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

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SECTION A. General description of project activity

A.1. Title of the project activity:

Title: Mozura Wind Farm.
Version: 1.0
Date: 29/11/2011

A.2. Description of the project activity:

The objective of the Mozura Wind Farm project is to generate electricity using a clean and renewable energy source, the wind. The installed capacity of the project is 46 MW.

According to the "Tool to demonstrate and assessment of additionality" Ver. 05.2.1, the baseline scenario is the current situation of the Montenegrin Electric Transmission System where the electricity is generated by a mix of sources (a fossil fuel plant and renewable source plants), not taking into consideration the propose project activity[1].

Prior to the start of the implementation of the project activity no other facilities exists in the area where the wind farm is going to be installed. These lands do not have any specific current use, so the project will not affect any human activities.

Without the development of the project activity the scenario discussed would remain the same. So, this scenario prior to the implementation of the project activity is considered as the baseline scenario. The project activity aims to be an environmental solution to the GHG emissions caused by the fossil fuel consumption required for electricity generation in the baseline scenario, by means of substitution of these fossil fuels for renewable energy sources which does not generate considerable emissions to the environment.

The power generation sector is one of the main sources responsible of the GHG emissions. The use of new and clean energy sources such as the installation of electrical wind power plants must be considered in order to reduce the high level of GHG emissions generated by the power sector.

The most important result of the project is the reduction of greenhouse gas (GHG) emissions as a result of diminishing the generation of electricity from fossil fuels supplied to the national grid, the Montenegrin Electric Transmission System.

Wind energy plants could be a very interesting alternative in many countries, but they have had to face regulatory, economical and technical obstacles for its development, including the lack of development incentives.

Contribution to sustainable development

CDM projects have, among others, the main objective of assisting the host country in achieving sustainable development. In this context, the municipalities of Bar and Ulcinj in Montenegro will be benefited by the project activity and will contribute to sustainable development in the following way:

[1] More detailed information can be found in section B.4.

Environmental sustainability:

- The project activity use renewable energy resources for electricity generation which otherwise would have been generated by the current grid mix (which includes a fossil fuel based power plant), contributing with a reduction in CO_2 emissions.
- Impulse of the environmental sustainability saving the exploitation and the exhaustion of a natural resource, finite and non-renewable like coal/natural gas.
- The project activity does not generate any significant negative environmental impact.

Economic and Social sustainability:

- Employment generation and improvement of incomes and working conditions of the population in the area: the project is expected to create jobs during its construction phase, which includes the construction of roads, and electric infrastructure, and the installation of the wind turbines and the operation of the wind farm.
- The project activity also leads to increase clean electric power generation of energy from a wind farm which has an emission factor of 0 tCO2/MWh.

The main economic benefit due to the implementation of the project is an economic growth in the municipalities of Bar and Ulcinj due to the generation of new jobs for each one of the project phases: construction, installation and operation of the wind farm, also the growth in the services sector. The jobs created will be available for all sectors: workers, contractors, project managers and engineers to name a few.

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)
Montenegro (host)	Mozura Wind Park, D. O. O. (Private entity)	No
United Kingdom	CO_2 Global Solutions International S.A. (Private entity)	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.		

Table 1. Project participants

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Montenegro

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

Bar and Ulcinj

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

Mozur

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

The wind farm project will be located in the municipality of Bar and Ulcinj (Geographical coordinates: 41°58'19.61" N, 19°12'32.55" E) (Decimal coordinates: 41.972114, 19.209042). The following vertices point where the wind turbines will be installed:

	Latitude		Longitude	
	Geographical	Decimal	Geographical	Decimal
1	41°59'28.85" N	41.991347	19°09'34.73" E	19.159647
2	41°59'13.78" N	41.987161	19°09'36.90" E	19.16025
3	41°57'24.95" N	41.956931	19°15'01.17" E	19.250325
4	41°57'38.30" N	41.960639	19°15'19.39" E	19.255386

Table 1. Project coordinates

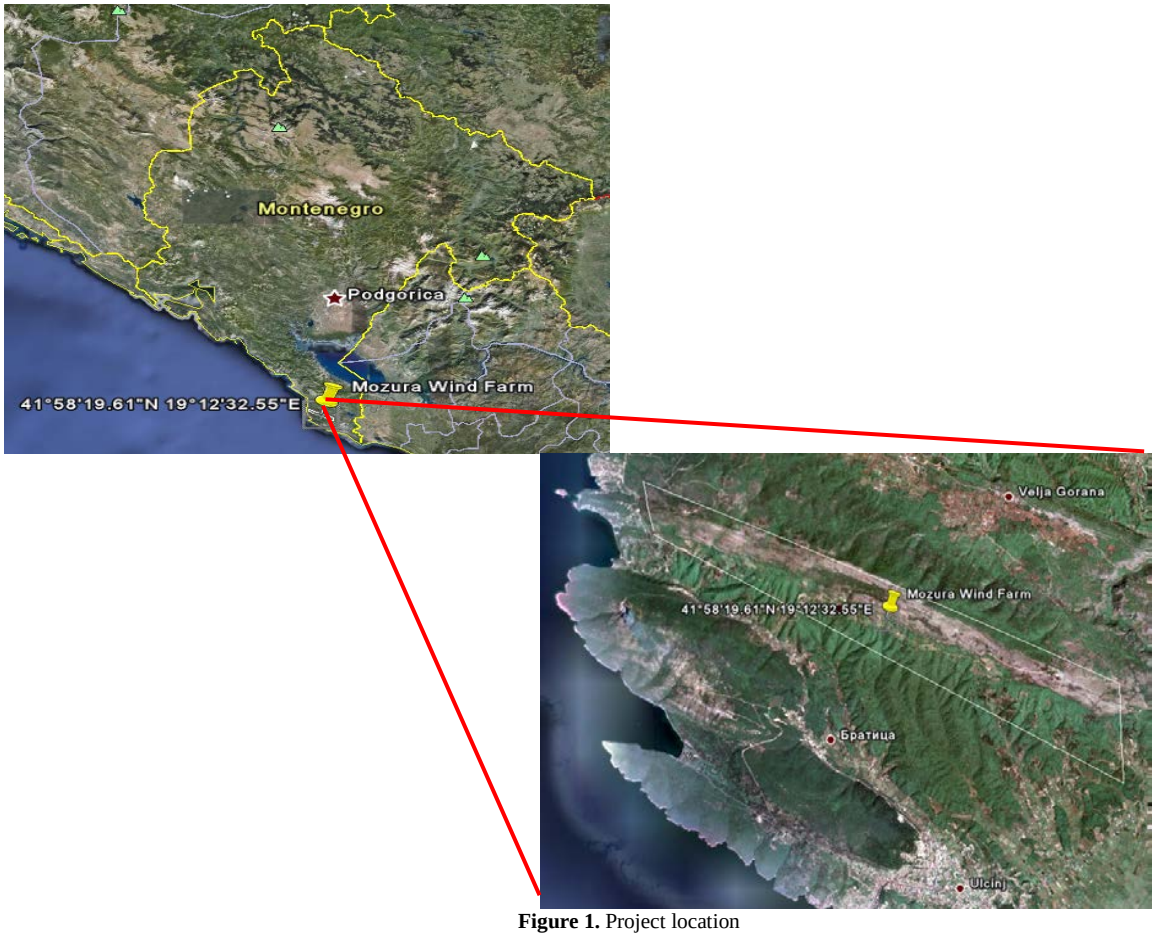

Figure 1. Project location

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

Sectoral Scope 1: Energy Industries (renewable/non renewable sources).

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

The current scenario in the Montenegrin Electric Transmission System is that the generated energy is produced mainly from renewable resources and another part from fossil fuels (lignite). This scenario is considered as the baseline and is considered the same scenario prior the start of the project activity.

In the current scenario the main source of the GHG emissions are the power fuels plants, these plants consume different types of fossil fuels for energy production, and due to the growing energy demand in Montenegro, these fossil fuel plants will continue to operate and consume more fossil fuels in order to supply the energy demand.

In order to mitigate GHG emissions it is necessary to develop new projects that could generate energy without generating GHG emissions, such as the energy project that involves the uses of renewable resources (solar, hydro, wind).

This means that this project activity reduces the emissions of greenhouse gases (CO_2, please refer to section B.3) due to the substitution of power generation using renewable energy source (which most are considered to have an emission factor of 0 tCO2/MWh) instead of using fossil fuels (the main producers of greenhouse gases). The project activity will generate "clean energy", which would replace the generated by fossil fuels.

The 23 wind turbines to be installed for the Mozura Wind Farm project are Gamesa G97-2.0 MW, with a nominal power output of 2 MW, achieving a total installed capacity of 46 MW. The project is expected to generate approximately 96.968 GWh per year.

