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: Cabeço Preto Wind Farm.
Version: Version 9.0
Date:14/09/2011

A.2. Description of the project activity:

The objective of the Cabeço Preto Wind Farm project is to generate electricity using a clean and renewable energy source, the wind; the installed capacity of the project will be 19.8 MW.

The proposed project activity is the installation of a new grid-connected renewable power plant/unit, according to methodology ACM0002 version 12.1.0 the baseline scenario is the following:

Electricity delivered to the grid[1] *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 02.2.0."*

The main result of the project is the reduction of greenhouse gas (GHG) emissions, as a result of diminishing the generation of electricity from fossil fuels using renewable sources for such generation supplied to the National Interconnected System.

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 to reduce the high emissions of the GHG generated by the power sector.

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 sound 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 content, the municipality of João Câmara will be benefited by the project activity and will contribute to sustainable development in the following way:

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 fossil fuels based power plants), contributing with a reduction in Carbon Dioxide (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.

[1] In this case the grid is the National Interconnected System

Economic and Social sustainability:

- Employment generation and improvement of incomes in the area: the project is expected to create jobs during its construction phase, which includes the construction of roads, and electric infrastructure, 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 that has an emission factor of 0 tonCO2/MWh

The main economic benefit due to the implementation of the project is an economic growth in the region of João Câmara due to the generation of new jobs (Gestamp Eólica Baixa Verde S.A. will hire people of the region of João Câmara) for the phases of construction (site preparation, roads), installation (wind turbines, transmission line, transformer, meters) and operation (monitoring of the control room, maintenance of wind turbines)of the wind farm, and a growth in the services sector. The jobs created will be available for all sectors as workers, contractors, project managers, engineers; due to the experience of GESTAMP to develop and operate a wind farm it is estimated that this project will generate approximately 15 new jobs in the phase of operation.[2]

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)
Brazil (host)	Gestamp Eólica Baixa Verde S.A. (Private entity)	No
Spain	Gestamp Eólica S.L. (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):

Brazil

[2] The information is supported with a letter provided by Gestamp. This letter mentions the position, number of workers and the activities of the people that Gestamp expects will be working when the project activity operates. This information is estimated according to previous experiences in other wind farms.

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

Rio Grande do Norte

A.4.1.3. City/Town/Community etc:

João Câmara

A.4.1.4. Detail 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 city of João Câmara with the following coordinates: 5°24’24.6’’S, 35°58’31’’W (5.406833 S, 35.975278 W). The road of the project is BR 406 Km 85. The area where the wind turbines will be installed in the following vertices:

- 5°23’32”S 35°57’06”W (5.392222 S, 35.951667 W)
- 5°23’35”S 35°56’53”W (5.393056 S, 35.948056 W)
- 5°23’53”S 35°57’01”W (5.398056 S, 35.950278 W)
- 5°24’02”S 35°56’42”W (5.400556 S, 35.945000 W)
- 5°24’22”S 35°56’40”W (5.406111 S, 35.944444 W)
- 5°24’38”S 35°56’46”W (5.410556 S, 35.946111 W)
- 5°24’43”S 35°56’36”W (5.411944 S, 35.943333 W)
- 5°25’05”S 35°56’44”W (5.418056 S, 35.945556 W)
- 5°25’15”S 35°56’26”W (5.420833 S, 35.940556 W)
- 5°25’21”S 35°56’29”W (5.422500 S, 35.941389 W)
- 5°25’22”S 35°56’27”W (5.422778 S, 35.940833 W)
- 5°25’51”S 35°56’32”W (5.430833 S, 35.942222 W)
- 5°26’34”S 35°57’01”W (5.442778 S, 35.950278 W)
- 5°26’51”S 35°57’11”W (5.447500 S, 35.953956 W)
- 5°26’28”S 35°57’46”W (5.441111 S, 35.962778 W)
- 5°26’15”S 35°58’02”W (5.437500 S, 35.967222 W)

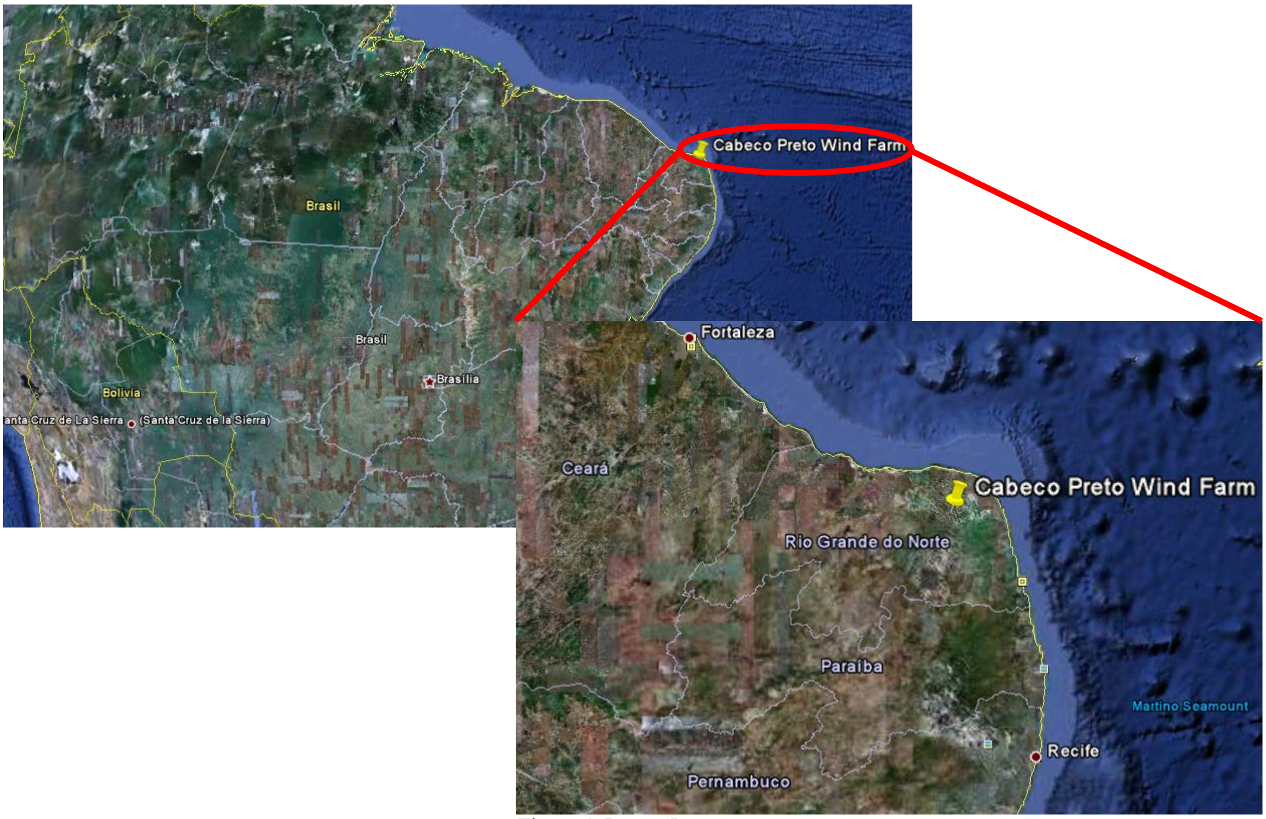

Figure 1. Project Location

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 National Interconnected System is that the generated energy is produced mainly from renewable resources and another part from fossil fuels (coal, oil products and natural gas). 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 (mention above) for energy production, and due to the growing energy demand in the Brazil, these fossil fuel plants will continue to operate and consume more fossil fuels in order to supply the energy demand.

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.

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 energy generated by fossil fuels.

The project will have 19.8 MW of total power generation installed capacity with an expected annual output of 73.45 GWh; its expected average plant load factor is of 42.35% (3,710 equivalent hours)[3] with a minimum lifetime span of 20 years[4].

The Project will be equipped with V100 IEC class III-A turbines manufactured by Vestas; the selection of these turbines was made on the basis of suitability studies for the particular wind conditions that prevail at the Project site and the general region, as well as of maintenance and operation criterion.

The design power generation per turbine will be 1800kW.

Total Power Capacity	19.8	MW
Turbine	IEC class III-A	
Rated Power per turbine	1.8	MW
Cut in-cut-out wind	4 -25	m/s
Rated output Voltage	1000	V
No. of turbines	11	-
Equivalent annual operating hours	3,710	h
Annual Production	73.45	GWh
Plan load factor	42.35	%
Transmission line length	25	km
Transmission line Voltage	69	kV
Wind Farm output transformer	34.5-69	kV
Diameter	100	m
Swept area	7,850	m^2
Hub Heigth	80	m

Table 2. Power plant characteristics

For project implementation, an arrangement consisting of 11 (eleven) Vestas V100 IEC Class III-A turbines, each of 1.8 MW design capacity has been selected. Each turbine will be mounted on an 80 m steel tower and will have a rotor diameter of 100 m.

The Project will be interconnected to the Substation João Câmara that is property of “Companhia Energética do Rio do Grande do Norte” (COSERN). The voltage and length of the transmission line is 69 kV and 25 km, respectively.

For the project Cabeço Preto Wind Farm, the turbines will be imported by Vestas, however, the steel towers, and the assembly of the elements of the nacelle will be developed in Brazil.

[3] Certifiçao Das Mediçoes Anemómetricas e Certificaçao da Produçao Anual de Energía by Barlovento Recursos Naturales, Page 25.

[4] The estimation is based on the technical information stated for the supplier. Brochure Vestas V100-1.8MW by Vestas, page 13.

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

The crediting period chosen is a 7 years 0 months period that will be renewable twice. This crediting period initiates in January 1, 2012 with a total emissions reduction of 194,887 tons of CO_2.

Year	Annual estimation of emission reductions in tonnes of CO2 e
2012	27,841
2013	27,841
2014	27,841
2015	27,841
2016	27,841
2017	27,841
2018	27,841
Total estimated reductions (tonnes of CO2 e)	**194,887**
Total number of crediting years	7 Years
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	**27,841**

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. 02.2.0);
- Tool for the demonstration and assessment of additionality (ver. 5.2);
- Combined tool to identify the baseline scenario and demonstrate additionality (ver. 3.0.1);
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (ver. 2.0).

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[5]:

"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)"

[5] UNFCCC-CDM. ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources. Available at: http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L

The proposed project Activity involves the installation of a new power plant for renewable electricity generation that will be connected to the grid.

"*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 is applicable as it fits in one of the types of power plants included in the methodology being a wind 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, connected to the Brazilian grid is the National Interconnected System (Sistema Interligado Nacional- SIN), which will be 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 National Interconnected System (Sistema Interligado Nacional- SIN) are included.
		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:

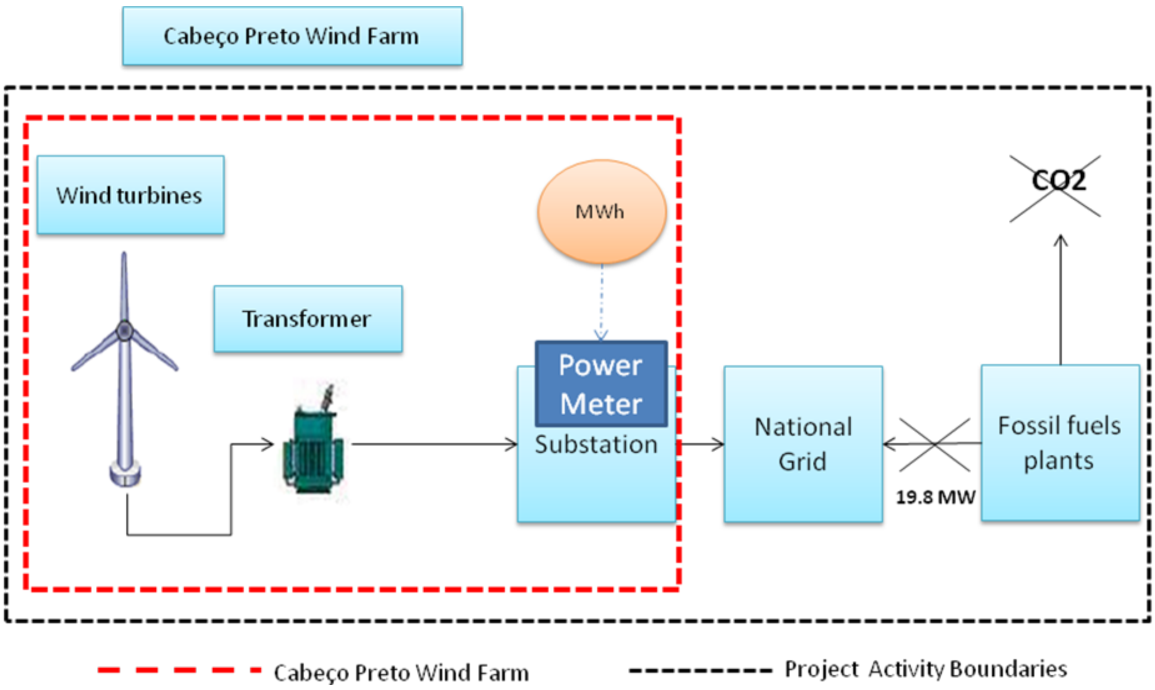

Figure 2. Flow diagram of the project

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 02.2.0".

