-usual scenario;
- help to stimulate the growth of the wind power industry in Serbia;
- create local employment opportunity during the assembly and installation of the wind turbines, and during operation of the wind farm and
- reduce other pollutants resulting from the power generation industry, compared to a business as usual approach, such as SO_2, NOx and soot.

A.3. Project participants:

Name of Party involved ((host) indicates a host Party):	Private and/or public entity(ies) project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of Serbia (host)	MK-Fintel Wind AD (private)	No
Government of Liechtenstein	Energy Changes Projektentwicklung GmbH (private) Plus Ultra Asset Management GmbH (private)	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

Republic of Serbia

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

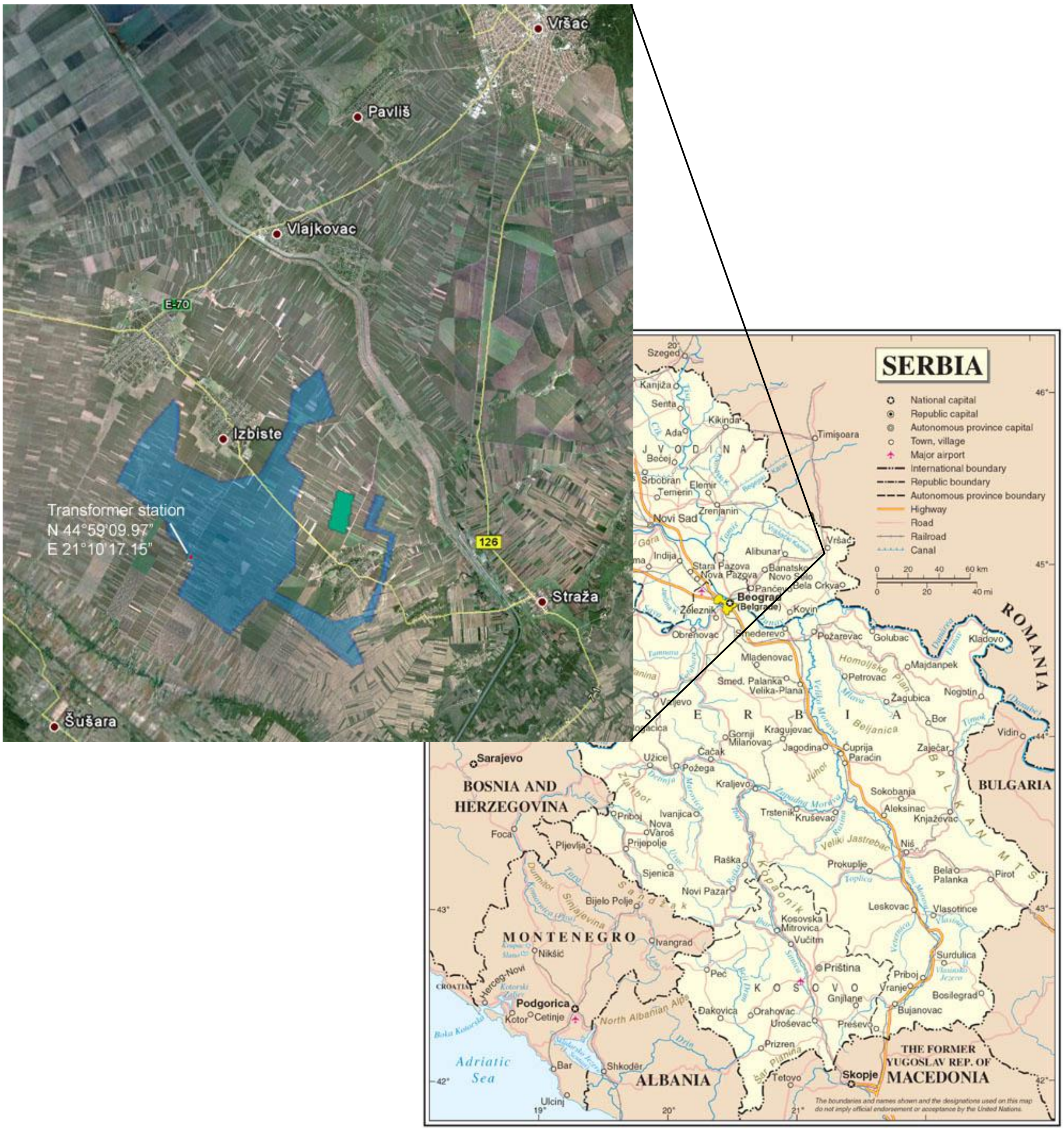
Vojvodina

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

Vrsac Municipality

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

The geographical coordinates of the centre of the transformer station are N 44°59’09.97” and E 21°10’17.15” (N 44.98610277 E 21.17143055).
The following map shows the exact location of the proposed project activity.



