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

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Annexes

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SECTION A. General description of project activity

A.1. Title of the project activity:

Grid connected electricity generation from renewable source: Windfarm Complex Santa Vitória do Palmar and Chuí.

Version: 01

Date: 10 January 2012

A.2. Description of the project activity:

The proposed project activity consists in the implementation and operation of the Windfarm Complex Santa Vitória do Palmar and Chuí, constituted by 16 new wind electricity generation facilities (Chuí I, Chuí II, Chuí IV, Chuí V, Minuano I, Minuano II, Verace I, Verace II, Verace III, Verace IV, Verace V, Verace VI, Verace VII, Verace VIII, Verace IX and Verace X) (Table 1), located in Santa Vitória do Palmar and Chuí Municipalities, in the Rio Grande do Sul State, Brazil. The project activity will employ 201 horizontal-axis aerogenerators (129 aerogenerators model Gamesa G97 in Verace's facilities and 72 aerogenerators IMPSA IWP-100 in Chuí and Minuano's facilities), each with 2.0 MW (total nominal capacity: 402.0 MW). The physical implementation has not yet begun.

Table 1: Windfarm Complex Santa Vitória do Palmar and Chuí's facilities.

Facility	Aerogenerators' model	Aerogenerators' quantity	Installed capacity (MW)	Plant load factor	Net capacity (MW)
Chuí I	IMPSA IWP-100	12	24.0	51.3%	12.3
Chuí II		11	22.0	48.3%	10.6
Chuí IV		11	22.0	47.7%	10.5
Chuí V		15	30.0	50.1%	15.0
Minuano I		11	22.0	51.6%	11.3
Minuano II		12	24.0	48.9%	11.7
Verace I	Gamesa G97	10	20.0	44.3%	8.9
Verace II		10	20.0	43.2%	8.6
Verace III		13	26.0	44.3%	11.5
Verace IV		15	30.0	45.8%	13.7
Verace V		15	30.0	43.2%	13.0
Verace VI		9	18.0	43.9%	7.9
Verace VII		15	30.0	44.3%	13.3
Verace VIII		13	26.0	43.3%	11.3
Verace IX		15	30.0	44.0%	13.2
Verace X		14	28.0	45.2%	12.6

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TOTAL		**201**	**402.0**	**46.2%**	**185.6**[1]

The project activity is projected to deliver an average of 1,625,744 MWh/year[2] of renewable electricity to the National Interconnected System (*Sistema Interligado Nacional* - SIN). In the baseline[3], electricity delivered to the grid by the project activity would have 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. Hence, the project activity will promote GHG emissions reductions by displacing fossil fuel-based electricity generation that would otherwise occur.

The project boundary includes CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. Project and leakage emissions are not expected.

The project activity contributes the host country's sustainable development in the following ways:

- **Contribution to local environmental sustainability**: The project activity will produce renewable electricity from low environmental impact wind power plants;

- **Contribution to the net workplace generation**: New job posts will be created by the project activity, especially during project implementation;

- **Contribution towards the diversification of the electric 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 complementary to hydroelectricity, which is the major electricity source in the Brazilian electrical

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[1] It should be noted that the Windfarm Complex Santa Vitória do Palmar and Chuí's current configuration with 201

1. The entrepreneurs contracted Inova Energy to analyze the estimated electricity generation in Verace's facilities, considering a total of 129 aerogenerators model Gamesa G90 2.0 MW, with a total installed capacity of 258.0 MW. The Inova Energy's wind report was made available to the entrepreneurs on 13/Apr/2011 (reference: Verace_InovaEnergy_20110413) and estimated a total net electricity generation of 998,985 MWh/year.
2. Similarly, the entrepreneurs contracted MegaJoule to analyze the estimated electricity generation in Chuí and Minuano's facilities, considering a total of 72 aerogenerators model IMPSA IPW-100 2.0 MW, with a total installed capacity of 144.0 MW. The MegaJoule's wind report was made available to the entrepreneurs on 16/Aug/2011 (reference: ChuiMinuano_MegaJoule_20110816) and estimated a total net electricity generation of 626,760 MWh/year.

Hence, in the investment decision date (i.e. the date of the 12th Brazilian Auction of New Energy), the entrepreneurs decided to implement Chuí and Minuano's facilities utilizing IMPSA's aerogenerators and Verace's facilities utilizing Gamesa's one. This is the current configuration of this windfarm.

[2] Considering the plant load factors defined in Inova Energy's study for Verace's facilities and in MegaJoule's study for Chuí and Minuano's facilities. A detailed description of the plant load factor of the project activity is presented in footnote 1 of this PDD.

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

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system, contributing 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[4].

- **Contribution to wind electricity generation sector's development in Brazil**: This type of project can stimulate similar initiatives inside the Brazilian energy sector and encourage the development of modern and more efficient renewable energy units throughout Brazil.

A.3. Project participants:

Table 2: Project participants.

Name of Party involved (*) ((host) indicates a host party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Federative Republic of Brazil (host)	Santa Vitória do Palmar Holding S.A.	No
	Chuí Holding S.A.	
	WayCarbon Soluções Ambientais e Projetos de Carbono Ltda.	
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Host Party: Federative Republic of Brazil

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

State: Rio Grande do Sul

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

Municipalities: Santa Vitória do Palmar and Chuí

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

[4] ANEEL (Brazilian Electricity National Agency – *Agência Nacional de Energia Elétrica*) – Brazilian Electricity Atlas (*Atlas de Energia Elétrica no Brasil*). Available at http://www.aneel.gov.br/aplicacoes/Atlas/download.htm. Accessed on 27/Dec/2011.

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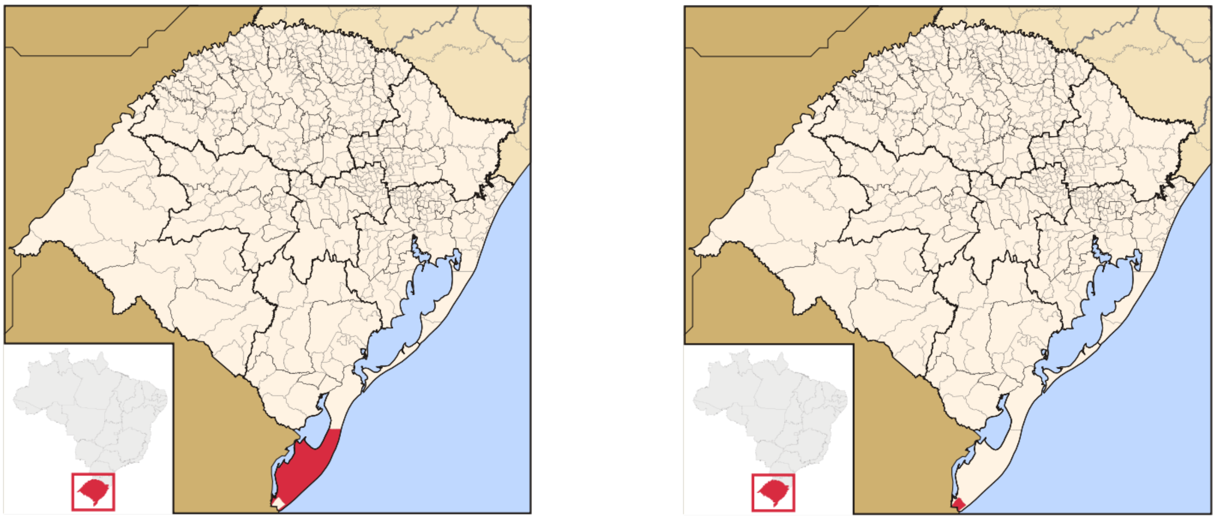

Figure 1: Geographic location of the project activity. Bottom-left panel in both figures: depicts the position of Rio Grande do Sul State in the Federative Republic of Brazil. Main left panel: depicts Santa Vitória do Palmar Municipality within Rio Grande do Sul State. Main right panel: depicts Chuí Municipality within Rio Grande do Sul State.