The baseline is the electricity that would have otherwise been generated by the operation plants connected to the National Interconnected System (Sistema Interconectado Nacional -SIN).

In terms of adding new energy to the system, the latest Brazilian Energy Balance[6] specifies that Brazil's electricity generation increased 4.2% from the period 2007-2008 to 463.1 TWh. Around 73.44% of electricity supply is matched by hydropower sources and 15.4% from thermal power sources. Thermal power supply (including natural gas, coal, and nuclear) increased at a rate of almost 63.2%, while

[6] Balanço Energético Nacional 2009. Available at: https://ben.epe.gov.br/

hydropower decreased by 1.4%. The wind power sources have 556.9 GWh of electricity supply (approximately 0.12% of the total energy contribution). A recent study published by ANEEL estimates that Brazil will have to install an additional load of 28,000 MW of new thermoelectric power plants in order to meet increasing electricity demand[7].

The project activity will reduce anthropogenic GHG emissions by supplying zero GHG emission power, which will displace conventional electricity generation. Based on official statistics and projections, it is possible to observe that in the absence of the project activity the electricity that would have to be generated would come from the current fuel mix of the grid (includes actual fossil fuel power plants and renewable power plants). The project activity is expected to reduce a total of 194,887 tCO_2 emissions during the 7 year crediting period, as described further in the document.

The following table shows the official forecast of the National Interconnected System[8].

Power (MW)	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Hydro	80,961	81,669	83,653	85,386	86,044	88,505	90,491	95,888	103,230	109,766
Small hydro (PCH)	3,951	5,157	6,261	6,415	6,445	6,859	7,734	7,734	7,734	7,734
Nuclear	2,007	2,007	2,007	2,007	2,007	2,007	3,357	3,357	3,357	3,357
Fuel Oil	1,369	1,673	3,405	4,845	5,271	8,889	8,889	8,889	8,889	8,889
Natural Gas	8,997	9,107	9,323	9,818	10,382	12,059	12,059	12,059	12,059	12,059
Diesel	1,657	2,516	2,691	2,691	2,127	1,574	1,574	1,574	1,574	1,574
Mineral Carbon	1,415	1,415	1,765	2,465	2,815	3,175	3,175	3,175	3,175	3,175
Biomass	982	1,637	3,997	4,056	4,056	4,170	4,170	4,170	4,170	4,170
Process gas	197	687	687	687	687	687	687	687	687	687
Combined Cycle	272	272	272	272	272	272	272	272	272	272
Wind	274	1,045	1,423	1,423	1,423	1,423	1,423	1,423	1,423	1,423
Total	**102,082**	**107,185**	**115,482**	**120,065**	**121,528**	**129,619**	**133,830**	**139,227**	**146,569**	**153,105**

Table 5. Energy capacity for source for the period of 2008 to 2017 Source: Ministero de minas e energía . "Prospectiva del sector eléctrico 2008-2017 Cuadro 33p. 112";

Wind power installations will comprise 0.92% of the total power installed within the National Interconnected System in 2017 and 1.17% in 2012 year of the first operation stage (not including the power capacity of the proposed project activity) according to long-term planning estimates. Thus power produced from this project will have zero impact on baseline calculations. The National Interconnected System will be mainly based on Hydro and Thermal Power Plants. The estimations percentage on hydropower will reach approximately 71.6% by 2017.

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. in the form of CERs for CDM projects.

[7] PNE 2030 – "Plano Nacional Energético para 2030", the Brazilian strategic energetic plan for 2030. Available at: http://www.epe.gov.br/PNE/Forms/Empreendimento.aspx

[8] EPE – "Plano Decenal de Expansão de Energia 2008-2017. Available at: http://www.epe.gov.br/PDEE/Forms/EPEEstudo.aspx

These arguments clearly indicate an unrealistic exception for any wind energy project to have delivered a reliable continuous supply of electricity which could be considered as a confident energy source within the National Interconnected System. Therefore, electricity generation from the mix power plants (renewable and no renewable) is 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
29/07/2009	Date when the project Cabeço Preto Wind Farm obtained the preliminary license to build the wind farm with with a power capacity of 19.8 MW (11 wind turbines) (Process No. 2009-027974/TEC/LP-0028). This preliminary license was issued by the Institute of Environment and Sustainable Development "Instituto de Desenvolvimento Sustentável e Meio Ambiente do Rio Grande do Norte" (IDEMA).	Copy of the preliminary license issued by Institute of Environment and Sustainable Development.
14/12/2009	Date when the project Cabeço Preto Wind Farm won the National Auction n° 03/2009 conducted by the ANEEL (Management Decision)	http://www.aneel.gov.br/aplicacoes/editais_geracao/documentos/032009-Resultado%20por%20vendedores.pdf
22/12/2009	Date when the project Cabeço Preto Wind Farm received received approval for the production and commercialization of electricity from wind power (Process No.48500.002227/2009-21)	Document published by the ANEEL that support the approval of the project.
03/02/2010	Date when CO2 Solutions sent the Prior Consideration of the CDM of the project Cabeço Preto Wind Farm to the UNFCCC and the brazilian DNA (Interministerial Commission on Global Climate Change)	Copies of the emails, in this emails CO_2 Solutions sent the Prior Consideration of the CDM to the UNFCC and the Interministerial Comission on Global Climate Change.
04/02/2010	Date when Interministerial Commission on Global Climate Change confirm the reception of the Prior Consideration of the	Copy of the email, in this email the Interministerial Comission on Global Climante Change confirms the reception of the Prior Consideration of the CDM to CO_2 Solutions.

	CDM	
18/02/2010	Date when UNFCCC confirm the reception of the Prior Consideration of the CDM	Copy of the email, in this email the UNFCCC confirms the reception of the Prior Consideration of the CDM to CO_2 Solutions.
26/03/2010	Date of the investment decision, Gestamp Eólica Baixa Verde S.A. made a deposit of the Bid Price Guarantee, corresponding to 5% of total investment of the project.	Receipt of the payment made by Gestamp Eólica Baixa Verde S.A. to Santander Bank.

Table 6. Timeline of the project since management decision until investment decision

As it can see in the timeline of the project activity, 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.

The main conclusion of the timeline is that Gestamp Eólica Baixa Verde S.A. considered the CDM since the beginning of the development of the project; this is supported by the following reasons:

- In the National Auction (December 2009) Gestamp Eólica Baixa Verde S.A. offered a bid price for the sales energy of 151.97 $R/MWh, this bid price was obtained due to a complete economic analysis made by Gestamp Eólica Baixa Verde S.A. One of the variables that was considered in the economic analysis was the CDM incentives, therefore, Gestamp Eólica Baixa Verde S.A. considered the CDM incentives when offered a bid price for the sales energy.
- The starting date of the project activity was when Gestamp Eólica Baixa Verde S.A. made a payment for a Bid Price Guarantee to the ANEEL (March, 2010), before this event happened Gestamp Eólica Baixa Verde S.A. sent the Prior CDM Consideration to UNFCCC (February, 2010).

These events demonstrated that the CDM Consideration was made since the first steps of the project development. The CDM incentive helps as an extra economical support to face the biggest economical barrier that is involved with the development of a wind farm.

Analysis of the additionality of the project

CDM incentives would be the ideal complement for wind energy in Brazil. This statement is based on the fact that recent wind farm projects in Brazil are being developed as CDM projects. It can be concluded that wind energy is not a particularly attractive proposition in the business-as-usual scenario.

To demonstrate its additionality, the approved "*Tool for demonstration and assessment of additionality ver 05.2*" has been used, following all steps defined. These steps will demonstrate that the project activity is not the baseline scenario.

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

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 National Interconnected System of electricity. 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 19.8 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 SIN (National Interconnected 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: Gestamp Eólica Baixa Verde S.A. does not implement the project; its designated customers will continue purchasing the electricity from the National Interconnected 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. This alternative is considered as the baseline scenario.

3. The same power generation through power plants from fossil fuels
   Gestamp Eólica Baixa Verde S.A. is a company whose core business is the development of renewable energy projects as is stated in its incorporation deed, where the company's purpose is established. Being such purpose the development of the necessary activities for the start-up, operation and maintenance of a wind farm located in Brazil.

   The generation through power plants from fossil fuels is not possible because Gestamp Eólica Baixa Verde S.A. is not interested in the generation of energy trough carbon intensive sources, therefore this scenario is eliminated.

4. The same power generation through power plants from renewable sources like mini hydropower plants.
   The development of a hydropower plant depends primarily on conditions in the region, it is necessary to determine whether it is feasible to develop a hydropower plant in the region. Also due to the size of the project activity, hydropower plants could only be a viable alternative if there was either a group of mini hydropower plants or at least one large hydropower plant.

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

The National Electric Energy Agency (ANEEL) is in charge of appointing Independent Producers of electrical energy. Therefore last December 22, 2009 the project Cabeço Preto received approval for the production and commercialization of electricity from wind power (Process No.48500.002227/2009-21), this approval may be used until July 1, 2012.

ANEEL also conducts auctions to win the right to develop hydropower plant. However Gestamp Eólica Baixa Verde S.A. was created with the specific objective of generating electricity using a wind farm; the following paragraph supports the social objective of Gestamp Eólica Baixa Verde S.A. according to its corporate charter:

Article 3° The Company has the objective to generate electric energy through wind turbines from plant Cabeço Preto, including implementation and installation, as well as the marketing of power generated.

Despite the alternative of develop a hydropower plant is consistent with the regulation of ANEEL, this does not match with the purpose of Gestamp Eólica Baixa Verde S.A. For this reason, this alternative is eliminated and excluded of any further analysis.

The installation license must be processed before work begins on wind farm construction. In this case, the Institute of Environment and Sustainable Development "Instituto de Desenvolvimento Sustentável e Meio Ambiente do Rio Grande do Norte" (IDEMA) gave the preliminary license to build the project Cabeço Preto wind farm with a power capacity of 19.8 MW (11 wind turbines) (Process No. 2009-027974/TEC/LP-0028), this authorization was issued on July 29, 2009 and is valid until July 28, 2011.

In summary, the development of Cabeço Preto Wind Farm is in consistency with all the national regulations. Gestamp Eólica Baixa Verde S.A. is in consistent with the permits (ANEEL, IDEMA) to build and operate the wind farm.

In the analysis of the possible alternatives of the project, there are still two alternatives for the project:

- The proposed project activity not undertaken as a CDM project activity.
- Continuation of the current situation: Gestamp Eólica Baixa Verde S.A. does not implement the project (baseline scenario).

