**PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Renascença and Ventos de São Miguel Wind Power Bundled Project
Version number of the PDD	Version 9.1
Completion date of the PDD	10/12/2013
Project participant(s)	Energisa Geração – Central Eólica Renascença I S/A, Energisa Geração – Central Eólica Renascença II S/A, Energisa Geração – Central Eólica Renascença III S/A, Energisa Geração – Central Eólica Renascença IV S/A, Energisa Geração – Central Eólica Ventos de São Miguel S/A, Zeroemissions do Brasil Ltda.
Host Party(ies)	Brazil (host)
Sectoral scope and selected methodology(ies)	Scope 01: Energy Industries (renewable/non-renewable sources). Methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources --- Version 13.0.0”, EB67, Annex 13.
Estimated amount of annual average GHG emission reductions	269,364 tCO2e

SECTION A. Description of project activity
A.1. Purpose and general description of project activity

The project activity comprehends the generation of electricity through renewable sources (wind) and is located at João Câmara and Parazinho cities, Rio Grande do Norte State in the Northeast region of Brazil. When the project becomes operational, the total installed capacity of 150 MW will collaborate with the Brazilian energetic matrix diversification since the dependency of other energy sources, including fossil fuels, will be reduced.

This project consist of five wind farms: Renascença I (R-I), Renascença II (R-II), Renascença III (R-III), Renascença IV (R-IV) and Ventos de São Miguel (VSM). Each wind farm is composed by 15 wind turbines generators with 2.0 MW of rated capacity each one, resulting in 30 MW of installed capacity each park. All electricity generated by the project will be delivered to the SIN (*Sistema Interligado Nacional*)- National Interconnected System in Brazil (national electricity grid) through the João Câmara II sub-station[1].

Table 01 below shows the capacity factor for each wind farm, represented by the P50 probability scenario as per the results of the independent wind energy certification/assessment performed by the independent 3rd party certification body Det Norske Veritas (DNV).

Table 01. Plant Load Factor for Renascença and Ventos de São Miguel wind farms.

Wind farm	Capacity Factor (P50)
Renascença I	50.9
Renascença II	48.8
Renascença III	43.3
Renascença IV	43.9
Ventos de São Miguel	46.9

The average capacity factor of the project is estimated to be approximately 46.76%, resulting in a projected average generation (P50[2]) of 614,426 MWh/year. Consequently, it will achieve an estimated emission

[1] The construction work for the project activity started in January 2012 and was finalized in August 2013. The project activity has a valid operational licence. However, due to an unexpected delay in the construction of the high voltage transmission line network to cover the region where the project activity is located, the conclusion of the connection of the project activity to the National Electricity Grid of Brazil is thus delayed. Due to that, as per the latest valid and revised time plan forecasts, the wind farms encompassed by the project activity are currently expected to start to operate in beginning of year 2015 (when the currently delayed construction of the high voltage transmission line network and connection of the project to the grid are forecasted to be concluded). It is crucial to note that the transmission lines of which construction are delayed are not part of the project activity. Furthermore, the implementation of such transmission lines are not under control or influence of the project participants. However, they are instrumental to the project activity being effectively connected to the National Electricity Grid of Brazil and have electricity being generated by the project activity and exported through the grid as per applicable connection requirements and rules set by the Brazilian Electricity Regulatory Agency (ANEEL).

[2] Probability scenario (P50): Probability scenarios refer to the probability of a given forecasted power generation amount actually occurring. As per the illustrative example above, if the P50 probability scenario is 614,426 MWh of annual production, there is 50% probability actual production will be higher than the referred electricity generation (MWh). The assured energy have been calculated based on the P50 energy production estimate "Certified Energy Production Study", produced by independent entities. Another commonly used parameter is P90. Using P90, the risk that a stated annual electricity production is not reached is 10%. Therefore, P90 means a lower estimated electricity production value, and therefore is more conservative from an electricity production point of view. Therefore, P50 is less conservative, because it means that the stated production is higher than when using P90. The P50 values are

reduction of 269,364 ton of CO_2 per year. The P50 used above refers to a more updated value. However, the one used in the financial analysis refers to the P50 available before the project start date.

The following characteristics demonstrate the ways in which this project implementation may contribute towards sustainable development:

- Contribution to local environmental sustainability: the project activity will generated renewable electricity from low environmental impact wind power plants. Additionally it will reduce land use and promote compatibility with other activities such as livestock, agriculture, fish farming, among others;
- Contribution to net workplace generation: Direct and indirect employment generation and regional socioeconomic development, through income increase and taxes revenues;
- Contribution towards better revenue distribution: the use of a renewable resource to generate electricity decreases the dependence upon fossil fuels, and its associated pollution and social costs;
- Contribution towards the diversification of the electricity mix and towards energetic security: The period when there is the greatest abundance of wind resources is coincident with the period of the smallest hydraulic availability in Brazil. Hence, wind-based electricity generation is seen as complementary to hydroelectricity, which contributes to the security of renewable electricity supply throughout the year and, hence, to the diminishment of the dependence upon fossil fuels during the dry season.
- Contribution to technological learning and technological development: the successful development of the proposed project activity will serve as an example for the expansion of this technology, both at a local and national level.
- Contribution to regional integration and linkage with other sectors: local infrastructure improvement, with the construction, restoration and maintenance of roads and electric power generation, which may be utilized by the surrounding municipalities of the project. Furthermore, it will attract new investments to the project region.

A.2. Location of project activity
A.2.1. Host Party(ies)

Brazil.

A.2.2. Region/State/Province etc.

Rio Grande do Norte State.

A.2.3. City/Town/Community etc.

João Câmara and Parazinho cities.

A.2.4. Physical/Geographical location

Renascença (I to IV) and Ventos de São Miguel Wind Power Plants are located in João Câmara and Parazinho cities, Rio Grande do Norte State, Northeast region of Brazil (figures 01 and 02).

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used because it is the value employed in the financial analysis. From a CDM perspective, if the P90 would be used in the financial analysis, the IRR would be lower, because the estimated electricity production is lower when using P90 values. Therefore, using P50 values for estimated electricity generation is a more conservative approach for performing the investment analysis from a CDM perspective, and that is why it is used in this PDD.

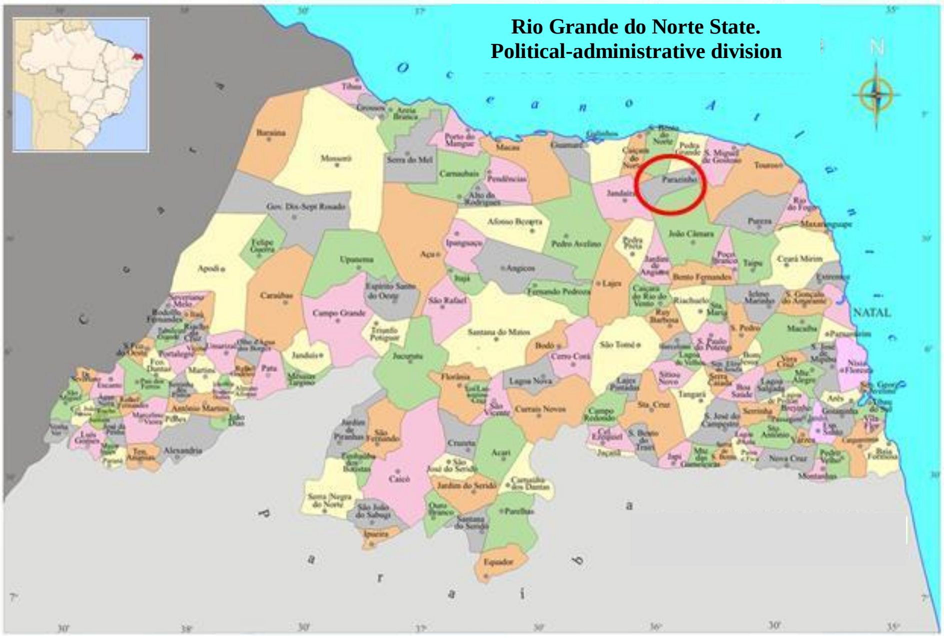
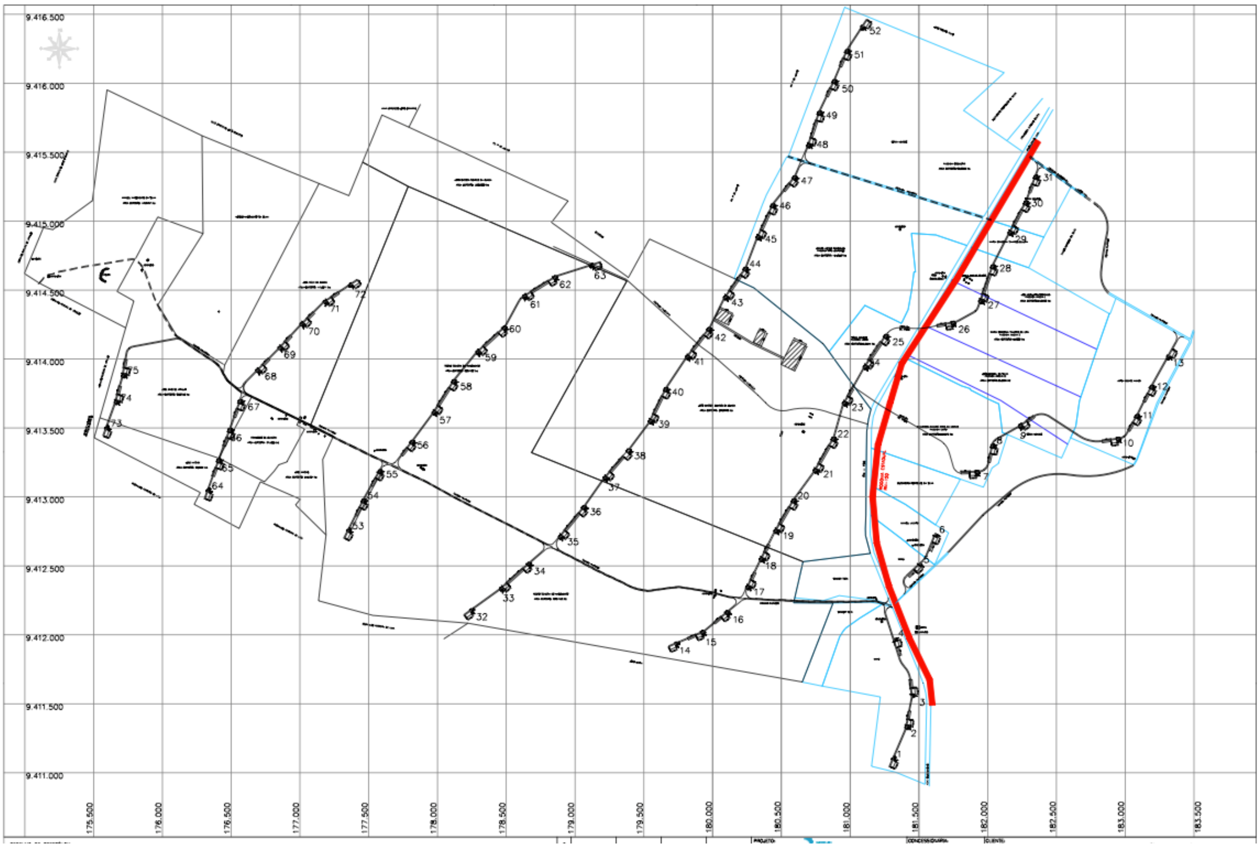


Figure 01. João Câmara and Parazinho cities location (surrounded by red circle) and Rio Grande do Norte State location (red color) within Brazilian map (top left map).

Figure 02. Renascença (I to IV) and Ventos de São Miguel wind power plants location.



Each wind farm has the following windmills, corresponding to the numbers in figure 02:

Renascença I	1 , 2 , 3, 4, 5 6, 7, 8, 9, 10, 11, 12, 13, 24 and 25
Renascença II	14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 39, 40, 41, 42, 43
Renascença III	37, 38, 32, 33, 34, 35, 36, 56, 57, 58, 59, 60, 61, 62, 63
Renascença IV	67 , 74, 75, 68, 69, 70, 71, 72, 66, 64, 65, 73, 53, 54 e 55
Ventos de São Miguel	26, 27, 28, 48, 49, 50, 51, 52, 29, 30, 31 44, 45, 46 e 47

To indicate the exact geographic location of the project activity, an imaginary polygon connecting the perimeter of the project is established. Such points are windmill 52 (most Northern windmill), 63, 72, 75, 73 (most Western windmill), 64, 53, 32, 14, 1 (most Southern windmill), 13 (most Eastern windmill) and 31.

Table 02. Geographical Coordinates

Windmill #	Longitude	Latitude
52	-35.877	-5.272
63	-35.893	-5.288
72	-35.909	-5.290
75	-35.925	-5.294
73	-35.927	-5.299
64	-35.919	-5.303
53	-35.910	-5.306
32	-35.903	-5.311
14	-35.889	-5.313
1	-35.875	-5.321
13	-35.856	-5.294
31	-35.866	-5.283

João Câmara city is located in the Northeast part of Rio Grande do Norte State with 32,203 inhabitants according to the Brazilian Institute of Geography and Statistics – IBGE in 2010[3]. João Câmara municipality area corresponds to 715 km^2 [4].

[3] IBGE – Instituto Brasileiro de Geografia e Estatística. The 2010 Census Collection. Available in: http://www.ibge.gov.br/censo2010/primeiros_dados_divulgados/index.php?uf=24. Accessed in: 30 May, 2011.

[4] Joao Câmara area. Available in: http://www.cmjoaocamara.rn.gov.br/historia_estatisticas.php . Accessed in: May 30, 2011.

Parazinho city is located in the Northeast part of Rio Grande do Norte State with 4,845 inhabitants according to the Brazilian Institute of Geography and Statistics – IBGE in 2010[5]. Parazinho municipality area corresponds to 274 km^2 [6].

A.3. Technologies and/or measures

Wind is the flow of gases on a large scale. Wind energy is the kinetic energy of the air in motion. Wind power is the conversion of wind energy into a useful form of energy, such as using wind turbines generators to make electricity[7].

Environmental benefits of wind-based electricity generation recognizably include: contribution for atmospheric emission reductions (including non-GHG gases) by thermoelectric plants, smaller demand for the construction of new large hydropower plants reservoirs, and the reduction of the risk derived from hydrological seasonality, in light of the aforementioned complementary nature of wind-based and hydroelectric electricity generation in Brazil[8].

Amongst the main negative environmental impacts of wind power plants noise generation can be highlighted. Noise is generated by the movement of the blades and varies according to the equipment specifications. Also, it could be mentioned the possibility of electromagnetic interference, which may disturb communication and data transmission systems. Such interferences are particularly related to the material used in the manufacture of the blades. Additionally, possible interference upon bird routes should be considered[9].