The reference geographic coordinates of the project activity are depicted in Table 3.

Table 3: Project facilities' reference geographic coordinates.

Facility	Type (Datum SIRGAS2000, 22S)	Latitude	Longitude
Chuí I	UTM	6,272,978 m	278,124 m
	Degrees	- 33°39'35".8261	- 53°23'34".2523
Chuí II	UTM	6,272,638 m	277,423 m
	Degrees	- 33°39'46".3286	- 53°24'01".7541
Chuí IV	UTM	6,271,959 m	276,022 m
	Degrees	- 33°40'07".2966	- 53°24'56".7231
Chuí V	UTM	6,271,619 m	275,322 m
	Degrees	- 33°40'17".7945	- 53°25'24".1914
Minuano I	UTM	6,265,987 m	277,429 m
	Degrees	- 33°43'22".0991	- 53°24'07".5259
Minuano II	UTM	6,266,662 m	276,662 m
	Degrees	- 33°42'59".6211	- 53°24'36".6908
Verace I	UTM	6,291,509 m	289,019 m
	Degrees	- 33°29'42".5793	- 53°16'15".7864
Verace II	UTM	6,290,313 m	288,112 m
	Degrees	- 33°30'20".7380	- 53°16'51".9279
Verace III	UTM	6,288,498 m	288,350 m
	Degrees	- 33°31'19".7952	- 53°16'44".2549

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Verace IV	UTM	6,285,283 m	293,316 m
	Degrees	- 33°33'07".6087	- 53°13'34".5595
Verace V	UTM	6,287,117 m	286,656 m
	Degrees	- 33°32'03".3882	- 53°17'51".0596
Verace VI	UTM	6,286,170 m	288,608 m
	Degrees	- 33°32'35".5107	- 53°16'36".2414
Verace VII	UTM	6,283,510 m	291,543 m
	Degrees	- 33°34'03".8931	- 53°14'44".7545
Verace VIII	UTM	6,285,104 m	285,803 m
	Degrees	- 33°33'08".0836	- 53°18'25".8421
Verace IX	UTM	6,282,745 m	286,505 m
	Degrees	- 33°34'25".1257	- 53°18'00".6700
Verace X	UTM	6,280,557 m	290,986 m
	Degrees	- 33°35'39".3113	- 53°15'08".8325

Sources:

- UTM: *Ficha de Dados EPE* (EPE's data sheet; EPE =*Empresa de Pesquisa Energética* = Brazilian Energetic Research Enterprise) (references: EPEDataSheet_Chui1; EPEDataSheet_Chui2; EPEDataSheet_Chui4; EPEDataSheet_Chui5; EPEDataSheet_Minuano1; EPEDataSheet_Minuano2; EPEDataSheet_Verace1; EPEDataSheet_Verace2; EPEDataSheet_Verace3; EPEDataSheet_Verace4; EPEDataSheet_Verace5; EPEDataSheet_Verace6; EPEDataSheet_Verace7; EPEDataSheet_Verace8; EPEDataSheet_Verace9; EPEDataSheet_Verace10).
- Degrees: conversion from UTM data by ProGrid Brazilian official program (program available at http://www.ibge.gov.br/home/geociencias/geodesia/param_transf/default_param_transf.shtm, accessed on 05/Dec/2011; conversion reference: ProGriD_0147_SIRGAS2000_Lat_Long_Chui1; ProGriD_0147_SIRGAS2000_Lat_Long_Chui2; ProGriD_0147_SIRGAS2000_Lat_Long_Chui4; ProGriD_0147_SIRGAS2000_Lat_Long_Chui5; ProGriD_0147_SIRGAS2000_Lat_Long_Minuano1; ProGriD_0147_SIRGAS2000_Lat_Long_Minuano2; ProGriD_0147_SIRGAS2000_Lat_Long_Verace01; ProGriD_0147_SIRGAS2000_Lat_Long_Verace02; ProGriD_0147_SIRGAS2000_Lat_Long_Verace03; ProGriD_0147_SIRGAS2000_Lat_Long_Verace04; ProGriD_0147_SIRGAS2000_Lat_Long_Verace05; ProGriD_0147_SIRGAS2000_Lat_Long_Verace06; ProGriD_0147_SIRGAS2000_Lat_Long_Verace07; ProGriD_0147_SIRGAS2000_Lat_Long_Verace08; ProGriD_0147_SIRGAS2000_Lat_Long_Verace09; ProGriD_0147_SIRGAS2000_Lat_Long_Verace10)

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

Sectoral scope: 01 – Energy industry (renewable source)

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

Wind energy is defined as the kinetic energy contained by moving air masses (wind). Its use for the production of electricity occurs by means of the conversion of translational kinetic energy in rotational kinetic energy and, then, by means of the conversion of the former form of energy into electricity, by means of the employment of wind turbines or aerogenerators[4].

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Environmental pros of wind-based electricity generation recognizably include contribution for atmospheric emissions reduction (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[4].

Negative environmental impacts of wind power plants are relatively limited, but might arise from noise generated by the movement of the blades. Also, electromagnetic interference with data transmission systems (radio, television, etc.) is possible. Additionally, possible interference upon bird routes should be considered[4].

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The project activity is projected to deliver an average of 1,625,744 MWh/year[5] of renewable electricity to the National Interconnected System (*Sistema Interligado Nacional* - SIN). In the baseline[6], electricity delivered to the grid by the project activity would have 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. Hence, the project activity will promote GHG emissions reductions by displacing fossil fuel-based electricity generation that would otherwise occur.

IMPSA is a hundred year-old company that provides integrated solutions for power generation from renewable resources, equipment for the process industry and environmental services. To perform its tasks, IMPSA has been organized into the following business units: IMPSA Hydro, IMPSA Wind and IMPSA Energy, all of them engaged in the provision of total solutions for sustainable power generation; IMPSA Process, a manufacturer of equipment for the process industry; and IMPSA Environmental Services, which is dedicated to waste management and treatment. The quality of IMPSA products is guaranteed by its internationally certified Quality Management System (ISO 9001:2000, ISO 14001:2004) and by the international construction standards applied to its manufacturing process at home and abroad[7].

IMPSA has been following the evolution of wind energy over the last thirty years through research and development. In 1998, the Company began to study composite materials and, early in 2003, it started to develop its own technology. As a provider of total solutions, IMPSA Wind is organized around three

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[5] Considering the plant load factors defined in Inova Energy's study for Verace's facilities and in MegaJoule's study for Chuí and Minuano's facilities. A detailed description of the plant load factor of the project activity is presented in footnote 1 of this PDD.

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

[7] IMPSA's website. Available at http://www.impsa.com/en/products/impsawind/SitePages/IMPSA%20Wind.aspx. Accessed on 28/Dec/2011.

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main areas: support functions; the product – state-of-the-art wind generators –; and turnkey supply of wind farms[7].

IMPSA Wind's generators are of the direct-drive permanent magnet (DDPM) type with the turbine directly coupled to the generator, which requires no gearbox. UNIPOWER®, IMPSA's proprietary design, combines turbine and generator in a single component which simultaneously converts wind energy into movement and movement into electricity. The UNIPOWER® technology enhances the efficiency and reliability of IMPSA's wind generators[7].

IMPSA IWP-100 is a direct-drive aerogenerator, with a rotor of 100-meter diameter, three-bladed, pitch controlled and with 2.0 MW of nominal capacity[8].

Similarly, with an experience of more than 15 years, Gamesa is a global technological leader in the design, manufacture, installation and maintenance of wind turbines, with 23,000 MW installed in 30 countries and 15,000 MW under maintenance. The company has its own wind turbine design and development capacity and it is vertically integrated; it covers the entire process from conception, manufacturing and installation of wind generators, including manufacturing of blades, molds, blade roots, multipliers, generators, converters and towers, as well as assembly, logistics and installation. Gamesa has more than 30 production facilities in Spain (supplying mainly the European market), US, Asia (China and India) and Brazil (since mid-2011). In Brazil, the company has begun construction of a nacelle assembly plant in the Bahia State (300 MW)[9].