The technical specification of the wind turbines are the following:

Total Power Capacity	46	MW
Turbine	G97-2.0 MW	
Rated Power per turbine	2.0	MW
No. of turbines	23	-
Equivalent annual operating hours	2,108	hrs
Annual Production	96.968	GWh
Plan load factor	24.06%	%
Transmission line length	1.8	km
Transmission line Voltage	30	kV
Diameter	97	m
Swept area	7,390	m^2
Hub Height	90	m

Table 2. Power plant characteristics

The energy produced by the wind farm will be send Transformer Station Ulcinj through 1.8 Km of 30 kV aerial line connecting to the existing Bar-Ulcinj 110 kV line[2].

[2] This information can be found in the project location layout.

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

The crediting period initiates in January 1st of 2013 with a total emissions reduction of 565,194 tons of CO2.

Year	Annual estimation of emission reductions in tonnes of CO2 e
2013	80,742
2014	80,742
2015	80,742
2016	80,742
2017	80,742
2018	80,742
2019	80,742
Total estimated reductions (tonnes of CO2 e)	**565,194**
Total number of crediting years	7 Years
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	**80,742**

Table 3. Emission reductions

A.4.5. Public funding of the project activity:

No public funding is used for this 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:

For the project activity, the approved baseline methodology used is ACM0002 Version 12.1.0, consolidated baseline methodology for grid-connected electricity generation from renewable sources.

This methodology also refers to the latest approved versions of the following tools:

- Tool to calculate the emission factor for an electricity system (ver. 02.2.1);
- Tool for the demonstration and assessment of additionality (ver. 05.2.1);
- Combined tool to identify the baseline scenario and demonstrate additionality (ver. 03.0.1);
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (ver. 2).

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

The methodology ACM0002 version 12.1.0 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)".

The proposed project activity involves the installation of a new power plant for renewable electricity generation that will be connected to the Montenegrin Electric Transmission System.

"The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit".

The project activity consist in the installation of a wind power plant unit, therefore, the project activity complies with the applicability condition.

"In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 11 to calculate the parameter $EG_{PJ,y}$): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity"

The project activity consist in the installation of a new wind power plant, therefore, the last condition of applicability does not apply because the project activity doesn't consist in a capacity addition, retrofit or replacement.

"In case of hydro power plants, one of the following conditions must apply:

- *The project activity is implemented in an existing reservoir, with no change in the volume of reservoir.*
- *The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2*
- *"The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2."*

This applicable condition is in the case of a hydro plant, for this reason this condition does not apply to this project activity.

The methodology is not applicable to the following:

"Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site".

"Biomass fired power plants."

"Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m2".

The project activity consist in the installation of a facility that uses the wind to generate electricity, with this is demonstrated that the project activity does not involve the use of fossil fuels neither is a fired power plant or a hydro power plant.

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

As indicated in the methodology ACM0002 Version 12.1.0, the project boundary will cover any CO_2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity.

Source		Gas	Included?	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source. All power plants interconnected to the Montenegrin Electric Transmission System.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project Activity	For geothermal power plants, fugitive emissions of CH4 and CO2 from noncondensable gases contained in geothermal steam.	CO_2	No	Not applicable to the proposed project activity.
		CH_4	No	Not applicable to the proposed project activity.
		N_2O	No	Not applicable to the proposed project activity.
	CO2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants.	CO_2	No	Not applicable to the proposed project activity.
		CH_4	No	Not applicable to the proposed project activity.
		N_2O	No	Not applicable to the proposed project activity.
	For hydro power plants, emissions of CH4 from the reservoir.	CO_2	No	Not applicable to the proposed project activity.
		CH_4	No	Not applicable to the proposed project activity.
		N_2O	No	Not applicable to the proposed project activity.

Table 4. Sources and gases included in the project boundary

The flow diagram of the project is shown next:

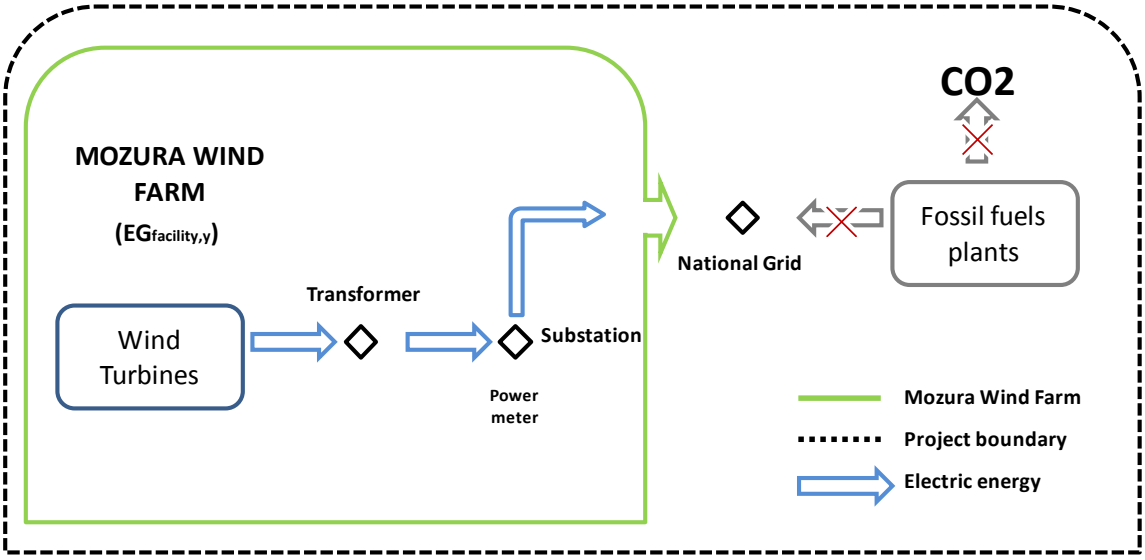

Figure 2. Flow diagram of the project

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

In the absence of the project, electricity would continue to be generated by the existing generation mix, operating in the grid.

The project activity is the "installation of a new grid-connected renewable power plant". Hence, as per ACM0002 version 12.1.0 the baseline scenario is the 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 version 02.2.1".

The baseline is the electricity that would have otherwise been generated by the operation plants connected to the Montenegrin Electric Transmission System.

The Montenegrin Electric Transmission System is owned by the National Electric Power Company (Elektroprivreda Crne Gore AD Niksic, EPCG AD Niksic) which supplies with electricity 351,722 consumers out of which 351,719 are households.[3]

According to Article 19 of the Energy Law, EPCG AD Niksic is a holder of the following three licenses:

- license for generation of electricity
- license for distribution of electricity
- license for supply of electricity

[3] Energy Regulatory Agency. "Quality of Electricity Supply, National Report of Montenegro". Pages 3 to 6. Available at: www.ecrb.eu/.../EnC%20-%20QoSR%20Study%20-%20National%20Report%20-%20Montenegro.pdf

Energy imports and exports

Montenegro imports more than a third of the required electricity needs, between 35% and 40%. This implies energy imports from abroad and energy procurement outside the borders of Montenegro, within the former State Union of Serbia and Montenegro. [4]

Energy development strategy and renewable energy sources for Montenegro

Montenegro ratified the Kyoto Protocol for the United Nations Framework Convention on Climate Change (UNFCCC) on March 27th 2007 (the Law on Ratification, Official Gazette of the Republic of Montenegro, no. 17/2007). Montenegro is not on the list of developed and/or transition countries towards market economy, thus not having direct obligations to reduce greenhouse gas emission at least by 2012. By signing the Protocol Montenegro also fulfilled one of the conditions for joining the European Union.[5]

The Montenegrin legislation, which is in line with EU regulations, implies the respecting of dynamics and deadlines for the implementation of EU directives contained in the Energy Community Treaty. The Treaty was ratified in the Montenegrin Parliament on October 26th 2006, with which Montenegro accepted short-, medium-, and long-term tasks, which includes the implementation of the current legislation of the EU for energy, environment, competition and renewable energy sources.

For these reasons, energy industry should get involved in activities that are mitigating climate change, which could be done by intensifying the construction of renewable energy sources and reducing greenhouse gas emissions, by improving energy efficiency and reducing all other negative effects on the environment.

Based on the projection of the electricity supply for 2025, it is easy to identify that the import of electricity will be on the increase until the new TPP "Pljevlja 2", a fossil fuel plant of 225 MW, starts to operate. The import-export balance of the entire period (2010-2025) will be negative, and will be significantly reduced by the construction of "Pljevlja 2", nevertheless, the CO2 emissions of the Montenegrin Electric Transmission System will increase dramatically with this kind of measures (Figure 3).