A.4.2. Category(ies) of project activity:

Category: Grid-connected electricity generation from renewable energy sources
Sectoral scope: 1 Energy industries (renewable - / non-renewable sources)

A.4.3. Technology to be employed by the project activity:

The scenario existing prior to the start of the implementation of the project activity is the Serbian national grid providing the same electricity service as the proposed project activity.

The project scenario is the implementation of the proposed project activity which will be implemented in two phases. The first (pilot) phase Kosava I (nicknamed "La Piccolina") consists of 2 turbines of the type Vestas V-112 with a capacity of 3 MW each. In the second phase (Kosava II) additional turbines with a capacity of up to approximately 117 MW will be erected, resulting in a total installed capacity of up to approximately 123 MW for the proposed project activity.
The supplied power is expected to be 409,442 MWh per year. The proposed project activity is expected to be operated for 25 years. As the Serbian national grid is dominated by the thermal power generation, the proposed project activity will achieve greenhouse gas (GHG) emission reductions by displacing the electricity from the Serbian national grid. The project activity transfers environmentally safe and sound technology and know-how to the host country since no such technology yet exists in Serbia.

The main technical parameters of the turbines are listed below:
Operational data
Rated power: 3MW
Cut-in wind speed: 3 m/s
Rated wind speed: 12 m/s
Cut-out wind speed: 25 m/s
Rotor
Rotor diameter: 112 m
Operational interval: 6.2 to 17.7 rpm
Air brake: full blade feathering with 3 pitch cylinders
Electrical
Frequency: 50 Hz/60 Hz
Converter type: full scale converter
Generator type: permanent magnet generator
Gearbox
Type: 4-stage planetary/helical
Pitch regulated with variable speed

The electricity will be fed into the grid at two different points, Kosava I will be connected to the substation Vrsac 1, at the 20 kV level, where approximately 14 km of a new over head line (=OHL) will be built by the project proponent. Kosava II will be feeding into the 110 kV grid through a new transmission line connected between the substations Vrsac 1 and Alibunar. A 20/110 kV substation will be built by the project proponent at the project site.

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

The chosen crediting period for the project activity is 7 years renewable twice. Annual estimates of emission reductions by the project activity during the above crediting period are furnished below:

Years	**Estimate of annual emission reductions in tonnes of CO_2e**
2012 (3 months)	114,906
2013	459,622
2014	459,622
2015	459,622
2016	459,622
2017	459,622
2018	459,622
2019 (9 months)	344,717
Total estimated reductions (tonne of CO_2e)	3,217,357
Total number of crediting years	**7** (first crediting period)
Annual average of the estimated reductions over the crediting period. (tCO_2e)	459,622

A.4.5. Public funding of the project activity:

There is no public funding from Annex I Parties for the proposed project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

Approved consolidated baseline and monitoring methodology *ACM0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources Version 12.1.0*

Methodological Tool: *Tool to calculate the emission factor for an electricity system Version 02.1.0*

Methodological Tool: *Tool for the demonstration and assessment of additionality Version 05.2*

Methodological Tool: *Combined tool to identify the baseline scenario and demonstrate additionality; N.A.*

Methodological Tool: *Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion. N.A.*

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

The approved baseline methodology ACM0002 Version 12.1.0, applies to the proposed project activity, based on the following conditions:

Applicability conditions in Version 12.1.0 of ACM0002 related to wind power activities	**Characteristics of the project activity**	**Applicability criterion met?**
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); or (d) involve a replacement of (an) existing plant(s).	The proposed project activity is a new grid-connected wind farm project and no renewable power plant was operated prior to the implementation at the proposed project activity site (Documentation: see satellite image in A.4.1.4, to be confirmed by on site visit)	Yes
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	The proposed project activity is a new grid-connected wind farm project and no renewable power plant was operated prior to the implementation at the proposed project activity site (Documentation: see satellite image in A.4.1.4, to be	Yes

power plant/unit;	confirmed by on site visit)	
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 proposed project activity does not involve switching from fossil fuels to renewable energy. It is neither a biomass fired power plant nor a hydro power plant. (Documentation: see satellite image in A.4.1.4, to be confirmed by on site visit)	Yes

Additionally, the geographic and system boundaries for the respective electricity grid can be clearly identified and information on the characteristics of the grid is available.