Gamesa is also a world leader in the development, construction and sale of wind farms. By the end of 2010, the company had completed over 170 wind farms in 11 countries, with a total installed capacity of 4,100 MW, and another 22,661 MW in various stages of development in Europe, America and Asia. Gamesa's wind farm development division undertakes all the activities associated with wind generation projects, including site identification, wind measurement, obtaining the necessary permits and licenses for wind farm construction and commissioning, final sale of wind farms, and operation and maintenance of operational farms[9].

Multi-megawatt turbines from the Gamesa G9X-2.0 MW platform improve competitive investment ratios per MW installed an Cost of Energy produced due to their versatile combination of a 2.0 MW unit power wind turbine and 4 different sized rotors: 80, 87, 90 and 97 m diameters, to achieve maximum output in all types of settings and wind conditions.

The reliability of the Gamesa G8X – 2.0 MW, backed by broad experience and proven capacity to adapt, are joined with the Gamesa G9X – 2.0 MW technological advances, providing notable improvements in performance, optimized models, a new tower portfolio and an upgraded image. The Gamesa G9X – 2.0 MW bases its operational improvements from its speed control and variable pitch technology enhancements, and other hardware and software design upgrades to extract the maximum amount of energy from the wind and to do it as efficiently as possible. The Gamesa G9X – 2.0 MW incorporates improved and increased mechanical capacity in key wind turbines components such as the yaw system,

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[8] IMPSA IWP-100 technical description. Reference: IPMSA_IWP-100_TechnicalDescription.

[9] Gamesa's website. Available at http://www.gamesacorp.com/en/gamesaen/. Accessed on 29/Dec/2011.

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the framework, main axis and blade bearings. These improvements guarantee maximum reliability of the equipment and allow larger rotors to be used to increase the electricity generated[10].

In relation to the technology to be employed in the project activity, it's important to emphasize that no technology transfer and know-how are previewed for the present project activity. Also, at least 60% of the technology employed in the project activity will be provided by the host country (Brazil), in accordance with the requirements of FINAME (Industrial Financing Special Agency) / BNDES (Brazilian Development Bank), the lender agent of the project.

The overview of the IMPSA and Gamesa aerogenerator's technical characteristics is provided in Table 4 and Table 5, respectively.

Table 4: IMPSA IWP-100's technical overview[8].

Operational data	
Rated power	2.0 MW
Cut-in wind speed	4 m/s
Cut-out wind speed	22 m/s
Rated wind speed	13 m/s
Wind class - IEC[11]	Average speed = 8.5 m/s Reference speed = 37.5 m/s
Rotor	
Diameter	100 m
Swept area	7,854 m^2
Rotor speed range	5 - 15 rpm
Speed regulation	Pitch control
Generator	
Type	Direct-drive permanent magnet (DDPM)
Voltage	750 V
Frequency	60 Hz
Brake system	
Type	Independent systems with blade pitching mechanism

Table 5: Gamesa G97's technical overview[9, 10].

Operational data	
Rated power	2.0 MW
Wind class - IEC[11]	IIA / IIIA
Rotor	

[10] Gamesa G9X – 2.0 MW: Technical Evolution. Reference: GamesaG9X-2.0MW_TechnicalDescription.

[11] International Electrotechnical Commission (IEC) is the world's leading organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

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Diameter	97 m
Swept area	7,390 m^2
Rotor speed range	9.6 – 17.8 rpm
Speed regulation	Variable pitch and speed technology
Generator	
Type	Doubly-fed machine
Voltage	690 V
Frequency	60 Hz
Brake system	
Type	Joint action of primary aerodynamic brakes and emergency brake with an hydraulic control system

It is noteworthy that the entrepreneurship is in accordance with all the determinations established by the Brazilian, State and Municipal Environmental Law. Moreover, possible interference with environment will be also minimized through the adoption of mitigation and environmental control measures[12]. The environmental aspects of the project activity are discussed in the Environmental Impact Assessment on the project activity, summarized in Section E.

The information provided above demonstrates that the project activity employs environmentally safe and sound technology.

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

A renewable crediting period is selected for the proposed project activity. The *ex-ante* estimated emission reductions for the first 7-year crediting period are presented in Table 6.

Table 6: Estimated amount of emission reductions over the chosen crediting period.

Years	Annual estimation of emission reductions in tonnes of CO_2e
From January 2014	640,706
2015	640,706
2016	640,706
2017	640,706
2018	640,706
2019	640,706
Till December 2020	640,706
Total estimated reductions (tonnes of CO_2e)	**4,484,942**
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	640,706

[12] Chuí, Minuano and Verace's Simplified Environmental Report (*Relatório Ambiental Simplificado* – RAS) (references: Chui_RAS; Minuano_RAS; Verace_RAS).

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A.4.5. Public funding of the project activity:

There is no public funding from Parties included in Annex 1 involved on this project activity.

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SECTION B. Application of a baseline and monitoring methodology

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

Approved consolidated baseline and monitoring methodology ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", Version 12.2.0.

Furthermore, it was used the latest approved versions of the following tools:

- "Tool to calculate the emission factor for an electricity system". Latest approved version at the time of conclusion of the PDD: 02.2.1;
- "Tool for the demonstration and assessment of additionality". Latest approved version at the time of conclusion of the PDD: 06.0.0.

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

In accordance with the applicability conditions of ACM0002 version 12.2.0, the proposed project activity consists in the installation of a grid-connected renewable power generation facility at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant).

Furthermore, the project activity fulfills all the applicability conditions of ACM0002/Version 12.2.0 in the following ways:

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

  Outcome: applicability condition is fulfilled, considering that the project activity is the installation of a "wind power plant/unit".

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

  Outcome: since the proposed project does not involve capacity addition, retrofits or replacements, this applicability condition is not applied.

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

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- The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or

- The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; or

- The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2".

Outcome: taking into account that the proposed project activity is based in a wind-based source, this applicability condition is not applied.

- In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m^2 all the following conditions must apply:

  - The power density calculated for the entire project activity using equation 5 is greater than 4 W/m^2;

  - Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project that collectively constitute the generation capacity of the combined power plant;

  - Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity;

  - Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m^2, is lower than 15MW;

  - Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m^2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.

Outcome: taking into account that the proposed project activity is based in a wind-based source, this applicability condition is not applied.

- "The methodology is not applicable to the following:

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

  - Biomass fired power plants;

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- A hydro power plant that result in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4 W/m^2"

Outcome: applicability condition fulfilled. The project activity does not involve fuel switch; biomass fired power plants; and is not a hydro power plant.

- "In case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is the "continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance"".

  Outcome: applicability condition fulfilled. The project activity does not involve retrofit, replacement or capacity addition.

Therefore, this methodology is applicable to the project activity.

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

The spatial extent of the project boundary includes the project power plants (constituted by Chuí I, Chuí II, Chuí IV, Chuí V, Minuano I, Minuano II, Verace I, Verace II, Verace III, Verace IV, Verace V, Verace VI, Verace VII, Verace VIII, Verace IX and Verace X) and all power plants connected physically to the electricity system that the CDM project power plant is connected to, i.e., SIN. Emission sources and gases included in the project boundary are depicted in **Table 7**.

Table 7: Emissions sources included in the project boundary, as per ACM0002 (version 12.2.0).

	Source	Gas	Included?	Justification/Explanation
Baseline	Power plants supplying energy to SIN (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 applicable.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants.	CO_2	No	Not applicable.
		CH_4	No	Not applicable.

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		N_2O	No	Not applicable.
	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	Not applicable.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.

A flow diagram of the project boundary, physically delineating the project activity, representing emissions sources and gases included in the project boundary and the monitoring variables, is depicted in Figure 2.