[4] Ministry for Economic Development of Montenegro: Energy development strategy of Montenegro by 2025, White Book. December 2007. Page 14. Available at: http://www.mipa.co.me/userfiles/file/Energy%20Development%20Strategy%20by%202025%20(White%20Book).pdf

[5] IREET: Abstract from the energy development strategy. June 2007. Pages 9 and 10. Available at: http://www.gov.me/files/1184765960.pdf

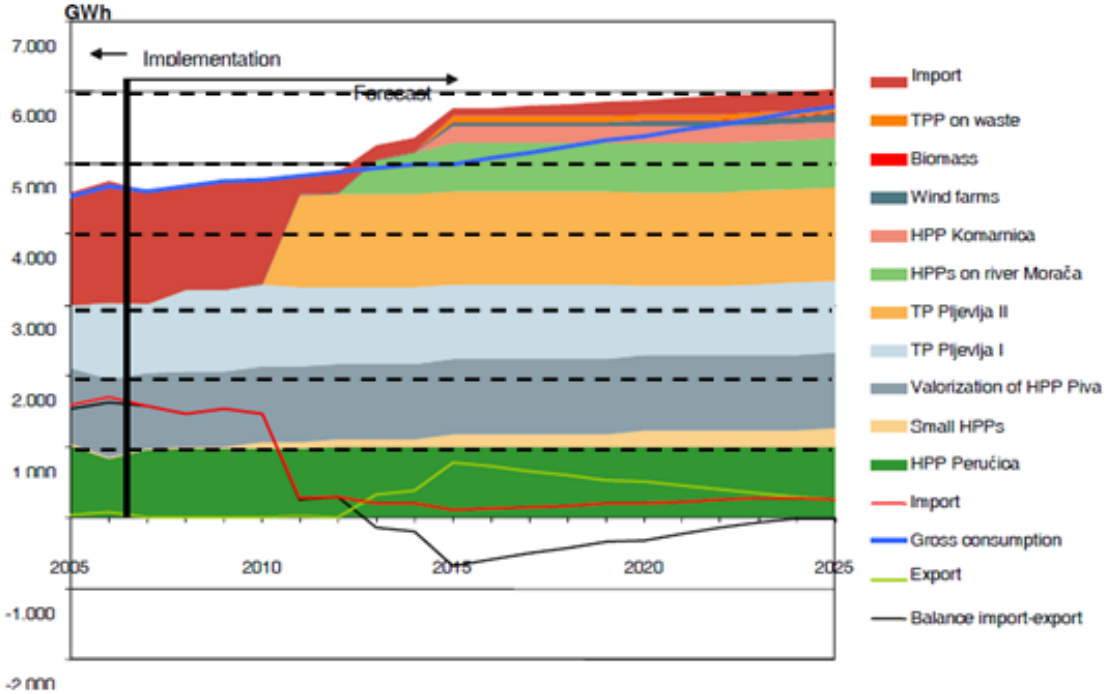

Figure 3. Long-term energy supply of Montenegro (GWh). [6]

According to all scenarios analyzed in professional basis, significant quantities of electricity (approximately 1,460-1,570 GWh annually) will continue to be imported due to impossibility of construction of any new power plants prior the start of operation of Pljevlja 2 (Table 5).

Year	HPPs (without HPP Piva)	Thermal Plant	HPP Piva	Renewables	Import	Export	Total
2010	971	1,152	1,065	120	1,456	0	4,765
2015	1,927	2,369	1,065	296	108	783	4,982
2020	1,927	2,290	1,065	406	194	511	5,372
2025	1,927	2,325	1,065	485	250	262	5,791

Table 5. Long-term energy supply of Montenegro (GWh). [7]

Nowadays, there is a good potential for using wind energy on locations along the Adriatic coast (hills close to Petrovac and mountains in the area among Herceg, Novi and Orahovac). Another interesting area is near Nikšić. Total potential is estimated at 100 MW, while the strategy of Montenegro envisages the construction of wind power plants with minimum output of 60 MW overall till 2025. In case that the

[6] Ministry for Economic Development of Montenegro: Energy development strategy of Montenegro by 2025, White Book. December 2007. Page 40. Available at: http://www.mipa.co.me/userfiles/file/Energy%20Development%20Strategy%20by%202025%20(White%20Book).pdf

[7] Ministry for Economic Development of Montenegro: Energy development strategy of Montenegro by 2025, White Book. December 2007. Page 40. Available at: http://www.mipa.co.me/userfiles/file/Energy%20Development%20Strategy%20by%202025%20(White%20Book).pdf

interest of the investors increases, the strategy of Montenegro allows bigger capacities and a faster development (Table 6).[8]

Operational in	New facilities	Power (MW)	Investments (mill. EUR)
2010	Small HPP	20	30
	Wind farms	10	10
2011	TPP Pljevlja 2	225	175
2013	HPP Andrijevo	127.4	194.9
	HPP Zlatica	37	84.7
2014	HPP Raslovici	37	73.5
2015	HPP Komamica	168	134.1
	HPP Milunovici	37	77
	Wind farms	15	15
	Small HPPs	30	45
	TPPS on waste	10	32
2020	Wind farms	15	15
	Small HPP	20	30
	CHP on biomass	2	3
2025	Wind farms	20	20
	Small HPP	10	15
	CHP on biomass	3	4.5
Total		**786.4**	**958.7**

Table 6. New power plants according to the energy development strategy of Montenegro by 2025[9]

Currently, the Energy Law of 2003 has been replaced by the Energy law of 2010, and comprehends as an incentive a preferential price for 12 years. Even then, renewable source projects as Mozura Wind Farm present economical barriers hard to obviate without important incentives as the CERs.

Conclusions

The project activity will reduce anthropogenic GHG emissions by supplying zero GHG emission power, which will displace the electricity generation based on fossil fuels. Based on official statistics and projections, it is possible to observe that in the absence of the project activity the electricity generated in a near future would come exclusively from fossil fuel based power plants. The project activity is expected to reduce a total of 565,194 tCO2 emissions during the 7 year crediting period, as described further in the document.

[8] Ministry for Economic Development of Montenegro: Energy development strategy of Montenegro by 2025, White Book. December 2007. Page 6. Available at: http://www.mipa.co.me/userfiles/file/Energy%20Development%20Strategy%20by%202025%20(White%20Book).pdf

[9] Ministry for Economic Development of Montenegro: Energy development strategy of Montenegro by 2025, White Book. December 2007. Pages 72 and 82. Available at: http://www.mipa.co.me/userfiles/file/Energy%20Development%20Strategy%20by%202025%20(White%20Book).pdf

It also has to be noted that the contribution of wind power to the power generation system is very unlikely to happen if these plants do not receive some sort of direct or indirect financial support, e.g. CERs incentive for CDM projects.

Summarizing, the Montenegrin Electric Transmission System, constituted by mix power plants (2 Hydro and 1 Thermal) identified as the baseline scenario.

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):

Timeline of events of the project

Date	Event	Support/Reference
05/07/2010	The project Mozura Wind Plant signed a contract with the Country of Montenegro for property lease and construction of a wind power plant.	Copy of the contract.
15/04/2011	CO2 Global Solutions International sent the Prior Consideration of the CDM of the project Mozura Wind Farm to the UNFCCC.	Copy of the email.
15/04/2011	CO2 Global Solutions International sent the Prior Consideration of the CDM of the project Mozura Wind Farm to the Montenegrin DNA (Ministry of Tourism and Environment)	Copy of the email.
17/05/2011	The UNFCCC confirm the reception of the Prior Consideration of the CDM	Copy of the email
13/06/2011	The Ministry of Tourism and Environment confirm the reception of the Prior Consideration of the CDM	Copy of the email.
01/04/2012	In this date Mozura Wind Park D. O. O. signed the contract with the technology supplier.	Contract signed by Mozura Wind Park, D. O. O and the technology supplier.

Table 7. Timeline of the project since management decision until investment decision.

In the timeline of the project activity (Table 7), the consideration of the CDM has been taken into account since the beginning of the development of the project activity, the Prior CDM Consideration was sent before the starting date of the project activity. Mozura Wind Park, D. O. O. always considered the CDM incentives due to the economical barriers that the project faces (this will be demonstrated in the investment analysis).

Analysis of the additionality of the project

At the present time, in Montenegro the wind power generation is not an attractive investment in a business as-usual-scenario. Despite the latest fact, in order to demonstrate the additionality of the project, the approved "Tool for demonstration and assessment of additionality" ver. 05.2.1 has been used, following all steps defined. These steps will demonstrate that the project activity is not the baseline scenario.

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

Definition of alternative scenarios to the project activity that otherwise could be implemented in case that the project activity does not reach its operative status.

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

The project activity is the production of energy without emissions that will be exported to the Montenegrin Electric Transmission System. The alternatives defined include:

1. The proposed project activity not undertaken as a CDM project activity; it would be a wind-based electrical power station of 46 MW which does not obtain CERs from a CDM registry. This alternative scenario consists in the installation of a new renewable electricity source into the Montenegrin Electric Transmission System. The renewable energy unit is a new wind farm, with the same configuration of the proposed project activity, without being registered as a CDM project activity.

2. Continuation of the current situation: Mozura Wind Park, D. O. O. does not implement the project; its designated customers will continue purchasing the electricity from the Montenegrin Electric Transmission System. This scenario consists in the continuation of the current practices, which is the use of carbon intensive electricity sources in the isolated system, and the non-implementation of the Proposed Project Activity as reflected in the combined margin calculations.

3. The same power generation through a mini-hydro power plant. This alternative scenario consists in the installation a different renewable source into the Montenegrin Electric Transmission System. The renewable energy unit is a new mini hydro power plant, with the same configuration of the proposed project activity.