Both the project activity and the alternatives scenarios are in compliance with all regulations according the following entities: National Electric System Operator (ONS from the Portuguese *OperadorNacional do Sistema Elétrico*), Electricity Regulatory Agency (ANEEL from the Portuguese *Agência Nacional de Energia Elétrica*), Minas Gerais Environmental Agency (FEAM from the Portuguese *Fundação do Meio Ambiente de Minas Gerais)* and the CDM Executive Board.

With this information it can be concluded that the two alternatives are viable options, they will be analyzed in the investment analysis in order to demonstrate the additionality of the project.

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 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 National Interconnected 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” (Version 05.2) 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 Brazilian Governmental Bond -BRL-2028. This bond was emitted several times in different years:
    - February 2007: First emission of the BRL-2028 bond with a maturity of 21 years and a yield of 10.68%[9]
    - June 2007: Fourth emission of the BRL-2028 bond, this bond is the last bond emitted before the management decision and it has a maturity of 21 years and a yield of 8.626%[7].
    - October 2010: Fifth emission of the BRL-2028 bond, this bond is the first bond emitted after the management decision with a maturity of 17 years and a yield of 8.85 %[10].

To be conservative the bond selected was the bond emitted in June 2007 (8.626%); additionally other registered projects already used this governmental bond as a benchmark[11].

- BNDES Bond: As an electricity project presents higher risks than a Governmental Bond, it is appropriate to add a risk premium in the bond yield. The BNDES, National Bank of Social and Economic Development is the main and the cheapest source for Brazilian Loans for infrastructure projects. The direct spread required by BNDES for investments related to renewable energy is 0.9% per year[12]
- Technology risk: In Brazil there is no information available about reliable technology risk premium values related to renewable and/or wind energy project. Hence, as a conservative approach, this risk was not considered for the benchmark value.

From the above the benchmark value would be 9.526 %. This value will be compared with the IRR of the project to demonstrate the additionality of the project.

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[9] Tesouro Nacional Divida Mobiliaria Externa. Available at: http://www.tesouro.fazenda.gov.br/divida_publica/downloads/soberanosinternet.xls

[10] Fazenda. Brazil issues 21 year bond in local currency of external market. Available at: http://www.tesouro.fazenda.gov.br/english/public_debt/downloads/informes/Emissao_Global_BRL2028_eng.pdf

[11] CDM Registered Project. CDM Project Paragominas. Available at: http://cdm.unfccc.int/Projects/DB/SGS-UKL1268746645.27/view

[12] BNDES Interest Rate, page 20. Available at: http://www.marinemoney.com/forums/RIO10/Presentations/Sept16th/Figueiredo.pdf

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. Gestamp Eólica Baixa Verde S.A. Will sell the electricity generated at a price of R$ 151.97/MWh.
- Revenues from CERs: These are estimated taking into account the emission reduction estimation, the average selling price of carbon credits of 14.26 USD/tCO2 and a 21 years crediting period.
- Euro average exchange rate: 1.48 USD/€
- Real average exchange rate: 1.74 R$/USD
- Capital expenditure: R$ 104,479,350.5
- Operations & Maintenance costs (O&M): 3% total investment.
- Transmission cost: 3.05 $R/kW-month
- Land rent cost: 6,000 $R/MW
- Inflation rate: The inflation is based on the average supported by the “Banco Central do Brasil”, the value is 4.5%

The Cabeço Preto 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	7.64 %
With CER revenues	8.39 %

Table 7. IRR of project

The IRR calculations clearly show that the IRR of the project activity (7.64%) is below the chosen financial benchmark (9.526 %), 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. After considering the CDM financial incentives in the project’s cash flow; the project IRR will be improved.

In the other hand if the CDM registration is obtained the IRR for the project activity taking into account the income from the CER’s sales will increase up to 8.39%. Even though this IRR value is not high enough to reach the financial benchmark (investor and country), the environmental and sustainable development contribution to the country and the derived image and economical benefits that Gestamp Eólica Baixa Verde S.A. will acquire derived from the project activity registration as a CDM project activity are a substantial and important incentive for the project implementation.

This section permits us to conclude that the project considered as a CDM project activity, and the attendant benefits and incentives derived from the CER revenues, will alleviate or will 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 of tCO2 (US$/tCO2)				
	5	**10**	**15**	**20**	**25**
IRR	7.90%	8.16%	8.42%	8.68%	8.94%
Project's IRR increment	0.26%	0.26%	0.26%	0.26%	0.26%

Table 8. 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% .

Total Investment	**-10%**	**-5%**	**5%**	**10%**
Project IRR	8.86	8.23	7.09	6.58
Electricity Prices	**-10%**	**-5%**	**5%**	**10%**
Project IRR	5.75	6.72	8.52	9.37
O&M	**-10%**	**-5%**	**5%**	**10%**
Project IRR	8.16	7.90	7.37	7.10
Port Cost	**-10%**	**-5%**	**5%**	**10%**
Project IRR	7.76	7.70	7.58	7.52
Plant load factor	**-10%**	**-5%**	**5%**	**10%**
Project IRR	5.75	6.72	8.52	9.37

Table 9. Financial Parameters.

Even though, the additionality of the project activity is clearly demonstrated based on the Investment analysis, Step 3.

In conclusion 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:

- The project IRR without the CER's incentives (7.64%) is below the benchmark (9.526%).
- In the sensitivity analysis the variables that have the main impact in the IRR of the project are the electricity price and the plant load factor; however, it is clearly demonstrated that in the most optimistic scenario, when the electricity price or the plant load factor increase by 10%, the project's IRR only increases up to 9.37%, this value is below the benchmark, for this reason it is demonstrated the additionality of the project.

Breakeven Analysis

In order to observe the variance necessary to overpass the benchmark limit, we made a breakeven analysis of each variable used in the sensitivity analysis.

- Investment

The figure 3 shows the breakeven analysis for the investment variable. In conclusion, it was observed that the investment needs to decrease about 15% (20 million of BRL) to over pass the benchmark of the project. The Investment Ratio of the project is about 5.2 million of BRL per MW.

The average investment ratio of other similar project developed in Brazil is about 13,000,000 $R/MW[13]. Cabeço Preto Wind Farm has a minor investment ratio compared to other similar wind farms projects developed in Brazil, is clearly demonstrated that the present project activity is one of the cheapest projects developed in Brazil and is unlike to suppose that the project investment will be reduced by approximately 15%.

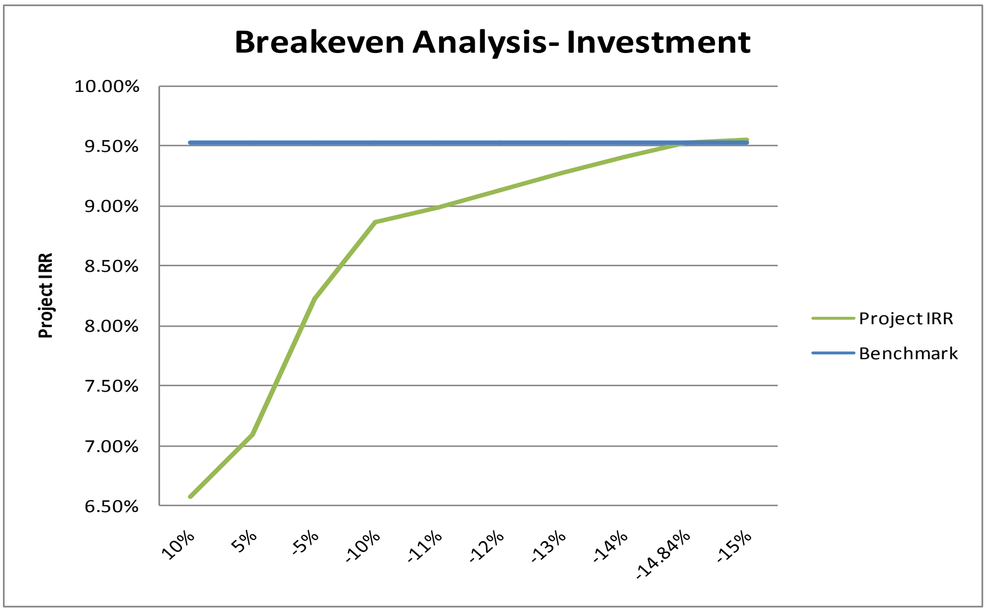

Figure 3. Breakeven Analysis- Investment.

- <u>Electricity Price</u>

The figure 4 shows the breakeven analysis for the sales price. The conclusion of this analysis is that the sales price needs to increase 10.95% to overpass the benchmark, this case is not possible to happen because the sales price depends directly of the country inflation but if the inflation increases the other cost also increase (O&M, land rent, transmission cost).The Brazilian bank forecasts estimate that inflation will be 4.5% for the next years. Also the base electricity price was establishes in the Brazilian National Auction (December 2009), this base value is 151.97 R$/MWh and this initial value cannot be changed.

[13] TÜV Nord has a comparative table of the investment ratio of different projects developed in Brazil; the average of these projects is about 13 million per MW. Some of these projects are:

- Praias de Parajuru Wind Farm: (Investment ratio of 19,000,000 $R/MW)
    - Reference: http://diariodonordeste.globo.com/materia.asp?codigo=662042
- Osorio Wind Farm: Project Registered as CDM (Investment ratio of 14,000,000 $R/MW)
    - Reference: http://cdm.unfccc.int/Projects/Validation/DB/XYRSB92C541AXM5SWKCGKIA6IEW0KE/view.html
- Bom Jardin and Agua Dolce Wind Farm: (Investment ratio of 5,400,000 $R/MW)
    - Reference: http://www.evwind.com/noticias.php?id_not=6742

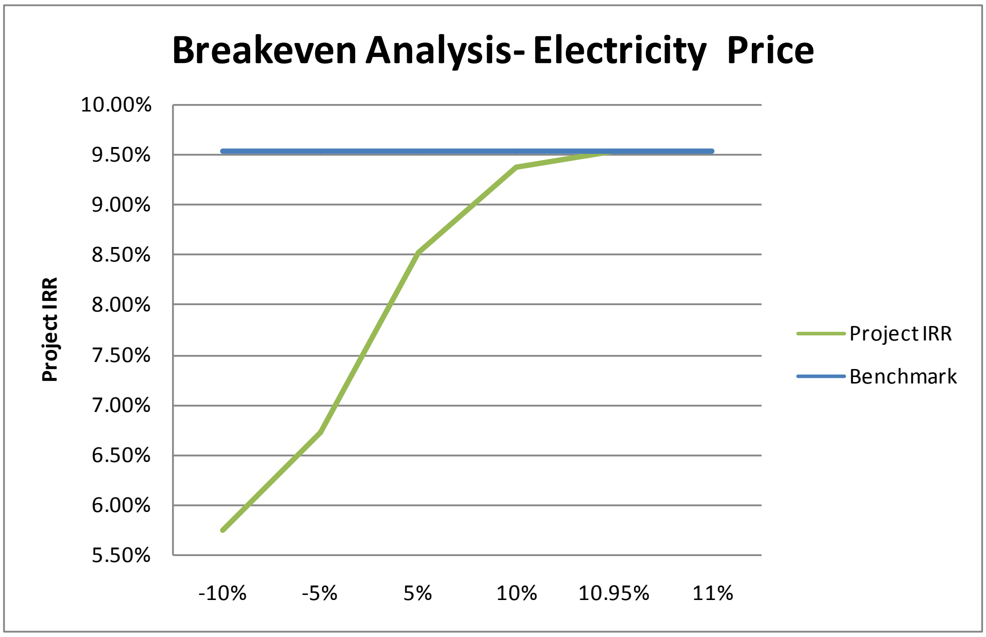

Figure 4. Breakeven Analysis- Electric Sale.