Therefore, the methodology ACM0002 Version 12.1.0 is applicable to the project activity

B.3. Description of the sources and gases included in the project boundary:

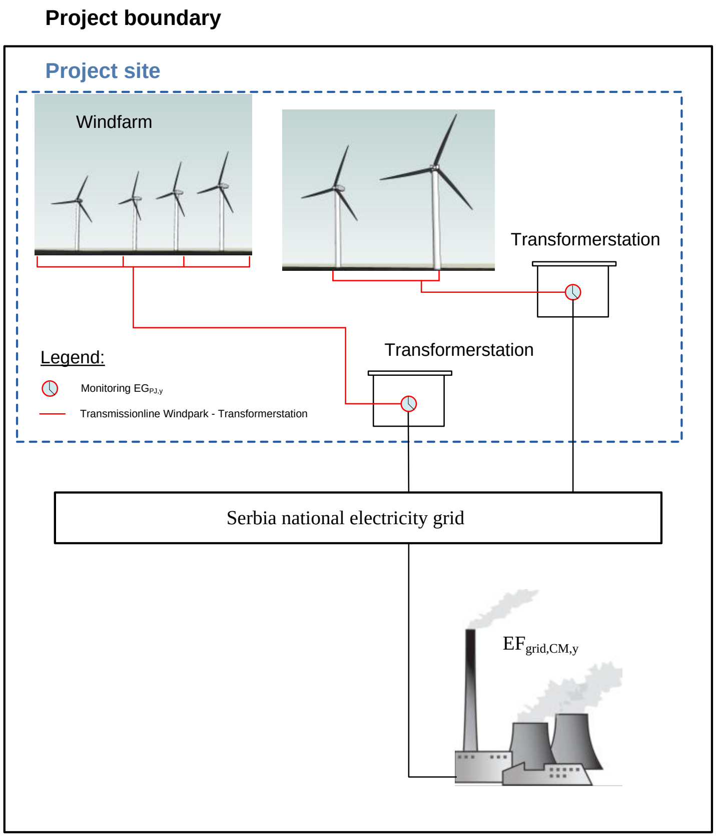
According to ACM0002 Version 12.1.0 the following greenhouse gases and emission sources must be considered to be included or excluded from the project boundary of the proposed project activity:

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	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	For geothermal power plants fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	Yes	Main emission source
		CH_4	Yes	Main emission source
		N_2O	No	Minor emission source
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	Yes	Main emissions source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	Minor emission source
		CH_4	Yes	Main emission source
		N_2O	No	Minor emission source

Baseline emissions to be included in the boundary of the proposed project activity are CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.

Since the proposed project activity is neither a geothermal nor a hydro power plant nor does it consume fossil fuels no project emissions occur within the project boundary.

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the Serbian national electricity grid where project power plant activity is connected to.



B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

Since the proposed project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

According to:
ACM0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources Version 12.1.0

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".

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

Ad starting date of the proposed project activity (prior consideration of CDM):
The CDM Glossary of Terms, Version 05 defines the start date as follows:

…..In light of the above definition, the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity. Minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, should not be considered in the determination of the start date as they do not necessarily indicate the commencement of implementation of the project.

The project proponent has not yet committed to expenditures related to the implementation or the construction of the project activity.

Ad explanation of how and why this project activity is additional
Methodological Tool *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

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

The CDM Validation and Verification Manual (v 01.2) states:

Identification of alternatives:
(i) Requirement to be validated
105. The PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required.

ACM0002 v.12.1.0 (page 4) prescribes the baseline scenario as follows:

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.*

Therefore two alternatives are considered for further discussion:

Alternative 1: The proposed project activity undertaken without being registered as a CDM project activity.
Alternative 2: Continuation of the current situation (no project activity or other alternatives undertaken).

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

All above mentioned alternatives are in compliance with all mandatory applicable legal and regulatory requirements of Serbia.

Step 2: Investment analysis

Investment analysis is not applied.

Step 3: Barrier analysis

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity:

(c) Barriers due to prevailing practice

For over 20 years no major investment has taken place in Serbia´s new power generation capacity. The latest major power plant which went online in 1991 was the Thermal Power Plant Kostolac B2. In relation to wind power the only existing first single wind turbine was installed in April 2011. It is a used 500 kW wind turbine of type Enercon E-40 which was implemented by the municipality of Tutin for demonstration purposes (as demonstrated by a confirmation from the Municipality of Tutin). This has led to the situation that at the start of validation there is no wind power plant in commercial operation in Serbia (as demonstrated by a confirmation from the Serbian Ministry of Infrastructure and Energy). Therefore the project activity classifies for the barrier of "*not prevailing practice*" or first of its kind.

The Clean Development Mechanism <u>alleviates</u> the identified barrier "first of its kind" by creating substantial additional cash flows and political leverage for the proposed project activity. Such leverage is achieved through the involvement of different institutions in the CDM process (i.e. as a member of the DNA), who are also responsible for some part in the general approval process for the wind power projects.

As by the Information Note on the barrier "first-of-its-kind" of the Meth Panel (MP34 Annex 10), *if a project activity is "first-of-its-kind", no additional assessment steps are undertaken to confirm additionality*.

Sub-step 3 b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

The identified barrier (c) *barriers due to prevailing practice* or first of its kind does not prevent the alternative "continuation of the current situation (no project activity or other alternatives undertaken)"

Step 4: Common practice analysis

The proposed project type has demonstrated to be first-of-its kind (according to Sub-step 3a), therefore the above generic additionality tests do not have to be complemented with an analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region.