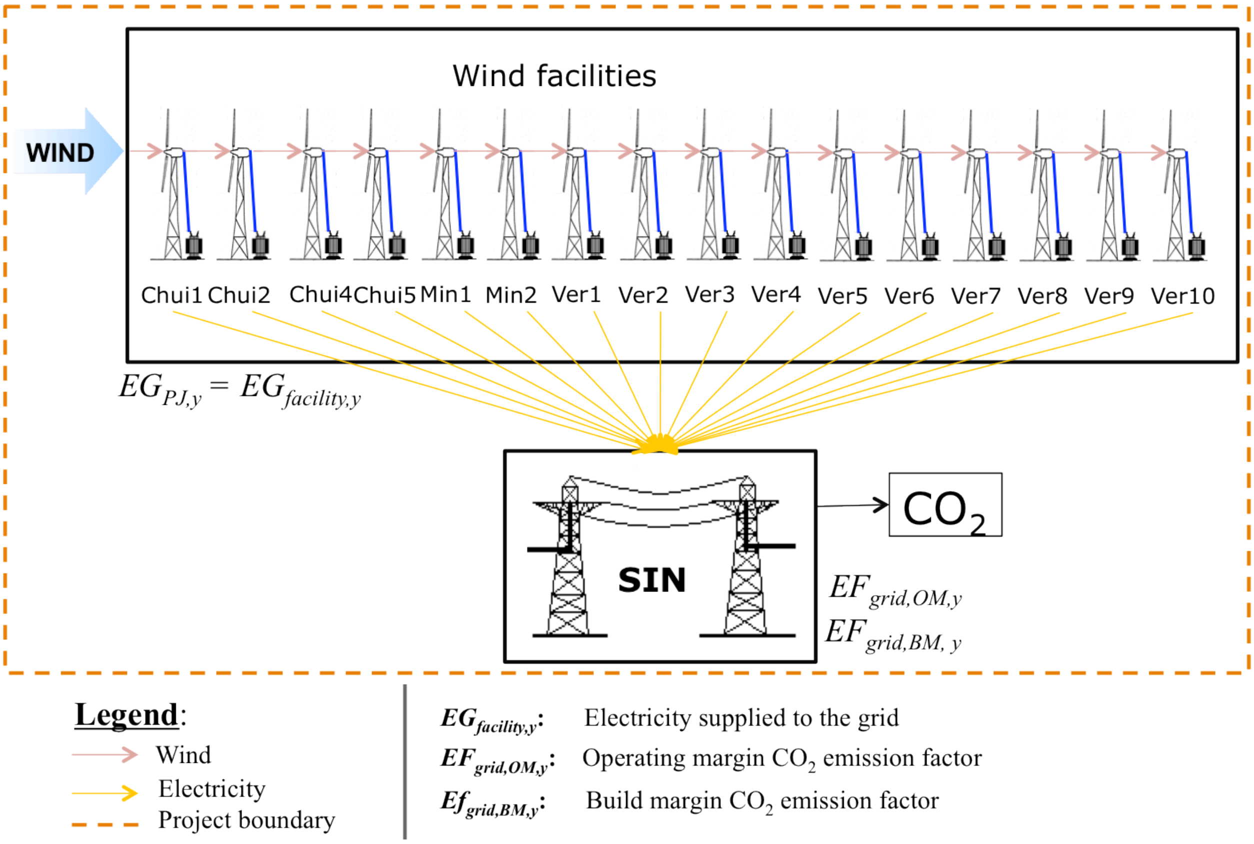

Figure 2: Project boundary. Monitored variables are depicted. Baseline emissions consist of CO_2 emissions from fossil fuel combustion for the electricity generation by the plants connected to SIN, as reflected in its combined margin.

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

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As per ACM0002/Version 12.2.0, since the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

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

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

Project Starting Date

According to the Glossary of CDM terms, "*the starting date of a CDM project activity is the earliest date at which either the implementation or construction or real action of a project activity begins*" and "*the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity. Minor pre-project expenses, e.g. the contracting of services /payment of fees for feasibility studies or preliminary surveys, should not be considered in the determination of the start date as they do not necessarily indicate the commencement of implementation of the project*".

Taking into account the definition of Starting Date provided above, the Project Starting Date has not occurred yet for this project activity. During the 12th Brazilian Auction of New Energy (*12º Leilão de Energia Nova - Leilão nº 02/2011*[13]), the wind electricity generation of this project activity have been contracted; nevertheless, the Power Purchase Agreement (PPA) established in the auction do not necessarily commit the entrepreneurs to the wind electricity generation facilities' implementation, since it is possible to sell the PPA to other part yet. During the auction, the entrepreneurs negotiated the costs of the Windfarm Complex implementation and finally dealt the final costs with the equipment suppliers and with the company responsible for implementing the facilities. However, these deals have not been officialised yet (i.e. there is no official contracts that commit entrepreneurs to the equipment suppliers and to the companies responsible for implementing the facilities). The entrepreneurs and the involved parts are drawing up the respective contracts.

Therefore, no implementation or construction or real action has occurred yet.

Demonstration and assessment of prior consideration of the CDM

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[13] 12th Brazilian Auction of New Energy (12º *Leilão de Energia Nova - Leilão nº 02/*2011). Available at http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=38820a6c2930f210VgnVCM1000005e01010aRCRD. Accessed in 07/Dec/2011. Reference: 12thNewEnergyAuction_Results

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As per the "Guidelines on the demonstration and assessment of prior consideration of the CDM" (Version 4 - Annex 13/EB62), "for project activities with a starting date on or after 02 August 2008, the project participant must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status".

Project participants have informed the Brazilian DNA and the UNFCCC Secretariat of the commencement of the project activity and of their intention in seeking the CDM status. Such notification was made within six months of the project activity starting date (in fact, the project starting date has not occurred yet for this project activity) and contained a brief description of the project activity and the precise geographical location of the project plant. The notifications, using the standardized form F-CDM-Prior Consideration, were sent for Brazilian DNA and UNFCCC Secretariat on 06/01/2012[14], and the receipt of such documents has been confirmed.

Documental evidences of these notifications were made available to DOE during validation.

A summary of milestones is presented in Table 8.

Table 8: Timeline of the project activity.

Date	Object	Related part	Document reference	Observation
2008	Chuí and Verace's Simplified Environmental Report (RAS – *Relatório Ambiental Simplificado*)	MAIA Meio Ambiente Consultoria Ambiental	Chui_RAS; Verace_RAS	Environmental impact assessment from Chuí and Verace's facilities, necessary to obtaining Prior License
21/11/08	Chuí's Prior License (LP – *Licença Prévia*)	FEPAM - Environmental Agency in charge of LP issuance	LP_Chui	LP valid until 20/11/2010
2009	Minuano's Simplified Environmental Report (RAS – *Relatório Ambiental Simplificado*)	MAIA Meio Ambiente Consultoria Ambiental	Minuano_RAS	Environmental impact assessment from Minuan's facilities, necessary to obtaining Prior License
25/02/10	Verace's Prior License (LP – *Licença Prévia*)	FEPAM - Environmental Agency in charge of LP issuance	LP_Verace	LP valid until 02/02/2011

[14] Notifications sent to UNFCCC Secretariat: Prior Consideration Form (reference: UNFCCCPriorConsideration_Form_20120106) and e-mail (UNFCCCPriorConsideration_Email_20120106; UNFCCCPriorConsideration_EmailReceipt_20120109). Notifications' sent to Brazilian DNA: Prior Consideration Form (reference: DNAPriorConsideration_Form_20120106) and DNA's confirmation of form receipt (reference: DNAPriorConsideration_Receipt_20120107).