4. The same power generation through power plants from fossil fuels. This alternative scenario consists in the installation of carbon fuel source into the Montenegrin Electric Transmission System.

Mozura Wind Park, D. O. O. experience comes from its parent company (Fersa Energias Renovables S. A.) which core business is the development of renewable energy projects (wind farms almost exclusively, 98% of its power install capacity worldwide is based on wind energy projects, and only 2% on solar and biogas projects), as is stated in its web page[10]. Even when there are available concessions to develop wind

[10] Fersa Energías Renovables S. A. Web page: http://www.fersa.es/index.php?leng=en&id=12.

and hydro power plant projects, to apply to any of the latest, one of the technical requirements is the experience on the correspondent type of power plant. Taking into consideration that Mozura Wind Park, D.O.O. has not experience developing hydro power plants it does not fulfill the technical requirements and cannot participate for the hydro power concessions, therefore the hydro power plant alternative is discarded from further analysis.

The generation through power plants from fossil fuels is not possible because Mozura Wind Park, D. O. O. is not interested in the generation of energy trough carbon intensive sources, therefore this alternative is eliminated. The other alternatives are analyzed in the following steps.

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

The Environmental Protection Agency of Montenegro is the environmental institution in charge of the environmental licensing. Mozura Wind Park, D. O. O. started the environmental procedure in October 17th of 2010 and the permit to build the Mozura Wind Farm project with a total power capacity of 46 MW is expected to be received in February of 2012.

Mozura Wind Park D. O. O. has followed the urban and technical terms number 04-3695/1-10 of November 5th of 2010 for the preparation of technical documentation related to the construction of the wind, established by the Ministry for Spatial Planning and Environment, according to the articles 171 and 62 of the Law on spatial planning and construction of installations of Montenegro.

In the analysis of the possible alternatives of the project still remain two:

- The proposed project activity not undertaken as a CDM project activity.
- Continuation of the current situation: Mozura Wind Park, D. O. O. does not implement the project (baseline scenario).

Both, the project activity and the continuation of the current situation are in compliance with all regulations according the following entities: Environmental Protection Agency of Montenegro, Ministry for Spatial Planning and Environment, CGES AD.

After this analysis, it can be concluded that either of the two latest alternatives are viable options and will be analyzed in further detail in the investment analysis.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

According to the "Tools for the demonstration and assessment of additionality" three analysis methods are suggested: simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III).

As the project activity generates other income than carbon credits due to the sale of electricity to the grid, simple cost analysis (option I) cannot be applied.
Comparison analysis method (option II) is applicable to projects whose alternatives are also investment projects. Only on such basis, comparison analysis can be conducted. The alternative baseline scenario of the project is the Montenegrin Electric Transmission System rather than new investment projects. Therefore, option II is not an appropriate method for the decision-making context.

Benchmark analysis (option III) is selected for this project activity.

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

For the benchmark analysis, the IRR is considered the most suitable indicator for the project type. The project IRR will be used, since it includes all in and out cash flows.

According to the "Tool for the demonstration and assessment of additionality" ver. 05.2.1 option a) was used to determine the discount rate and benchmark used for the benchmark analysis.

(a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data;

In order to estimate an adequate discount rate to evaluate the project activity financial feasibility the following was considered:

- Government bond rates: In this case is used the Montenegrin 2011 Eurobond, which was issued in April of 2011 with a 5 years maturity and a yield of 7.25 %.[11]
- The country risk premium for Montenegro is 4.88%.[12]

From the above the calculated benchmark value would be 12.13 %. This value will be compared with the IRR of the project to demonstrate the additionality of the project.

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

Relevant data considered for analysis are:

- Revenues from electricity sale: These are estimated taking into account the power that will be sold to the grid and the electricity prices at which the power will be sold. Mozura Wind Park, D. O. O. will sell the electricity generated at a price of $95.99 €/MWh during the first 12 years, after that period the sell price will be the one of the market.
- Revenues from CERs: These are estimated taking into account the emission reduction estimation, the average selling price of carbon credits of 11.75 USD/tCO2 and a 21 years crediting period.
- Euro average exchange rate: 1.3547 USD/€
- Capital expenditure: €$ 64,588,000.00
- Operations & Maintenance costs (O&M): 35,000 €/MW
- Transmission cost: 5.51 €/MWh
- Land rent cost: 0.37 €/m2
- Inflation rate: The inflation is based on a forecast until 2016 obtained from Economy Watch.[13]

Year	Value
2010	0.50%

[11] Cbonds Web page. Available at: http://www.cbonds.info/em/eng/emissions/emission.phtml/params/id/15177
[12] Table of country risks premium (updated January 2011). Available at: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html
[13] Economy Watch. Economic statistics by country. Available at: http://www.economywatch.com/economic-statistics/Montenegro/Inflation_Average_Consumer_Price_Change_Percentage/

2011	3.10%
2012	2%
2013	1.80%
2014	1.95%
2015	1.95%
2016-2032	1.95%

Table 8. Inflation rate forecast

The Mozura Wind Farm Project's cash flow shows that the IRRs for the project activity development with and without considering CER revenues were the following:

Scenario	Project IRR
Without CER revenues	7.98 %
With CER revenues	9.64 %

Table 9. IRR of project

The IRR calculations clearly show that the IRR of the project activity (7.98%) is below the chosen financial benchmark (12.13%), demonstrating that the net income from the electricity sales is not enough to justify and overcome the required investment.

The CER's income was considered for 21 years of project duration because of the CDM renewable credit period of 7 years selected; this assumption represents high risk due the uncertainty of the renovation of the Kyoto Protocol post 2012.

The result of the analysis shows that the project IRR is lower than the benchmark; therefore, the project without CDM incentives is financially unattractive. Considering the financial incentives of the CDM as a part of the investment analysis, the IRR is significantly improved.

On the other hand, once the project is registered as CDM the resulting IRR, that will take into account the income from CERs revenues, will increase up to 9.64%. Even though this IRR value is just below the financial benchmark, the environmental and sustainable development contribution to the country and the derived image and economical benefits that Mozura Wind Park, D. O. O. will acquire derived from the project activity registration as a CDM will be substantial and will mean an important incentive for the project implementation.

This section allows us to conclude that the project considered as a CDM project activity, and the attendant benefits and incentives derived from CER´s revenues will alleviate or help to overcome the financial hurdles described.

Sub-step 2d. Sensitivity Analysis

The main driver for performing a sensitivity analysis would be the price of the tCO_2 in organized markets. The increment of the IRR for scenarios with different price of tCO_2:

Price ($/tCO2)	**0**	**5**	**10**	**15**	**20**	**25**
IRR	7.98%	8.70%	9.40%	10.09%	10.76%	11.43%

IRR increment		8.97%	8.07%	7.33%	6.72%	6.20%

Table 10. Increase on IRR with different scenarios.

Other indicators as total investment, electricity prices, operation and maintenance (O&M) and transmission costs were selected for sensitivity analysis, these financial indicators fluctuated within the range of -10% to +10%.

In the Guidance on the Assessment of Investment Analysis version 05, paragraph 20 mentions the following:

Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude).

For the last paragraph, we conclude the following variables in the sensibility analysis:

- Investment: The paragraph mention that the investment cost should be including in the sensibility analysis.
- O&M: This cost represents more than the 40% of the total cost; this is consistent with the paragraph of the Tool.
- Transmission cost: This cost represents more than the 25% of the total cost; this is consistent with the paragraph of the Tool.
- Sales price: The paragraphs mention that the total revenues should be including in the sensibility analysis.

	Variation				
Parameter	**-10%**	**-5%**	**0%**	**5%**	**10%**
Investment	9.40%	8.66%	7.98%	7.35%	6.77%
Electricity sale Price	5.94%	6.98%	7.98%	8.94%	9.88%
O&M	8.37%	8.17%	7.98%	7.78%	7.59%
Transmission Cost	8.11%	8.05%	7.98%	7.91%	7.85%

Table 11. Financial Parameters.

The project is in accordance with the requirements of this step and it is demonstrated that the project activity is additional; this conclusion is supported by the following facts:

- The project IRR without the CER's incentives (9.64 %) which is below the benchmark (12.13 %).
- In the sensitivity analysis the variables that impact the most in the IRR of the project are the electricity price and the investment. However, by the sensibility analysis has been clearly demonstrated that in the most optimistic scenarios, when the electricity price increases by 10% the IRR of the project reaches as the highest value 9.88% which still remains below the benchmark. The analyses of these optimistic and conservative scenarios lead us to a positive conclusion about the additionality of the project.

In synthesis, the development of the project activity without the CER´s incentive (alternative 1, Sub-Step 1a) does not represent such an attractive investment alternative. Based on the latest conclusion and on the investment analysis (step 2), the additionality of the project activity results easy to see and to verify.