Not applicable.

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

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

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to:
ACM0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources Version 12.1.0

Project emissions
ACM0002 Version 12.1.0 states that *"For most renewable power generation project activities, PEy = 0".*The only exceptions to this rule are project activities involving energy generation based on geothermal, solar thermal and hydro power.

The project activity does not involve any of the above mentioned technologies. Thus according to *ACM0002 Version 12.1.0*:

$PE_y = 0$

Baseline emissions
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:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} \qquad \textbf{(1)}$$

Where:

BE_y	=	*Baseline emissions in year y (tCO_2/yr)*
$EG_{PJ,y}$	=	*Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)*
$EF_{grid,CM,y}$	=	*Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)*

Calculation of $EG_{PJ,y}$
The calculation of $EG_{PJ,y}$ is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions.

The proposed project activity is a greenfield wind power plant therefore (a) applies.

(a) Greenfield renewable energy power plants

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y} \quad \textbf{(2)}$$

Where:
$EG_{PJ,y}$ = *Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)*
$EG_{facility,y}$ = *Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)*

Calculation of $EF_{grid,CM,y}$
The combined margin CO_2 emission factor for grid connected power generation in year y $EF_{grid,CM,y}$ is calculated applying the *Tool to calculate the emission factor for an electricity system, Version 02.1.0* according to the following steps:

STEP 1: Identify the relevant electricity systems
For the purpose of determining the electricity emission factor, a project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints. In the case of the proposed project activity, the connected grid is the Serbian national grid and all connected power plants (without significant transmission constraints) are included in the project boundary.

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)
Only grid power plants are included in the calculation, Option I.

STEP 3: Select a method to determine the operating margin (OM)
The Simple Operating Margin method is applied.

Justification:
Low-cost/must-run resources, namely hydro power, constitute less than 50% of total grid generation in average of the five most recent years. Years 2006-2010 have been used as the five most recent years (see Annex 3 for further details).

The emission factor is fixed with *ex ante* option.

STEP 4: Calculate the operating margin emission factor according to the selected method
The simple OM is calculated applying option A resp. A1 except for the district heating plants (Combined Heat and Power plants, CHPs) delivering also electricity to the Serbian grid, for which option A2 is chosen.

Justification for all power plants except the above mentioned CHPs:
Fuel consumption and net electricity generation is available per power unit m.

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \textbf{(3)}$$

Where:

$EF_{grid,OMsimple,y}$	=	*Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)*
$EG_{m,y}$	=	*Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)*
$EF_{EL,m,y}$	=	*CO_2 emission factor of power unit m in year y (tCO_2/MWh)*
m	=	*All power units serving the grid in year y except low-cost / must-run power units*
y	=	*The relevant year as per the data vintage chosen in Step 3*

The emission factor of each power unit *m* is determined as follows

$$EF_{EL,m,y} = \frac{\sum_i FC \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_{m,y}} \qquad \textbf{(4)}$$

Where:

$EF_{EL,m,y}$	=	*CO_2 emission factor of power unit m in year y (tCO_2/MWh)*
$FC_{i,m,y}$	=	*Amount of fossil fuel type i consumed by power unit m in year y (Mass or volume unit)*
$NCV_{i,y}$	=	*Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)*
$EF_{CO2,i,y}$	=	*CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)*
$EG_{m,y}$	=	*Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)*
m	=	*All power units serving the grid in year y except low-cost/must-run power units*
i	=	*All fossil fuel types combusted in power unit m in year y*
y	=	*The relevant year as per the data vintage chosen in Step 3*

Justification for the above mentioned CHPs:

No information is available for the fuel consumption that can be attributed to the electricity generation only. Therefore Option A2 for the calculation of $EF_{EL,m,i,y}$ is used. The default efficiency factor for combined cycle plants in the table in Annex 1 of the *Tool to calculate the emission factor for an electricity system, Version 02.1.0* is used as a source for the energy conversion efficiency $\eta_{m,y}$.

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \cdot 3.6}{\eta_{m,y}} \qquad \textbf{(5)}$$

Where:

$EF_{EL,m,y}$	=	*CO_2 emission factor of power unit m in year y (tCO_2/MWh)*
$EF_{CO2,m,i,y}$	=	*CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)*
$\eta_{m,y}$	=	*Average net energy conversion efficiency of power unit m in year y (ratio)*
m	=	*All power units serving the grid in year y except low-cost/must-run power units*

y = *The relevant year as per the data vintage chosen in Step 3*

All relevant parameters to carry out the calculations are provided under B6.2 and Annex 3.