The project activity encompasses electricity generation through the wind farms, which will be connected to the SIN grid through the João Câmara II power substation when the high voltage transmission line network becomes available. Each wind farm includes 15 wind turbines generators of the type V100 2.0 MW 60 Hz Grid Streamer with 2,000 kW of rated capacity each one, manufactured by Vestas Wind Systems A/S, resulting in 30 MW of installed capacity for each farm. Five wind farms, all together (R-I, R-II, R-III, R-IV and VSM) are responsible for the total of 150 MW of installed capacity at Parazinho and João Câmara cities, Rio Grande do Norte State, Brazil.

Energisa S.A (through the companies established for this purpose: Energisa Geração - Central Eólica Ventos de São Miguel S.A., Energisa Geração - Central Eólica Renascença I S.A., Energisa Geração - Central Eólica Renascença II S.A., Energisa Geração - Central Eólica Renascença III S.A. and Energisa Geração - Central Eólica Renascença IV S.A.) has contracted Vestas do Brasil for the supply, installation and commissioning of the turbines.[10]

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[5] IBGE – Instituto Brasileiro de Geografia e Estatística. The 2010 Census Collection. Available in: http://www.ibge.gov.br/censo2010/primeiros_dados_divulgados/index.php?uf=24. Accessed in: 30 May, 2011.

[6] Parazinho area. Available in: http://www.cprm.gov.br/rehi/atlas/rgnorte/relatorios/PARA098.PDF . Accessed in: May, 30, 2011.

[7] Wind power definition. Available in: http://www.aneel.gov.br/aplicacoes/atlas/pdf/06-Energia_Eolica(3).pdf Accessed in: May 27, 2011.

[8] ANEEL - Agência Nacional de Energia Elétrica, Atlas de Energia Elétrica do Brasil. Available in: http://www.aneel.gov.br/aplicacoes/Atlas/download.htm. Accessed in: August 25, 2011.

[9] ANEEL - Agência Nacional de Energia Elétrica, Atlas de Energia Elétrica do Brasil. Available in: http://www.aneel.gov.br/aplicacoes/Atlas/download.htm. Accessed in: August 25, 2011.

[10] Vestas. Available in: http://www.vestas.com/Default.aspx?ID=10332&action=3&NewsID=2630 . Accessed in May 30, 2011.

Vestas is one of the world's leading wind turbine suppliers with over 43,000 wind turbine installations in sixty five countries across five continents[11].

Vestas wind turbines are checked and tested at its test centers, after which the results are verified and certified by independent organizations. They also continuously monitor a large number of the turbines in operation, both to determine how the turbine design can be optimized and to use the data and knowledge to make turbine operation even more reliable and cost-effective.

The company has an extensive portfolio of turbines which are suited to specific conditions and requirements.

The following table and figure shows the technology applied by each wind farm.

Table 03. Technical data[12] by each wind power plant

Turbine	
Model	V100-2.0MW Grid Streamer
Rated capacity (kW/turbine)	2,000
IEC wind class	IEC II[13]
Rotor	
Diameter (m)	100
Swept area (m^2)	7,850
Number of blades	3
Nominal revolutions	14.9
Tower	
Hub height (m)	95
Operational Data	
Cut-in wind speed (m/s)	3.0
Cut-out wind speed – 10 min avg. (m/s)	20
Rated wind speed (m/s)	12.5
Blades	
Type description	Airfoil shells bonded to supporting beam
Blade description	49 m
Material	Fibre glass reinforced epoxy and carbon fibres
Blade connection	Steel roots inserted
Chord	3.9 m

[11] Vestas. Available in: http://www.vestas.com/en/about-vestas/profile.aspx. Accessed in May 30, 2011.
[13]Document sent to the DOE at CAR 21: General Specification V100-2.0 MW.
[13] It is mentioned on pages 24 of the General Specification mentioned on the previous footnote.

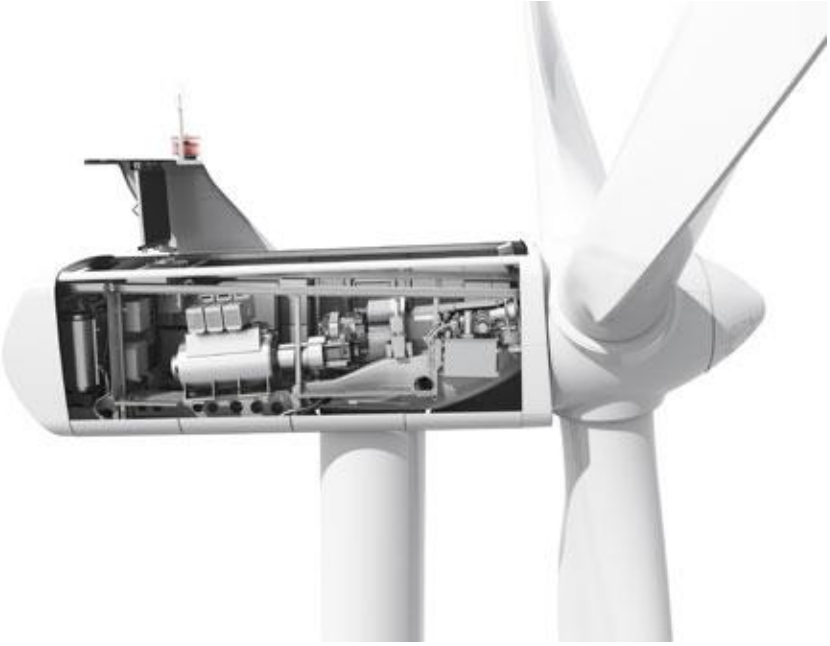

Figure 03. Schematic design of the turbine V100-2.0MW Grid Streamer.

During construction and operational phases of the project activity, potential interferences with the environment were/will be minimized through the adoption of mitigation and environmental control measures. The environmental impacts of the project activity are summarized in Section D. The information provided above demonstrates that the project activity employs environmentally safe and sound technology.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil (host)	Energisa Geração – Central Eólica Renascença I S/A	No
	Energisa Geração – Central Eólica Renascença II S/A	
	Energisa Geração – Central Eólica Renascença III S/A	
	Energisa Geração – Central Eólica Renascença IV S/A	
	Energisa Geração – Central Eólica Ventos de São Miguel S/A	
	Zeroemissions do Brasil Ltda.	

A.5. Public funding of project activity

The project will not receive any public funding from Parties included in Annex I of the UNFCCC.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

The approved consolidated baseline and monitoring methodology utilized for the project activity is the ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources -Version 13.0.0", EB67, Annex 13[14].

This methodology also refers to the approved versions of the following tools. Below are the ones applicable in the context of the project activity:

- "Tool to calculate the emission factor for an electricity system", version 4.0, EB75, Annex 15[15].
- "Tool for the demonstration and assessment of additionality", version 07.0.0, EB70, Annex 08[16].

B.2. Applicability of methodology

The approved methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (version 13.0.0) is applicable to this project activity since:

- It is a grid-connected renewable power generation project activity that encompasses five new power plants at a site where no renewable power plant was operated prior to the implementation of this project activity;

- This project activity does not involve hydro power plant. It corresponds to five new wind power plants and, consequently, does not present any restriction regarding to the reservoir volume and/or power density;

- The proposed project does not involve switching from fossil fuel to renewable energy sources at the site of the project activity;

- This project activity does not correspond to a biomass fired power plants. It includes five new wind power plants: Renascença I, Renascença II, Renascença III, Renascença IV and Ventos de São Miguel.

[14] ACM0002 – Available in: http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT. Accessed in: July 5th, 2011.
[15] Available in: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf Accessed in: November 14th, 2013.
[16] Available in: http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf. Accessed in: July 23rd, 2013.

B.3. Project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	No	Not included. The project does not encompass use of geothermal energy source.
		CH_4	No	Not included. The project does not encompass use of geothermal energy source.
		N_2O	No	Not included. The project does not encompass use of geothermal energy source.
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Not included. The project does not encompass use of geothermal or solar energy sources.
		CH_4	No	Not included encompass use of geothermal or solar energy sources.
		N_2O	No	Not included. encompass use of geothermal or solar energy sources.
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	Not included. The project does not encompass use of hydraulic energy source.
		CH_4	No	Not included. The project does not encompass use of hydraulic energy source.
		N_2O	No	Not included. The project does not encompass use of hydraulic energy source.

"The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to", in accordance with the approved consolidated baseline methodology ACM0002 (version 13.0.0). The project boundary is presented in Figure 04.

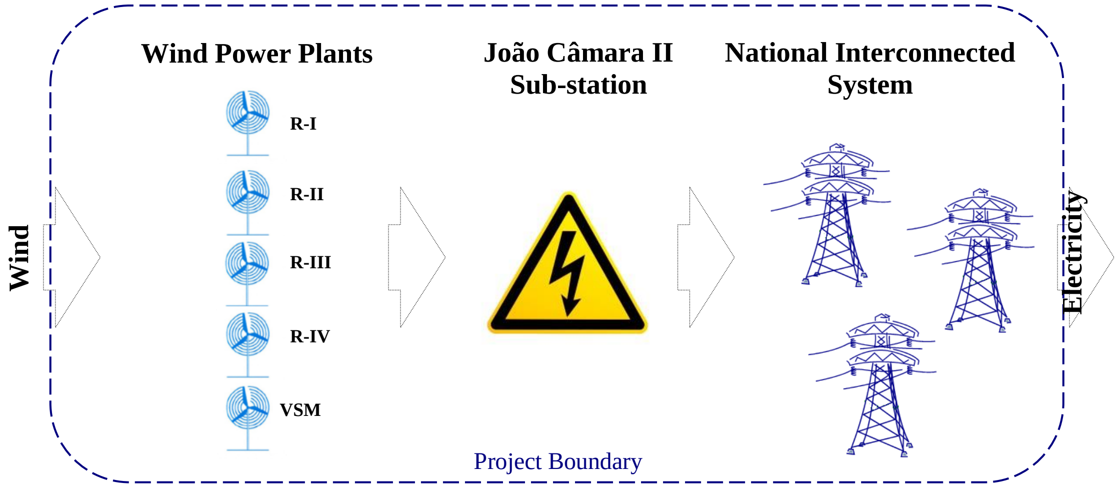

Figure 04. Project Boundary of Renascença and Ventos de São Miguel Wind Power Plants

B.4. Establishment and description of baseline scenario

According to description of the approved methodology ACM0002 (version 13.0.0), if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

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

According to this, the baseline scenario for the proposed project activity is the Brazilian national grid.

B.5. Demonstration of additionality

Prior consideration of CDM

The following table indicates the timeline of relevant milestones for the Renascença and Ventos de São Miguel project development.

Table 05. Renascença and Ventos de São Miguel project timeline.

Time	Events and comments
30/10/2009	Non-disclosure Agreement signed between Energisa and Zeroemissions
13/11/2009	Zeroemissions sending contract model for the development of CDM project consulting.
13/08/2010	As an outcome of performed preliminary assessments, the independent 3rd party certification body DNV issues the preliminary and initial report for the performed wind energy assessments for the 5 wind farms encompassed by the project activity. This preliminary and initial report includes the forecasted P50 capacity factors for the wind farms which were considered for the financial structuring of the project.

26/08/2010	Date of electricity future supply and commercialization auction (start date of the project)[17]
10/11/2010	Zeroemissions sending proposals for the development of CDM project consulting.
08/12/2010	As outcome of performed complete assessments, the independent 3rd party certification body DNV issues the final and complete reports for the performed wind energy assessments for the 5 wind farms encompassed by the project activity. These reports include the revised forecasted P50 capacity factors for the wind farms.
12/01/2011	CDM prior consideration was published in UNFCCC.
24/01/2011	CDM prior consideration receipt was confirmed by Brazilian DNA.
30/03/2011	Turbines commercial agreement between Vestas do Brasil and Energisa Geração was signed.
06/06/2011	Contract between Zeroemissions do Brasil and Energisa Geração for CDM consultancy was signed.
12/08/2011	DOE Validation contract was signed
03/12/2011	Publication of PDD at UNFCCC website as initial step of the validation assessment.
January – August 2012	Construction of the 5 wind farms started between those months. The construction of the access roads is considered the start of the construction phase.
April – July 2013	The 5 wind farms get operation license
26/08/2013	ANEEL, the regulator, confirms that there are no issues pending in the implementation of the wind farms. The construction phase of the project activity is thus concluded.
January 2015	The construction of a high voltage transmission line network covering the region where the project activity is located is estimated to be concluded. This will allow the project activity to be connected to the National Electricity Grid of Brazil and to start operating.

[17] Energisa bought the project in 2009 for 20.4 M BRL. The 20.4 M BRL project purchase costs are considered sunk costs, because they could not be recovered. It was the cost of the development of a green field project in those initial stages. This cost was associated to:

- Prospecting.
- Measurement program.
- Land titling.
- Environmental assessment + previous environmental license.
- Other.

However, the investment decision was only taken once the energy sale took place in 2010. Renascença I to IV participated in the electricity future supply and commercialization auction in 2009, but they were not successful in selling its energy. Therefore, in 2009 the project was not feasible. Also a letter is included as an evidence that proves that even if the project was still not feasible in 2009, Energisa considered the carbon credits from the very beginning. The project does not become feasible only with the sale of the carbon credits. It needs an arrangement where the CAPEX / OPEX / Income are vital for its feasibility. Energisa made the prior consideration to the UNFCCC once the CAPEX and the income (PPA of the auction + potential carbon credits sale) were defined.

Therefore, we can conclude that the date when REN I to IV and VSM project became feasible is August 2010, when it was actually negotiated electricity future supply and commercialization as part of an auction. It was then when the actual investment decision was taken. Before the decision to invest more than 500 million BRL was not made. Besides, sunk costs were not included in the financial analysis because it followed the recommendations done by EB 62, Annex 5, Paragraph 6: "*Any expenditures occurred prior to the decision to proceed with the investment in the project will not impact the final investment decision as such expenses sunk costs which remain unaffected by the decision to proceed or not with a project activity*". Evidences to prove the above were provided to the DOE.

Accordingly to the approved methodology ACM0002, the latest approved version of the "Tool for the demonstration and assessment of additionality", shall be utilized to demonstrate and assess the additionality. The stepwise procedure of the "Tool for the demonstration and assessment of additionality" is applied as follows:

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The project activity is not regarded as the first-of-its-kind.

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

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

The following scenarios are possible alternatives to the project activity for all project sites as they are all basically the same (same installed capacity):

- The continuation of the current situation, with equivalent amount of electricity being generated by existing electricity generation sources connected to the National Electricity Grid of Brazil and new additions of electricity generation sources.

- The project activity undertaken without being registered as a CDM project activity.

Outcome of Step 1a: Identified realistic and credible alternative scenario(s) to the project activity.

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

All alternatives are consistent with national and local laws and regulations.

Outcome of Step 1b: Identified realistic and credible alternative scenarios to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and Executive Board decisions on national and/or sectoral policies and regulations.