- <u>O&M</u>

The figure 5 shows the breakeven analysis for the O&M variable. The conclusion of this analysis is that the O&M needs to decrease 37.47% to overpass the benchmark. This fact is not probable to happen because the O&M cost of a wind farm has the tendency to increase through the time of operation, this is supported with the report of Risø National Laboratory which mentions that the O&M appears to be strongly correlated with the turbine age.

"In the first years the manufactures warranties implies a low level of O&M to the owner, but after the 10th year, large repairs and reinvestment should be expected"[14].

The same study also mentions that in the first two years the O&M cost is approximately 0.3-0.4 c€/kWh (4.44- 5.92 USD/MWh). Then after six years, the O&M costs had increased to approximately 0.6-0.7 c€/kWh (8.88-10.36 USD/MWh)[15]. Therefore, it is concluded that the costs of O&M are unlikely to decrease during the project lifetime, then this kind of change, on real basis, is off the table.

[14] Risø National Laboratory .Wind Energy- The facts. Volume 2. Costs and Prices. Page 101. Available at: http://www.ewea.org/fileadmin/ewea_documents/documents/publications/WETF/Facts_Volume_2.pdf

[15] Risø National Laboratory .Wind Energy- The facts. Volume 2. Costs and Prices. Page 100. Available at: http://www.ewea.org/fileadmin/ewea_documents/documents/publications/WETF/Facts_Volume_2.pdf

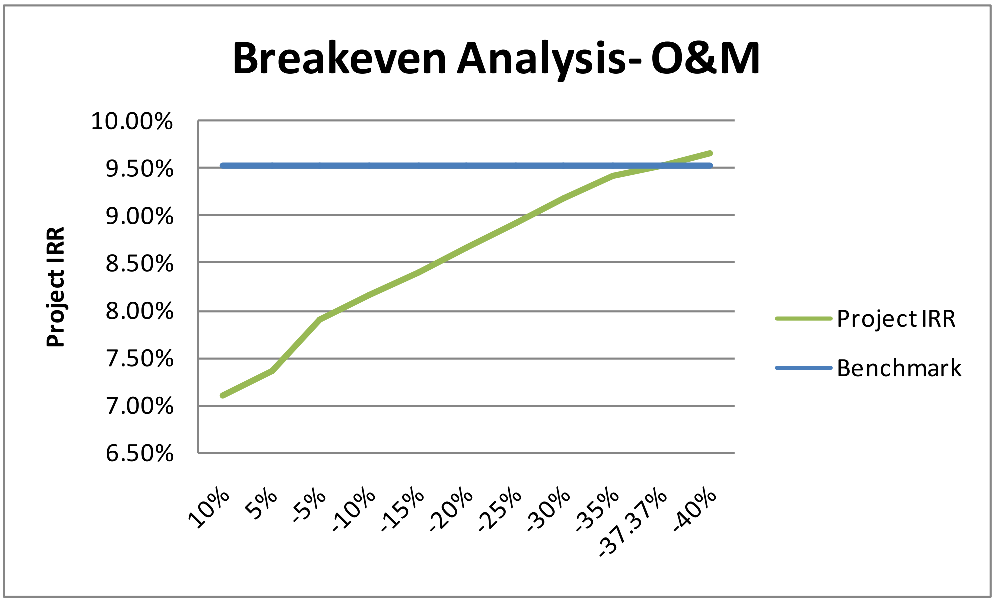

Figure 5. Breakeven Analysis- O&M.

- Transmission cost

The figure 6 shows the breakeven analysis for the transmission cost variable. The conclusion of this analysis is that if the transmission cost is not used the project IRR will not over pass the benchmark. When the transmission cost has a value of 0, the project IRR is 8.82%.

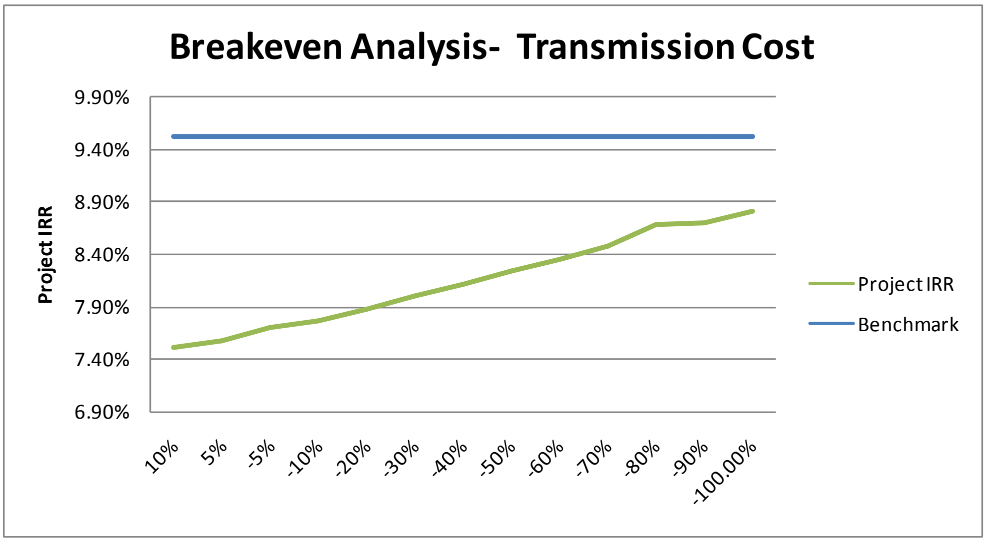

Figure 6. Breakeven Analysis- Transmission Cost.

- Plant load factor

The figure 7 shows the breakeven analysis for the plant load factor variable. The conclusion of this analysis is that the plant load factor needs to increase 10.95% (the value will be about 47%), but this case is not probable to happen supported by the fact that a typical wind farm has a plant load factor that varies between 20-40%[16]. This is supported especially in the particular case of Brazil which shows that the plant load factor of the wind farms in this country is approximately 30%[17], a lower value that the one presented for the current project activity. Additionally, the plant load factor considered for this project is very conservative (according UNFCCC requirements), since the value used is 43.35% that has a probability of 50% of occurring; the realest value is 25.21% (2,209 Equivalent hours) whose probability of happening is 95%[18]. Therefore, it is demonstrated that a conservative approach is used for the development of the project and that on actual basis the value of the plant load factor will be lower.

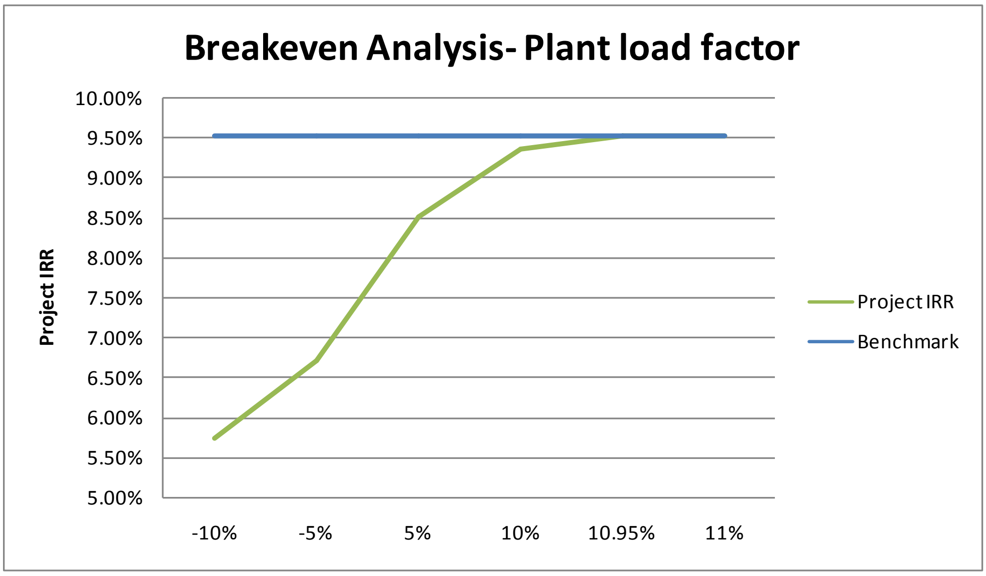

Figure 7. Breakeven Analysis- Plant load factor.

In conclusion, the development of the project activity without the CERs incentive (alternative 1, Sub-Step 1a) is not possible; therefore, the additionality of the project activity is clearly demonstrated based on the Investment analysis, Step 2.

Step 3. Barrier analysis

N/A

[16] Green Energy Times. Searsburg Wind Distributions: Truths and Facts. Available at: http://www.greenenergytimes.org/2011/03/23/searsburg-wind-distortions-truths-facts/

[17] CleantechInvestor. Build Brazil’s Wind Business. Available at: http://www.cleantechinvestor.com/portal/wind-energy/5374-building-brazils-wind-business.html

[18] “Certifiçao Das Mediçoes Anemómetricas e Certificaçao da Produçao Anual de Energía” by Barlovento Recursos Naturales, Table 13.Page 26.

Step 4. Common practice analysis

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

The following table show all wind farms in operation (39) and under construction (8) in Brazil according to the information published by the National Agency of Electric Energy[19]. However, even though similar activities are being implemented in the host country all of these activities have the support of the PROINFA program that provides several benefits which permit/facilitates the implementation of wind farms.

Units in operation			
Source	**Units**	**Power (kW)**	**%**
Hydro	316	182,101	0.17
Wind	39	744.38	0.69
Small hydro	361	3,082,089	2.82
Solar PV	1	20	0
Hydro (2)	167	75,559,377	70.4
Thermal	1,327	28,402,543	24.1
Nuclear	2	2,007,000	1.86
Total	**2,213**	**109,977,510**	100

Table 10. Plants in operation until May 20, 2010[20].

Some wind farm units in operation or under construction in Brazil were developed within the framework of the PROINFA program. This program envisaged the installation of 220 MW of wind energy in each state, using the Environmental Initial Permit issuing date as criterion for the selection of projects. Cabeço Preto Wind Farm Project was not selected by PROINFA and it is not able to take advantage of fixed electricity prices and funding provided by the program.

The selection of the projects that will be developed by the PROINFA program was finished before the beginning of year 2009; therefore, the project Cabeço Preto Wind Farm could not have the benefits of this program because by the date when the project received the license for electricity generation (December 2009) the application for the PROINFA program was closed.

The PROINFA program's objective was to support the development of wind farms (up to 1.379 MW of

[19] Agência Nacional de Energía Eléctrica (ANEEL) Available at: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp

[20] Agência Nacional de Energía Eléctrica (ANEEL) Available at: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp

Table 10 is obtained from the data bank of the ANEEL website so this page is constantly updated. The information in the table was taken on May 20, 2010.

capacity)[21]; however, as previously mentioned the project Cabeço Preto Wind Farm was not able to get the benefits of this program.

Some principal incentives of the PROINFA program are:

- Funding of up to 70% of the investment, with the exception of imported products, services and land acquisition. Investors should ensure 30% of project capital[22].
- Depreciation is considered 10 years.
- Cancellation of interest payments during construction of the project[23].
- Power purchase guaranteed for 20 years[24].