Step 3. Barrier analysis

According to the "Guidelines on additionality of first-of-its-kind project activities" Version 01.0:

A proposed project activity is the First-of-its-kind in the applicable geographical area if:

(a) The project is the first in the applicable geographical area that applies a technology that is different from any other technologies able to deliver the same output and that have started commercial operation in the applicable geographical area before the start date of the project; and

(b) Project participants selected a crediting period for the project activity that is "a maximum of 10 years with no option of renewal";

As it will be explain in further detail in step 4, no similar projects has been registered as CDM for Montenegro or the countries in the closest geographical area such as Bosnia and Herzegovina, Albania and Serbia, then, the condition (a) of this guidelines can be met.

As the chosen crediting period for this project activity is 7 years renewable twice, condition (b) cannot be reached and therefore the project cannot prove its additionality by this mean. Even with what has just been mentioned, it is important to remark the challenge that represents being the first project of its kind because all of the knowledge that has to be gathered to its implementation, not only technically speaking but because of the implicit not completely defined tramitology.

Project participants have decided to prove the additionality of the project by the investment barrier explained in step 2.

Step 4. Common practice analysis

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

Currently Montenegro has not projects registered as CDM in the UNFCCC database. By the end of 2008 the DNA expected to be submitted 7 small scale and 2 small scale projects, none of them was a wind power project and neither of them started the UNFCCC process by issuing the Prior Consideration of the CDM. Montenegro also had in the same year, 9 pilot initiatives either in pre-feasibility or feasibility stage (Table 12) ready to start the CDM development process, only 4 of them were wind farms but none of them has been registered. [14]

Project Name
Landfill Gas to Energy in Podgorica
Energy Efficiency at Livnica Foundry A. D.
SHPP Krupac
SHPP Slano
Goli Vrh Wind power plant
Njegos Wind power plant
Poljice Pass Wind Farm
Mount Vrsuta Wind Farm
Wood Biomass Power Plant in Northern Montenegro (Berane)

Table 12. List of CDM project iniciatives

[14] Ministry of Sustainable Developement and Tourism, CDM Potential and projects in Montenegro. Available at: http://www.mse.gov.me/en/sections/clean-development-mechanism-in-montenegro-/93031/175355.html

Currently only 2 projects have submitted the Prior Consideration of the CDM to the UNFCCC, the Hydropower Plant Otilovici (March 15th 2011) developed by the EPCG AD Niksic and this project activity (April 15th 2011) developed by Mozura Wind Park, D. O. O.

According with the previous information it is concluded that this project activity cannot be considered as common practice, that the project needs the CDM incentives to become the first wind farm in Montenegro and finally that the project is additional.

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

As it is mentioned in the Sub-step 4b, even when in 2008 there were interesting CDM pilot initiatives, only 4 of them were wind projects and finally, none of them was registered, everyone of them stayed in either a prefeasibility or feasibility analysis, therefore no similar activities are observed.

According with what is mention in the "Tool for demonstration and assessment of additionality*": "If Sub-steps 4a and 4b are satisfied, i.e.(i) similar activities cannot be observed or (ii) similar activities are observed, but essential distinctions between the project activity and similar activities can reasonably be explained, then the proposed project activity is additional)"*, it is finally concluded that the additionality of the project is real and the CDM incentive needed.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Emissions reductions

According to the methodology ACM0002 v.12.1.0 the emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \textbf{(1)}$$

Where:

ER_y Emissions reductions in year *y* (tCO2/yr)

BE_y Baseline emissions in year *y* (tCO2/yr)

PE_y Project emissions in year *y* (tCO2/yr)

Project emissions

The proposed project is not based on hydroelectric or geothermic energy, and therefore it is not necessary to consider the greenhouse gas emissions of the project, this asseveration is in accordance with the guidelines established by the ACM0002 ver.12.1.0 methodology that mentions the following;
The project emissions are calculated as follows:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad \textbf{(2)}$$

Where:

PE_y Project emissions in year *y* (tCO2/yr)

$PE_{FF,y}$	Project emissions from fossil fuel consumption in year *y* (tCO2/yr)
$PE_{GP,y}$	Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO2/yr)
$PE_{HP,y}$	Project emissions from water reservoirs of hydro power plants in year *y* (tCO2/yr)

"For most renewable power generation project activities, $PE_y = 0$ *".*

This project activity is not related with the development of a geothermic plant or hydro power plant, in conclusion the project emission of the project is considered zero ($PE_y = 0$).

Leakage

For the calculations of leakage, the methodology ACM0002 ver.12.1.0 states:

*"No leakage emissions are considered. The main emission 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 emission from fossil fuel use (e.g. extraction, procession, transport). These emissions sources are neglected***".**

In conclusion the leakage emissions are considered zero.

Baseline emissions

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$ **(3)**

Where:

BE_y	Baseline emissions in year *y* (tCO2/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 CO2 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" (tCO2/MWh)

According to the methodology, as the project activity is being developed in a site where no renewable power plant was operated prior to the implementation, then:

$$EG_{PJ,y} = EG_{facility,y}$$ **(4)**

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)

For the calculation of the emission factor, which will yield the total equivalent CO_2 emission reduction for the whole crediting period, a Combined Margin (CM) will be used, in accordance with the "Tool to calculate the emission factor for an electricity system" ver. 02.2.1.

The steps to following for calculate emission factor are:

1. Identify the relevant electricity systems;
2. Choose whether to include off-grid power plants in the project electricity system (optional);
3. Select a method to determine the operating margin (OM);
4. Calculate the operating margin emission factor according to the selected method;
5. Calculate the build margin (BM) emission factor;
6. Calculate the combined margin (CM) emission factor.

Step 1.Identify the relevant electricity systems

The Montenegrin Electric Transmission System delivers to its customers around 4,500 GWh of electricity annually and is characterized by its mostly radial structure on all three voltage levels and a good connection with the neighboring electric power systems of Serbia, Bosnia and Herzegovina and Albania.

Adequate connection of the Montenegrin Electric Transmission System with the neighboring systems increases the reliability of its electric power system and enables a significant level of exchange among the surrounding systems, although this also exposes this transmission system to a considerable transit of electric power:

- *Montenegro - Serbia:* Congestions occur on the border to Serbia, in the direction from Serbia to Montenegro, because a significant part of Montenegrin imports is coming from that direction and because of internal congestion within the Serbian network.
- *Montenegro - Albania:* Congestions occur on the border to Albania, because of huge Albanian imports transit the Montenegrin system. Thus a new 400 kV interconnector is under construction.

This Montenegrin Electric Transmission System consists of 19 substations (TS) of total installed power capacity of 3,034.5 MVA, out of which 1400 MVA (46.14%) in 400/x kV transformer (400/220 kV and 400/110 kV), 575 MVA (18.95%) in 220/110 kV transformer and 1059.5 MVA (34.91%) in 110/xkV transformer (110/35kV and 110/10kV). The substations were mostly constructed during the period 1950-1980. The substations are connected by the transmission lines of a total length of 1 322.7 km (400kV - 255km, 220kV – 348.1km and 110kV -719.6km).[15]

[15] Ministry of Transport, Maritime Affairs and Telecommunications. Information requested by the European Commission to the Government of Montenegro for the preparation of the Opinion on the application of Montenegro for membership of the European Union. December 2009. Page 17. Available at:
http://www.questionnaire.gov.me/O/Pdf/C21.pdf

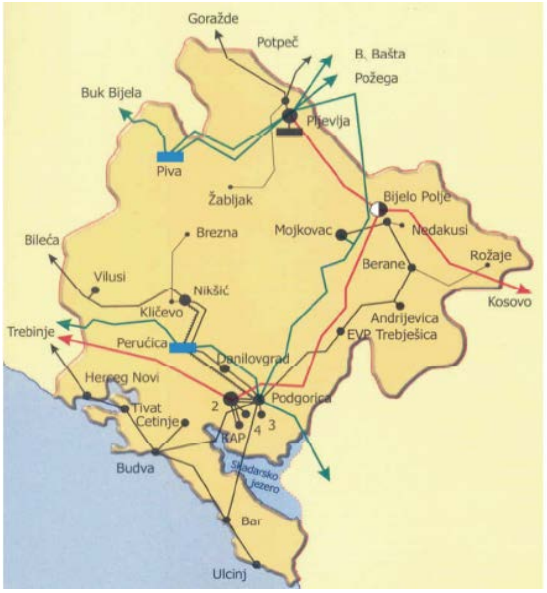

Figure 4. Transmission Grid of Montenegro: 400 kV (red), 220 kV (green) and 110 kV (black)

Montenegro is member of the UCTE (Union for the Coordination of Transmission of Electricity), which coordinates the operation and development of the electricity transmission grid for the Continental European synchronously operated transmission grid, and is well connected to its neighboring countries Serbia and Albania. A new 400 kV interconnector with Albania is in construction. It will operate under general conditions like all other interconnectors in Montenegro.[16]

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

- Option I: Only grid power plants are included in the calculation.
- Option II: Both grid power plants and off-grid power plants are included in the calculation.