SATISFIED/PASS – Proceed to Step 2

Step 2: Investment analysis

Sub-step 2a. Determine appropriate analysis method

The project will generate financial benefits from the sale of electricity and therefore *simple cost analysis* can not be applied. Also, taking into account that the alternative to the implementation of the project activity is the continuation of the current situation (equivalent amount of electricity being generated by existing electricity generation sources connected to the National Electricity Grid of Brazil and new additions of electricity generation sources), the investment comparison analysis is not appropriate either. Therefore, the appropriate analysis method is the benchmark analysis. (Option III of the Guidelines on the assessment of the investment analysis, version 05 (EB62, Annex 5).

Sub-step 2b: Option III. Benchmark analysis

Identification of the financial indicator

A benchmark analysis is considered as a suitable option for this project, and the project's Internal Return Rate (IRR) is selected as an appropriated financial indicator. The IRR calculation is carried out by considering all five wind farms as a single one (and in individual basis for each one of the wind farms). This is demonstrated to represent a more realistic and conservative approach. The five Wind farms are located in adjoining sites. Due to this characteristic, the five wind farms were developed considering several synergies that in a standalone basis are not feasible. The terms and conditions, including values for CAPEX and OPEX were positively affected by the fact that Energisa negotiated and structured a project of 150 MW, instead of 30 MW[18]. The power connection infrastructure which connects the five wind farms (150 MW) to the yet to be made available high voltage transmission line network covering the region where the project activity is located has its costs (CAPEX and OPEX) shared. The same connection infrastructure costs, which is currently diluted among five wind farms, would be borne by only one wind farm (30 MW) if there wasn't other four wind farms. It has a positive impact on project revenues and consequently in the Project´s Internal Return Rate (IRR).

Figured 1 of the EB's Decision 52, Annex 3, was followed to determine the treatment of national/sectorial policies. In this project it does exist an E- policy for the applicable discount of 50% for applicable power transmission and distribution fees (termed as TUSD and TUST). According to the applicable CDM guidance, as the policy was adopted after November 11th 2001, it was not required to be taken it into account in the investment analysis. However, such valid discount for TUSD and TUST fees are being taken into consideration in the investment analysis as a conservative approach. This decision makes the investment analysis more realistic and even more conservative as it reduces the expected operational cost of the project activity (when compared to a situation not taking into account this sectoral policy in the investment analysis) and therefore increases the project IRR.

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[18] Wind energy investors and practitioners of the emerging wind energy market in Brazil splitting greenfield wind energy projects into set of individual wind farms (with a maximum installed power generation capacity of 30 MW each one) and establishing independent individual business enterprises (normally under the category of special purpose company) for each one of the split wind farms (with the same ownership or identical shareholder structure in most of the cases) has been a market practice. Regardless of existing practical synergies and/or economy of scale when setting the funding structure and operation model for all independents winds farms as a unique larger wind farm, this legally acceptable practice has adopted by investors and players of the emerging Brazilian wind energy market as a window of opportunity for taking relative advantage of an existent applicable regulation set by the Brazilian Electrical Energy Agency (ANEEL) which represents as an incentive/benefit, discounts of 50% for applicable power transmission fees (termed as TUSD and TUST) for grid-connected wind energy power generation enterprises (with nameplate installed power generation capacity not higher than 30 MW). Furthermore, such splitting strategy also allows each individually established power generation business enterprise to have taxes on profits being determined by applying a somehow simplified method (which is termed as per the Brazilian taxation rules as "presumed profit tax calculation approach"). The application of such simplified taxation method may results in improved (lower) final applicable income tax rate for the business enterprises that meets the requirements for this simplified method and it is seen as an advantage. While the fee reduction of 50% for the TUSD and TUST fees (fees for the use of the Distribution System and fee for the use of the Transmission System) applicable for wind energy projects are acknowledged to represent a potential national/sectorial policies to be regarded as an "E-policy" as per the CDM rules, they are however not excluded from the investment analysis as a conservative approach. The business structuring approach applied by the project participants and other wind energy investors and practitioners of the emerging wind energy market in Brazil of splitting their greenfield wind energy projects into a set of individual wind farms (with a maximum installed power generation capacity of 30 MW each one) is not regarded as a "E- policy" since it does not represent any national/sectorial policies.

The business structuring approach applied by the project participants of splitting their green field wind energy projects into a set of individual wind farms (with a maximum installed power generation capacity of 30 MW each one) is not regarded as a "E- policy" since it does not represent any national/sectorial policies.

Identification of the benchmark

The "Tool for the demonstration and assessment of additionality" (Version 07.0.0) 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;

The benchmark analysis is performed comparing the project's IRR to a benchmark. The established benchmark for this comparison is the average yield of a Government Bond rate increased by a suitable risk premium to reflect private investment and/or the project type.

The project participant chose a Brazilian Government Bond named National Treasury Notes, Series B (NTN-B), with maturity on August 15th, 2024. This Bond was previously issued by the Brazilian National Treasury through a Public Offering and its remuneration is indexed to IPCA (*Índice Nacional de Preços ao Consumidor Amplo* – Brazilian Extended National Consumer Price Index) plus a coupon. NTN-B historical yields, presented as the project benchmark, is a liquid and public investment option and its risk is compared to Brazilian sovereign risk. It is considered as a low risk investment if compared to a wind farm investment.

Project participants have decided to use NTN-B with maturity in August 15th, 2024, in order to match as much as possible the investment horizon of the benchmark to project horizon. Project PPA (power purchase agreement) matures in 2032. In 2007 it was released a NTN-B bond with maturity in 2035, but the horizon to calculate its profitability is considered too short if compared with the bond with maturity in 2024, released in March 2006. Besides, the resulting benchmark for those three years is less conservative if compared with the bond with maturity in 2024 for those same three years.

Project participants have also decided to use the six-yearlong historical average yield of the Bond because at the time of the investment decision, Brazilian macroeconomic perspective was not stable. There were a lot of uncertainties about what would be the trend of the interest curve (DI). In this way, the series includes since the beginning of the publication of annual data of the government bond. The bonds started commercialization in October 2003.

Although NTN-B is linked to an inflation index, the market prices its yield in accordance to the interest curves for the same maturity. Please find below the NTN-B historical yield.

Government bond	Index	Maturity	Yield on maturity		
			2004	**2005**	**2006**
NTN-B	IPCA	15/08/2024	20.02%	12.92%	24.24%

Yield on maturity			
2007	**2008**	**2009**	**Average**
19.04%	8.10%	21.91%	**17.71%**

As seen above, there was a lot of volatility in NTN-B performance. The inflation was increasing, and therefore there was the perspective that the government would have to increase the interest rates which directly affect the yield of the bond.

Another argument to use the historical data is that financial literature usually use statistical calculations of historical data to define assumptions of models such as CAPM (Capital Asset Pricing Model).

Such approach has also been used in other registered projects, such a CDM Reference 4676.

Therefore, the project participant has defined the benchmark as the 6 year historical average yield of the NTN-B maturing in 2024.

The table above summarizes the NTN-B historical yield, with detailed calculation included in the spreadsheet "Government bonds benchmark calculation NTN_B":

In this way, the NTN-B government bond (valid until 15/08/2024) was established as the benchmark. The average yield on the NTN-B is 17.71% per year. In order to assure that the chosen methodology is not opportunistic; project participant has decided not to apply a risk premium over the bond yield, resulting in a more conservative approach. The addition of the risk premium would result a higher benchmark.

As the benchmark is calculated in nominal terms, the 6 year average yield has to be calculated in real terms. Therefore the inflation has to be subtracted to get a result in real terms, as the IRR of the project is calculated in real terms. Following the "Guidelines on the assessment of Investment Analysis", version 5, EB 62, Annex 5, the inflation forecast of the Central Bank of Brazil for the duration of the crediting period should be used. As the Central Bank of Brazil doesn't publish such long term predictions (just 2 years in advance), the target inflation rate shall be used. In the case of Brazil, this value was 4.5%, as can be found in the Central Bank's website[19], at the time of the investment decision making.

Therefore, the final benchmark to be used in real terms, to be compared to the IRR of the project, is 12.64% (((1 + 17.71%) / (1 + 4.5%)) - 1). The project's IRR is compared against this benchmark in order to demonstrate the additionality of the project.

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

The annual value of project IRR for the Renascença and Ventos de São Miguel Wind Power Bundled Project corresponds to 7.80 % in real terms, which have been demonstrated in the spreadsheet economic model made available for DOE analysis and enclosed to the PDD. In the investment analysis, applying assumptions and data valid at the time when the decision to implement the project was taken, the start date of the operation of the project activity was considered as being January 2013[20].

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[19] http://www.bcb.gov.br/pec/metas/tabelametaseresultados.pdf

[20] At the time the decision to implement the project was taken, it was estimated that the project construction would be concluded in January 2013. It was also assumed that the currently delayed construction of a high voltage transmission line network, covering the region where the project activity is located, would also be concluded in January 2013, thus allowing the project activity to be connected to the grid and start its operations in January 2013. As per the revised project's construction time plan, the construction phase of the wind farms were concluded in August 2013. However, due to the unexpected delay in the construction transmission line network in the region where the project activity is located (including the transmission lines that will connect the project to the National Electricity Grid of Brazil), the wind farms encompassed by the project activity are currently expected to start its operations in beginning of year 2015.

The input values and assumptions for the IRR calculation are based on the firm's free cash-flow. They are based on the annual cash flow during the project's life. The main financial parameters utilized in the IRR calculation are summarized below.

CAPEX[21] [22]

Financial Parameter	Value	Relevant Reference
Land and other environmental actions	6,436,999 BRL	Energisa (see footnote). It is only 1.2% of the total investment (CAPEX). A letter explaining the process has been provided to the DOE.
Civil Works	74,795,965 BRL	"RESULTADO Civil VESTAS 75 WGT 20 MW 21 08 2010" provided to the DOE.[23]
Wind Tower Generator (WTG)	419,537,300 BRL	Proposal done by Vestas plus others.[24]
Electric Equipment	12,003,592 BRL	Based on proposals presented by WEG, and consolidated by Energisa. Everything has been provided to the DOE.
Engineering	6,479,125 BRL	Energisa (see footnote 23). It is only 1.2% of the total investment (CAPEX).
Connection/transmission System	19,913,874 BRL	Study done by Energisa, reflected in the documents "Orcamento_Sumarizadora" and "Modulação_Orçamento_WEG" based on third party information from WEG. All references have been provided to the DOE.

[21] CAPEX: Capital Expenditures.

[22] The "CAPEX" sheet of the financial analysis has more detail in the document "OPEOL RENASCENÇA 20100824", already provided to the DOE. It is important to mention that some categories were calculated based on the previous experience of Energisa, although it only represents 2.52% of the CAPEX. A letter that explains how those numbers were obtained was provided to the DOE. This way allows the technical office of Energisa to estimate the costs of some categories that are not as relevant in the final amount. However, the most relevant categories, such as the turbines, which include more than 77% of the investment, are justified with third party evidences.

[23] The civil site budget adopted by Energisa adopted the following procedures:

1 – The forwarding of the planimetric project for the VIAs, terrain exploration and general information for the budgets' composition to the proponents;

2 – Receipt of the proposals according to each proponents' quantitative analysis;

3 – The received proposals were equalized in accordance with the wind projects' needs;

4 – For the auctions' composition of an Energisa value, the following actions were taken in order to adopt the reference values:

- 4.1 – Quantitative and unitary values analysis for each proponent. When the quantitative and value are coherent the presented value would be adopted by the company for such service;
- 4.2 – When such quantitative value was not coherent the Energisa quantitative would be adopted based on experience in civil sites and other generation projects developed by Energisa;
- 4.3 – When the value was not coherent, the market value would be applied or a internal costs composition would be made based on specialized magazines such as "Informador das Construções".

[24] The wind tower generator total investment is 401,850,000 BRL. That value is obtained from multiplying the value stated by Vestas (2,679 BRL per kW installed) in the document "Anexo 1 - Proposta 22210-PR-ENE-V100-2.0-95m REV1.pdf" by the total capacity of the wind field. The other costs can be explained from a document called "Planilha de WTG para OPEOL", also provided to the DOE.

Insurance cost	686,584 BRL	Energisa (see footnote 23). It is only 0.1% of the total investment (CAPEX). A letter explaining the process has been provided to the DOE.

It is important to mention that the project has a CAPEX of 3,599.02 kBRL/MW. Considering an exchange rate of 2.00 BRL/USD, the project has a CAPEX of 1,799.51 kUSD/MW. It is within the range of recently registered wind energy projects in Brazil, such as CDM references 5495, 6571, 7012 or 7021. Besides, just for reference, the actual CAPEX in September 2012 was BRL 558.8 million, almost BRL 20 million higher than what was forecasted in 2010. A document has been provided to the DOE. Besides, as explained in the sensitivity analysis, the CAPEX should decrease around 47% percent in order for the project to reach the benchmark. Given the actual expenses up-to-date, it is literally impossible for the CAPEX to decrease enough to reach the benchmark.

OPEX[25]

Financial Parameter	Value	Relevant Reference
Initial Annual Maintenance of the WTG	7,079,452 BRL	Proposal presented by Vestas, and provided to the DOE, plus relevant taxes.
Land Lease	1.5% Net revenue	Land lease contracts provided to the DOE.
Insurance	0.5% of the gross revenue	Based on Energisa experience in similar contracts. A letter explaining the process has been provided to the DOE.
Administrative Fees	0.2% of the gross revenue	Based on Energisa experience in similar contracts.
Regulatory Fees		
CCEE / System Operator – ONS	0.07 BRL/kW	Based on Energisa experience in similar contracts, taking into account CCEE regulations.[26]
Inspection Fee (Economic Benefit)	335.42 Benefit BRL /kW	Agência Nacional de Energia Elétrica – ANEEL. Despacho Nº4.778, of December 23rd 2008. Provided to the DOE.
Inspection Fee (TFSEE)	0.5%	Law 9.427, of 26/12/1996

[25] OPEX: Operating Expense

[26] In relation to the costs of CCEE, our electricity distributor based the price in the following procedure (evidence provided to the DOE):

- Considering the approved annual supply, total costs, both operational and the investment, as well as those resulting from activities developed for the functioning of CCEE, they will be divided among all agents on twelfths, proportionally to the last distribution of votes calculated for the association contribution (100,000 votes).
- Of the 100,000 votes, 5,000 votes will be divided among all CCEE agents. 95,000 votes will be divided among CCEE agents proportionally to the amount of energy sold in the CCEE (based on the results of the last 12 accounted months).
- New generation agents will have the right to vote up to one year prior to the expected date of the start of their facilities, but limited to the division of the 5,000 votes. Additionally, if they would start operation before the expected date, and they would sell energy during that period, they will have the right to participate in the division of the 95,000 votes. If they would delay the start of operations of their facilities, they would be limited to their proportion in the 5,000 votes.

ICG Connection	0.92 BRL/kW	Based on a study done by Energisa, and provided to the DOE[27].