STEP 5: Identify the group of power units to be included in the build margin (BM)
The sample group of power units *m* used to calculate the build margin consists of:

- the set of five power units that have been built most recently;

Justification
This set of power units comprises the larger annual generation (see Annex 3 for details)

In terms of vintage of data Option 1 is chosen.

STEP 6: Calculate the build margin emission factor
The build margin emission factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \textbf{(6)}$$

Where
$EF_{grid,BM,y}$ = *Build margin CO_2 emission factor in year y (tCO_2/MWh)*
$EG_{m,y}$ = *Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)*
$EF_{EL,m,y}$ = *CO_2 emission factor of power unit m in year y (tCO_2/MWh)*
m = *Power units included in the build margin*
y = *Most recent historical year for which power generation data is available*

STEP 7: Calculate the combined margin (CM) emissions factor.
The combined margin emission factor was calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$):

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \textbf{(7)}$$

$EF_{grid,BM,y}$ = *Build margin CO_2 emission factor in year y (tCO_2/MWh)*
$EF_{grid,BM,y}$ = *Operating margin CO_2 emission factor in year y (tCO_2/MWh)*
$w_{OM,}$ = *Weighting of operating margin emissions factor (%)*
$w_{BM,}$ = *Weighting of build margin emissions factor (%)*

For $w_{OM,}$ *and* w_{BM} *0.75 and 0.25 is used*

Justification
These default values are prescribed for wind and solar generation project activities.

According to:

ACM0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources Version 12.1.0

Leakage emissions
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.

No leakage emissions are considered in the proposed project activity.

B.6.2. Data and parameters that are available at validation:
(Copy this table for each data and parameter)

Data / Parameter:	$FC_{i,m,y}$, $FC_{i,y}$, $FC_{i,k,y}$
Data unit:	Mass or volume unit
Description:	Amount of fossil fuel type *i* consumed by power plant / unit *m*, *k* (or in the project electricity system in case of $FC_{i,y}$) in year y.
Source of data used:	Power Generation Data provided by DNA
Value applied:	See details in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Officially (DNA) provided data
Any comment:	-

Data / Parameter:	$\eta_{m,y}$
Data unit:	ratio
Description:	Average net energy conversion efficiency of power unit *m* in year *y*
Source of data used:	The default values provided in the table in Annex 1 of the *Tool to calculate the emission factor*
Value applied:	See details in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The default efficiency factor for combined cycle plants in the table in Annex 1 of the *Tool to calculate the emission factor for an electricity system, Version 02.1.0* is used, as no information is available for the fuel consumption that can be attributed to the electricity generation only.
Any comment:	Used only for the calculation of $EF_{CO2,m,i,y}$ for the Combined Heat and Power plants delivering electricity to the grid.

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data used:	Power Generation Data provided by DNA

Value applied:	See details in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Officially (DNA) provided data
Any comment:	-

Data / Parameter:	$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y*
Source of data used:	Power Generation Data provided by DNA
Value applied:	See details in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Officially (DNA) provided data
Any comment:	-

Data / Parameter:	$EG_{m,y}$, EG_y, $EG_{k,y}$
Data unit:	MWh
Description:	Net electricity generated by power plant/unit *m*, *k* or *n* (or in the project electricity system in case of EG_y) in year *y* or hour *h*
Source of data used:	Power Generation Data provided by DNA
Value applied:	See details in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Officially (DNA) provided data
Any comment:	-

B.6.3. Ex-ante calculation of emission reductions:

The plant load factor is defined according to the *Guidelines for the Reporting and Validation of Plant Load Factors Version 01*.

Option (b) was chosen, the plant load factor was determined by a third party.

The proposed project activity will approximately generate 409,442 MWh electricity to the Serbian grid annually. The emission reduction ER_y by the project activity during a giving year y is calculated as follows:

$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = 409{,}442\ MWh \times 1.123 tCO_2/MWh = 459{,}622\ tCO_2$

$ER_y = BE_y – PE_y – LE_y = 459{,}622\ tCO_2 – 0 = 459{,}622\ tCO_2$

The emission reductions ER_y by the project activity during a given year y are 459,622 tCO_2 and the total emission reductions in the first crediting period are 3,217,357 tCO_2.