The following tables show all wind farm projects included in the PROINFA program:

Date	Qualif	Plant	State	Power (MW)
15/10/2003	PIA	UEE BA 3- Caetité	BA	192.10
18/06/2001	PIA	UEE Beberibe	CE	25.20
26/04/2002	PIA	UEE Praia do Morgado	CE	28.80
26/04/2002	PIA	UEE Volta do Rio	CE	42.00
28/05/2002	PIA	UEE Enacel	CE	31.50
03/09/2002	PIA	UEE Praias de Parajuru	CE	28.80
27/09/2002	PIA	UEE Canoa Quebrada	CE	57.00
23/03/2003	PIA	UEE Canoa Quebrada	CE	10.50
08/10/2002	NAO PIA	UEE Formosa	CE	104.40
08/10/2002	NAO PIA	UEE Foz do Rio Choró	CE	25.20
08/10/2002	NAO PIA	UEE Paracuru	CE	23.40
18/10/2002	NAO PIA	UEE Icaraizinho	CE	54.00
13/12/2002	PIA	UEE Taíba Albatroz	CE	16.50
27/12/2002	PIA	UEE Central Geradora Eólica Bons Ventos	CE	50.00
20/03/2003	PIA	UEE Lagoa do Mato	CE	27.00
24/07/2003	PIA	UEE Taíba Águia	CE	27.00
30/07/2003	PIA	UEE Caraúbas	CE	10.50
17/09/2003	PIA	UEE Ubajara	CE	100.00
17/09/2003	PIA	UEE Paracuru	CE	100.00

[21] World Resources Institute. Program of Incentives for Alternative Electricity Sources (PROINFA). Available: http://projects.wri.org/sd-pams-database/brazil/programme-incentives-alternative-electricity-sources-proinfa

[22] Organization of Iberoamerican States. Proinfa incentiva fontes alternativas de energia. Available at: http://www.oei.es/divulgacioncientifica/reportajes_084.htm

[23] The Entrepreneur'sToolkit. PROINFA –Programa de Incentivo às Fontes Alternativas de Energia Eléctrica do Brasil. Available at: http://www.entrepreneurstoolkit.org/index.php?title=PROINFA_-_Programa_de_Incentivo_%C3%A0s_Fontes_Alternativas_de_Energia_El%C3%A9trica_no_Brasil

[24] Brazil Government. Matriz Energética. Available at: http://www.brasil.gov.br/cop-espanol/panorama/lo-que-brasil-esta-haciendo/matriz-energetica/br_model1?set_language=es

13/11/2003	PIA	UEE Taíba Andorinha	CE	22.00
24/12/2003	PIA	UEE Caponga	CE	10.00
20/02/2004	PIA	UEE da Fábrica da Wobben Windpower	CE	0.60
06/11/2003	PIA	UEE Alhandra	PB	5.40
07/11/2003	PIA	UEE Vitória	PB	4.25
26/11/2003	PIA	UEE Coelhos I	PB	4.50
26/11/2003	PIA	UEE Millenium	PB	10.20
23/12/2003	PIA	UEE Albatroz	PB	4.50
23/12/2003	PIA	UEE Caravela	PB	4.50
23/12/2003	PIA	UEE Mataraca	PB	4.50
30/12/2003	PIA	UEE Atlântica	PB	4.50
30/12/2003	PIA	UEE Camurim	PB	4.50
30/12/2003	PIA	UEE Coelhos II	PB	4.50
30/12/2003	PIA	UEE Coelhos III	PB	4.50
30/12/2003	PIA	UEE Coelhos IV	PB	4.50
30/12/2003	PIA	UEE Presidente	PB	4.50
02/05/2002	PIA	UEE Pirauá	PE	4.25
14/07/2003	NAO PIA	UEE PE3- Poçao	PE	62.05
12/09/2003	NAO PIA	UEE PE2- Serra de Macambira	PE	59.50
05/12/2003	PIA	UEE Gravatá Fruitrade	PE	4.25
05/12/2003	PIA	UEE Mandacaru	PE	4.25
05/12/2003	PIA	UEE Santa Maria	PE	4.25
05/12/2003	PIA	UEE Xavante	PE	4.25
09/01/2004	PIA	UEE Pedra do Sal	PI	70.55
09/01/2004	PIA	UEE Coqueiro	RJ	14.40
09/01/2004	PIA	UEE Gargaú	RJ	28.05
09/01/2004	PIA	UEE Mundéus	RJ	23.80
09/01/2004	PIA	UEE Saco Dantas	RJ	26.40
23/01/2004	NAO PIA	UEE Quintanilha Machado 1	RJ	135.00
03/02/2004	PIA	UEE Maravilha	RJ	49.60
20/11/2002	NAO PIA	UEE RN 1 – Mel	RN	89.25
20/11/2002	NAO PIA	UEE RN 11- Guamaré	RN	146.20
20/11/2002	NAO PIA	UEE RN 15- Rio do Fogo	RN	49.30
20/11/2002	PIA	UEE RN 3 – Gameleira	RN	49.30
20/11/2002	PIA	UEE RN 4- Pititinga	RN	49.30
12/03/2003	PIA	UEE Alegria I	RN	51.00
12/03/2003	PIA	UEE Alegria II	RN	100.80
21/03/2003	PIA	UEE Vale de Esperança	RN	29.70
02/10/2003	PIA	UEE Paraíso Farol	RN	102.00

17/12/2003	PIA	UEE Aralém	RN	27.00
17/12/2003	PIA	UEE Zumbi	RN	29.70
08/01/2004	PIA	UEE Fonseca	RN	97.50
20/02/2004	PIA	UEE Paraíso Azul	RN	51.00
31/03/2004	PIA	UEE Lagoas de Genipabu	RN	4.50
27/03/2003	PIA	UEE Ponta do Mel	RN	50.40
08/01/2003	NAO PIA	UEE dos Índios	RS	50.00
08/01/2003	NAO PIA	UEE Osório	RS	50.00
08/01/2003	NAO PIA	UEE Sangradouro	RS	50.00
30/05/2003	PIA	UEE Elebras Cidreira I	RS	72.00
27/06/2003	NAO PIA	UEE Serra dos Antunes	RS	98.60
24/09/2003	NAO PIA	UEE Palmares	RS	50.00
24/12/2003	PIA	UEE Fazenda Eólica de Xangri-lá	RS	26.25
30/01/2004	PIA	UEE Fazenda Eólica de Imbé	RS	35.00
10/09/2003	PIA	UEE Osório I	RS	28.50
10/09/2003	PIA	UEE Xangri-lá II	RS	6.00
23/09/2003	PIA	UEE Xangri-lá I	RS	24.00
10/12/2003	PIA	UEE Casqueiro I	RS	6.00
10/12/2003	PIA	UEE Casqueiro II	RS	45.00
22/10/2003	NAO PIA	UEE Livramento	RS	74.80
04/04/2003	PIA	UEE Água Doce	SC	9.00
08/04/2003	NAO PIA	UEE Aquibata	SC	30.00
08/04/2003	NAO PIA	UEE Bom Jardim	SC	30.00
08/04/2003	NAO PIA	UEE Cascata	SC	4.80
08/04/2003	NAO PIA	UEE Cruz Alta	SC	30.00
08/04/2003	NAO PIA	UEE Pulpito	SC	30.00
08/04/2003	NAO PIA	UEE Santo Antônio	SC	4.80
08/04/2003	NAO PIA	UEE Três Pinheiros	SC	30.00
08/04/2003	NAO PIA	UEE Salto	SC	30.00
08/04/2003	PIA	UEE Amparo	SC	30.00
08/04/2003	PIA	UEE Campo Belo	SC	9.60
08/04/2003	PIA	UEE Rio do Ouro	SC	30.00
26/11/2003	PIA	UEE Santa Marta	SC	46.531
07/05/2004	PIA	UEE do Vigia	SC	30.00

Table 11. Plants under PROINFA program[25].

[25] Eletrobras. Available at: http://www.eletrobras.gov.br/ELB/services/eletrobras/ContentManagementPlus/FileDownload.ThrSvc.asp?DocumentID={9B6832B3-F317-4BF6-A663-E466A250B8A7}&ServiceInstUID={9C2100BF-1555-4A9D-B454-2265750C76E1}&InterfaceInstUID={18F15ED9-1E73-4990-8CC6-F385CE19FF17}&InterfaceUID={72215A93-CAA7-4232-

The following tables show all wind farm units in operation in Brazil and their correspondence with the previous tables:

Plant	State	Power (MW)	Developed with PROINFA Program
UEE Beberibe	CE	25.60	YES
UEE Praia do Morgado	CE	28.80	YES
UEE Enacel	CE	31.50	YES
UEE Praias de Parajuru	CE	28.80	YES
UEE Canoa Quebrada	CE	57.00	YES
UEE Canoa Quebrada	CE	10.50	YES
UEE Formosa	CE	104.40	YES
UEE Foz do Rio Choró	CE	25.20	YES
UEE Paracuru	CE	23.40	YES
UEE Icaraizinho	CE	54.60	YES
UEE Taíba Albatroz	CE	16.50	YES
UEE Central Geradora Eólica Bons Ventos	CE	50.00	YES
UEE Lagoa do Mato	CE	3.23	YES
UEE Coelhos I	PB	4.50	YES
UEE Millenium	PB	10.20	YES
UEE Albatroz	PB	4.50	YES
UEE Caravela	PB	4.50	YES
UEE Mataraca	PB	4.50	YES
UEE Atlântica	PB	4.50	YES
UEE Camurim	PB	4.50	YES
UEE Coelhos II	PB	4.50	YES
UEE Coelhos III	PB	4.50	YES
UEE Coelhos IV	PB	4.50	YES
UEE Presidente	PB	4.50	YES
UEE Pirauá	PE	4.95	YES
UEE Gravatá Fruitrade	PE	4.95	YES
UEE Mandacaru	PE	4.95	YES

A6A1-2550B7CBEE2F}&ChannelUID={B38770E4-2FE3-41A2-9F75-DFF25AF92DED}&PageUID={ABB61D26-1076-42AC-8C5F-64EB5476030E}&BrowserType=IE&BrowserVersion=6

The Electrobas webpage suffer several changes; therefore, sometimes this link can fail. However a copy of the document was given to TÜV Nord to support the information of the link.

UEE Santa Maria	PE	4.95	YES
UEE Xavante	PE	4.95	YES
UEE Pedra do Sal	PI	18.00	YES
UEE RN 15- Rio do Fogo	RN	49.30	YES
UEE dos Índios	RS	50.00	YES
UEE Osório	RS	50.00	YES
UEE Sangradouro	RS	50.00	YES
UEE Água Doce	SC	9.00	YES
UEE Bom Jardim	SC	0.60	YES
UEE Mucuripe	CE	2.40	NO
UEE Olinda	PE	0.23	NO
UEE Macau	RN	1.80	NO
UEE do Horizonte	SC	4.80	NO
UEE Prainha	CE	10.00	NO
UEE Taíba	CE	5.00	NO
UEE Elétrica de Palmas	PR	2.50	NO
UEE Fernando de Noronha	PE	0.23	NO
UEE IMT	PR	2.20	NO

Table 12. Wind farms in operation until May 20, 2010[26].

In the table 12 is seen that 74% of the wind projects currently in operation in Brazil were developed within the framework of the PROINFA program. The remaining cases are small-scale farms (between 0.226 and 10 installed MW) with investment costs which are not comparable with those of the proposed project activity.

Furthermore, 4 wind projects in operation are registered CDM projects:

Date of registration	Project Title	MW	Host Country
28/08/2006	Horizonte Wind Power Generation Project	4.8	Brazil
30/09/2006	Água Doce Wind Power Generation Project	9.0	Brazil
28/12/2006	Osório Wind Power Plant Project	50.0	Brazil
09/03/2007	Petrobras Wind Power Project for Oil Pumping at Macau, Brazil	1.8	Brazil

Table 13. CDM projects registered until May 20, 2010.

[26]Table 12 is obtained from the data bank of the ANEEL website so this page is constantly updated. The information in the table was taken on May 20, 2010.
The information in the column "Developed with PROINFA Program" was completed taking into account the table 11.

ANEEL Banco de Informações de Geração
http://www.aneel.gov.br/aplicacoes/capacidadebrasil/GeracaoTipoFase.asp?tipo=7&fase=3

Currently, all registered wind farm projects are in operation. These plants also have issued CER's in this order: Osório Wind Power Plant (584,920 CER's), Horizonte Wind Power Plant (20,824 CER's), Água Doce Wind Power (16,067 CER's) and Petrobras Wind Power Plant (0 CER's)

According to the previous information, it can be concluded that the operation of wind farms with a capacity superior to 10 MW can be only considered as common practice in Brazil under the PROINFA program, even though some of these wind farms are also receiving CDM incentives. The Cabeço Preto Wind Farm project does not have incentives from the PROINFA program, thus the development of the project cannot be considered as a common practice since its total capacity is 19.8 MW. In conclusion the project is not going to be developed without the support of CDM incentives, so the project is additional.