Mozura Wind Park, D. O. O. has chosen Option I and only grid power plants are included in the calculation. Option I corresponds to the calculation procedure contained in earlier versions of the "Tool to calculate the emission factor for an electricity system".

Step 3: Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following options:

[16] Energy Community Regulatory Board (ECRB), National Report Electricity and Gas of Montenegro. Version 1.1, page 16. September 2nd 2008. Available at: www.ecrb.eu/.../ECRB%20REPORTS%20%20DOCUMENTS/National%20Report%20-%20Montenegro.pdf

(a) Simple OM
(b) Simple adjusted OM
(c) Dispatch data analysis OM
(d) Average OM

The simple OM method is only applicable if the low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. In Montenegro, more than 60% of the total grid generation comes from hydro power plants, and then this option is not applicable.

The simple adjusted OM method was chosen to perform the $EF_{grid,OM,y}$ calculation.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- *Ex ante* option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. For off-grid power plants, use a single calendar year within the 5 most recent calendar years prior to the time of submission of the CDM-PDD for validation.
- *Ex post* option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year preceding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

The simple adjusted OM will be calculated *ex ante* and will be kept fixed for the first crediting period. *Ex ante* option has been chosen due to the simplicity of the project development and also for the emission reduction verification.

Step 4: Calculate the operating margin emission factor according to the selected method.

The simple adjusted OM emission factor ($EF_{grid,OM-adj,y}$) is a variation of the simple OM, where the power plants / units (including imports) are separated in low-cost/must-run power sources (k) and other power sources (m). As under Option A of the simple OM, it is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{grid,OM-adj,y} = (1-\lambda_y) \times \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \times \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}} \quad \textbf{(5)}$$

Where:

$EF_{grid,OM-adj,y}$ Simple adjusted OM CO_2 emission factor in year *y* (tCO_2/MWh).

λ_y	Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year *y*
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power units *m* in year *y* (MWh)
$EG_{k,y}$	Net quantity of electricity generated and delivered to the grid by power units *k* in year *y* (MWh)
$EF_{EL,m,y}$	CO2 emission factor of power unit *m* in year *y* (tCO2/MWh)
$EF_{EL,k,y}$	CO2 emission factor of power unit *k* in year *y* (tCO2/MWh)
m	All grid power units serving the grid in year *y* except low-cost/must-run power units
k	All low-must/cost-run grid power units serving the grid in year *y*
y	The relevant year as per the data vintage chosen

$EF_{EL,m,y}$, $EF_{EL,k,y}$, $EG_{m,y}$ and $EG_{k,y}$ should be determined using the same procedures as those for the parameters $EF_{EL,m,y}$ and $EG_{m,y}$ in option A of the simple OM method.

Net electricity imports must be considered low-cost/must-run units *k*.

The parameter λ_y is defined as follows:

$$\lambda_y = \frac{\text{Number of hours low-cost / must-run sources are on the margin in year y}}{\text{8760 hours per year}}$$

Lambda is calculated in a four steps process for each year *y* in the period 2008-2010:

1. Plot a load duration curve. Collect chronological load data (in MW) for each hour of the year *y*, and sort the load data from the highest to the lowest MW level. Plot MW against 8760 hours in the year, in descending order.
2. Collect data generation data from each power plant/unit. Calculate the total annual generation (in MWh) from low-cost / must-run power plant/units (i.e. $\sum_k EG_{k,y}$).
3. Fill the load duration curve. Plot a horizontal line across the load duration curve such that the area under the curve (MW times hours) equals the total generation (in MWh) from low-cost/must-run power plants/units (i.e. $\sum_k EG_{k,y}$).
4. Determine the "Number of hours for which low-cost/must-run sources are on the margin in year *y*". First locate the intersection of the horizontal line plotted in step (3) and the load duration curve plotted in step (1). The number of hours (out of the total of 8760 hours) to the right of the intersection is the number of hours for which low-cost/must-run sources are on the margin. If the lines do not intersect, then one may conclude that low-cost/must-run sources do not appear on the margin and λ_y is equal to zero.

In determining λ_y only grid power units (and no off-grid power plants) are considered.

The Operating Margin refers to the actual energy generation mix installed in Montenegro, and the data used for its calculation (see Annex 3) was obtained with the kind support of the CGES AD.

Step 5: Calculate the build margin (BM) emission factor

In terms of vintage of data, project participants have chosen the following option:

"For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period".

Due to the Montenegrin total grid generation is produced, almost in the same percentage, by three power plants (2 Hydro and 1 Thermal), each one of them older than 10 years, the selected $Set_{sample\text{-}CDM}$ corresponds only to one plant, not a CDM project but older than 10 years.

As defined by the "Tool to calculate the emission factor for an electricity system": *The build margin emissions factor is the generation-weighted average emission factor (tCO2/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 6: Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,BM,y}$) is based on one of the following methods: a) Weighted average CM and b) Simplified CM.

The weighted average CM method (option a) is preferred for this project, because even when the project activity is located in a country with less than 10 CDM registered projects at the starting date of validation, the data requirements for the application of step 5 can be met.

The combined margin emissions factor is calculated as follows:

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

Where:

$EF_{grid,OM,y}$	Operating margin CO2 emission factor in year y (tCO2/MWh)
$EF_{grid,BM,y}$	Build margin CO2 emission factor in year y (tCO2/MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)

For wind and solar projects, the default weights are as follows: w_{OM} = 0.75 and w_{BM} = 0.25 (due to their intermittent and non-dispatchable nature).

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	**$EF_{grid,CM,y}$**
Data unit:	tCO_2/MWh
Description:	Combined Margin CO_2 emission factor for grid connected power generation in year *y* calculated using the last version of the "Tool to calculate the emission factor for an electricity system".
Source of data used:	Estimated figure based on 75% of OM and 25% of BM values
Value applied:	**0.8327tCO_2/MWh**
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is calculated by us, using the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1) with 3 years vintage data and a calculation based on 75% of OM and 25% of BM values approach. Computed once during PDD finalization.
Any comment:	-

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tCO_2/GJ
Description:	CO2 emission factor of fossil fuel type *i* in year *y*
Source of data used:	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value applied:	Lignite: 90,900
Justification of the choice of data or description of measurement methods	Fuel emission factors have been selected from the 2006 IPPC guidelines, following the conservative assumptions established in the monitoring worksheets.

and procedures actually applied :	
Any comment:	-

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

Project emissions

The proposed project is not based on hydroelectric or geothermic energy, and therefore it is not necessary to consider the greenhouse gas emissions of the project, this asseveration is in accordance with the guidelines established by the ACM0002 ver.12.1.0 methodology:

"For most renewable power generation project activities, $PE_y = 0$ *".*

This project activity is not related with the development of a geothermic plant or hydro power plant, in conclusion the project emission of the project is considered zero ($PE_y = 0$ *).*

Leakage

The methodology ACM0002 ver.12.1.0 mentions the following:

*"No leakage emissions are considered. The main emission 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 emission from fossil fuel use (e.g. extraction, procession, transport). These emissions sources are neglected***".**

In conclusion the leakage emissions are considered zero.

Baseline emissions

In order to calculate the baseline emissions it is necessary to obtain the emission factor of the grid, the emission factor is composed of two parts: Operating Margin (OM) and Build Margin (BM), and it is calculated according the "Tool to calculate the emission factor for an electricity system" ver.02.2.1. The following equation 3, is used to calculate the baseline emissions (This equation was presented before in section B.6.1).

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \textbf{(3)}$$

Where:

BE_y = Baseline emissions in year *y* (tCO2/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 CO2 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" (tCO2/MWh)

The data of the operation and build margin calculated was obtained using the information of the Designated National Authority of Brazil (Interministerial Commission on Global Climate Change-CIMGC).

The data of the operation and build margin calculated was obtained using the information of the Ministry of Tourism and Environment (DNA of Montenegro).

The Operating Margin emission factor based on the data from 2008 to 2010 is 0.7346tCO2/MWh (see details in Annex 3).

The Build Margin is obtained with the annual information given by the CGES AD for the 2008-2010 period. Updated to the 2010 the Build Margin is 1.127 tCO2/MWh.

Calculate the baseline emission factor EF

The baseline emission factor is calculated as the weighted average of the Operating Margin emission factor and the Building Margin emission factor. For wind and solar projects, the default weights are as follows: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature).

Thus, the *ex-ante* baseline emission factor will be: 0.8327tCO2/MWh.