In the investment analysis enclosed to the PDD, the forecasted P50 capacity factor values considered for the 5 wind farms refer to the figures based on information available at the time the electricity future supply and commercialization auction took place (which is the time the decision to implement the project was taken). These values are P50 values based on the outcome of preliminary assessment which were previously performed by the independent 3rd party certification body Det Norsk Veritas (DNV) as reported in a technical report dated 13/08/2010. The forecasted capacity factor values used in other sections of the PDD are P50 values based on the outcome of complete assessments, which were also performed by the independent 3rd party certification body DNV as reported in 5 technical reports dated 08/12/2010. The more recently derived capacity factor values represent the outcome of more detailed and recent assessments which were finalized after the electricity future supply and commercialization auction occurred[28]. The average P50 capacity factor value for the project activity as per the more detailed and recent assessments is slightly higher than previously derived average value: 46.76% against 44.3% respectively. The previously derived P50 capacity factor values are the ones used in the context of the investment analysis as they represent the values which were available and were considered at the time the project financial structuring and investment decision making were performed (at the time of the the electricity future supply and commercialization auction took place in 26/08/2010). Relevant references were provided to the DOE.

The LFA[29] tariff considered in the investment analysis was 141.37 BRL/MWh. Before the auction, the Board of Energisa, considered that value. With that value as reference, it was prepared the financial analysis. However, later on, the auction value was reduced to 136 BRL/MWh. In any case, having the value of 141.37 BRL/MWh only makes the financial analysis more conservative from a CDM point of view, because it considers a higher price for electricity, making the IRR higher. Relevant evidences has been provided to the DOE.

Regarding the income tax, according to the rules set by the Brazilian Tax Authority (Receita Federal), companies having gross income lower than 48 MM BRL are eligible to get a taxation base of 8% for the income tax. It is established in Law 10.637, December 30th, 2002, mainly in article 46. This law establishes the maximum amount that a company can have to belong to a specific regime ("*regime de tributação com*

[27] The name of the document is "ICG - Renanscença - Cálculo do Encargo".

[28] In the context of the investment analysis, the considered values for capacity factor for the 5 wind farms are as follows:

	REN I	REN II	REN III	REN IV	VSM
Previously available capacity factor values (P50)	48.94%	46.74%	43.74%	41.54%	40.44%

In the context of ex-ante estimates of emission reductions to be achieved by the project activity, the considered values for capacity factor of the 5 wind farms are as follows:

	REN I	REN II	REN III	REN IV	VSM
More recent capacity factor values (P50)	50.90%	48.80%	43.30%	43.90%	46.90%

[29] LFA: *leilão de fontes alternativas* (Electricity future supply and commercialization auction for electricity generated from alternative energy sources).

base no lucro presumido"). Decree 3000, article 518, establishes that the calculation base for such regime is 8%.) The "expected profit base – CS" (*base de cálculo da contrubuição social sobre o lucro liquido*) is 12% in the financial analysis. It is established in article 22 of Law 10.684 of 2003, that modifies article 20 of Law 9.249 of 1995.
Regarding the calculation of the salvage value, it has been considered zero because the costs of equipment decommissioning compensate the potential income due to the sale of the wind turbines as scrap material in the end of the project lifetime. A more detail explanation of the main argument is explained in a footnote, and relevant evidences were provided to the DOE[30].

The result of the investment analysis shows that the IRR of the project activity without CER revenues is lower than the selected benchmark value.

Project IRR of 7.80 % < Benchmark rate of 12.64%

Therefore, the conclusion of the performed investment analysis is that the project without CDM incentives is not financially attractive.

[30] To explain why the equipment salvage value is zero, we explain how the uncertainty of repowering, the scrap material value and equipment dismantling costs, leave a scenario where the salvage value for the project can be safely assumed as zero, and even consider it conservative.
Uncertainty of repowering: It should be noted that the actual documented costs of decommissioning wind projects after their design lifetime of 20 years is not generally well known. The turbines that gave birth to the industry as well as the first generation of multi-MW machines in the mid-90s, generally speaking, had a number of drive train problems or were poorly sited and did not make it to the end of the design life. Thus, the cost data is often unreliable in these cases as repowering was undertaken well before the end of life or aggregated with other corrective measures. It should also be noted that Brazil presents a remarkable wind regime in that it is a very benign climate with low extreme load events, generally very low turbulence (the single largest contributing factor to drive train degradation) and stable wind conditions (high k factor on the weibull curve). Therefore, we would expect to see turbines survive longer here than in the icy, high turbulence conditions of traditional markets such as North America, Northern Europe and China. Thus, we should see a higher incidence of repowering and life-extension activities provided that the economics make sense at that time, but there are too many variables to predict the technical-commercial cost-benefit analysis of such a decision today. For instance, once the project is over, electricity tariffs might be significantly affected by the development of more efficient technologies in the generation sector, and therefore is not certain that the repowering of Energisa's project will have economic rationale.
Cost Considerations: A recent study by the Swedish Energy Agency and compiled by Consortis Producentansvar, an energy consultant, showed that a provision of 1-2% of lifetime costs (CAPEX + 20 year OPEX) should be expected to cover full decommissioning costs. Another study provided to the DOE (Universidad de Comillas, page 65) says that decommissioning costs were 3% of the initial investment (CAPEX). Considering a value of 1,077.9 M BRL in our project for CAPEX + 20 year OPEX (539.8 + 538.1), a conservative 1% for decommissioning costs, and 75 WTG, a result of 143,720 BRL (approximately 70,000 USD) per WTG is obtained. In another wind farm (Marble River Wind Farm, page 1) a value of 54,900 USD was considered for each WTG. Then one must consider a certain value for disposal provided that the metal can be scrapped at some reasonable salvage value and you only have to cover transportation. The same source that stated that decommissioning costs were around 3% of the initial investment (Universidad de Comillas, page 58), states that the scrap value would be 2% of the initial investment. In the other study (Marble River Wind Farm, page 1) it is mentioned that the scrap value is 45,000 USD for a turbine very similar to our own. This means that in both cases the scrap values is lower than decommissioning costs.
In sum, analysis of different sources shows good correlation with our assumption in the financial analysis that the demobilization cost might completely offset the scrap revenue; therefore, the salvage value might be zero. This assumption is even conservative from a CDM point of view because a potential cost is excluded from the analysis.

Sub-step 2d: Sensitivity analysis

Additionally, to demonstrate that the investment analysis was appropriately performed, a sensitivity analysis was prepared with the deviation in key parameters of the financial calculations. The input factors which are object of this analysis are listed below:

- Construction costs;
- Operating costs;
- Amount of electricity generation;
- Electricity sale price.

The following table shows the variation of the mentioned factors within +/- 10%, as reflected by the IRR of the project, which still remains lower than the benchmark value. The sensitivity analysis reflects the assumptions detailed in the document.

Table 06. Sensitivity analysis

Construction costs	
(+) 10%	6.58%
Base Case	7.80%
(-) 10%	9.22 %
Operating costs	
(+) 10%	7,61%
Base Case	7.80%
(-) 10%	8.00%
Amount of electricity generation	
(+) 10%	9.51%
Base Case	7.80 %
(-) 10%	5.98%
Electricity sale price	
(+) 10%	9.51%
Base Case	7.80 %
(-) 10%	5.98%

For the assumed electricity sale price of 141.37 BRL/MWh[31] and for the assumed investment cost of 3,599 BRL/kW, the effect on the IRR is about 7.80%, very far from the benchmark (Benchmark = 12.64%).

To reach the benchmark in this project, investment costs should fall by 28.5%, which is unlikely.

Electricity price: To get the benchmark (Benchmark = 12.64%) the purchase price of energy should be increased by 30%, from 141.37 BRL/ MWh to 183.78 BRL/MWh, and this is very unlikely.

O&M: To get the benchmark (Benchmark = 12.64%) the operation and maintenance costs have to be negative, something that is not possible.

Amount of electricity generation: to reach the benchmark (Benchmark = 12.64%), the electricity generation would need to increase 30%, something that is very unlikely to happen.

[31] BRL = Brazilian Real.

SATISFIED/PASS – Proceed to Step 3

Step 3: Barrier analysis

Not applied. Step 2 was applied to determine project´s additionality.

SATISFIED/PASS – Proceed to Step 4

Step 4: Common practice analysis

As part of the demonstration of additionality for the project acticity, the common practice analysis is a credibility check to complement the investment analysis (Step 2). The common practice analysis is peformed as per the Sub-step 4a of the "Tool for the demonstration and assessment of additionality" which refers to the latest version of the stepwise procedure of the "Guidelines on Common Practice".

Sub-step 4a: The proposed CDM project activity applies measures that are listed in the definitions section above;

The project is a renewable energy project promoting the utilization of wind energy source for generation of electricity. As use of renewable energy is considered a "measure" within the definitions of the tool for the demonstration and assessment of additionality (version 07.0.0), the "Stepwise approach for common practice" as per the latest version of the "Guidelines on Common Practice" (version 02.0) is applied.

In July 2012, the Brazilian electrical system corresponded to about 2,651 power units in operation, of which encompassed 118,433,824 kW [32] of installed capacity. At that time, operating wind power plants corresponded to 76 units which represented only 1.3% of the total installed electricity generation capacity of the country.

Table 07. Operating grid-connected electricity generation facilities in Brazil – July 2012 [33]

Type	Quantity	Verified Installed Capacity - kW -	%
Hydropower generator plants	384	228,142	0.19
Wind power plants	76	1,543,042	1.30
Small hydropower plants	430	3,946,823	3.33
Solar power plants	8	1,494	0
Hydropower plants	185	78,827,149	66.56
Thermoelectric power plants	1,555	31,880,174	26.92
Thermonuclear power plants	2	2,007,000	1.70
Total	**2,640**	**118,433,824**	**100**

[32] Source: Banco de Informação de Geração - BIG/ANEEL (Power generation information database from ANEEL). Available in: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp . Accessed in July 06, 2012.

[33] Source: Banco de Informação de Geração - BIG/ANEEL (Power generation information database from ANEEL). Available in: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp . Accessed in July 06, 2012.

In July 2012, electricity generation facilities under construction corresponded to 174 new units from which 63 of them were wind power plants. It represented 5.63% of the total authorized installed capacity, as the table below shows:

Table 08. Grid-connected electricity generation facilities under construction in Brazil – July 2012 [34]

Type	Quantity	Authorized Installed Capacity - kW -	%
Hydropower generator plants	1	848	0.00
Wind power plants	56	1,570,694	5.63
Small hydropower plants	53	588,827	2.11
Solar power plants	0	0	0
Hydropower plants	11	18,282,400	65.57
Thermoelectric power plants	43	6,090,419	21.85
Thermonuclear power plants	1	1,350,000	4.84
Total	**165**	**27,883,188**	**100**

In the Rio Grande do Norte State, where the proposed project activity will operate, there were 25 operating grid-connected electricity generation facilities in July 2012 of which 13 corresponded to wind power plants[35]. The following figure shows the operating plants distribution.

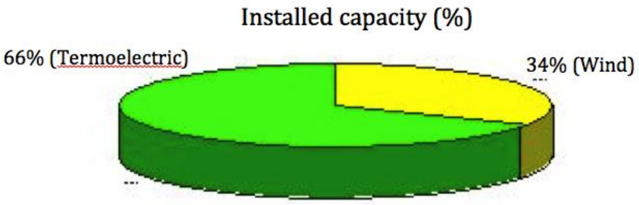

Figure 05. Operating plants distribution in Rio Grande do Norte State

By following applicable guidance of the “Tool for the demonstration and assessment of additionality”, the “Stepwise approach for common practice” as per the latest version of the “Guidelines on Common Practice” (version 02.0) is applied for demonstrating that the project activity does not represent a commonly adopted practice in the host country as follows:

[34]Source: Banco de Informação de Geração - BIG/ANEEL (Power generation information database from ANEEL). Available in: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp . Accessed in July 06, 2012.

[35] Source: Banco de Informação de Geração - BIG/ANEEL (Power generation information database from ANEEL). Available in: http://www.aneel.gov.br/aplicacoes/ResumoEstadual/CapacidadeEstado.asp?cmbEstados=RN:RIO GRANDE DO NORTE . Accessed in July 06, 2011.

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

For performing the common practice analysis, the geographical area is defined as the whole host country Brazil and the installed capacity of each individual wind farm encompassed by the project activity is considered (and not the total installed capacity for the proposed project activity). The reason for considering the installed capacity of each wind farm encompassed by the project activity (30 MW) is that each one of the 5 wind farms is treated as an independent unit in the context of the project (each wind farm is organized and set as an independent electricity generation facility within the applied business structuring and regulatory framework). While each wind farm has an installed capacity of 30 MW, the applicable output range +/-50% of 30 MW in the context of the common practice analysis results on installed capacity range from 15 MW to 45 MW[36]. By considering the applied technology, any power generation unit with installed capacity higher than 15 MW is selected for the performance of the common practice analysis (with no upper limit for installed capacity being set as part of Step 1 of the "Stepwise approach for common practice")[37].

Step 2: Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

(a) The projects are located in the applicable geographical area;

(b) The projects apply the same measure as the proposed project activity;

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

While 378[38] electricity generation facilities under operation are identified (incl. small hydropower plants, wind power plants, thermal plants, biomass and large hydropower plants, etc.), 67 wind farms which were under operational status in July 2012 are identified in Brazil. The number of wind farms under operation

[36] It is crucial to note that applying 150 MW as a basis for the determination of the installed capacity range (as +/-50% of the total design capacity of the proposed project activity) would significantly reduce the amount of comparable operational power plants to be considered in the context of the common practice analysis. Thus, the selection of 30 MW as part of application of Step 1 is more appropriated and realistic.

[37] By taking into account that splitting greenfield wind energy projects into a set of individual wind farms (with a maximum installed power generation capacity of 30 MW each one) and establishing independent individual business enterprises for each one of the split wind farms have been a practice by wind energy investors and practitioners of the emerging wind energy market in Brazil, defining no upper limit in terms of installed capacity for the performance of the common practice analysis reveals appropriate. This also justifies the selection of 30 MW as installed capacity in the context of the common practice analysis (instead of 150 MW).

[38] Available at spreadsheet "Common practice Analysis". Data for July 6th, 2012.

with installed capacity higher than 15 MW (+ 2 facilities with installed capacity of 14.4 MW[39]) which meet all the above-presented conditions is identified as 18 units.