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29/06/10	Minuano's Prior License (LP – *Licença Prévia*)	IBAMA - Environmental Agency in charge of LP issuance	LP_Minuano	LP valid until 28/06/2012
16/03/11	Verace's Installation License (LI – *Licença de Instalação*)	FEPAM - Environmental Agency in charge of LI issuance	LI_Verace	LI valid until 15/03/2016
13/04/11	Inova Energy's wind report utilizing Gamesa's aerogenerators in Verace's facilities	Inova Energy	Verace_InovaEnergy_20110413	The entrepreneurs contracted Inova Energy to analyze the estimated electricity generation in Verace's facilities, considering a total of 129 aerogenerators model Gamesa G90 2.0 MW, with a total installed capacity of 258.0 MW. The Inova Energy's wind report estimated a total net electricity generation of 998,985 MWh/year.
16/08/11	MegaJoule's wind report utilizing IMPSA's aerogenerators in Chuí and Minuano's facilities	MegaJoule	ChuiMinuano_MegaJoule_20110816	The entrepreneurs contracted MegaJoule to analyze the estimated electricity generation in Chuí and Minuano's facilities, considering a total of 72 aerogenerators model IMPSA IPW-100 2.0 MW, with a total installed capacity of 144.0 MW. The MegaJoule's wind report estimated a total net electricity generation of 626,760 MWh/year.
14 – 17/08/11	Budget provided by aerogenerators' suppliers (IMPSA and Gamesa) to the entrepreneurs	IMPSA and Gamesa	IMPSABudjet_20110814; GamesaBudjet_20110817	The project developer requested budgets to IMPSA and Gamesa, aiming the acquisition of the aerogenerators required to the project activity.
17/08/11	12th Brazilian Auction of New Energy (*12º Leilão de Energia Nova - Leilão nº 02/2011*)	-	12thNewEnergyAuction_Results	Date on which the entrepreneurs have sold electricity from Windfarm Complex Santa Vitória do Palmar and Chuí; nevertheless, the Power Purchase Agreement (PPA) established in the auction does not necessarily commit the entrepreneurs to the wind electricity generation facility's implementation. This date is the moment of the investment decision.
19/08/11	Schahin's document formalizing the project's costs negotiated before and during the auction	Schahin (turnkey implementation company)	Schahin_NegotiatedCosts_20110819	The costs of turnkey implementation of the project activity's facilities presented by Schahin were negotiated during the auction. The final costs established in this negotiation were formalized by means of a document from Schahin to the entrepreneurs.

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17/11/11	Contract signed with the CDM consultant	WayCarbon	Chui1_WayCarbonContract; Chui2_WayCarbonContract; Chui4_WayCarbonContract; Chui5_WayCarbonContract; Minuano1_WayCarbonContract; Minuano2_WayCarbonContract; Verace1_WayCarbonContract; Verace2_WayCarbonContract; Verace3_WayCarbonContract; Verace4_WayCarbonContract; Verace5_WayCarbonContract; Verace6_WayCarbonContract; Verace7_WayCarbonContract; Verace8_WayCarbonContract; Verace9_WayCarbonContract; Verace10_WayCarbonContract	Entrepreneurs contracted WayCarbon in order to develop the CDM project.
06/01/12	Prior Consideration of CDM	Brazilian DNA and UNFCCC Secretariat	UNFCCCPrior consideration_Form_20120106; UNFCCCPrior consideration_Email_20120106; UNFCCCPrior consideration_Email Receipt_20120109; DNAPrior consideration_Form_20120106; DNAPrior consideration_Receipt_20120107	Accordingly, project participants informed the Brazilian DNA and the UNFCCC Secretariat of the commencement of the project activity and of their intention in seeking the CDM status. Such notification was made within six months of the start date of project activity (in fact, the project starting date has not occurred yet for this project activity) and contained a brief description of the project activity and the precise geographical location of the project plant.

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Demonstration and assessment of additionality

As per ACM0002/Version 12.2.0, the additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality".

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

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

The identified realistic and credible alternative scenarios available to the project participants are:

- The project activity undertaken without being registered as a CDM project activity;
- The continuation of the current situation (no project activity undertaken).

Outcome of step 1a: two realistic and credible alternative scenarios were identified.

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

All identified alternatives are in accordance with laws and regulations.

Outcome of step 1b: both scenarios identified are in compliance with mandatory legislation and regulations taking into account the Brazilian enforcement and EB decisions on national and/or sectoral policies and regulations.

Step 2: Investment analysis

The investment analysis determines whether the proposed project activity is not economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

The investment analysis was conducted according to the "Tool for the demonstration and assessment of additionality" (version 06.0.0) and the "Guidelines on the Assessment of Investment Analysis" (version 05). Therefore, the following sub-steps shall be undertaken:

Sub-step 2a. Determine appropriate analysis method:

The project activity generates incomes other than CDM related income, hence simple cost analysis cannot be applied. Investment comparison analysis is not used as there is no evidence that the proposed baseline scenario leaves project proponents no other options than to make an investment to supply the same (or substitute) product or service. Hence, benchmark analysis (Option III) will be used.

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

Identification of the financial indicator

The method of the Equity Internal Rate of Return (Equity IRR) was considered as the most appropriate, once it is the most suitable for the project type and decision context. Equity IRR was the financial indicator based on which the project developer made the investment decision.

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Identification of the benchmark

The cost of equity (K_e) was defined as the benchmark in accordance to the "Guidelines on the Assessment of Investment Analysis" (Version 5), paragraph 12: "Required/expected returns on equity are appropriate benchmarks for an equity IRR".

The cost of equity (K_e) was calculated using the Capital Asset Pricing Model (CAPM), a widely used pricing model in finance, as described below. Data used are publicly available and assumptions, sources and calculation steps used in benchmark development are described in detail in documents made available during validation.

(1) $K_e = R_f + \beta (R_m - R_f)$[15]

Where:

R_f = Risk Free Rate (%) Data used: Long Term Brazilian Treasury Bond (type NTN-B) yields, in real terms, of years 2006 (from August to December), 2007, 2008, 2009, 2010 and 2011 (from January to July), taking into account the investment decision date by the project owner.[16] Rationale: Governments control currency printing, which reduces probability of default, approximating to a risk free asset concept. The Treasury bond used is NTN-B (maturity date: 15/May/2035), which is a long-term bond that reflects a comparable horizon to an investment in a wind energy project in Brazil. Source: Publicly Available - Brazilian National Treasury: http://www.tesouro.fazenda.gov.br/tesouro_direto/;

β = Investment risk compared to the market (dimensionless). It is estimated as a proxy and measured as the sensitivity of the asset's returns to market returns calculated through equation (2);

[15] The formulae used in the Capital Asset Pricing Model are publicly available in papers and reports such as http://www.abce.org.br/downloads/ingleswacc.PDF.

[16] A 5-year historical series was used to calculate the benchmark (from August 2006 to July 2011) with the intention of reflecting the existing Brazilian market expectations at the moment of investment decision (August 2011). Period used is considered adequate as shorter periods could have biased the results towards the short term economic conjuncture in detriment of the medium to long term economic structure, while longer periods would add together substantially different macroeconomic structures and regulatory regimes, also potentially adding high volatility to the calculation and biases to results.
Besides, whereas longer historical series cannot be considered appropriated because they may not reflect accurately the economic environment of the investment decision, adopting shorter periods in the calculation of the benchmark is not considered a conservative approach because of the recent occurrence of a world economic crisis since 2008 and 2009, which has affected countries' lines of action and their results. Although Brazil did not suffer consequences in the same magnitude as developed countries, using punctual data could have deviated Brazilian conditions in the medium term.
Moreover, historical data for the Long Term Brazilian Treasury Bond returns (type NTN-B, with maturity date of 15/May/2035), adopted as risk free rate in the CAPM calculation, are available from 12/Apr/2006 onwards, reflecting the starting date of the bond's transaction. That is a good example that domestic markets have been growing in liquidity, since government bonds can be bought directly by project proponents.