B.6.4 Summary of the ex-ante estimation of emission reductions:

Ex-ante estimation of emission reductions of the project activity in the first crediting period

Year	**Estimation of project activity Emissions (tonnes of CO_2e)**	**Estimation of baseline emissions (tonnes of CO_2e)**	**Estimation of leakage (tonnes of CO_2e)**	**Estimation of overall emission reductions (tonnes of CO_2e)**
2012 (3 months)	0	114,906	0	114,906
2013	0	459,622	0	459,622
2014	0	459,622	0	459,622
2015	0	459,622	0	459,622
2016	0	459,622	0	459,622
2017	0	459,622	0	459,622
2018	0	459,622	0	459,622
2019 (9 months)	0	344,717	0	344,717
Total tonnes of CO_2e	**0**	**3,217,357**	**0**	**3,217,357**

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{facility,y,p}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid for each of the two grid connection points p in year y
Source of data to be used:	Electricity meter(s) in the substation situated at the high voltage side of the transformer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	409,442
Description of measurement methods and procedures to be	Continuous measurement and at least monthly recording by the SCADA system. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The precision of the meter is no lower

applied:	than 0.5s.
QA/QC procedures to be applied:	The calibration frequency is according to national standards(Grid Code of the national transmission grid operator EMS or of the distribution grid operator Elektrovojvodina). In order to ensure plausibility of the data, cross checks with electricity invoices will be made.
Any comment:	This data will be used to calculate direct emission reductions.

Data / Parameter:	$EG_{export\text{-}facility,y,p}$
Data unit:	MWh/yr
Description:	Quantity of gross electricity generation supplied by the project plant/unit to the grid for each of the two grid connection points p in year y
Source of data to be used:	Electricity meter(s) in the substation situated at the high voltage side of the transformer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	409,442
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording by the SCADA system. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The precision of the meter is no lower than 0.5s.
QA/QC procedures to be applied:	The calibration frequency is according to national standards(Grid Code of the national transmission grid operator EMS or of the distribution grid operator Elektrovojvodina).
Any comment:	This data will be used to calculate direct emission reductions.

Data / Parameter:	$EG_{import\text{-}facility,y,p}$
Data unit:	MWh/yr
Description:	Quantity of electricity consumed by the project plant/unit from the grid for each of the two grid connection points p in year y
Source of data to be used:	Electricity meter(s) in the substation situated at the high voltage side of the transformer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording by the SCADA system. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The precision of the meter is no lower than 0.5s.
QA/QC procedures to be applied:	The calibration frequency is according to national standards(Grid Code of the national transmission grid operator EMS or of the distribution grid operator Elektrovojvodina).

Any comment:	This data will be used to calculate direct emission reductions.

Data / Parameter:	$EG_{export\text{-}total,y,p}$
Data unit:	MWh/yr
Description:	Quantity of total gross electricity generation supplied to the grid metered by a joint main meter at the substation for each of the two grid connection points p in year y (MWh/yr)
Source of data to be used:	Electricity meter(s) in the substation situated at the high voltage side of the transformer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	n/a
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording by the SCADA system. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The precision of the meter is no lower than 0.5s.
QA/QC procedures to be applied:	The calibration frequency is according to national standards(Grid Code of the national transmission grid operator EMS or of the distribution grid operator Elektrovojvodina).
Any comment:	This parameter will be used for the calculation of the net generated electricity only in case also additional wind farms feed electricity into the grid at the specified substation.

Data / Parameter:	$EG_{project,y,p}$
Data unit:	MWh/yr
Description:	Quantity of gross electricity generated by the project plant/unit metered by individual meters at the point of feed into the substation at the site of the project plant for each of the two grid connection points p in year y
Source of data to be used:	Electricity meter(s) in the substation situated at the low voltage side of the transformer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	n/a
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording by the SCADA system. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The precision of the meter is no lower than 0.5s.
QA/QC procedures to be applied:	The calibration frequency is according to national standards(Grid Code of the national transmission grid operator EMS or of the distribution grid operator Elektrovojvodina).
Any comment:	This parameter will be used for the calculation of the net generated electricity only in case also additional wind farms feed electricity into the grid at the specified substation.

Data / Parameter:	$EG_{other\text{-}windfarms,y,p}$
Data unit:	MWh/yr
Description:	Quantity of gross electricity generated by other windfarms that share the transmissions facilities with the project plant metered by individual meters at the point of feed into the substation for each of the two grid connection points p in year y
Source of data to be used:	Electricity meter(s) in the substation situated at the low voltage side of the transformer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	n/a
Description of measurement methods and procedures to be applied:	Separate meter(s) in the substation measuring the electricity generation of the other wind farms connected to the same substation as the project activity.
QA/QC procedures to be applied:	The responsibility for the calibration of the meter(s) lays with the project owners of the other windfarms. The meter(s) will be calibrated at least every 3 years according to manufacturer's specifications.
Any comment:	This parameter will be used for the calculation of the net generated electricity only in case also additional wind farms feed electricity into the grid at the specified substation.

Data / Parameter:	$EG_{import\text{-}total,y,p}$
Data unit:	MWh/yr
Description:	Quantity of electricity imported from the grid metered by a joint main meter at the substation for each of the two grid connection points p year y
Source of data to be used:	Electricity meter(s) in the substation situated at the high voltage side of the transformer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	n/a
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording by the SCADA system. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The precision of the meter is no lower than 0.5s.
QA/QC procedures to be applied:	The calibration frequency is according to national standards(Grid Code of the national transmission grid operator EMS or of the distribution grid operator Elektrovojvodina).
Any comment:	This parameter will be used for the calculation of the net generated electricity only in case also additional wind farms feed electricity into the grid at the specified substation.