The table below summarizes all the identified grid-connected wind farms under operation in Brazil and highlighs the 18 facilities which meet the above-presented conditions:

Table 09: Operating electricity generation facilities using wind energy source located in Brazil- July 2012 [40]

Plant	Authorized Installed Capacity (MW)	Location (State)	Status	Implemented under PROINFA programme?	CDM considered ?	CDM Status?
Albatroz	4.50	PB	Operating	Yes	No	N.A.
Atlântica	4.50	PB	Operating	Yes	No	N.A.
Bons Ventos	**50.00**	**CE**	**Operating**	**Yes**	**No**	**N.A.**
Camurim	4.50	PB	Operating	Yes.	No	N.A.
Canoa Quebrada	**57.00**	**CE**	**Operating**	**Yes**	**Yes**	**Under validation**
Caravela	4.50	PB	Operating	Yes	No	N.A.
Coelhos I	4.50	PB	Operating	Yes	No	N.A.
Coelhos II	4.50	PB	Operating	Yes	No	N.A.
Coelhos III	4.50	PB	Operating	Yes	No	N.A.
Coelhos IV	4.50	PB	Operating	Yes	No	N.A.
Eólica Água Doce	9.00	SC	Operating	Yes	Yes	Registered
Eólica Canoa Quebrada	10.50	CE	Operating	Yes	No	N.A.
Eólica de Bom Jardim	0.60	SC	Operating	Yes	No	N.A.
Eólica de Prainha	10.00	CE	Operating	No	No	N.A.
Eólica de Taíba	5.00	CE	Operating	No	No	N.A.
Eólica Icaraizinho	**54.60**	**CE**	**Operating**	**Yes**	**Yes**	**Under validation**
Eólica Paracuru	**23.40**	**CE**	**Operating**	**Yes**	**Yes**	**Under validation**
Eólica Praias de Parajuru	**28.80**	**CE**	**Operating**	**Yes**	**No**	**N.A.**
Eólio - Elétrica de Palmas	2.50	PR	Operating	No	No	N.A.
Foz do Rio Choró	**25.20**	**CE**	**Operating**	**Yes**	**Yes**	**Under validation**
Gargaú	**28.05**	**RJ**	**Operating**	**Yes**	**Yes**	**Under validation**
Gravatá Fruitrade	4.95	PE	Operating	Yes	No	N.A.
Lagoa do Mato	3.23	CE	Operating	Yes	Yes	Under validation
Macau	1.80	RN	Operating	No	Yes	Registered
Mandacaru	4.95	PE	Operating	Yes	No	N.A.
Mataraca	4.50	PB	Operating	Yes	No	N.A.
Millennium	10.20	PB	Operating	Yes	No	N.A.
Mucuripe	2.40	CE	Operating	No	No	N.A.
Parque Eólico de Beberibe	**25.60**	**CE**	**Operating**	**Yes**	**No**	**N.A.**
Parque Eólico de Osório	**50.00**	**RS**	**Operating**	**Yes**	**Yes**	**Registered**

[39] Since the wind farms denominated "Aratúa" and "Miassaba II" (listed in Table 09) have both installed capacity of 14.4 MW (which is a installed capacity very close to the set threshold of 15.0 MW), they are also considered for the determination of N_{all}.

[40] Banco de Informação de Geração - BIG/ANEEL (Information of Generation Bank). Available in: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/GeracaoTipoFase.asp?tipo=7&fase=3

Parque Eólico do Horizonte	4.80	SC	Operating	No	Yes	Registered
Parque Eólico dos Índios	**50.00**	**RS**	**Operating**	**Yes**	**Yes**	**Registered**
Parque Eólico Enacel	**31.50**	**CE**	**Operating**	**Yes**	**No**	**N.A.**
Parque Eólico Sangradouro	**50.00**	**RS**	**Operating**	**Yes**	**Yes**	**Registered**
Pedra do Sal	**18.00**	**PI**	**Operating**	**Yes**	**No**	**N.A.**
Pirauá	4.95	PE	Operating	Yes	No	N.A.
Praia do Morgado.	**28.80**	**CE**	**Operating**	**Yes**	**No**	**N.A.**
Praia Formosa	**104.40**	**CE**	**Operating**	**Yes**	**Yes**	**Under validation**
Presidente	4.50	PB	Operating	Yes	No	N.A.
Púlpito	**30**	**SC**	**Operating**	**Yes**	**No**	**N.A.**
Rio de Ouro	**30**	**SC**	**Operating**	**Yes**	**No**	**N.A.**
RN 15 - Rio do Fogo	**49.30**	**RN**	**Operating**	**Yes**	**Yes**	**Under validation**
Salto	30	SC	Operating	Yes	No	N.A.
Santa Maria	4.95	PE	Operating	Yes	No	N.A.
Santo Antônio	3	SC	Operating	Yes	No	N.A.
Taíba Albatroz	**16.50**	**CE**	**Operating**	**Yes**	**No**	**N.A.**
Volta do Rio	**42.00**	**CE**	**Operating**	**Yes**	**No**	**N.A.**
Xavante	4.95	PE	Operating	Yes	No	N.A.
Alegria I	**51.00**	**RN**	**Operating**	**Yes**	**No**	**N.A.**
Parque Eólico Elebrás Cidreira 1	**70.00**	**RS**	**Operating**	**Yes**	**No**	**N.A.**
Parque Eólico de Palmares	8.00	RS	Operating	No	Yes	Under validation
Vitória	4.50	PB	Operating	Yes	No	N.A.
Aratúa	**14.4**	**RN**	**Operating**	**No**	**Yes**	**Under validation**
Alhandra	2.10	PB	Operating	Yes	No	N.A.
IMT	2.20	PR	Operating	No	No	N.A.
Campo Belo	10.5	SC	Operating	Yes	No	N.A.
Bom Jardim	**30**	**SC**	**Operating**	**Yes**	**No**	**N.A.**
Cabeço Preto	**19.8**	**RN**	**Operating**	**No**	**Yes**	**Under validation**
Cascata	6	SC	Operating	Yes	No	N.A.
Canoa Quebrada	**57**	**CU**	**Operating**	**Yes**	**No**	**N.A.**
Cerro ChatoI, II, and II	**90**	**RS**	**Operating**	**No**	**Yes**	**Under validation**
Cruz Alta	**30**	**SC**	**Operating**	**Yes**	**No**	**N.A.**
Aquibatã	**30**	**SC**	**Operating**	**Yes**	**No**	**N.A.**
Amparo	**22.5**	**SC**	**Operating**	**Yes**	**No**	**N.A.**
Miassaba II	**14.4**	**RN**	**Operating**	**No**	**Yes**	**Under validation**
Cabeço Preto IV	**19.8**	**RN**	**Operating**	**No**	**Yes**	**Under validation**
Ventos do Brejo A-6	6	RN	Operating	No	No	N.A.

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}

For the determination of N_{all}, the previous consideration of the CDM for the wind farms listed in Table 09 is analysed. The implementation of winds farms under the PROINFA programme are also considered for the determination of N_{all} as follows:

Wind energy initiatives promoted as part of the PROINFA programme: implementation under a not comparable investment environment and regulatory framework

The publication "Analysis of the regulatory framework for wind power generation in Brazil"[41]; which is co-authored by the The Global Wind Energy Council (GWEC) and the Brazilian Association of Wind Energy – ABEEólica and was published in year 2011; summarizes the contribution and role played by the Programme of Incentives for Alternative Electricity Sources (PROINFA) for the dissemination of wind energy in Brazil:

> *"The development of wind power in Brazil started in 2002 based on the public policies adopted under the Programme of Incentives for Alternative Electricity Sources (PROINFA), which had the aim of diversifying the electricity mix in the country by increasing the use of new alternative energy sources.*
> *The programme, which was divided into two phases, extended to small hydro power plants, biomass and wind power, and is divided into two successive phases. Law No. 10. 438 of 26 April 2002 set out the targets and timescales for PROINFA, as well as the mechanisms for assigning projects and determining the prices at which electricity will be sold.*
> *For the first phase, a total capacity of 3,300 MW was assigned, distributed between wind power, biomass and small hydropower, of which 1,429 MW were allocated to wind power.*
> *This first quota had to be implemented before 30 December 2008, and included provisions for a fixed tariff and grid access for all electricity produced over a period of 20 years, distributed equally across all participating sources.*
> *The first phase of the programme was based on a 20-year guaranteed power purchase agreement with ELETROBRAS at the price defined by the government, with floors of 50%, 70% and 90% (for small hydro, biomass and wind farms respectively), of the average retail power price in the final twelve months, and where participation in the programme is via an Independent Power Producer, and provided that the nationalisation index for equipment and services is at least 60% in the first stage.*
> *(...)*
> *Evaluation of PROINFA: During the implementation of the first phase, several practical issues undermined the development of some projects, which led to a delay in the start of operations. These problems included:*
>
> - *Onerous demands and heavy bureaucratic procedures to obtain or renew environmental licences;*
> - *Problems and delays in obtaining the Declaration of Public Utility (DUP) for projects, a qualification which facilitates negotiations to obtain the right to use the assets and rights affected by the projects, in particular the land, which in many cases is affected by complicated terms of use and occupation, and disputes between owners and landholders which make it difficult to identify the property;*
> - *Obstacles in connecting to the grid, particularly in the Central Western region;*
> - *Difficulty for the domestic industry to meet high demand for equipment.*
>
> *Due to these first experiences, the deadlines set out in the Programme have been repeatedly postponed and, by the end of 2010, 926 MW of wind power were installed in Brazil, spread over 51 wind farms and corresponding to 40 PROINFA projects. Brazil has recently achieved the threshold of 1,000 MW of installed wind power and is expected to reach the target of the first phase of PROINFA in 2011.*
> *The rate at which new wind power capacity was installed increased during the last two years of the PROINFA programme, demonstrating a trend towards sustained growth. Currently, over 97%*

[41] http://gwec.net/wp-content/uploads/2012/06/Brazil_report_2011.pdf

of the installed wind generation capacity was achieved through PROINFA projects."

Regardless of the above summarized difficulties faced by the wind energy initiatives implemented under the PROINFA programme, the financial incentives and benefits encompassed by the programme (including differentiated values for electricity sale price and assured purchase for generated electricity within a 20-year time horizon for initiatives under the programme) can be regarded governmental incentives which were instrumental to overcome the barriers for the implementation of the projects under the PROINFA programme.

It is also important to note that, as established under valid contractual agreements, all potential CDM benefits for the wind farms implemented under the PROINFA programme were to claimed only by the government owned entity who acts as power purchaser agent under the programme: ELETROBRAS[42]. As per the regulatory framework valid for the PROINFA programme, the independent power producers that proposed and later start to operate wind energy initiatives (wind farms) under the programme are not eligible to claim potential CDM revenues for such wind farms. Due to that, only few wind energy initiatives had actually declared interest in CDM benefits and/or initiated CDM validation process. It is important to note that later in 15 October 2012, ELETROBRAS announced its decision to initiate CDM validation process for 15 wind energy projects implemented as part of the programme[43]. However, information related to the progress of the CDM validation process for such initiatives is not yet available made at UNFCCC CDM website.

In summary, by considering that all operating wind energy initiatives as part of the PROINFA programme had implementation taking place in an investment environment and regulatory framework which are not comparable to the ones faced by the proposed project activity; and by also taking into account the requirements previously set by ELETROBRAS for claiming CDM benefits for power generation initiatives under the PROINFA programme, all the above listed wind energy initiatives which were implemented under the programme are thus regarded as not comparable and not similar to the proposed project activity. Due to that none of them are considered for the determination of N_{all}.

By excluding all power plants implemented under PROINFA from the list of identified potentially comparable/similar wind energy facilities under operation in July 2012 and with installed capacity higher than 15 MW; and by also excluding the ones registered as CDM project activities, submitted for CDM registration or undergoing CDM validation; N_{all} is thus determined as null (zero).
In summary, Table 9 does not included any wind farm under operation with installed capacity higher than 15 MW, not implemented under the PROINFA programmed and not being previously proposed as a CDM project activity up to July 2012.

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[42] Eletrobras (Centrais Elétricas Brasileiras S.A.) is a major Brazilian power generation company. It's also Latin America's biggest power utility company, tenth largest in the world and is also the fourth largest clean energy company in the world. Eletrobras holds stakes in a number of Brazilian electric companies, so that it generates about 40% and transmits 69% of Brazil's electric supply. The company's power generation capacity is about 43,000 MW, mostly in hydroelectric plants. The Brazilian federal government owns 52% stake in Eletrobras.

[43] http://www.eletrobras.gov.br/ELB/data/Pages/LUMISEB7EA1A1ITEMID381A2240C0384AD1B066322F079A271EPTBRIE.htm

Step 4: Within plants identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

While N_{all} is defined as zero, among all the wind farms identified under Step 2 (which are not even regarded as similar/comparable to the project activity in the particular context of the performed common practice analysis), all of them actually apply the same wind-to-electricity conversion technology. Large turbines with horizontal axis (including rotor, generator and structural support components) represent the technology used to convert kinetic energy from the wind into electrical power as part of all the grid-connected wind energy initiatives previously implemented and currently under operation in Brazil. N_{diff} is thus also defined as zero.

Step 5: Calculate factor $F = 1 - N_{diff} / N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

While both N_{all} and N_{diff} are determined as null (zero), the values for Factor F (calculated as "$F = 1 - N_{diff} / N_{all}$") is thus assumed as not determinable (1 minus an undeterminable ratio). The difference between N_{all} and N_{diff} is also assumed as not determinable.
The following conditions of the methodological tool for having the proposed project activity being regarded as common practice within a sector in the applicable geographical area therefore are not simultaneously met:
- Factor F greater than 0.2
- $N_{all} - N_{diff}$ greater than 3.0

As per the "Guidelines on Common Practice" (version 02.0), both conditions should be simultaneously fulfilled in order to have the proposed project activity being regarded as common practice within the sector in the applicable geographical area. While such conditions are assumed as not fulfilled (since Factor F and the difference between N_{all} and N_{diff} are both regarded as not determinable), the proposed project activity is not regarded as common practice.

SATISFIED/PASS – Project is ADDITIONAL

B.6. Emission reductions
B.6.1. Explanation of methodological choices

As per by the applied approved consolidated methodology ACM0002 (version 13.0.0), the equations utilized to calculate the project emissions, baseline emissions, leakage and emission reductions are described below.

Project emissions

For most renewable power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad (1)$$

Where:

PE_y = Project emissions in year y (tCO_2e/yr)
$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2e/yr)
$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO_2e/yr)
$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

As this proposed project activity corresponds to five new power plants without fossil fuel consumption and it does not involve any geothermal and/or hydro power plants, the project emissions are determined as zero.

Baseline emissions

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

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} \tag{2}$$

Where:

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

Calculation of $EG_{PJ,y}$

As per ACM0002 (version 13.0.0), determination of $EG_{PJ,y}$ is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions. Since this project activity is the installation of a five new grid-connected renewable power plant/units at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plants), the option (a) was selected:

$$EG_{PJ,y} = EG_{facility,y} \tag{3}$$

Where:

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

Calculation of $EF_{grid,CM,y}$

Combined margin CO_2 emissions factor is calculated in accordance with the "Tool to calculate the emission factor for an electricity system" (version 04.0). This methodological tool determines the CO_2 emission factor for the displacement of electricity generated by a grid-connected power plants, by calculating the combined margin emission factor ($EF_{CM,y}$) of the electricity system. As per the "Tool to calculate the emission factor for an electricity system" (version 04.0), $EF_{CM,y}$ is determined as a weighted average of two

CO_2 emission factors pertaining to the electricity system: the CO_2 operating margin emission factor ($EF_{OM,y}$) and the build margin emission factor ($EF_{BM,y}$). The operating margin emission factor refers to the group of existing power plants whose current electricity generation would be potentially affected by the proposed CDM project activity. The build margin emission factor refers to the group of prospective power plants whose construction and future operation would be potentially affected by the proposed CDM project activity.