Baseline emission factor = **0.8327**tCO_2/MWh
Annual generation = 96.968 MWh
Baseline Emissions = 80,742 tCO_2/year

Emission Reductions

The emission reduction by the project activity is the difference between the baseline emissions, project emissions and emissions due to leakage. Since there are no project emission and no emission due to leakage, the emission reductions will be the baseline emission. This baseline emission is the baseline emission factor multiplied by the energy generation.

$$ER_y = BE_y - PE_y$$

Where:

ER_y Emission reductions in year *y* (tCO2/yr)

BE_y Baseline emissions in year *y* (tCO2/yr)

PE_y Project emissions in year *y* (tCO2/yr)

Baseline emissions = 80,742 tCO2/MWh
Project emissions = 0 tCO2/MWh
Emissions Reductions = 80,742 tCO2/year

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

Year	Estimation of project activity emissions (tonnes of CO2 e)	Estimation of baseline emissions (tonnes of CO2 e)	Estimation of leakage (tonnes of CO2 e)	Estimation of overall emission reductions (tonnes of CO2 e)
2013	0	80,742	0	80,742
2014	0	80,742	0	80,742
2015	0	80,742	0	80,742
2016	0	80,742	0	80,742
2017	0	80,742	0	80,742
2018	0	80,742	0	80,742
2019	0	80,742	0	80,742
Total (tonnes of CO2e)	**0**	**565,194**	**0**	**565,194**

Table 13. Estimation emission reductions.

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

B.7.1 Data and parameters monitored

Data / Parameter:	**$EG_{facility,y}$**
Data unit:	MWh/yr
Description:	Quantity of net electricity supplied by the project to the grid in year *y*.
Source of data to be used:	Energy meters installed in the substation.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The project has not been implemented, therefore, the available estimations has been used on 96.968 GWh/year, established by the Wind Resource Study.
Description of measurement methods and procedures to be applied:	The energy dispatched by the project's activity will be monitored using official measurements in accordance with the procedures established by CGES AD. Extra information of the meters: • Number of meters: 2 meters at the substation for the net energy of the entire transmission line (1 main, 1 backup). • Type: bidirectional • Accuracy class: Max error 0.2 KWh • Calibration frequency: 2 years • Measurement: Hourly measurement and monthly recording.
QA/QC procedures to be applied:	This data will be directly used for calculation of CO2 emission reductions. The measurement equipment will be properly calibrated and checked periodically for

	accuracy. The cross check will made with the energy measured and the report of energy produced published by the CGES AD.
Any comment:	The data will be archived in electronic way. Archived data kept during the crediting period and two years after.

B.7.2. Description of the monitoring plan:

1. Introduction

The Monitoring Plan defines the process of gathering data required for:

- The preparation of a periodical report on the monitoring of reductions in CO2 emissions attributable to the Mozura Wind Farm, which should be verified for the periodical presentation of the CERs (see Annex 4).

The Monitoring Plan defines the following tasks:

- Data gathering and calculation to determine the emission reductions and contributions to sustainable development.
- Quality control and assurance provisions.
- Responsibilities.

2. Duration

The Monitoring Plan will be implemented over the 7-year crediting periods of project activity. All data and evidences collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the last crediting period.

3. Preparation of a periodical report on the monitoring of emission reductions

3.1. Grid emission factor:

Operating margin emission factor

The operating margin is considered *ex-ante.* This factor is calculated with the hourly production of the last 3 years, referring to the period of 2008 to 2010.

Build margin emission factor

The build margin is considered *ex-ante*. In this case, the factor will be calculated once at the beginning of the credit period with the latest information available.

3.2. Data quality control and assurance

Quality of data used in the estimation of CO_2 emission reductions is controlled and/or assured by means of:

Using internal controls:

- Measuring of energy delivered by the wind farm will be carried out according to the CGES AD procedures.
- Power meters (and safety power meters) must comply with technical requirements and be calibrated.
- Preventive and corrective maintenance of the measuring system shall be performed.

Undertake data validations:

- Cross check data of energy supplied by the wind farm to the Montenegrin Electric Transmission System and data published in the CGES AD report of energy produced.
- In the event that the principal meter malfunctions, it will use the backup meter readings. When the main meter is repaired, the main meter measurements will be used.
- In the case that both meters were broken the information of the energy generated will be obtained from the CGES AD report of energy produced.
- Measurements of energy delivered by the project activity to the Montenegrin Electric Transmission System will be recorded and compared every month with data published in the CGES AD report of energy produced. In case of differences exceeding 0.2% being identified, the energy generation measuring system should be reviewed. The lowest value will be used to estimate emission reductions.

3.3. Responsibilities

- The operation manager of the wind farm will undertake all responsibilities regarding the monitoring of emission reductions and will be trained by the parent Company regarding the application of the monitoring plan and the related data monitoring system.
- Maintenance of the measuring system following CGES AD procedures will be carried out by the maintenance manager. Training of maintenance personnel will be carried out by the supplier of wind turbines.
- For this type of project, situations where emergencies can cause significant unintended emissions are not probable to occur, therefore, this issue is not considered in the monitoring plan.

The next figure describes the operational and management structure that will monitor emissions reductions generated by the project activity.

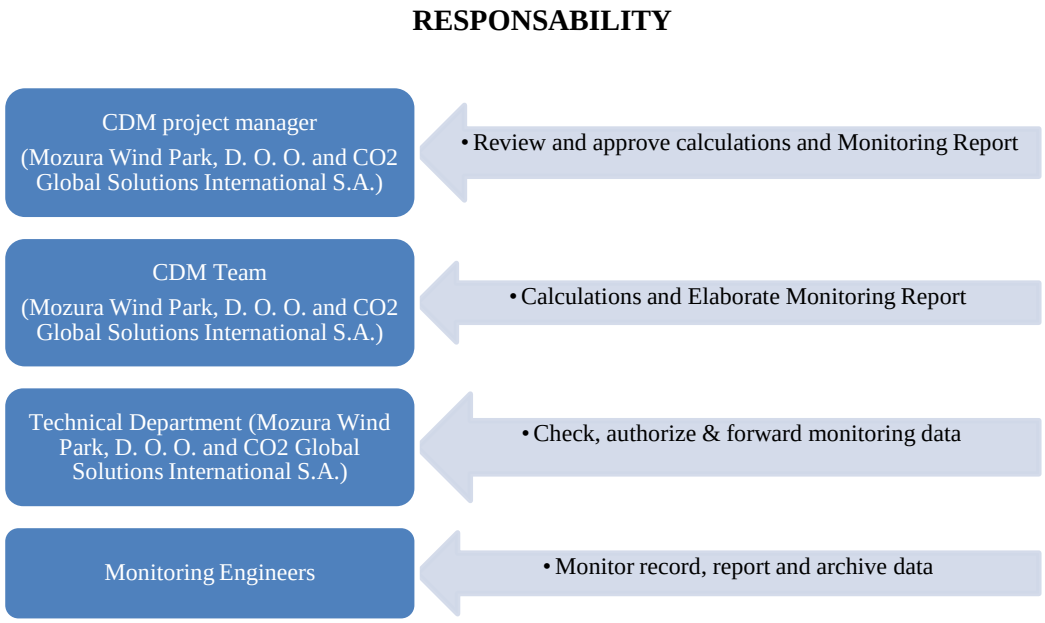

Figure 5. Flow diagram of monitoring emissions.

Emission Monitoring and Calculation Procedure	
Data Source and collection	Data are taken from Technical Department for the wind farm.
	Most data are available and recorded according to the management system.
	Frequency of data is based on data management system.
	Data are monitored by monitoring engineers for the wind farm. All data are reviewed by Technical Department.
Data compilation	Data is transmitted to CDM Team
Emission calculation and Monitoring Report	Emission calculations are conducted on yearly basis from data which is collected daily, monthly or annually, depending on the nature of the data.
	All data is calculated by CDM Team, using a excel spreadsheet. Monitoring Report will be elaborated by CDM Team.
Emission data review and approval	Calculation and Monitoring Report is reviewed and approved by CDM project manager.
Record keeping	All data will be recorded electronically. Monitoring engineers are responsible for record keeping.

Table 14. Emission Monitoring and Calculation Procedure

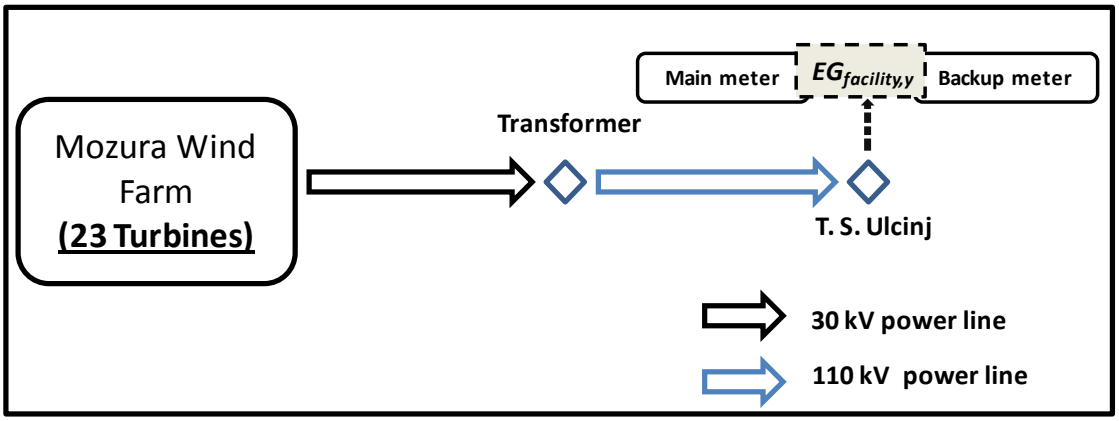

Figure 6. Simplified wiring diagram

There will be two meters at the substation (main and backup). Monitoring of the electricity produced is made in accordance with regulations of the country; these regulations are stated by the CGES AD.