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R_m = Expected Return on a Risky Asset (Market Return) (%). Data used: Daily Return of Bovespa Index of years 2006 (from August to December), 2007, 2008, 2009, 2010 and 2011 (from January to July). Rationale: According to BMF&Bovespa website: "The *Bovespa Index* is the main indicator of the Brazilian stock market's average performance. Ibovespa's relevance comes from two facts: it reflects the variation of BM&FBOVESPA's most traded stocks and it has tradition, having maintained the integrity of its historical series without any methodological change since its inception in 1968". Therefore it is a credible index to reflect returns on risky assets (market return). Source: Publicly Available - BMF&BOVESPA: http://www.bmfbovespa.com.br;

Note: In order to obtain market return rates (**R_m**) in real terms, Fisher equation was used: Real R_m = [(1+Nominal R_m) / (1 + Inflation Rate)] – 1. The inflation index used is the National Index of Prices for the General Consumer (*Índice Nacional de Preços ao Consumidor Amplo* – IPCA), which is the most consistent rate once it is the index for annual energy price inflation adjustments and the inflation type used to calculate NTN-B public bond nominal yield.

R_i = Expected Return on an Energy Sector Asset (%) Data used: Daily Return of BMF&Bovespa's Electric Power Index of years 2006 (from August to December), 2007, 2008, 2009, 2010 and 2011 (from January to July). Rationale: According to the "Tool for the demonstration and assessment of additionality", Sub-Step 2b, Paragraph 5: "When applying Option II or Option III, the financial/economic analysis shall be based on parameters that are standard in the market, considering the specific characteristics of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer". The BMF&Bovespa's Electric Power Index (Índice de Energia Elétrica - IEE) satisfies this applicable additionality tool, since according to BMF&Bovespa the index has "the purpose of providing a segmented view of the stock market performance. They are composed by the most significant publicly-held companies of specific economic sectors, representing the aggregated performance of the sector considered". Source: Publicly Available - BMF&BOVESPA: http://www.bmfbovespa.com.br;

Note: All data related to year 2011 considers the period from 01/Jan to 31/Jul in order to reflect information available at the investment decision date of the project activity in August 2011.

(2) $$\beta = \frac{Cov(R_i, R_m)}{\sigma_m^2}$$

Where:

Cov (R_i,R_m) = Covariance of the Asset Return (R_i) and the Market Return (R_m) (percentage points);
σ_m^2 = Variance of Market Return (percentage points).

ii) Benchmark established

The required/expected rate of return described and calculated in the spreadsheets "Benchmark_Verace.xls" and "Benchmark_ChuíMinuano.xls" and reproduced below is K_e = 14.75% p.y., in real terms (Table 9). These are the benchmarks defined to assess the additionality of the project activity and will be used in the comparison with the Equity IRRs.

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Table 9: Assumptions and results of CAPM.

Year	R_f	Months	Beta	R_m	R_m-R_f
2011 (Jan-Jul)	5.94%	7	1.11	-27.71%	-33.66%
2010 (Jan-Dec)	6.13%	12		-4.59%	-10.72%
2009 (Jan-Dec)	6.67%	12		75.11%	68.44%
2008 (Jan-Dec)	7.19%	12		-44.50%	-51.69%
2007 (Jan-Dec)	6.66%	12		37.52%	30.86%
2006 (Aug-Dec)	7.99%	5		53.92%	45.94%
Average	6.69%	-	-	-	7.28%
k_e	14.75%				
k_d	2.79%				
w_e	36.50%				
w_d	63.50%				

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

The detailed financial analysis is provided in the annex electronic spreadsheets "FinancialAnalysis_ Verace.xls" and "FinancialAnalysis_Chui-Minuano.xls"[17], where a full description of all the variables and assumptions is available. The "Guidelines on the Assessment of Investment Analysis" (version 05) was thoroughly observed in the elaboration of the financial analysis whose results are reported below.

Assumptions and calculation of the Equity IRRs:

Electricity generation:

At the time of the investment decision, the annual amount of electricity generation estimated for the 10 Verace's facilities was 114.0 MW, or 998,984 MWh. In order to achieve this electricity generation, the weighted net load factor projected to the 10 plants at that moment was 44.2%.

At the time of the investment decision, the annual amount of electricity generation estimated for the 6 Chuí and Minuano's facilities was 71.5 MW, or 626,760 MWh. In order to achieve this electricity generation, the weighted net load factor projected to the 6 plants was 49.7%.

Taking into account all the project activity, the amount of electricity generation is estimated as 185.6 MW, or 1,625,744 MWh. In order to achieve this electricity generation, the weighted net load factor projected to the 16 plants was 46.2%.

Electricity tariff:

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[17] It shall be highlighted that, despite investment analyses of Verace's and Chuí and Minuano's facilities have been performed separately, they represent the reconstitution of the same decision-making process. That is because Chuí and Minuano's facilities would only be implemented in case Verace´s facilities won the 12th Brazilian Auction of New Energy, since their larger size would enable their connection to the grid at a lower cost.

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The price of electricity considered in the analysis was obtained from the results of the 12th Brazilian Auction of New Energy (*12º Leilão de Energia Nova - Leilão nº 02/2011*). Taking into account CVerace's facilities, the price of energy is equal to R$ 98.22/MWh. For Chuí and Minuano's facilities, it is equal to R$102.39/MWh. Considering all facilities of the project activity, the weighted average price is R$99.70/MWh. All prices correspond to the base date of August, 2011 and is subject to annual adjustments by the Extended National Consumer Price Index (*Índice Nacional de Preços Consumidor Amplo* – IPCA).

Capital Expenditures:

The amount to be disbursed on aerogenerators are evidenced by the Gamesa's budget from 17/Aug/2011 (for Verace's facilities) and by the IMPSA's budget from 14/Aug/2011 (for Chuí and Minuano's facilities).

The price of civil works for the project activity is evidenced by the letter addressed by Schahin Engenharia S.A. to Eletrosul Centrais Elétricas S.A. on 19/Aug/2011, in which the supplier ratifies the values agreed by the parts during the auction.

Expenditures related to substations, transmission lines, trenching and transmission installation for shared connection stations are evidenced by the technical and commercial proposal addressed by ABB Ltda. to Eletrosul Centrais Elétricas S.A. on 16/Aug/2011.

It should be noted that in investment decision date the Windfarm Complex Santa Vitória do Palmar and Chuí was assumed to be eligible to the Special Incentive Regime for Infrastructure Development (*Regime Especial de Incentivo para Desenvolvimento de Infraestrutura* – REIDI), which would exempt their investments from collection of PIS and Cofins taxes.

Operation and Maintenance (O&M):

Operation and maintenance (O&M) costs during the first 5 years of operation of Chuí and Minuano's facilities were obtained from the IMPSA's budget from 14/Aug/2011. O&M costs for Verace's facilities are evidenced by the Gamesa's budget from 17/Aug/2011.

Transmission costs:

The values of the Use of Transmission System Tariff (*Tarifa de Uso do Sistema de Transmissão* – TUST), which refer to the transmission costs of the grid, were obtained from the Electricity Regulatory National Agency (*Agência Nacional de Energia Elétrica* – ANEEL) Technical Note #085/2011 from August 3rd, 2011. The tariff is levied on the installed power of the project and will be updated to account for inflation every tariff cycle. In addition, the project falls under the conditions displayed by Law #9,427, article 26, § 1st, from December 26th, 1996. According to the text set by Law 11,488, from June 15th, 2007, it establishes a reduction percentage not lower than 50% of TUST for certain wind power projects.

National and/or sectoral policies:

According to the Sub-step 2c of the "Tool for demonstration and assessment of additionality" in the calculation of the suitable financial indicator of the project activity "*include all relevant costs (including,*

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for example, the investment cost, the operations and maintenance costs), and revenues (excluding CER revenues, but possibly including inter alia subsidies/fiscal incentives[18]*, ODA etc, where applicable), and, as appropriate, non-market cost and benefits in the case of public investors if this is standard practice for the selection of public investments in the host country*". Regarding the "Clarifications on the consideration of national and/or sectoral policies and circumstances in baseline scenarios" (version 2), "*(b) National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs)*", are considered a type E- policy. If this type of policy has been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001), it need not be taken into account.