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

No other activities are observed. Similar projects that have been recently announced rely on additional income from registration as a CDM project in order to overcome the existing barriers.

The above described application of the Additionality Tool shows that all steps and sub-steps are satisfied. There are realistic and credible alternatives consistent with mandatory laws and regulations, a benchmark analysis including a sensitivity analysis consistently supports that the proposed project activity is unlikely to be financially attractive and essential distinctions between the project activity and similar activities observed are reasonably explained. Therefore, the proposed project activity is additional.

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* (tCO2e/yr)
BE_y	Baseline emissions in year *y* (tCO2/yr)
PE_y	Project emissions in year *y* (tCO2e/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 version 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* (tCO2e/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* (tCO2e/yr)
$PE_{HP,y}$	Project emissions from water reservoirs of hydropower plants in year *y* (tCO2e/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 hydropower 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

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

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)

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:

$$EG_{PJ,y} = EG_{facility,y} \qquad \textbf{(4)}$$

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)
$EF_{facility,y}$	= 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 ($EF_{grid,CM,y}$) will be used, in accordance with the "Tool to calculate the emission factor for an electricity system ver. 02.2.0".

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) emissions factor.

Step 1.Identify the relevant electricity systems.

At their meeting on 29 April 2008, the Designated National Authority of Brazil (Interministerial Commission on Global Climate Change - CIMGC) approved a decision whereby Brazil was considered to have a single electricity system National Interconnected System ("Sistema Interligado Nacional" or SIN) for the purposes of calculating the emission factors defined in the ACM0002 version 12.1.0 methodology. The SIN therefore constitutes the **electricity system of the project**.

The electricity systems of Uruguay and Argentina are considered to be **connected electricity systems,** which are linked to the SIN by means of transmission lines. The following diagram illustrates the identification of the electricity system.

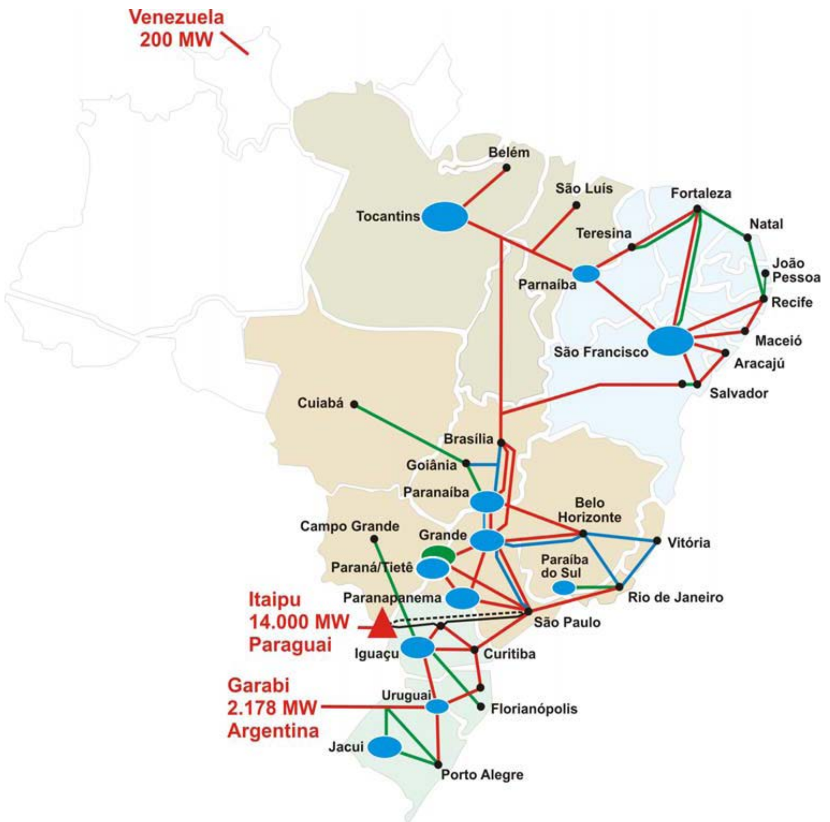

Figure 8. National Interconnected System

The following options described in the tool have been adopted for the electricity system defined above:

- When determining the operating margin emission factor, imports from Argentina and Uruguay are considered as sources of electricity generation with an emission factor of 0 tonnes of CO_2 per MWh.
- Exports of electricity to Uruguay or Argentina are not excluded from the generation data used to calculate and monitor emission factors.

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.

Gestamp Eólica Baixa Verde S.A. 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 data of the operating margin published by the Interministerial Commission on Global Climate Change is using the Dispatch data analysis OM method, so option (c) is chosen.

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

The dispatch data analysis OM emission factor ($EF_{grid,OM-DD,y}$) is determined based on the grid power units that are actually dispatched at the margin during each hour *h* where the project is displacing grid electricity. This approach is not applicable to historical data and, thus, requires annual monitoring of $EF_{grid,OM-DD,y}$.

The emission factor is calculated as follows:

$$EF_{grid,OM-DD,y} = \frac{\sum_{h} EG_{PJ,h} \cdot EF_{EL,DD,h}}{EG_{PJ,y}} \tag{5}$$

Where:

$EF_{grid,OM-DD,y}$	= Dispatch data analysis operating margin CO_2 emission factor in year *y* (tCO2/MWh).
$EG_{PJ,h}$	= Electricity displaced by the project activity in hour *h* of year *y* (MWh).
$EF_{EL,DD,h}$	= CO_2 emission factor for grid power units in the top of the dispatch order in hour *h* in year *y* (tCO2/MWh).
$EG_{PJ,y}$	= Total electricity displaced by the project activity in year *y* (MWh).
h	= Hours in year *y* in which the project activity is displacing grid electricity.
y	= Year in which the project activity is displacing grid electricity.

If hourly fuel consumption data is available, then the hourly emissions factor is determined as:

$$EF_{EL,DD,h} = \frac{\sum_{i,n} FC_{i,n,h} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_{n} EG_{n,h}} \quad \textbf{(6)}$$

Where:

$EF_{EL,DD,h}$	= CO2 emission factor for grid power units in the top of the dispatch order in hour *h* in year *y* (tCO2/MWh).
$FC_{i,n,h}$	= Amount of fossil fuel type *i* consumed by grid power unit *n* in hour *h* (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).
$EF_{CO2,i,y}$	= CO2 emission factor of fossil fuel type *i* in year *y* (tCO2/GJ).
$EG_{n,h}$	= Electricity generated and delivered to the grid by grid power unit *n* in hour *h* (MWh).
n	=Grid power units in the top of the dispatch (as defined below).
i	= Fossil fuel types combusted in grid power unit *n* in year *y*.
h	= Hours in year *y* in which the project activity is displacing grid electricity.
y	= Year in which the project activity is displacing grid electricity.

The CO2 emission factor of the grid power units *n* ($FE_{EL,n,y}$) should be determined as per the guidance for the simple OM, using the Options A1, A2 or A3.

To determine the set of grid power units *n* that are in the top of the dispatch, obtain from a national dispatch center:

- The grid system dispatch order of operation for each grid power unit of the system including power units from which electricity is imported.
- The amount of power (MWh) that is dispatched from all grid power units in the system during each hour *h* that the project activity is displacing electricity.

At each hour *h*, stack each grid power unit's electricity generation using the merit order. The group of grid power units *n* in the dispatch margin includes the units in the top x% of total electricity dispatched in the hour *h*, where x% is equal to the greater of either:
(a) 10%.
(b) The quantity of electricity displaced by the project activity during hour *h* divided by the total electricity generation by grid power plants during that hour *h*.

The Operating Margin refers to the actual energy generation mix installed in Brazil. The total fuel consumption for generation is divided into the different types of power plants, in order to determine the weighted average of the actual CO_2 emissions in Brazil.

In this country the Designated National Authority of Brazil (Interministerial Commission on Global Climate Change - CIMGC) published in the Ministry of Science and Technology web site the emission factor data of the operating margin for each month.

The data of the electricity generated in Brazil have been obtained from the SIN dispatch center (ONS – National Electricity System Operator)[27]:

- Total net monthly electricity generation from each thermal, hydro, wind and nuclear power plant, published by ONS (2010).
- Total net annual electricity generation from each thermal, hydro, wind and nuclear power plant, published by ONS (2010).

The data of the emission factor for the operating margin was obtained from the Ministry of Science and Technology "Ministério da Ciência e Tecnologia"[28]. The calculation of the operating margin emission factor will be updated every year because the emission factor is expost.

Step 5: Calculate the build margin (BM) emissions factor.

The value published in the DNA web page[29] for the BM for the year 2009 is 0.0794.This value will be updated every year due to the emission factor is expost.

Step 6: Calculate the combined margin (CM) emissions factor.

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:	**$EF_{CO2,i,y}$**
Data unit:	tCO_2/GJ
Description:	CO2 emission factor of fossil fuel type *i* used in power unit *m* in year *y*
Source of data used:	IPCC default values at the lower limit of the uncertainty at a 95% confidence

[27] Operador Nacional do Sistema Eléctrico. Available at: http://www.ons.org.br/historico/geracao_energia.aspx

[28] The Ministry of Science and Technology webpage is constantly updated; therefore, sometimes this link can fail. The value of the $EF_{grid,OM,y}$ was certified by Tüv Nord.

"Ministério da Ciência e Tecnologia". Available at: http://www.mct.gov.br/index.php/content/view/307492.html

[29] The Ministry of Science and Technology webpage is constantly updated; therefore, sometimes this link can fail. The value of the $EF_{grid,BM,y}$ was certified by Tüv Nord.
"Ministério da Ciência e Tecnologia". Available at:
http://www.mct.gov.br/index.php/content/view/303076.html#ancora

	interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value applied:	Diesel Oil: 72,600 Natural Gas: 54,300 Residual Fuel Oil: 75,500
Justification of the choice of data or description of measurement methods and procedures actually applied :	Fuel emission factors have been selected from the 2006 IPPC guidelines, following the conservative assumptions established in the monitoring worksheets.
Any comment:	This data is not used in the calculation of the $EF_{grid,CM,y}$ because the host DNA already provides the value of the $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ for the National Interconnected System

Data / Parameter:	$\eta_{k,y}$
Data unit:	%
Description:	Average net energy conversion efficiency of power unit *j/k* in year *y*
Source of data used:	Annex 1 of the emission factor tool.
Value applied:	Coal Steam Turbine: 50% Diesel Oil Internal Combustion Engine: 39.5% Diesel Oil Open Cycle: 39.5% Natural Gas Combined Cycle: 60% Natural Gas Open Cycle: 39.5% Residual Fuel Oil Internal Combustion Engine: 39.5% Residual Fuel Oil Steam Turbine: 39% Blast furnace gas steam turbine 37.5%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Energy conversion efficiencies have been selected from the emission factor tool. Since detailed information on power plants is not available (detailed technology and date of construction), the following conservative assumptions must be adopted in determining plants' efficiency: all plants are considered to be constructed after 2000 and the higher efficiency technology is applied when the technology is not detailed.
Any comment:	This data is not used in the calculation of the $EF_{grid,CM,y}$ because the host DNA already provides the value of the $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ for the National Interconnected System

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 hydropower 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 ($EF_{grid,OM,y}$) and Build Margin ($EF_{grid,BM,y}$), and it is calculated according the "Tool to calculate the emission factor for an electricity system" (ver 02.2.0).

Using the approved methodology ACM0002 Version 12.1.0 and the "Tool to calculate the emission factor for an electricity system", we take data of the operation and build margin calculated by the Designated National Authority of Brazil (Interministerial Commission on Global Climate Change - CIMGC) The emission coefficient factor by fuel type is determined in tCO_2/MWh instead of tCO_2/mass or volume.