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: 29/11/2011

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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:

01/04/2012

On this date the project owner made the first major financial commitment. Mozura Wind Park, D.O.O. will sign with GAMESA the contract for the purchase of the wind turbines.

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

The project activity is expected to have a minimum lifetime of 20 years and 0 months.

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

The project activity will use a renewable crediting period.

C.2.1. Renewable crediting period:

The crediting period will be of 7 years 0 months and may be renewed at most two times.

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

01/01/2013

C.2.1.2. Length of the first crediting period:

Mozura Wind Park, D. O. O. will select 7 years 0 months renewable twice crediting period.

C.2.2. Fixed crediting period:

N/A

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A

SECTION D. Environmental impacts

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

Mozura Wind Park, D. O. O., elaborated the Environmental Impact Assessment study of the project to reflect the environmental impact of the implantation of the wind farm. This study is a requirement to obtain the environmental license issue by the Environmental Protection Agency of Montenegro. In this

document can be found the physical, social, biological and cultural impacts in the zone where the project will be carried out.

The procedure for the solicitude of the environmental license has started the October 17th of 2011, date when Mozura Wind Park, D. O. O. requested to the Environmental Protection Agency the appropriated approach for the assessment that should be comprehended in the Environmental Impact Assessment (EIA), pursuant of what is stated in Article 12 of the Environmental Impact Assessment law ("Official Gazette " No. 80/05 and 40/10). The public announcement of the beginning of this procedure was made by the Environmental Protection Agency on October 22nd of 2011, giving as a deadline for public comments until November 5th of 2011.

Due to the procedure and times established by the Environmental Protection Agency of Montenegro the issuance of this license is still in process and is expected to be received in February of 2012.

EIA for the Mozura wind farm construction

The environmental assessment carried out identified the environmental impacts of the project in order to propose mitigation measures to minimize these impacts. In general, a wind power generator is an activity which produces electricity and is more compatible with the environment. This has a favourable environmental aspect due to the operational characteristics of wind turbines, and further that, is an example of clean energy that do not produce effluents into the environment.

To study the environmental impact the project developer will assess positive and negative environmental impacts resulting from the development of Mozura Wind Farm, considering key areas where it is necessary to ensure the implementation of mitigation, management and monitoring measures in order to minimize and control such impacts.

As a conclusion of this study it has been found that the impacts in the vegetation and habitats during the process of preparation and construction at the site will not be significant. During the stage of operation of the project activity, the regeneration of the vegetation will become in a natural way. Also, the advantages that will be obtained by the project activity exceed the possible negative environmental impacts.

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:

The final conclusion of the EIA is that the project presents no significant environmental impacts. Taking into consideration that the environmental license is still to be issued, comments received about possible environmental impacts will be taken into consideration in the project implementation by the develop of the appropriate mitigation actions.

SECTION E. Stakeholders' comments

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

The stakeholder´s consultation was carried over on November 24th of 2011, in which a questionnaire was given to local stakeholders in order to get to know their commentaries about the project and incorporate them into real mitigation actions in case of finding a significant negative impact. In general, there are really high expectations of the project, they hope it gets implemented and wonder about the possibility of

even more projects of this kind. There is also confidence about the creation of new jobs and analyze the possibility of getting a job in this sector.

In addition, the same questionnaire deliver to local stakeholders plus a descriptive presentation of the project was sent in November 22nd of 2011 to the following Ministries and organisms from both municipalities where the project will be located (Bar and Ulcinj):

- Ministry of Economy
- Government: foreign investment area.
- Ministry of Sustainable Development and Tourism
- Environmental Protection Institute
- City Council Secretary for space development of Bar - Housing, Local Matters and Environment
- City Council Secretary for space development of Ulcinj - Housing, Local Matters and Environment
- Ministry of Agriculture

E.2. Summary of the comments received:

The comments received by the project were overall positive. Among other the comments were the following:

- The City council of Ulcinj supports the project, especially the chosen location due that it is not harmful for the environment. Their representative remark the importance of following the standards and regulations applicable for the project.
- The Ministry of Sustainable Development and Tourism suggests carrying over the environmental impact study and taking into account that in the region of Mozura there is a heavy transit of birds, then this must be considered.

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

As part of the solicitude of the environmental license the approach for the assessment comprehended in the Environmental Impact Assessment (EIA) followed what is stated in Article 12 of the Environmental Impact Assessment law ("Official Gazette " No. 80/05 and 40/10), which takes into account the comment received from the representative of the Ministry of Sustainable Developments and Tourism.

Besides the comments received in this stakeholder´s consultation, mitigation actions will be carried out to minimize any identified negative impact.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

N/A

Annex 3

BASELINE INFORMATION

Energy Generation per type of plant:[17]

	2010		2009		2008	
	Hydro Sector	*Thermic Sector*	*Hydro Sector*	*Thermic Sector*	*Hydro Sector*	*Thermic Sector*
Jan	401,589	154,132	280,821	159,557	173,782	180,678
Feb	309,227	156,728	493,366	170,425	14,848	175,796
Mar	413,141	-924	324,141	186,221	9,962	179,490
Apr	276,331	161,700	273,193	156,651	146,198	187,056
May	90,926	181,720	39,927	179,441	91,438	-472
Jun	189,354	-440	18,696	-431	28,434	180,366
Jul	33,428	185,900	19,654	-396	23,716	186,878
Aug	0	189,068	74,760	-400	55,222	-7,865
Sep	0	190,212	0	0	0	182,520
Oct	49,623	-616	0	-44	0	180,673
Nov	44,348	190,432	50,102	0	242,874	-1,132
Dec	599,430	156,948	174,790	-528	280,281	154,363

Amount and heat capacity of the fossil fuel (lignite) consumed by TPP Pljevlja:[18]

	Tons of lignite	Heat capacity (KJ/Kg)
2010	1,850,000	8,400
2009	885,232	8,200
2008	1,636,000	8,500

Baseline calculations:

- Operating Margin: All calculations necessary to obtain the operation margin are available in the excel file of the project.

$EF_{grid,OM,2010}$ = 0.7346 tCO_2/MWh

- Build Margin:

$EF_{grid,BM,2010}$ = 1.1268 tCO_2/MWh

Emission factor ex-post = $0.75 \times EF_{grid,OM,2010} + 0.25 \times EF_{grid,BM,2010}$ = **0.8327tCO_2/MWh**

[17] Crnogorskog Elektroprenosnog Sistema (CGES). Web page: http://www.tso-epcg.com/nono/

[18] Elektroprivreda Crne Gore (EPCG). Web page: http://www.epcg.co.me/enindex.html

Annex 4

MONITORING INFORMATION

A. Measuring and calculation procedure.

1. Measuring.

The Operation Department will obtain the readings from the meters installed in the substation monthly, and will report them in the spreadsheet designed for measurement control and will store the data discharged from the meters electronically.

2. Monitoring of electricity generation (crosscheck):

The net electricity supplied to the grid measured at the substation will be cross-checked with the CGES AD record sales. If the two do not match, the person(s) responsible will solve it with CGES AD explaining the discrepancy, the origin of deviations and the corrective actions taken. Also, all the documentation related will be filed.

3. Calculation of emission reductions.

Emission reductions will be calculated with cross-checked net electricity supplied to the grid as per the formula:

$$BE_y = EG_{PJ,y}.EF_{grid,CM,y}$$

Mozura Wind Farm emission reductions		
Year:		
A	**B**	**C**
Annual validated generation (GWh)	**Emission factor *ex-post* (tCO_2/GWh)**	**Emission reductions (tCO_2)**
A	B	A*B
A	**832.7**	A* 832.7

The value of 832.7 tCO2e/GWh will be actualized yearly because the emission factor will be calculated ex-post.

B. Quality control (QC) procedures and quality assurance procedures (QA).

1. Monitoring equipment

1.1. Monitoring equipment shall be set up under the CGES AD regulations.
1.2. Monitoring equipment shall be authorized through a certificated formal process.
1.3. After set up monitoring equipment shall be calibrated and checked periodically for accuracy.

2. *Monitoring of amount of energy.*
   2.1. The amount of energy transmitted to the grid shall be measured automatically by the established equipment. The measured variables are simultaneously transferred to central control system.
   2.2. The measured amount of electricity shall be collected daily, weekly, and monthly and shall be archived in electronic way.
   2.3. The collected variables in article 2.2. shall be checked with the report of energy produced published by the CGES AD.

3. *Corrective and preventive actions:*
   3.1. If the two variables compared in article 2.3. are different, the operation condition of energy meters and other equipments shall be verified. In case measurements were not properly operated by the monitoring equipment, internal revision and correction procedure shall be followed.
   3.2. Corrective and preventive actions will be properly documented.