The applicable procedures of "Tool to calculate the emission factor for an electricity system" (version 04.0) tool are described in the following steps:

- *Step 1. Identify the relevant electricity systems*

For determining the electricity emission factors, a project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints. The spatial extent of the project boundary includes the project site which is connected to the National Interconnected System.

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

Option I of the tool is chosen which is to include only grid power plants in the calculation.

- *Step 3. Select a method to determine the operating margin (OM)*

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

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

Any above method can be utilized. However, the simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. This is not the case for the project electricity system being considered. Since the simple adjusted OM (option b) emission factor is a variation of the simple OM, where the power plants/units (including imports) are separated in low-cost/must-run power sources and other power sources, this is also not applicable to this project activity. For the similar reason, the option (d), average OM emission factor is not eligible for this project, since it is calculated as the average emission rate of all power plants serving the grid, using the methodological guidance for the simple OM, but including in all equations also low-cost/must-run power plants,

Therefore, for the OM calculation method, the option (c) dispatch data analysis is preferred, since the Ministry of Science, Technology and Innovation has been updated and published annually the information for power units[44].

[44] The Ministry of Science, Technology and Innovation have been calculating the CO_2 emission factor according to the methodology tool "Tool to calculate the emission factor for an electricity system" (version 3.0), approved by the CDM Executive Board. The CO_2 emission factor was obtained in the Brazilian DNA website. Source of data used: Tool to calculate the emission factor for an electricity system (version 3.0): The actual value has been calculated by Ministry of Science, Technology and Innovation (MCTI), Brazilian Designated National Authority (DNA). The Emission Factor will be monitored through ex-post calculation, following the latest version of Tool to calculate the

For the dispatch data analysis OM, the year in which the project activity displaces grid electricity and the emission factor updating annually during monitoring is utilized.

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

In order to determine the combined margin emission factor, the dispatch data analysis method has been selected among four options proposed in the methodology, since it is publicly available in Brazil.

The dispatch data analysis OM emission factor ($EF_{grid,OM\text{-}DDy}$) 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 $EF_{grid,OM\text{-}DDy}$., as the MCTI have been done.

The operating margin emission factor is calculated as follows:

$$EF_{grid,OM\text{-}DDy} = \frac{\sum_h EG_{PJ,h} \cdot EF_{EL,DD,h}}{EG_{PJ,y}} \quad (4)$$

Where:

$EF_{grid,OM\text{-}DD,y}$	= Dispatch data analysis operating margin CO_2 emission factor in year *y* (tCO_2/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* (tCO_2/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

- Step 5. Calculate the build margin (BM) emission factor

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, *ex post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ante*, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

emission factor for an electricity system. The Brazilian DNA calculated the value based on the Tool. The Combined Margin is calculated through a weighted-average formula, considering both the $EF_{grid,OM\text{-}DD,y}$ and the $EF_{grid,BM,y}$ and the weights w_{OM} and w_{BM} (are default 0.75 and 0.25, respectively).

In agreement to the information published by the Brazilian Ministry of Science, Technology and Innovation, the choice of the project participants is the option 2. The calculation of the build margin emission factor is utilized by the Ministry of Science, Technology and Innovation in Brazil and applied for data updating in annual publication.[45]

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad (5)$$

Where:

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

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

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM,y} \cdot w_{BM} \qquad (6)$$

Where:

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

[45] The Ministry of Science,Technology and Innovation have been calculating the CO_2 emission factor according to the methodology tool "Tool to calculate the emission factor for an electricity system" (version 3.0), approved by the CDM Executive Board. The CO_2 emission factor was obtained in the Brazilian DNA website. Source of data used: Tool to calculate the emission factor for an electricity system (version 3.0): The actual value has been calculated by Ministry of Science, Technology and Innovation (MCTI), Brazilian Designated National Authority (DNA). The Emission Factor will be monitored through ex-post calculation, following the latest version of Tool to calculate the emission factor for an electricity system. The Brazilian DNA calculated the value based on the Tool. The Combined Margin is calculated through a weighted-average formula, considering both the $EF_{grid,OM-DD,y}$ and the $EF_{grid,BM,y}$ and the weights w_{OM} and w_{BM} (are default 0.75 and 0.25, respectively). The DNA calculated the value based on version 3.0. Even it is not the latest version of the tool available (version 4.0. EB 75 Annex 15) there has not been changes that affect the calculation of the value. Version 4.0 provided a single change:

- Provide requirements for applying this tool for a programme of activities (PoA).

Besides, the new version of the excel sheet provided by UNFCCC used to calculate the emission factor has no had modification that would have an effect on the resulting value. Therefore, we can conclude that changes to the tool do not affect the resulting value. Anyway, it is just used for ex-ante calculation of emission reductions, so it will not have an impact in the number of CER generated by the project activity.

The default values utilized for w_{OM} is 0.75 and w_{BM} is 0.25 for the first crediting period.

Leakage

Accordingly to the ACM0002 (versions 13.0.0), no leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected.

Emission Reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (7)$$

Where:

ER_y = Emission reductions in year *y* (tCO_2e/yr)
BE_y = Baseline emissions in year *y* (tCO_2e/yr)
PE_y = Project emissions in year *y* (tCO_2e/yr)

B.6.2. Data and parameters fixed ex ante

Data / Parameter	w_{OM}
Unit	Non-dimensional
Description	Weighting of operating margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system", Version 4.0
Value(s) applied	75%
Choice of data or Measurement methods and procedures	Default value for wind power plants
Purpose of data	Baseline emissions
Additional comment	This value will be applied in the first crediting period.

Data / Parameter	w_{BM}
Unit	Non-dimensional
Description	Weighting of build margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system", Version 4.0
Value(s) applied	25%
Choice of data or Measurement methods and procedures	Default value for wind power plants
Purpose of data	Baseline emissions
Additional comment	This value will be applied in the first crediting period.

B.6.3. Ex ante calculation of emission reductions

The ex-ante calculation of emission reductions is described below in accordance with the approved consolidated methodology ACM0002 (version 13.0.0)

Baseline emissions

To calculate the baseline emissions, the combined margin CO_2 emissions factor is required.

Calculation is based on the latest data available and published by Ministry of Science, Technology and Innovation, Brazil[46]. As is shown in Annex 4 of this project design document, $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ values are 0.5176 tCO_2/MWh and 0.2010 tCO_2/MWh, respectively for 2012 as base year. Thus, the resulting grid emission factor is:

$EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM,y} \cdot w_{BM}$
$EF_{grid,CM,y} = (0.5176 \cdot 0.75) + (0.2010 \cdot 0.25)$
$EF_{grid,CM,y} = 0.4384\ tCO_2e/MWh$

Hence, the estimation of baseline emissions is:
$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y}$
$BE_y = (70.14 \cdot 8{,}760) \cdot 0.4384$
$BE_y = 269{,}364\ tCO_2e/year$

Emission Reductions
$ER_y = BE_y - PE_y$
$ER_y = 269{,}364 – 0$
$ER_y = 269{,}364\ tCO_2e/yr$

Project emissions
As mentioned previously in the section B.6.1, this proposed project activity corresponds to five new wind power plants without fossil fuel consumption. Thus, project emission is zero.

$PE_y = 0$

[46] The Ministry of Science, Technology and Innovation have been calculating the CO2 emission factor according to the methodology tool "Tool to calculate the emission factor for an electricity system" (version 3.0), approved by the CDM Executive Board. The CO2 emission factor was obtained in the Brazilian DNA website. Source of data used: Tool to calculate the emission factor for an electricity system (version 3.0): The actual value has been calculated by Ministry of Science,Technology and Innovation (MCTI), Brazilian Designated National Authority (DNA). The Emission Factor will be monitored through ex-post calculation, following the latest version of Tool to calculate the emission factor for an electricity system. The Brazilian DNA calculated the value based on the Tool. The Combined Margin is calculated through a weighted-average formula, considering both the EFgrid,OM-DD,y and the EFgrid,BM,y and the weights wOM and wBM (are default 0.75 and 0.25, respectively). The DNA calculated the value based on version 3.0. Even it is not the latest version of the tool available (version 4.0, EB 75 Annex 15) there has not been changes that affect the calculation of the value. Version 4.0 provided a single changes:
- Provide requirements for applying this tool for a programme of activities (PoA).

Besides, the new version of the excel sheet provided by UNFCCC used to calculate the emission factor has no had modification that would have an effect on the resulting value. Therefore, we can conclude that changes to the tool do not affect the resulting value. Anyway, it is just used for ex-ante calculation of emission reductions, so it will not have an impact in the number of CER generated by the project activity.

Despite the fact that $EF_{CM,grid,y}$ will be monitored *ex-post*, for the purposes of the *ex-ante* emission reduction calculations it has been assumed that this parameter would remain constant throughout the whole crediting period as a simplicity measure. This assumption is supported by data from Ten-Year Energy Plan (2010-2019) of Energy Research Company (EPE). According to this plan, during the period 2010–2019, the contribution of renewable and thermoelectric sources in the installed capacity additions will be symmetric[47]. The fairly symmetric capacity additions render a low impact in the grid emission factor.

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions ($t\ CO_2e$)	Project emissions ($t\ CO_2e$)	Leakage ($t\ CO_2e$)	Emission reductions ($t\ CO_2e$)
2015	269,364	0	0	269,364
2016	269,364	0	0	269,364
2017	269,364	0	0	269,364
2018	269,364	0	0	269,364
2019	269,364	0	0	269,364
2020	269,364	0	0	269,364
2021	269,364	0	0	269,364
Total	1,885,548	0	0	1,885,548
Total number of crediting years	7 years			
Annual average over the crediting period	269,364	0	0	269,364

[47] EPE – Empresa de Pesquisa Energética (Energy Research Company) PDE 2010-19; page 26. Available in: http://www.epe.gov.br/PDEE/20101129_2.pdf. Accessed in November 29, 2011.

B.7. Monitoring plan
B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility,y}$
Unit	MWh/y
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Measurement report from CCEE (Electric Energy Commercialization Chamber), based on electricity meters explained below.
Value(s) applied	614,426 MWh/year
Measurement methods and procedures	The electricity dispatched by the project's activity will be monitored using official measurements in accordance with the procedures established by the ONS. Extra information of the meters: Number of meters: 2 meters outside each wind farm (1 main, 1 backup), and 10 at the substation for the net energy of the entire transmission line but for each wind farm (5 main, 5 backup). • Type: bidirectional • Accuracy class: Max error 0.2 KWh • Calibration frequency: 2 years
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	This data will be applied in the project emission reductions calculation. The measurement equipment will be properly calibrated and checked periodically for accuracy. The cross-check will be made with the electricity measured and the report of energy produced published by the CCEE (Electric Energy Commercialization Chamber) based on the data they recive. The data will be annually filed (electronic archive) and it will be kept for two years after the end of project activity
Purpose of data	Baseline emissions
Additional comment	The value specified in "value(s) applied" is an estimation. The actual data will vary from year to year depending on the electricity generation. To obtain such a value it will be necessary to sum the electricity generated by each of the five wind farms.

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor
Source of data	Tool to calculate the emission factor for an electricity system: The actual value has been calculated by Ministry of Science, Technology and Innovation (MCTI), Brazilian Designated National Authority (DNA).
Value(s) applied	0.4384 (for the crediting period)
Measurement methods and procedures	The Emission Factor will be calculated following the latest version of Tool to calculate the emission factor for an electricity system. The Brazilian DNA calculated the value based on the Tool. The Combined Margin is calculated through a weighted-average formula, considering both the $EF_{grid,OM-DD,y}$ and the $EF_{grid,BM,y}$ (both ex-post parameters) and the weights w_{OM} and w_{BM} (are default 0.75 and 0.25, respectively, and both ex-ante paramenters).
Monitoring frequency	Every time a verification report is sent for verification
QA/QC procedures	This data will be applied in the project emission reductions calculation. The data will be annually filed (electronic archive) and it will be kept for two years after the end of project activity.
Purpose of data	Baseline emissions
Additional comment	See explanation on section B.6.3

Data / Parameter	$EF_{grid, OM, y}$
Unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor
Source of data	Tool to calculate the emission factor for an electricity system: The actual value has been calculated by Ministry of Science, Technology and Innovation (MCTI), Brazilian Designated National Authority (DNA).
Value(s) applied	0.2920 (for the crediting period)
Measurement methods and procedures	Official EF_{OM} will be collected in the MCTI website which is responsible to calculate this factor. The Emission Factor will be monitored through ex-post calculation, following the latest version of Tool to calculate the emission factor for an electricity system. The Brazilian DNA calculated the value based on the Tool. The Combined Margin is calculated through a weighted-average formula, considering both the $EF_{grid,OM-DD,y}$ and the $EF_{grid,BM,y}$ and the weights w_{OM} and w_{BM} (are default 0.75 and 0.25, respectively).
Monitoring frequency	Annually.
QA/QC procedures	This data will be applied in *ex-post* calculation of the Emission Factor. The data will be annually filed (electronic archive) and it will be kept for two years after the end of project activity.
Purpose of data	Baseline emissions
Additional comment	-

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO_2/MWh
Description	Build margin CO_2 emission factor
Source of data	Tool to calculate the emission factor for an electricity system: The value has been calculated by Ministry of Science, Technology and Innovation (MCTI), Brazilian Designated National Authority (DNA).
Value(s) applied	0.2010 (for the crediting period)
Measurement methods and procedures	Official EF_{BM} will be collected in the MCTI website which is responsible to calculate this factor. The Emission Factor will be monitored through ex-post calculation, following the latest version of Tool to calculate the emission factor for an electricity system. The Brazilian DNA calculated the value based on the Tool. The Combined Margin is calculated through a weighted-average formula, considering both the $EF_{grid,OM-DD,y}$ and the $EF_{grid,BM,y}$ and the weights w_{OM} and w_{BM} (are default 0.75 and 0.25, respectively).
Monitoring frequency	Annually.
QA/QC procedures	This data will be applied in *ex-post* calculation of the Emission Factor. The data will be annually filed (electronic archive) and it will be kept for two years after the end of project activity.
Purpose of data	Baseline emissions
Additional comment	-

B.7.2. Sampling plan

There are no parameters to be sampled in the project activity.

B.7.3. Other elements of monitoring plan

The monitoring plan is developed in accordance with the approved consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources – ACM0002, version 13.0.0.

All the five wind farms involved in this proposed project will follow the same monitoring procedures which are required for the determination of GHG emission reductions to be achieved by the project activity and verified during regular monitoring periods.

The monitoring plan of the project will be executed by the project owner, meanwhile guided by Zeroemissions do Brasil Ltda., and verified by a DOE. To ensure the smooth implementation of the monitoring plan, the project owner has established clear monitoring system.

The monitoring system of this project is shown in the following figure.