B.7.2. Description of the monitoring plan:

Management structure and responsibility

Overall responsibility for daily operating and reporting lies with the project proponent. A staff will be defined within the company to carry out the monitoring work (data recording and archiving, quality assurance and quality control of the data, equipment´s calibration, scheduled and unscheduled maintenances and adoption of corrective actions, if needed)

Management structure

The manager of the proposed project activity will hold the overall responsibility for the monitoring process, including the follow up of daily operations, definition of personnel involved with the monitoring work, revision of the monitored results/data, and quality assurance of measurements and the process of training new staff.

Responsibility of the personnel directly involved

The personnel involved with monitoring will be responsible for carrying out the following tasks:

- Supervise and verify metering and recording: the staff will coordinate internally with other departments to ensure and verify adequate metering and recording of data, including power delivered to the grid;

- Collection of additional data, sales/invoices: the staff will collect sales receipts and relevant data for monitoring of the proposed project activity;

- Calibration: the staff will coordinate with the responsible organizations to ensure that calibration of the metering instruments is carried out in accordance with national standards (Grid Code of the Serbian Transmission Grid Operator Elektromreža Serbia or of the distribution grid operator Elektrovojvodina).

- Data archives: the staff will be responsible for keeping all monitoring data and making it available to the DOE for the verification of emission reductions

Support and third parties participation

The staff will receive support from the CDM experts (internal and/or external) in its responsibilities through the following actions:

- Provide the staff with a calculation template in electronic form for calculation of annual emission reductions;
- Provide specific CDM monitoring instructions to the personnel involved in the project activity´s operation;
- Follow-up of the monitoring plan and continuous on demand advice to the staff;
- Compilation of the monitored data and preparation of the monitoring report;
- Coordination with DOEs for the preparation of periodical verifications;

Monitoring equipment and installation:

The quantity of annual electricity delivered to the grid by the proposed project activity ($EG_{export,y}$) and the electricity consumed from the grid by the proposed project activity ($EG_{import,y}$) will be monitored through the bidirectional main meters in the substation Vrsac 1 for the generated electricity of Kosava I as well as in the new substation for the generated electricity of Kosava II. Any error resulting from the meters shall not exceed 0.5%. All equipment will be in compliance with national standards.

If the proposed project activity has to share the same substation or transmission line with some other wind farms at any of the two grid connection points, appropriate additional meters will be installed at the project site so that the electricity generation can be monitored for each wind farm separately so as to determine the share of this wind farm of the net supply to the grid.

The net electricity supplied by the project activity will be measured as follows:

$$EG_{facility,y} = EG_{facility,y,p} \qquad (8)$$

Where:

$EG_{facility,y,}$	=	*Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)*
$EG_{facility,y,p}$	=	*Quantity of net electricity generation supplied by the project plant/unit to the grid at the grid connection point p in year y (MWh/yr)*

$$EG_{facility,y,p} = EG_{export-facility,y,p} - EG_{import-facility,y,p} \qquad (9)$$

Where:

$EG_{facility,y,p}$	=	*Quantity of net electricity generation supplied by the project plant/unit to the grid at the grid connection point p in year y (MWh/yr)*
$EG_{export\text{-}facility,y,p}$	=	*Quantity of gross electricity generation supplied by the project plant/unit to the grid at the grid connection point p in year y (MWh/yr)*
$EG_{import\text{-}facility,y,p}$	=	*Quantity of electricity consumed by the project plant/unit from the grid at the grid connection point p in year y (MWh/yr)*

In case in the future other wind farms supply electricity to the grid at the same substation as the project activity and their electricity generation will be measured by the same meter as it is used for the monitoring of electricity generation of the current project activity, additional existing meters will be utilized to separate the amounts of electricity generated by the different wind farms. In this case the parameters $EG_{export\text{-}facility,y,p}$ and $EG_{import\text{-}facility,y,p}$ will be calculated as follows:

$$EG_{export-facility,y,p} = EG_{export-total,y,p} \times \frac{EG_{project,y,p}}{(EG_{project,y,p} + EG_{other-windfarms,y,p})} \qquad (10)$$

Where:

$EG_{export\text{-}facility,y,p}$	=	*Quantity of gross electricity generation supplied by the project plant/unit to the grid at the grid connection point p in year y (MWh/yr)*
$EG_{export\text{-}total,y,p}$	=	*Quantity of total gross electricity generation supplied to the grid metered by a joint main meter at the grid connection point p in year y (MWh/yr)*
$EG_{project,y,p}$	=	*Quantity of gross electricity generated by the project plant/unit metered by individual meters at the site of the project plant for the units delivering to the grid connection point p in year y (MWh/yr)*