Considering these clarifications from the Executive Board, the following specific sectoral policy was implemented in Brazil in order to provide incentives for implementation and diffusion of renewable energy plants:

Discount of 50% on electricity transmission tariffs:

One of the costs associated to the operation of power plants in Brazil refers to the transmission and distribution of the electricity generated by the power plants. In order to induce the implementation of renewable power plants by the private sector, the Brazilian government has created a specific incentive related to the transmission costs for different types of plants.

The incentive mentioned created by the Brazilian Electricity Regulatory Agency (ANEEL) determines a sectoral policy of 50% reduction on tariffs for the use of electrical systems for transmission and distribution systems, by hydroelectric developments and for those based on solar, wind, biomass or qualified cogeneration, where the power injected into the transmission and distribution systems is less than or equal to 30,000 kW. This benefit was created on 26/Apr/2002, by the Law number 10,438, where it was determined that ANEEL should stipulate a reduction not inferior to 50% on the tariffs of transmission.

The Normative Resolution number 77[19], issued on 18/Aug/2004, establishes the procedures related to tariff's reduction, where in the same document it is cited that the Law number 10,762 from 11/Nov/2003, extends to the generation projects typified above the reduction on TUST.

As described above, these types of policy do not need to be taken into account in the calculation of the project activity financial indicator if it was created after the adoption of the CDM M&P. Considering that, the TUST (transmission tariff) discount was not taken into account in the calculation of the suitable financial indicator – Equity IRRs.

Regulatory costs:

For all the Windfarm Complex Santa Vitória do Palmar and Chuí the value of the Electric Services Inspection Tax (*Taxa de Fiscalização dos Serviços de Energia Elétrica* – TFSEE) is equivalent to 0.5%

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[18] See EB guidance on the consideration of national/local/sectoral policies and measures for the baseline setting.

[19] Normative Resolution number 77 issued on 18/Aug/2004 by ANEEL: http://www.aneel.gov.br/cedoc/bren2004077.pdf.

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of the annual Unitary Typical Economic Benefit (*Benefício Econômico Típico Unitário*) – R$385.73 per installed KW – according to the ANEEL #4,080 Dispatch, from 27/Dec/2010, and the Presidency of the Republic Decree #2,410, from 28/Nov/1997.

The tax due to the National System Operator (*Operador Nacional do Sistema* - ONS), proportional to the project activity`s installed capacity, and the contribution due to the Electric Energy Commercialization Chamber (*Câmara de Comercialização de Energia Elétrica* - CCEE), proportional to the number of votes of the agent in the CCEE General Assembly and the energy sold, are estimated as 0.1% of gross revenues for Verace, Chuí and Minuano's facilities.

Land lease:

Expenditures relating to land leasing correspond to 1.8% of the project's monthly net revenues, as evidenced by the land lease contracts signed between Verace Energia Eólica Ltda., Chuí Energia Eólica Ltda., Minuano Energia Eólica Ltda. and the land owners.

Administrative expenditures:

Annual administrative expenditures were estimated as a fixed value for each group of facilities at the time of the investment decision.

Financial structure:

By the time of the investment decision, fundraising through a BNDES Credit Line was considered for Verace, Chuí and Minuano's facilities as its standard terms for wind farms facilities. The terms reflect the expectation of the decision makers and are in accordance to the conditions established by BNDES for wind projects, as per information collected from BNDES' website.

Taxes:

As per presumed profit taxation regime, PIS and Cofins taxes correspond to 3.65% of gross revenues of Santa Vitória do Palmar and Chuí Windfarm Complex, according to Laws #10,637 from 2002 and #10,833 of 2003.

In accordance with the same taxation regime, the income tax rate of 15% is levied on the presumed profit of 8%, according to Decree Law #1,598, from 1977, and Laws #9,249 from 1995 and #9,430 from 1996. As per the same Law, an additional income tax rate of 10% is levied on assumed profits that exceed R$ 240,000.00 per year.

The Social Contribution on Net Profits (*Contribuição Social sobre Lucro Líquido* - CSLL) rate is equal to 9% and is levied on 12% of gross revenues, according to Laws #9,430 from 1996 and #10,637 from 2002.

Period of assessment:

As a conservative assumption in accordance with the "Guidelines on the Assessment of Investment Analysis" (Version 05), paragraph 3 and the operational lifetime of aerogenerators, the period of analysis was considered as 20 years from the beginning of the plants operation.

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Result:

After applying the assumptions enumerated above and others described in the financial analysis spreadsheets, the Equity IRRs for Verace's facilities and for Chuí and Minuano's facilities are, respectively, 6.25% p.y. and 10.16% p.y., in real terms.

Comparison of Equity IRRs and the Benchmark rates:

According to the Tool for the demonstration and assessment of additionality, Sub-step 2c, sub-item 10. (b): *"The financial benchmark, if Option III (benchmark analysis) is used. If the CDM project activity has a less favourable indicator (e.g. lower IRR) than the benchmark, then the CDM project activity cannot be considered as financially attractive".*

Thus, without the CDM revenues, the proposed CDM project is not financially feasible, that is, the Equity IRRs of 6.25% p.y. and 10.16% p.y.are lower than their reference of 14.75% p.y..

Verace's Equity IRR of 6.25% p.y. < Benchmark rate of 14.75% p.y.

Chuí-Minuano's Equity IRR of 10.16% p.y. < Benchmark rate of 14.75% p.y.

Sub-step 2d. Sensitivity analysis:

A sensitivity analysis was carried out for the project activity in order to demonstrate that the conclusion regarding financial unattractiveness is resilient to reasonable variations in the critical assumptions. Variables that constitute more than 20% of either total project costs or total revenues were subject to reasonable variation. The variables subjected to sensitivity analysis were:

- Revenues;
- Operational Expenditures (Opex);
- Capital Expenditures (Capex).

The results obtained through +10% and -10% variations in the parameters above are presented in Table 10 below.

Table 10: Sensitivity analysis - +/10% variations.

Facilities	Parameter	+/- 10% Variation	Result obtained	Original Equity IRR
Verace	Revenues	+10%	9.73%	6.25%
	OPEX	-10%	7.31%	
	CAPEX	-10%	9.44%	
Chuí and	Revenues	+10%	13.27%	10.16%

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Minuano	OPEX	-10%	10.69%	
	CAPEX	-10%	13.93%	

Moreover, a breakeven point analysis was provided in order to show the required variation for Equity IRR to achieve the benchmark. The results obtained and a discussion regarding these values is presented in Table 11 below.

Table 11: Sensitivity analysis considering variations required to achieve the benchmark.

Parameter	Variation required to achieve the benchmark	
	Verace	Chuí and Minuano
Revenues	+24.45%	+14.75%
OPEX	-86.02%	-85.52%
CAPEX	-20.25%	-11.89%

Revenues

It would take increases of 24.45% and 14.75% in Verace's and in Chuí and Minuano's facilities' revenues, respectively, for their internal rates of return to achieve the established benchmarks. That would be an extremely unlikely variation, because the price for which the power plants will sell the electricity generated are already determined and its adjustments are already contemplated by the financial model.

Besides, according to Article 5.3 of Annex II to the 12th Brazilian Auction of New Energy (*12º Leilão de Energia Nova - Leilão nº 02/2011)*'s Public Notice[20], it is the electricity seller's responsibility to pay for the electrical losses verified from the energy generation to the correspondent sub-market of SIN. To allow for conservativeness of the investment analysis, such losses have not been taken into account in the calculation of the project activity's Equity IRR. Deducting the electrical losses from the energy generation would represent a reduction of the Plant Load Factor. Therefore, it would lead to a reduction in project activity's revenues. The existence of these losses (which tend to be equivalent to 2.5% of energy generated) confirms the conservativeness of the investment analysis and reduces the probabilities that project's revenues will increase and that Equity IRR will reach the benchmark.