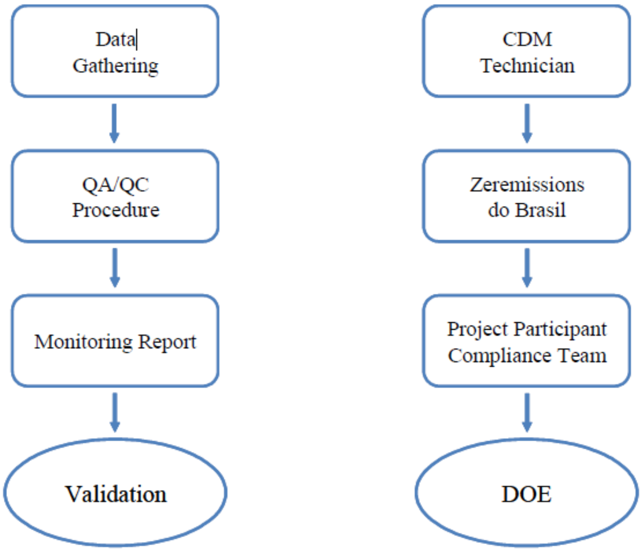

Figure 06. Monitoring system chart of the proposed project for CDM

The monitoring plan covers all the aspects to certify the quality and consistency of the monitoring process for Renascença and Ventos de São Miguel wind Farms in Brazil. Thus, the monitoring stages include essentially the items listed below:

Responsibilities

The monitoring procedures will be performed by the project owner, who is the main responsible of the monitoring plan. Electricity export measurements will be carried out by a measuring agent, which in this case will be the official purchaser of electricity. This measuring agent will be a specialized company in electricity purchase and will fulfil with all grid procedures established by the regulator. The project owner must support the measuring agent, who will be responsible for data gathering and its presentation consolidated to CCEE[48]. As the Commercialization Convention approved by ANEEL Resolution No 109 of 26 October 2004 determines that CCEE is responsible for the specification, guidance and determination of the issues concerning the adequacy of measurement systems billing (SMF), and the deployment, operation and maintenance of SCDE - Data Collection System for Energy, in order to facilitate electricity data collection for use in the Accounting and Settlement System (SCL), to ensure the accuracy of the quantities found, and meet the required deadlines.

In order to ensure that the monitoring plan is well organized, in terms of collection and archiving of complete and consistent data, before the beginning of the crediting period, the organization of the monitoring team will establish clear roles, and responsibilities for data storage and reporting.

In summary, the monitoring plan of the project will be executed by the project owner, under the supervision of the CDM consultant, Zeroemissions do Brasil. The process will be carried in agreement with the requirements from Executive Board on monitoring and verification to ensure the emissions reduction are monitored, recorded and reported accurately.

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[48] CCEE – Câmara de Comercialização de Energia Elétrica (Electric Power Commercialization Chamber). Available in: http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=2e09a5c1de88a010VgnVCM100000aa01a8c0RCRD . Accessed in May 30, 2011.

Monitoring equipment and installation

Electricity generated by each wind farm and exported through the grid will be measured and monitored with an invoicing measurement system – SMF[49] , according to a standard procedure used for all electricity generation systems.

Individual electricity meters for each wind farm will be installed in the substation and data will be sent remotely to CCEE and to the connected agent. The measuring system is regulated by ONS[50] through the sub-modules developed specifically for this system. After equipment installation, ONS commissions the equipment and informs ANEEL[51] that the project is operational and meets the procedures set forth.

In addition, the meters will have certificate of conformity of design approved and issued by the National Institute of Metrology Standardization and Industrial Quality (*Instituto Nacional de Metrologia, Normalização e Qualidade Industrial – INMETRO*).

Before the operation starts, CCEE demands that the meters will be calibrated by an entity with "Brazilian Calibration Network" (*Rede Brasileira de Calibração* - RBC) credential. These electricity meters will be calibrated each 2 years following ONS recommendations and procedures[52].

Data stored on the meters will be collected by the System of Energy Data Collection of CCEE, remotely and automatically through direct access to the meters of the project participant. These collected data will be processed in SCDE for electricity accounting by CCEE and will be available to DOE´s verification and all energy market participants to control their respective incomes.

Furthermore, the electricity meters will be the source to invoice the electricity buyer, and therefore measures the quantity of electricity that the project will be paid for. As these meters provide main CDM measurement, it will be the key part of the verification process.

Procedure of data recording and archiving

All electricity generated by Renascença and Ventos de São Miguel Wind Power Bundled Project will be monitored online simultaneously by CCEE and by the measuring agent. Monthly readings and records keepings of the energy generated will be responsibility of CCEE. The online reading performed by CCEE guarantees the reading lecture correspondent to the amount of energy in case of local meter problem.

The monitoring and measuring system consists of a meter panel and a link to communicate and send data to CCEE. Both, SMF and link are commissioned by ONS and meet the technical requirements of ONS and ANEEL. SMF electricity measurement consists of a principal meter and a back-up meter (reserve meter), simultaneously connected to the panel. If there is problem with the principal meter, the reading lecture can be done by the back-up meter automatically. A reserve meter disconnected from the panel will be available

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[49] SMF – Sistema de Medição para Faturamento – Módulo 12 (Medição para Faturamento). Available in: http://extranet.ons.org.br/operacao/prdocme.nsf/principalPRedeweb?openframeset . Accessed in May 30, 2011

[50] ONS – Operador Nacional do Sistema Elétrico (National Operator of Electric System). Available in: http://www.ons.org.br/home/ . Accessed in May 30, 2011.

[51] ANEEL – Agência Nacional de Energia Elétrica (Brazilian Electricity Regulatory Agency). Available in: http://www.aneel.gov.br/ . Accessed in May 30, 2011.

[52] SMF – Sistema de Medição para Faturamento – Módulo 12.5 (Certificação de padrões de trabalho). Available in: < http://extranet.ons.org.br/operacao/prdocme.nsf/videntificadorlogico/37E24C71C9B3FFA1832577A6004FEFBB/$file/Submodulo%2012.5_Rev_1.1.pdf?openelement. Accessed in May 30, 2011

in case of equipment damage for immediately replacement. The equipment will be calibrated every two years and its certification will be attached to follow-up reports.

In the first week of each month, the CCEE consolidates data from previous generation of the month, and if there is any inconsistency or error in the collected data, it generates an e-mail, informing the agent about the missing or inconsistent data and asks the team to adjust these data in SCL – (Accounting and Settlement System) and to the justify the need for this adjustment.

The information contained in the internal spreadsheet for control of electricity generation will be checked with a spreadsheet of CCEE. For calculation purposes of emission reductions, the electricity generation data used will be those of the General Service Report of CCEE, present in the CCEE website for agents accredited by CCEE.

In case of discrepancies occur along these years, both meters will be calibrated again. All measurements will be conducted with calibrated measurement equipment according to relevant industry standards.

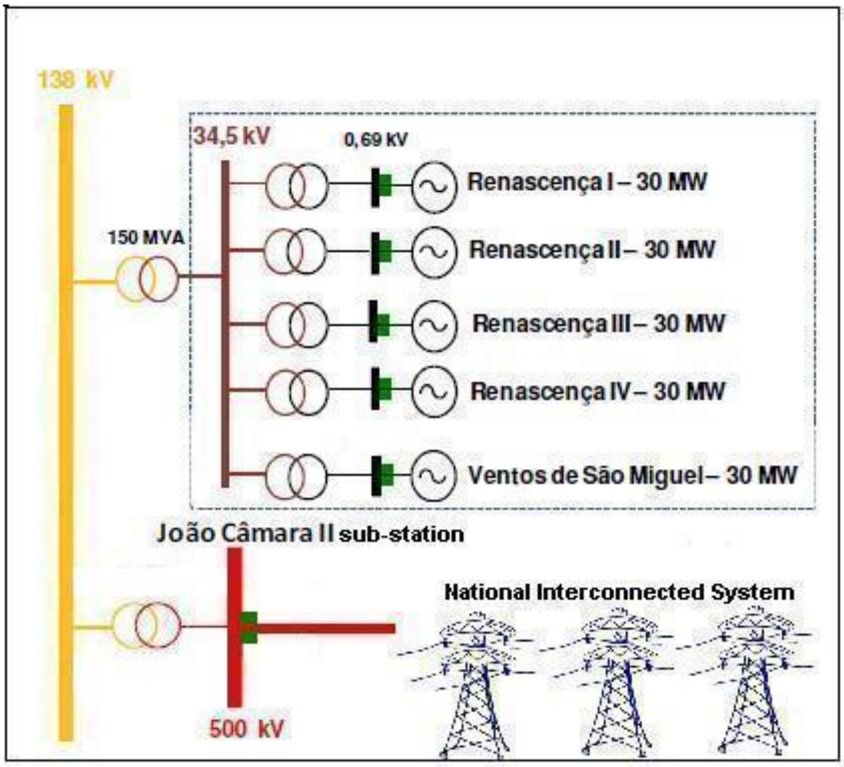

Figure 07: Simplified wiring diagram

As seen in Figure 07, there will be two meters for each wind farm at the beginning of the substation (simplified in the figure) and two additional meters at the exit of each of the five wind farms. The meters are represented by green colour. This is carried out in order to know the generated power for the wind farm. Monitoring of the electricity produced is made in accordance with regulations of the country; these regulations are stated by the CCEE.

The project participants will archive data electronically and keep the data for at least two years after the end of last crediting period, as predicted by the approved consolidated baseline and monitoring methodology ACM0002 (version 13.0.0).

Furthermore, the quality assurance (QA) and quality control (QC) will be applied. The quality of data generated by this project will be maintained through the development of an overarching monitoring system. This system may include procedures used to double check data, for staff training, meter calibration, accreditation of facility completing calibration and the adherence to the relevant standards.

For more details about the monitoring plan, the Appendix 5 can be consulted.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

26/08/2010

The date indicated above corresponds to that of the 2nd auction for the future supply and commercialization of electricity generated from alternative energy sources which occurred in 26/08/2010 as per the rules of the regulated power market of Brazil (2º Leilão de Fontes Alternativas de Energia[53]). It was in this auction that the five electricity generation facilities encompassed by the project activity (Renascença I to IV and Ventos de São Miguel) have been contracted for the supply of electricity during a 20-year period. In Brazil, a power producer within the regulated market needs to bid and be selected in a public auction in order to ensure that the electricity produced by the grid-connected electricity generation facility in question will be supplied through the grid. By considering the terms and conditions for the 2nd auction for the future supply and commercialization of electricity generated from alternative energy sources (which occurred in 26/08/2010), this date is considered the project starting date as per its definition as established in the "Glossary of CDM terms".

C.1.2. Expected operational lifetime of project activity

20 years and 0 month. This is the period defined in the electricity sale contract.

C.2. Crediting period of project activity

C.2.1. Type of crediting period

First renewable crediting period.

C.2.2. Start date of crediting period

01/01/2015

C.2.3. Length of crediting period

7 years and 0 month.

[53] ANEEL – Agência Nacional de Energia Elétrica (Brazilian Electricity Regulatory Agency). Available in: http://www.aneel.gov.br/aplicacoes/editais_geracao/documentos_editais.cfm?IdProgramaEdital=87#. Accessed in May 30, 2011.

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts

A Simplified Environmental Report – RAS[54] was elaborated for the five sites (RI, RII, RIII, RIV and VSM) by Geoconsult[55] (Consulting, Geology and Environment Ltd.) and was concluded that the proposed project activity meets the technical, economic and environment aspects, as well as the legal conditions for the wind power plants installation, with implementation and operation viable under RAS recommendation. Only one site, VSM, was required to obtain a more detailed assessment. There were many wind farms in the area, and due to potential cumulative effects, VSM had more requirements than the other wind farms.

RAS is one of the documents which the Institute of Sustainable Development and Environment of Rio Grande do Norte – IDEMA[56] accept for the environmental license approval for energetic generation enterprises in the Rio Grande do Norte State.

The previous license (LP[57]), during preliminary stages of the project, contained basic requirements regarding the phases of location, installation and operation, observing the environmental viability of the enterprise in the subsequent licensing phases. This project activity has already filed its previous environmental license to the IDEMA for all the wind sites, as the following table shows:

Table 11. Previous License of each wind power plant

Site	LP number
RI	2009-029951/TEC/LP-0105
RII	2009-029954/TEC/LP-0108
RIII	2009-029944/TEC/LP-0100
RIV	2009-029959/TEC/LP-0113
VSM	2010-036831/TEC/LP-0075

The installation license (LI) for all wind sites were already received.

Table 12. Definitive Licenses of each wind power plant

Site	LI number
RI	2011-044277/TEC/LI-0028
RII	2009-044328/TEC/LI-0031
RIII	2009-044325/TEC/LI-0030
RIV	2009-044323/TEC/LI-0029
VSM	2010-049976/TEC/LI-0092

There are no transboundary environment impacts since the technology utilized by the proposed project activity is considered a zero-emission technology.

The following table lists main impacts identified and corresponding mitigation programs defined.

[54] RAS – Relatório Ambiental Simplificado. Available for DOE analysis.
[55] Geoconsult – Consultoria, Geologia & Meio Ambiente Ltda. Responsible for RAS elaboration.
[56] IDEMA – Instituto de Desenvolvimento Sustentável e Meio Ambiente do Rio Grande do Norte. Available in: http://www.idema.rn.gov.br/contentproducao/aplicacao/idema/licenciamento_ambiental/gerados/licenciamento_documentacao.asp . Accessed in: May 30, 2011.
[57] LP – Licença Prévia. Available for DOE analysis.

Table 13. Main impacts and associated mitigation measures

Impacts	Mitigation Programs / Actions
Waste Management, air pollution	Environmental Management Plan
Vibrations, Noise and Gas Emissions	Environmental Plan for General Construction
Work Accident Risk	Protection Plan for Worker and Workplace Safety
Loss of vegetation	Recovery Plan of Degraded Areas
Erosion; sedimentation dynamics modification	Erosion and Sedimentation Control Plan
Loss of vegetation	Deforestation Control Plan
Noise	Noise Monitoring Plan
Fauna Escape	Avifauna Monitoring Plan

The Environmental Education Plan and Social Communication Plan meet the recommendation arising from the identification and assessment of impacts of the proposed project and associated measures in order to provide real benefits to the community of the area of the enterprise and workers. Additionally a Programme for historical and archaeological sites identification was performed.

The operation license was granted for the five wind farms, with the following numbers:

Site	LO number
RI	2012-059233/TEC/LO-0287
RII	2012-059708/TEC/LO-0297
RIII	2012-059789/TEC/LO-0304
RIV	2012-060648/TEC/LO-0325
VSM	2012-062562/TEC/LO-0386

D.2. Environmental impact assessment

As stated in section D.1., only one out of the five bundled projects required a more detailed environmental impact assessment. This project was Ventos de São Miguel. VSM applied later on the process for their environmental licenses. The environmental impact of this project is basically the same. However, the main difference was the potential cumulative impact. Therefore, it had to apply to a more complex process. They had to develop an Environmental Impact Assessment (EIA)[58] more complete than the previously developed RAS. It included 2 reports: the EIA itself and the Environmental Impact Report (RIMA)[59]. After fulfilling both requirements, the project received its final environmental license (LI), with number 2010-049976/TEC/LI-0092. The main impacts and its corrective measures are the same ones established for the rest of the project, summarized in table 13 above.