The Operating Margin emission factor calculation for 2010 is 0.4789 tCO_2/MWh (see details in Annex 3)

The Build Margin is obtained in the annual information reported by the Interministerial Commission on Global Climate Change- CIMGC. For the year 2009 the Build Margin is 0.0794 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-post* baseline emission factor will be: 0.75*0.4789 + 0.25* 0.0794 = **0.379** tCO_2/MWh

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.

Baseline emission factor	= 0.379 tCO_2/MWh
Annual generation	= 73.45 GWh
Baseline Emissions	= 27,841 tCO_2/year

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

Total emission reduction during the crediting period: 194,887 tCO_2 (See Annex 3)

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)
2012	0	27,841	0	27,841
2013	0	27,841	0	27,841
2014	0	27,841	0	27,841
2015	0	27,841	0	27,841
2016	0	27,841	0	27,841
2017	0	27,841	0	27,841
2018	0	27,841	0	27,841
Total (tonnes of CO2e)	0	194,887	0	194,887

Table 14. 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 generation supplied by the project plant/unit to the grid in year *y*
Source of data to be used:	Energy meters installed in the Wind farm and 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 have been used (73.45 GWh/year, established by the document "Certification of annual energy generation", prepared by Barlovento Recursos Naturales).
Description of measurement methods and procedures to be applied:	This value is calculated, considering the losses of energy due to the length of the transmission line, the data is calculated using the following equation: $$EG_{facility,y} = X_{Loss} * EG_{m,WF} \quad (9)$$ Where: $EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr) X_{Loss} = Losses factor due energy loss through transmission line (calculated in equation 8). $EG_{m,WF}$ = Gross energy measure by the project wind farm at the exit of the wind farm (MWh), including the project activity.

	The sum of the net electricity generation of each wind farm (connected to the same transmission line) using the equation 9 will cross check with the report published by the CCEE. In order to calculate the net energy of the project is necessary to calculate a power loss factor due energy loss through transmission line, this factor is calculated with the following equation: $$X_{Loss} = \frac{EG_{DP}}{\sum_{m} EG_{m,WF}} \qquad (8)$$ Where: X_{Loss} = Losses factor due energy loss through transmission line. EG_{DP} = Net energy measure at the Substation/ Delivery Point (MWh). $EG_{m,WF}$ = Gross energy measure by each wind farm (connected to the same transmission line) at the exit of the wind farm (MWh), including the project activity. The variables X_{Loss}, EG_{DP} and $EG_{m,WF}$ are defined in this section. The energy dispatched by the project's activity will be monitored using official measurements in accordance with the procedures established by the National Operator of Electric Systems "Opérador Nacional do Sistema Eléctrico" ONS . Extra information: • Number of meters: 2 meters outside wind farm (1 main, 1 backup), and 2 before the substation for the net energy of the entire transmission line (1 main, 1backup). • 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 be made with the energy measured and the report of energy produced published by the CCEE (Chamber of Power Commercialization).
Any comment:	The data will be archived in electronic way. Archived data will be kept during the crediting period and two years after.

Data / Parameter:	$\mathbf{EF_{grid, CM,y}}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"
Source of data to be	Estimated figure based on 75% of OM and 25% of BM values

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	**0.379 tCO_2/MWh.** This value will change because the emission factor is expost and need to be updated yearly, with the latest available data of the OM and BM.
Description of measurement methods and procedures to be applied:	It is calculated by the DNA using the Tool to calculate the emission factor for an electricity system (Version 02.2.0) with 1 year vintage data and option of ex post calculation based on 75% of OM and 25% of BM values approach. Computed once during PDD finalization.
QA/QC procedures to be applied:	N/A
Any comment:	**N/A**

Data / Parameter:	**$EF_{grid,OM,y}$**
Data unit:	tCO_2/MWh
Description:	Operating Margin of the National Interconnected System, obtained with the dispatch method by the Brazilian DNA
Source of data to be used:	Monthly values are available in the DNA web page. http://www.mct.gov.br/index.php/content/view/327118.html#ancora[30]
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Due to variations in the production of electricity. Operating margin is derived from a weighted average of the energy produced and the emission factor provided by the DNA. See annex 3
Description of measurement methods and procedures to be applied:	The weighted average is calculated by the next equation: $EF_{grid,OM,y}$ = sum (Net monthly generation*Monthly $EF_{grid,OM}$)/ (Net year energy)
QA/QC procedures to be applied:	N/A
Any comment:	**N/A**

Data / Parameter:	**$EF_{grid,BM,y}$**
Data unit:	tCO_2/MWh
Description:	Build Margin of the National Interconnected System, published by the Brazilian DNA
Source of data to be used:	The build margin is available in the DNA web page. http://www.mct.gov.br/index.php/content/view/303076.html#ancora[31]
Value of data applied for the purpose of calculating expected	For the year 2009 the build margin is 0.0794 tCO2/MWh. This value will change in the future because the emission factor is calculated expost.

[30] The Ministry of Science and Technology webpage is constantly updated; therefore, sometimes this link can fail. The value of the $EF_{grid,OM,y}$ was certified by Tüv Nord.

[31] The Ministry of Science and Technology webpage is constantly updated; therefore, sometimes this link can fail. The value of the $EF_{grid,BM,y}$ was certified by Tüv Nord.

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The Brazilian DNA yearly calculates the build margin.
QA/QC procedures to be applied:	N/A
Any comment:	**N/A**

Data / Parameter:	**EG_{DP}**
Data unit:	MWh
Description:	Net energy measured at the substation/delivery point.
Source of data to be used:	Data monitored in the meter installed in the substation João Câmara (Delivery Point of Energy).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This variable will be monitored; therefore, there is not an expected value to apply until the project activity begins to operate.
Description of measurement methods and procedures to be applied:	The energy dispatched will be monitored using official measurements in accordance with the procedures established. Extra information of meters: • 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 the net energy generated by the project activity. The measurement equipment will be properly calibrated and checked periodically for accuracy.
Any comment:	**N/A**

Data / Parameter:	**$EG_{m,WF}$**
Data unit:	MWh
Description:	Gross energy measure by the project wind farm at the exit of the wind farm (MWh), including the project activity.
Source of data to be used:	Data monitored in the exit of the wind farm.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This variable will be monitored; therefore, there is not an expected value to apply until the project activity begins to operate.
Description of measurement methods and procedures to be	The energy dispatched will be monitored using official measurements in accordance with the procedures established. Extra information of meters:

applied:	• 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 the net energy generated by the project activity. The measurement equipment will be properly calibrated and checked periodically for accuracy.
Any comment:	**N/A**

Data / Parameter:	**X_{Loss}**
Data unit:	Dimensionless
Description:	Losses factor due energy loss through transmission line.
Source of data to be used:	Relation between the energy measured in the delivery point and the sum of all energy measured in each wind farm. $X_{Loss} = \frac{EG_{DP}}{\sum_m EG_{m,WF}}$ (8)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This variable will be calculated after the measure of energy in the wind farm and substations has been realized.
Description of measurement methods and procedures to be applied:	The energy dispatched will be monitored using official measurements in accordance with the procedures established. Extra information of meters: • 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 the net energy generated by the project activity. The measurement equipment will be properly calibrated and checked periodically for accuracy.
Any comment:	**N/A**

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 Cabeço Preto 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-post.* The DNA website contains the value of the operating margin in a monthly period. Then the weighted average of the operating margin emission factor is calculated and the latest available value in the verification period will be used.[32]

Build margin emission factor

The build margin is considered *ex- post*. In this case, the latest available value in the verification period will be used.[33]

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 ONS 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 National Interconnected System and data published in the CCEE report of energy produced.
- In the event that a 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 CCEE report.
- Measurements of energy delivered by the project activity to the national grid will be recorded and compared every month with data published in the CCEE 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.

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[32] The Ministry of Science and Technology webpage is constantly updated; therefore, sometimes this link can fail. The value of the $EF_{grid,OM,y}$ was certified by Tüv Nord.
Interministerial Commission on Global Climate Change CIMGC available at:
http://www.mct.gov.br/index.php/content/view/74689.html

[33] The Ministry of Science and Technology webpage is constantly updated; therefore, sometimes this link can fail. The value of the $EF_{grid,BM,y}$ was certified by Tüv Nord.
Interministerial Commission on Global Climate Change CIMGC available at:
http://www.mct.gov.br/index.php/content/view/74689.html

Undertake calculations using a Data Management System (DMS)

- A data management system has been prepared to ensure that all calculations are undertaken automatically and adequately stored, recorded and controlled, and could therefore be appropriately verified. This system is structured in spreadsheets, validated data, as mentioned above.

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 ONS/CCEE 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.

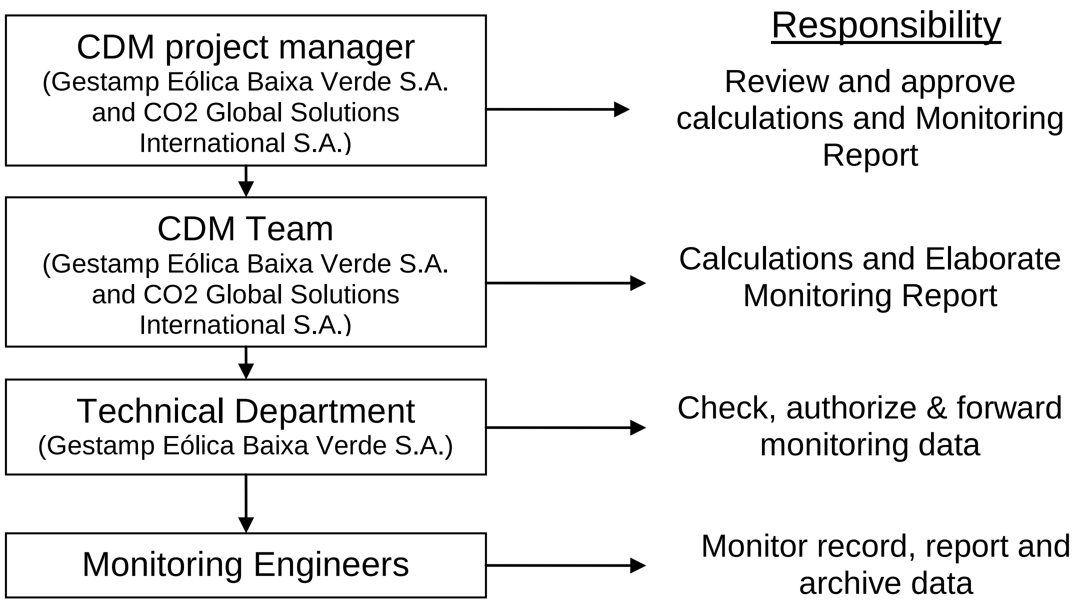

Figure 9. Flow diagram of monitoring emissions

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 15. Emission Monitoring and Calculation Procedure.

The figure below shows the layout of the project with turbines, meters and point of delivery.