$EG_{other\text{-}windfarms,y,p}$ = *Quantity of gross electricity generated by other windfarms that share the transmissions facilities with the project plant metered by individual meters for the other units delivering to the grid connection point p in year y (MWh/yr)*

$$\boldsymbol{EG_{import-facility,y,p} = EG_{import-total,y,p}} \quad \textbf{(11)}$$

Where:

$EG_{import\text{-}facility,y,p}$ = *Quantity of electricity consumed by the project plant/unit from the grid in year y (MWh/yr)*

$EG_{import\text{-}total,y,p}$ = *Quantity of electricity imported from the grid in metered by a joint main meter at the grid connection point p year y (MWh/yr)*

This approach is flexible to accommodate potential future installations which also share transmission facilities with the proposed project activity.

Data monitoring and management

The quantity of annual electricity delivered to the grid by the proposed project activity ($EG_{export\text{-}facility,y,p}$) and the electricity purchased from the grid by the proposed project activity ($EG_{import\text{-}facility,y,p}$) will be monitored. The net electricity generation is electricity delivered to the grid minus electricity purchased from the grid.

All monitoring data and records will be archived in electronic format as well as on paper. The electronic documents will be backed up on compact disc or hard disc. The project proponent will also keep copies of sales receipts and prepare a periodic monitoring report, which includes the net electricity generation, the monitoring data summary, the calibration records and the emission reductions calculation.

Quality control

Calibration

All metering equipment will be properly calibrated according to the relevant calibration standard, either the Grid Code of the Serbian Transmission Grid Operator Elektromreža Serbia (EMS) or of the distribution grid operator Elektrovojvodina. Currently the frequency specified in this Grid Code is annual calibration. The meter in the substation Vrsac 1 (the feed in point for Kosava I) is in the ownership of Elektrovojvodina, which will also be responsible for the calibration of this meter. The main commercial meter on the 110kV side of the transformer for Kosava II will be in ownership of EMS, thus EMS will also be responsible for the calibration of this meter.

Emergency treatment

When the main meter at one of the two points of measurement for the two phases of the wind farm has a break down the net electricity supplied to the grid will be determined from the readings of the separate meters at the site of the project plant deducting line losses. Those meters will be installed and maintained by the project proponent, who is also responsible for the calibration which will follow manufacturer’s specification. The calibration frequency will be not less than 3 years. Any error resulting from the meters shall not exceed 0.5%.

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

Date of completion of the baseline study and monitoring methodology: 04/08/2011

Contact information of the entity and persons responsible:
Energy Changes Projektentwicklung GmbH (EC) and Plus Ultra Asset Management GmbH (PUAM) prepared the PDD. EC and PUAM are project participants. Contact information is given in Annex 1.

The persons preparing the documentation were:

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SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

The start date of the project activity will be the ordering of the wind turbines, which is expected to happen on 15/02/2012.

C.1.2. Expected operational lifetime of the project activity:

25y-0m.

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

01/10/2012 or the date of registration, whichever is later.

C.2.1.2. Length of the first crediting period:

7y-0m

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

According to the *Law on Environmental Impact Assessment ("OJ RS", No 135/04, 36/09)* and the Decree on *Establishing the List of Projects that May Require Environmental Impact Assessment ("OJ RS", No 114/08*) an environmental impact assessment is mandatory for wind farms with a total capacity of equal to or above of 50 MW.

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

During the Detailed Planning Regulation (DPR) for Kosava I a strategic Environmental Impact Assessment has been conducted, which also received a positive opinion from the Ministry of Environment.

In the year 2010 one full year of birds and bats monitoring has been conducted for the total project area of Kosava I+II. The results confirm that the project will have no significant impact on the fauna.

The DPR process for Kosava II has been started and has also received a positive opinion from the Ministry of Environment.

SECTION E. Stakeholders' comments

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E.1. Brief description how comments by local stakeholders have been invited and compiled:

The public consultation was carried out on October 5th 2010 in the Municipality of Vrsac. The meeting was announced in "Privredni pregled" 02nd September 2010 and in local week newspaper "Vrsacka kula" 03rd September 2010. Public inspection lasted 30 days.

E.2. Summary of the comments received:

No comments from local stakeholders were received.

E.3. Report on how due account was taken of any comments received:

No comments from local stakeholders were received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I Parties for the proposed project activity.

Annex 3

BASELINE INFORMATION

The detailed calculations and input assumptions of the parameter $EF_{grid,CM,y}$ according to the *Tool to calculate the emission factor for an electricity system Version 02.1.0* are provided in a separate excel sheet *PDD_WindFarmKosavaI+II-GEFSerbiaV2-20110804.xls*.

Annex 4

MONITORING INFORMATION

The monitoring details for the project activity have been mentioned in section B.7 of this PDD.

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