[58] In Portuguese, *Estudo de Impacto Ambiental (EIA).*
[59] In Portuguese, *Relatório de Impacto Ambiental (RIMA).*

SECTION E. Local stakeholder consultation
E.1. Solicitation of comments from local stakeholders

According to the "Brazilian Implementation Guide: The Clean Development Mechanism (CDM)"[60] (2009) and to the Article 3rd of the Resolution number 7th, provided by the Brazilian DNA, the stakeholders of the project activity were invited for comments sending invitation letters. The Project Design Document (PDD) was available for stakeholders' consultation on the corporative website of a Project Participant.

As the proposed project activity comprises the municipalities of João Câmara and Parazinho within geographical boundaries of one federal entity (Rio Grande do Norte State), invitation letters were sent to the following stakeholders in July 2011:

- City Hall of the municipalities involved
  - Prefeitura Municipal de Parazinho
  - Prefeitura Municipal de João Câmara

- Chamber of Councilors of each municipality involved
  - Câmara Municipal de Parazinho
  - Câmara Municipal de João Câmara

- State environmental agency
  - IDEMA – Instituto de Desenvolvimento Sustentável e Meio Ambiente do Rio Grande do Norte

- Municipal environment agency
  - Secretaria Municipal de Administração de Parazinho.
  - Secretaria Municipal de Admnistração de João Câmara.[61]

- NGO's
  - Fórum Brasileiro de ONG's e Movimentos Sociais para o Meio Ambiente e Desenvolvimento – FBOMS

- Communitarian associations with direct or indirect relationship with the project activity
  - Casa da Família

- State Attorney General
  - Comarca de João Câmara
  - Fórum da Comarca de João Câmara

- Public Ministry of Rio Grande do Norte State

- Federal Public Ministry

Additionally, the SEMARH – Secretaria de Estado do Meio Ambiente e Recursos Hídricos was invited.

[60] Guia de Orientação – Mecanismo de Desenvolvimento Limpo. Available in: http://www.mct.gov.br/upd_blob/0205/205947.pdf. Accessed in: May 30, 2011.
[61] João Câmara and Parazinho cities do not have Municipal environment agencies. In this case, both Municipal Administrative Secretaries are the responsible institutions for environment questions.

All the cases listed above, the invitation letters were clearly addressed by post office with receipt requested at least fifteen days before validation process starts, so any comments received would be incorporated in the validation report to be submitted to the Executive Secretariat of the Interministerial Commission. CIMGC considers as validation process starting on the day that Project Design Document (PDD) is available for public consulting with international stakeholders on the CDM website at the Secretariat of the Climate Convention[62].

E.2. Summary of comments received

No comments were received by the project participants.

E.3. Report on consideration of comments received

No comments were received by the project participants.

SECTION F. Approval and authorization

Not available yet. The DNA of Brazil only provides letter of approval once the final validation report is available.

- - - - -

[62] Available in: http://cdm.unfccc.int/Projects/Validation/index.html.

Appendix 1: Contact information of project participants

Organization name	Energisa Geração – Central Eólica Renascença I S.A.
Street/P.O. Box	Av. Pasteur, 110, 6º andar - Botafogo
Building	
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State/Region	RJ
Postcode	
Country	Brazil
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Fax	
E-mail	joao.gabriel@energisa.com.br
Website	www.energisa.com.br
Contact person	joao.gabriel@energisa.com.br
Title	*Gerente de Operações Estruturadas – DEOE.* Structured Operations Manager
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Middle name	Gabriel
First name	João
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Mobile	
Direct fax	
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State/Region	RJ
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Country	Brazil
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Fax	
E-mail	joao.gabriel@energisa.com.br
Website	www.energisa.com.br
Contact person	joao.gabriel@energisa.com.br
Title	*Gerente de Operações Estruturadas – DEOE.* Structured Operations Manager
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Middle name	Gabriel
First name	João
Department	
Mobile	
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Organization name	Energisa Geração – Central Eólica Renascença III S.A.
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Direct tel.	(+55) (21) 2122-6960
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Street/P.O. Box	Av. Pasteur, 110, 6º andar - Botafogo
Building	
City	Rio de Janeiro
State/Region	RJ
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Appendix 2: Affirmation regarding public funding

Not applicable. The implementation and operation of the project do not involve any kind of public funding from Parties included in Annex I.

Appendix 3: Applicability of selected methodology

All information about the applicability of selected methodology is presented in Section B.2.

Appendix 4: Further background information on ex ante calculation of emission reductions

Calculation of the CO_2 emission factor for the National Electricity Grid of Brazil

The Ministry of Science, Technology and Innovation (MCTI), which is the Designated National Authority (DNA) for Brazil [63] has calculated the CO_2 emission factor for the National Electricity Grid of Brazil for year 2012 according to the methodology tool “Tool to calculate the emission factor for an electricity system” (version 3.0), approved by the CDM Executive.

The DNA of Brazil declares in its website that the calculated value is in accordance with version 3.0 of the methodological tool. Although version 3.0 it is not any longer the latest version of this methodological tool (version 4.0 is currently the latest version of the tool) it is important to note that there are no changes in the latest version that would affect the calculation of the value for the the CO_2 emission factor for the National Electricity Grid of Brazil when compared to version 3.0 of the tool. Version 4.0 of the tool provided a single change when comperared to version 3.0 of the tool:

- Provide requirements for applying this tool for a programme of activities (PoA).

The project participants believe that very soon the DNA of Brazil will declare that its calculations for the CO_2 emission factor for the National Electricity Grid of Brazil for year 2012 are also in accordance with “Tool to calculate the emission factor for an electricity system” (version 4.0).

Besides, the new version of the excel sheet provided by UNFCCC for calculating the CO_2 grid emission factors has no had modification that would have an effect on the resulting value. Therefore, we can conclude that changes to the methodological tool promoted by version 4.0 do not affect the resulting value. Anyway, it is crucial to note that the value for the CO_2 emission factor for the National Electricity Grid of Brazil for year 2012 is just used for ex-ante calculation of emission reductions. So it will not have an impact in the emission reduction to be achieved by the project activity and determined ex-post as annual values for the CO_2 emission factor for the National Electricity Grid of Brazil will also be determined ex-post based on required monitoring.

The CO_2 emission factor of the National Electricity Grid of Brazil consists of the combination of operating margin emission factor (which corresponds to the CO_2 emissions intensity of the electricity dispatch margin) and the build margin emissions factor (which corresponds to the CO_2 emission intensity of the last power plants constructed in Brazil).

[63] The Ministry of Science, Technology and Innovation have been calculating the CO2 emission factor according to the methodology tool “Tool to calculate the emission factor for an electricity system” (version 3.0), approved by the CDM Executive Board. The CO2 emission factor was obtained in the Brazilian DNA website. Source of data used: Tool to calculate the emission factor for an electricity system (version 3.0): The actual value has been calculated by Ministry of Science, Technology and Innovation (MCTI), Brazilian Designated National Authority (DNA). The Emission Factor will be monitored through ex-post calculation, following the latest version of Tool to calculate the emission factor for an electricity system. The Brazilian DNA calculated the value based on the Tool. The Combined Margin is calculated through a weighted-average formula, considering both the EFgrid,OM-DD,y and the EFgrid,BM,y and the weights wOM and wBM (are default 0.75 and 0.25, respectively).

MCTI have published the operating margin emission factor monthly, and build margin emission factor annually, for the Brazilian National Interconnected Grid. All of these data is available online on the MCTI website[64].

The following tables show the 2012 vintage values for operating margin emission factor and build margin emission factor according to the MCTI calculations based on the "Tool to calculate the Emissions Factor for an electricity system" (version 03.0.0).

Table A.1. Monthly values for OM, BM and CM emission factor for year 2012

Emission Factor (tCO_2/MWh) – Monthly												
2012	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
EF_{OM}	0.2935	0.3218	0.4050	0.6236	0.5943	0.5056	0.3942	0.4490	0.6433	0.6573	0.6641	0.6597
EF_{BM}	0.2010	0.2010	0.2010	0.2010	0.2010	0.2010	0.2010	0.2010	0.2010	0.2010	0.2010	0.2010
w_{OM}	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
w_{BM}	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
$EF_{grid,CM}$	0,2704	0.2916	0.3540	0.5180	0.4960	0.4295	0.3459	0.3870	0.5327	0.5432	0.5483	0.5450

Table A.2. Annual values for OM, BM and CM emission factors for year 2012

Emission Factor (tCO_2/MWh) – Annually	
2012	
$EF_{OM,y}$	0.5176
$EF_{BM,y}$	0.2010
$EF_{grid,CM,y}$	0.4384

[64] Available in: http://www.mct.gov.br/index.php/content/view/338047.html#ancora.

Appendix 5: Further background information on monitoring plan

General introduction

Monitoring plan determines the target distribution and time arrangement of monitoring, in order to ensure the true, maintainable and measurable GHG emission determination of a CDM project. That aims to ensure that the CDM project in question is monitored, recorded and reported in a appropriated manner. This is the key procedure to determine emission reductions to be achieved by the project activity during the crediting period.

According to monitoring plan, monitoring system should be reliable, conservative and comprehensive. This system should have the function of evaluation, measurement and collection and reporting of monitoring data in order to provide true, reliable and conservative emission reduction determination process.

This procedure will ensure the authenticity of CERs to be is issued as a result of emission reductions to be achieved by the project activity. Staff responsible for the monitoring process should strictly follow the designed monitoring plan. They should effectively and truly report the emission reduction calculations.

Monitoring procedure for electricity generation

Monitoring procedures will be performed by the project owner, who is responsible for assigning clear roles in the monitoring team at the beginning of the project activity. All monitoring procedures will be supervised by CDM consultant, in order to meet the requirements from the CDM Executive Board.

The CDM monitoring of this project is mainly focused on the monitoring the amount of electricity to be generated by the project activity and exported through the National Electricity Grid of Brazil. Net electricity generation measurements for each one of the five wind farms encompassed by the project activity will be monitored by the automatic monitoring system. Electricity measurement data will automatically obtained and saved. The project owner will be in charge of the implementation of the monitoring system. Electricity generated by the project activity will be delivered to a power substation which will be connected to the National Electricity Grid of Brazil.

Electricity generation will be monitored for each wind farm by appropriated electricity meters which will be installed at the power substation. The meters will be calibrated according to the manufacturer specifications to ensure measurement accuracy.

o Data to be monitored

The monitoring plan for the project activity focuses mainly on the monitoring of project net electricity generation which will be exported through the grid. Furthermore, as both the operating margin emission factor and build margin emission factor are required to be determined ex-post, related monitoring will also be performed as part of the operation of the monitoring plan.

Electricity exported by the project through the grid will be measured by electricity meter installed at the power substation and recorded monthly. Another monthly report will be carried out by the project owner, and this report will be cross-checked with the electricity meter.

Measurements will be carried out by a measuring agent, which in this case will be the official purchaser of electricity. This measuring agent will be a specialized company in energy purchase and will fulfil with all grid procedures established by the regulating agent in Brazil. The project owner must support the measuring agent, who will be responsible for data gathering and its presentation consolidated to CCEE[65].

An additional check will be carried annually, when it will be adjusted the payment by the grid company according to the power purchase agreement.

Procedures and routines for calibration of electricity meters will also be implemented in accordance with manufacturer instructions/requirements. All records should be documented and maintained by the project participants for future DOE's assessment and verification.

o Procedures for maintenance of monitoring equipment and installations

The monitoring system will be periodically maintained by the project owner. Its precision will ensure any error occurred within the acceptable scale. Equipment and meters will be calibrated according to the manufacturers to ensure its precision. The information about calibration will be kept by the project participants.

o Calculation of emission reductions

Emission reduction of the project will be calculated by Zeroemissions do Brasil Ltda., as participant of the project. To ensure transparency and conservativeness, an excel table will be used for calculation, with all relative data and calculate process provided. Meanwhile, source of default value is provided for DOE verification.

Management process

o Quality Assurance & Quality Check

QA&QC, including data monitoring, maintenance and storage, will be modified according to operation status and verification requirement.

o Electricity supply to Grid

Electricity supply to National Interconnected System from this project will be monitored by electricity meters, which are located in the power substation. Measurement data will be recorded and stored by both CCEE and by the project owner.

o Emergency plan

The operation of the project activity will include all required safety and emergency procedures. When the the project operation is interrupted, no electricity is generated and no GHG emissions reductions are thus promoted.

[65] CCEE – Câmara de Comercialização de Energia Elétrica (Electric Power Commercialization Chamber). Available in: http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=2e09a5c1de88a010VgnVCM100000aa01a8c0RCRD . Accessed in May 30, 2011.

o Data management systems

Data management systems are used to manage and maintain monitoring data. It is the key step in the monitoring process. Emission reductions cannot be verified, if the monitoring data is not kept well.

The original data and the final results, as well as all the information and relative data will be archived electronically.

o Procedures for review of reported results/data and for corrective actions

In the first week of each month, the CCEE consolidates electricity generation data from previous generation of the month, and if there is any inconsistency or error in the collected data, it generates an e-mail, informing the agent about the missing or inconsistent data and asking for adjustment of these data in SCL – Accounting and Settlement System and the justification for the need of such adjustment.

Information contained in the internal spreadsheet for control of electricity generation will be checked against a spreadsheet with data sourced by CCEE. For the calculation of emission reduction achieved by the project activity, electricity generation data used will be those of the General Service Report of CCEE, as reported in the CCEE database, of which data can be retrieved online by agents accredited by CCEE.

To guarantee the required accuracy and rationality of the reported results/data for future CER verifications, the project participants will perform internal review of data to be reported. All reported results/data will be internally reviewed prior to being submission to a DOE for assessment/verification.

Electronic and hard copy of data recorded will be submitted to the project manager for the internal review. The objective of the internal review includes reliability of project operation, continuity of monitoring and accuracy of monitored data.

Moreover, all of the monitored data and results related to the internal review should be archived by the project owner and transparent for verification.

o Verification of monitoring results

Verification of monitoring results is a necessary part of all CDM projects. The main purpose of verification is to verify the achievement of GHG emission reduction by an independent 3rd party.

The verification frequency of the project will be determined based on the project participants' decision.

o Personnel training

The monitoring plan needs to be executed by qualified professionals, therefore project participants agree internally on the development of a training program for all involved staff.

The training program will be carried by the relevant personnel on a periodic basis.

o Efficiency evaluation

To assess whether the project can reach the efficiency anticipated on the PDD, the project participants evaluate the electricity delivered to the grid and project power generation at the end of every year.

The evaluation results will be stored as reference for next year.

Appendix 6: Summary of post registration changes

This section is intentionally left blank.

History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for CDM project activities" (EB 66, Annex 8).
03	EB 25, Annex 15 26 July 2006	
02	EB 14, Annex 06b 14 June 2004	
01	EB 05, Paragraph 12 03 August 2002	Initial adoption.
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