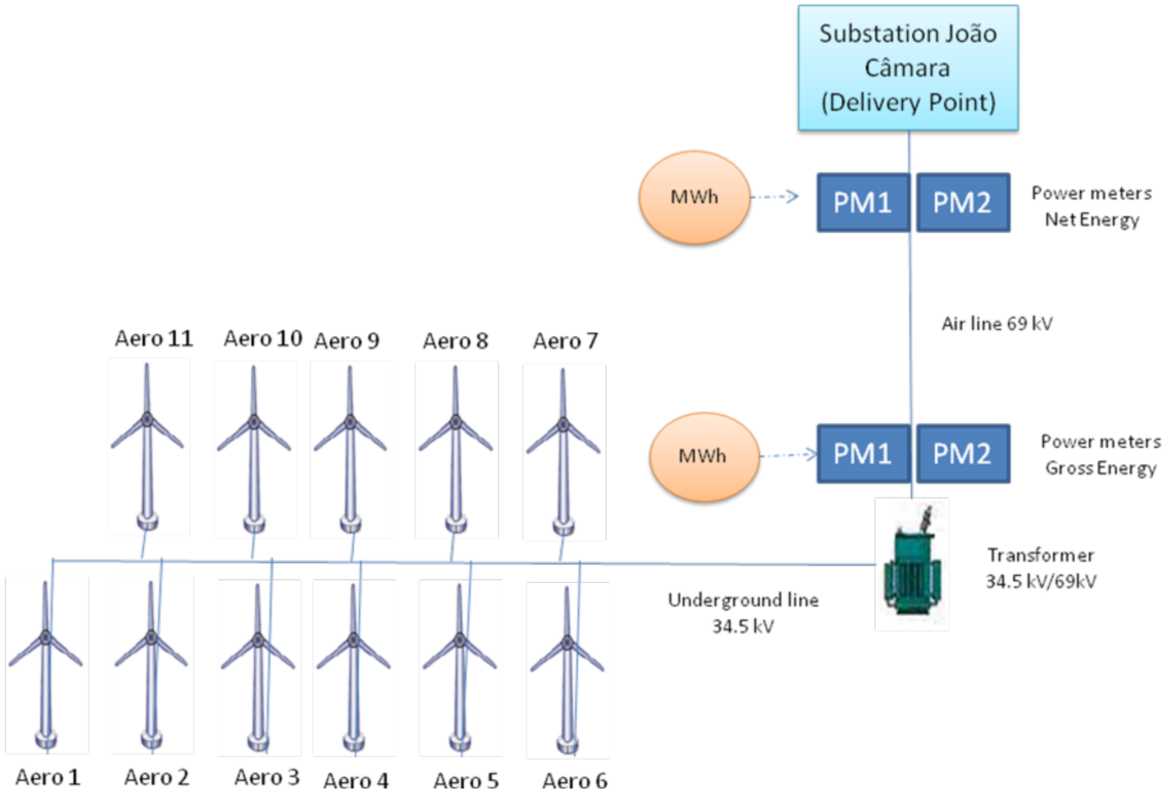

Figure 10. Simplified wiring diagram.

As seen in Figure 10, there will be two meters at the beginning of the substation and two additional meters at the exit of the wind farm. This is carried out in order to know the generated power for the wind farm and prevent a future problem if a new wind farm is connected to the same transmission line Monitoring of the electricity produced is made in accordance with regulations of the country; these regulations are stated by the CCEE.

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: 22/05/2010

Alfonso Lanseros Valdés
Partner consultant
infocdm@co2-solutions.com
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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:

26/03/2010

On this date the project owner made a the first major financial commitment of project owner, Gestamp Eólica Baixa Verde S.A. made a deposit for Bid Price Guarantee, corresponding to 5% of total investment of the project, this payment is required by the government as pre-requisite for granting the official authorization for project implementation according to the rules set out in the energy Auction Edict, at which the project bid for energy price was a winner.

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

The project activity is expected to have a minimum lifetime of 20 years[34].

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:

01/01/2012

C.2.1.2. Length of the first crediting period:

Gestamp Eólica Baixa Verde S.A. will select 7 years 0 months renewable crediting period.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A

[34] The estimation is based on the technical information stated for the supplier. See Brochure Vestas V90-1.8MW by Vestas, page 13.

SECTION D. Environmental impacts

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

Gestamp Eólica Baixa Verde S.A. elaborate the RAS (Simplified Environmental Report) of the project to reflect the environmental impact of the implantation of the wind farm, this study was a requirement to obtain the environmental license (Process No. 2009-027974/TEC/LP-0028). In this document you can see the physical, social, biological and cultural impacts of the zone where the project will be carried out. Gestamp Eólica Baixa Verde S.A. will generate energy by means of renewable sources, in particular, the wind. The location of the activity of the project will be in João Câmara, Rio do Grande do Norte.

To study the environmental impact they used the "Checklist" method which consists in listing the project activities that can have an effect on the environment where the project is developed. Some attributes were used to characterize the benefit or adverse effects of the project activities, this attributes are: Character, magnitude, size, length, condition or reversibility, order, temporality and scale.

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.

In conclusion, 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:

After the corresponding legal revision, the project of the wind farm of Cabeço Preto obtained the preliminary license issued on July 29,2009 and approved by the IDEMA "Instituto de Desenvolvimento Sustentável e Meio Ambiente do Rio Grande do Norte" (Process No. 2009-027974/TEC/LP-0028).

The final conclusion of the Simplified Environmental Report is that the project presents no significant environmental impact.

In the agreement with the terms and the conditions of the resolution there will be some mitigating measures to diminish the most possible environmental impacts and to benefit more to the society. These actions are performed in accordance with the activities asked for in the final environmental permit issued by the Institute for sustainable Development and Environmental (IDEMA).

SECTION E. Stakeholders' comments

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

Comments from stakeholders were received by means of sending out invitation letters, following the recommendations as defined by the Inter-ministerial Commission on Climate Change. The following stakeholders have been invited:

- City council of João Câmara
- Municipal Chamber of João Câmara
- National Council of Environment
- FBOMS: Brazilian NGO Forum and Social Movements for the Environment and Development
- Institute of Environment
- Public Ministry of the State of Río Grande do Norte.
- Federal Public Ministry.
- Department of Environment and Water Resources - State Government of Rio Grande do Norte

Invitation letters were sent on the June 28, 2010. The DNA of Brazil requested that the PDD document is available on a website; in this case on June 23, 2010 in the CO2 Solutions website the PDD of Cabeço Preto Wind Farm was published in the Portuguese version.

http://www.co2-solutions.com/menu_web/index_menu.asp?cuerpo=xlarge.asp&id_sec=1678&id_web=1

Due to a problem in the CO2 Solution web site, the information was changed to the following link:

http://www.co2-solutions.com/#/brgstmp01/4546777851

Letters could be received within a period of 15 days, according to the recommendations, and copies of the letters with their corresponding AR (confirmation of reception) will be delivered to the Brazilian DNA (Inter-ministerial Commission on Climate Change). Additionally, new letters were sent to the stakeholders to inform about the change of the web link.

E.2. Summary of the comments received:

No comments received.

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

No comments received

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 (GWh):

Hydro Sector (GWh)	
Month	**2010**
Jan	37,586.52
Feb	35,431.87
Mar	39,299.17
Apr	36,035.14
May	35,750.91
Jun	33,115.37
Jul	35,346.34
Aug	33,902.32
Sep	32,438.16
Oct	34,026.46
Nov	33,564.24
Dec	36,396.89

Termic Conventional Sector (GWh)	
Month	**2010**
Jan	1,163.16
Feb	1,556.92
Mar	1,421.98
Apr	1,309.60
May	2,094.10
Jun	3,109.51
Jul	2,980.16
Aug	4,744.83
Sep	5,466.11
Oct	4,890.18
Nov	5,243.13
Dec	3,517.26

Wind Sector (GWh)	
Month	**2010**
Jan	82.38
Feb	109.97
Mar	108.67
Apr	76.13
May	104.70
Jun	108.74
Jul	108.48
Aug	154.10
Sep	193.17
Oct	142.17
Nov	157.93
Dec	125.13

Termo Nuclear Sector (GWh)	
Month	**2010**
Jan	1,463.65
Feb	1,279.66
Mar	1,464.71
Apr	1,130.28
May	1,275.02
Jun	1,424.93
Jul	1,222.67
Aug	1,072.70
Sep	1,332.32
Oct	1,125.40
Nov	434.43
Dec	1,289.32

Source: Opérador Nacional do Sistema Eléctrico (ONS) http://www.ons.org.br/historico/geracao_energia.aspx

Net Monthly Generation of Energy (GWh):

	2010 (GWh)
Jan	40,295.71
Feb	38,378.42
Mar	42,294.53
Apr	38,551.15
May	39,224.73
Jun	37,748.55
Jul	39,657.65
Aug	39,873.95
Sep	39,429.76
Oct	40,184.21
Nov	39,399.73
Dec	41,328.60
Total	476,376.99

Source: Opérador Nacional do Sistema Eléctrico (ONS) http://www.ons.org.br/historico/geracao_energia.aspx

Operation Margin Emission Factor (tCO_2/MWh):

Month	$EF_{grid,OM}$ (tCO_2/MWh)
Jan	0.2111
Feb	0.2798
Mar	0.2428
Apr	0.2379
May	0.3405
Jun	0.4809
Jul	0.4347
Aug	0.6848
Sep	0.7306
Oct	0.7320
Nov	0.7341
Dec	0.6348

Source: Interministerial Commission on Global Climate Change CIMGC at http://www.mct.gov.br/index.php/content/view/327118.html#ancora[35]

Baseline calculations:

- Operating Margin:

Operating Margin = Sum (Net monthly energy * EF monthly)/(Net year energy)

[35] The Ministry of Science and Technology webpage is constantly updated; therefore, sometimes this link can fail. The value of the $EF_{grid,OM,y}$ was certified by Tüv Nord.

All calculations necessary to obtain the operation margin are available in the excel sheet of the project.
$EF_{grid,OM,2010}$= 0.4789 tCO_2/MWh

- Build Margin:

$EF_{grid,BM,2009}$= 0.0794 tCO_2/MWh

Source: Interministerial Commission on Global Climate Change CIMGC at
http://www.mct.gov.br/index.php/content/view/303076.html#ancora[36]

Emission factor ex-post = 0.75*OM+ 0.25*BM = 0.379 tCO_2/MWh

[36] The Ministry of Science and Technology webpage is constantly updated; therefore, sometimes this link can fail. The value of the $EF_{grid,BM,y}$ was certified by Tüv Nord.

Annex 4

MONITORING INFORMATION

A. Measuring and calculation procedure.

1. Measuring.

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

Personnel of the Operation Department will be trained continuously. In case new personnel are hired, they will have to follow a training program and will be formed in the specific skills required to carry out the Monitoring Plan.

2. Calculation of energy generation to be monitored:

There will be two meters at the exit of the wind farm and two meters in the substation (delivery point), the meters in the wind farm will measure the gross energy and the meters in the substation will measure the net energy. In the event that a meter malfunctions, it will use the backup meter readings. When the main meter is repaired, the main meter measurements will be used. And in the case that both meters do not operate the information of the energy generated will be obtained from the CCEE report.

In addition to this project, there are other projects that are estimated to operate at the same time and these projects will also join the same transmission line. If all projects are joining the same transmission line, the meters at the substation may not only measure the net energy of the project Cabeço Preto Wind Farm, for this reason the following calculation is proposed to measure the net energy of the project.

In order to calculate the net energy of the project it is necessary to calculate a power loss factor due to energy loss through transmission line, this factor is calculated with the following equation:

$$X_{Loss} = \frac{EG_{DP}}{\sum_{m} EG_{m,WF}} \quad (8)$$

Where:

X_{Loss} = Losses factor due energy loss through transmission line.
EG_{DP} = Net energy measure at the Substation/Delivery Point (MWh).
$EG_{m,WF}$ = Gross energy measure by each wind farm at the exit of the wind farm (MWh).

With the calculation of the loss factor to obtain the net energy of the wind farm will be calculated by the following:

$$EG_{facility,y} = X_{Loss} * EG_{m,WF} \quad (9)$$

Where:

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

X_{Loss} = Losses factor due energy loss through transmission line (calculated in equation 8).
$EG_{m,WF}$ = Gross energy measure by the project wind farm at the exit of the wind farm (MWh), including the project activity.

The sum of the net electricity generation of each wind farm (connected to the same transmission line) using the equation 9 will cross check with the report published by the CCEE.

Calculation of emission reductions.

Cabeço Preto 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	**379**	A* 379

The value of 379 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 CCEE regulation.
   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 Cabeço Preto 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 CCEE.

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.