Operational expenditures

It would be necessary a reduction of 86.02% in Verace's facilities' operational expenditures in order for its internal rate of return to achieve the established benchmark. Similarly, it would be necessary a

[20] Annex II – Power Purchase Agreement in the Brazilian Regulated Market (*Contrato de Comercialização de Energia no Ambiente Regulado – CCEAR por disponibilidade*). Available at http://www.aneel.gov.br/aplicacoes/editais_geracao/documentos/ANEXO2-CCEAR_disp_biomassa_fechamento_AP%20VF.pdf. Accessed on 09/Jan/2012.

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reduction of 85.52% in Chuí and Minuano's operational expenditures for the internal rate of return to achieve the established benchmark. However, the commercial proposal of operation and maintenance costs of Verace's equipment, which account for a great part of the project's global expenditures, already contemplates discounts agreed between the project developer and Gamesa during the auction. Operational expenditures also encompass regulatory costs, which would hardly decrease in real terms during the period analyzed. Thus, such a high variation of operational expenses would not constitute a plausible scenario for the project.

Capital expenditures

In order for the project activities internal rates of return to achieve the established benchmark rates, it would be necessary reductions of 20.25% and 11.89% in Verace's and in Chuí and Minuano's capital expenditures, respectively. That would be a highly unlikely scenario, since the commercial proposals from which Capex values were obtained already contemplate successive discounts granted by the suppliers to the project developer during the auction.

Moreover, as explained in footnote 17, Chuí and Minuano's facilities would only be implemented in case Verace´s facilities won the 12th Brazilian Auction of New Energy, because their larger size would enable their connection to the grid at a lower cost. Therefore, even in the unlikely case that Chuí and Minuano's capital expenditures decreased more than 11.89%, that variation would not be enough to support the Chuí and Minuano's investment decision if Verace's Equity IRR remained below the benchmark.

Sensitivity analysis shows that the investment analysis provided a valid argument in favor of the additionality of the proposed project activity, since it consistently supports, for a realistic range of assumptions, the conclusion that the project activity without CERs revenues is unlikely to be financially/economically attractive.

Outcome of step 2: after the sensitivity analysis, it is concluded that the proposed CDM project activity is unlikely to be financially/economically attractive.

Step 3: Barrier analysis

This step was not applied.

Step 4: Common practice analysis

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

There are 71 operating wind power plants in Brazil, summing 1.53 GW of installed capacity, which represents 1.22% of the total installed capacity in the country (Table 12).

Table 12: Electricity production entrepreneurships in operation in Brazil.

Type	Units	Verified installed capacity	
		kW	%
Mini and Micro Hydroelectric Plants (≤ 1 MW)	367	211,225	0.18%
Wind power plants	**71**	**1,424,792**	**1.22%**

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Small hydroelectric plants (1 MW – 30 MW)	418	3,829,007	3.28%
Photovoltaic plants	6	1,087	0.00%
Large hydroelectric plants (≥ 30 MW)	181	78,347,369	67.03%
Thermoelectric plants	1,497	31,062,157	26.58%
Nuclear plants	2	2,007,000	1.72%
Total	**2,542**	**116,882,637**	**100.00%**

Source: National Electric Energy Agency (ANEEL - *Agência Nacional de Energia Elétrica*): Generation Database (BIG - *Banco de Informação de Geração*). Available at http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp. Accessed on 03/Jan/2012 (reference: BrazilianElectricityGenerationMatrix_ANEEL_20120103).

The data depicted in Table 12 show that the participation of wind-based electricity is still not significant in the electric matrix in Brazil. Moreover, it should be noted that most wind-based electricity generation entrepreneurships in Brazil accrue from one of the following incentive mechanisms: CDM and PROINFA[21].

PROINFA (*Programa de Incentivo às Fontes Alternativas de Energia Elétrica* – Program of Incentive to Alternative Sources of Electric Energy) was launched in 2002 with the objective of increasing the participation of electricity produced from wind and biomass sources and from small hydroelectric plants in the National Interconnected System (SIN). PROINFA is based on feed in tariffs and was designed to have 2 phases. The first phase initially set a quota of 3.3 GW of new generation capacity equally distributed among wind, biomass and small hydro. After the program was launched, part of the quota of biomass was transferred to wind projects[21].

The program foresees the implementation of 144 plants, totaling 3,299.40 MW of installed capacity, being 1,191.24 MW from 63 small hydroelectric plants (1 MW - 30 MW), 1,422.92 MW from 54 wind plants and 685.24 MW from 27 biomass plants[21].

Projects developed under PROINFA have a 20-year Power Purchase Agreement signed with the state-owned electricity utility ELETROBRÁS[21]. PROINFA presets the price of the electricity paid to generators as a technology specific economic value, which is defined as the value that guarantee, for a defined timeframe and efficiency level, the economic feasibility of a typical project based on alternative sources of energy. It is worthy mentioning that the prices paid by PROINFA are higher than those practiced by the market[22].

Besides, electricity generation companies that had Electricity Purchase and Sale Contracts signed with ELETROBRÁS in the ambit of PROINFA could take up a loan from the National Development Bank (*Banco Nacional do Desenvolvimento* – BNDES). Under the so-called Program of Financial Support to Investments in Alternative Sources of Electric Energy in the Ambit of PROINFA (*Programa de Apoio Financeiro a Investimentos em Fontes Alternativas de Energia Elétrica no Âmbito do PROINFA*),

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[21] Programa de Incentivo às Fontes Alternativas de Energia Elétrica/ *Program of Incentive to Alternative Sources of Electric Energy*. Available at http://www.mme.gov.br/programas/proinfa. Accessed on 11/Jun/2010.

[22] Alves de Brito, M.L. 2009. Investments in Wind Energy in Brazil: Comparing PROINFA and CDM project finance. Master Thesis. Graduate School of Humanities and Social Sciences. University of Tsukuba, Japan.

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borrowers could finance up to 70% of financeable items, where the first installment could be paid up to third month after the operation start date with up to 10-year amortization periods[23].

It is worthy mentioning that "PROINFA also aims at the reduction of GEE, in the terms of UNFCCC, contributing to sustainable development" and "it is the attribution of ELETROBRÁS the direct or indirect development of the processes of preparation and validation of PDDs, registration, monitoring, and certification of the emissions reductions, and the commercialization of carbon credits obtained by PROINFA". "The resources originated from the activities related to the CDM or other carbon markets will be destined to the reduction of the costs of PROINFA"[24]. In that sense, 12 PROINFA wind projects in operation in Brazil are being/were developed as CDM projects (Table 13).

54 out of 71 operating wind plants in Brazil accrue from PROINFA incentives (Table 13). Importantly, 6 out 17 non-PROINFA operating plants are being developed as CDM projects (Table 13). The remaining 11 non-CDM and non-PROINFA wind plants have been evaluated as follows.

According to the "Tool for the demonstration and assessment of additionality" (version 06.0.0), sub-step 4a, similar activities are defined as activities "in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc". Therefore the analysis will be conduct in order to identify those activities among the remaining 11 wind plants that can be considered similar to the proposed project activity.

The first criterion used to identify the similarities between any other operational wind plant and the project activity is related to the environment with respect to access to technology. *Eólica de Prainha*, *Eólica de Taíba* and *Mucuripe* belong to the company *Wobben Wind Power Indústria e Comércio Ltda*[25]. Wobben projects, constructs, assembles, operates and maintains wind power plants, and was the first Brazilian company to manufacture large scale aerogenerators (800 – 3,000 kW)[26]. Hence, they posses an intrinsically higher competitiveness in regards to the acquisition of the aerogenerators in comparison to other project proponents, which do not manufacture the wind turbines themselves, such as the proponents of the current project activity. *Eólico – Elétrica de Palmas* is currently owned and operated by *Centrais Eólicas do Paraná Ltda.*[25]*,* which, in turn, is owned by the State-owned power utility *Companhia Paranaense de Energia* (COPEL)[27]. However, *Palmas* was formerly co-owned by Wobben (70%) and

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[23] Program of Financial Support to Investments in Alternative Sources of Electric Energy in the Ambit of PROINFA/*Programa de Apoio Financeiro a Investimentos em Fontes Alternativas de Energia Elétrica no Âmbito do PROINFA*. Available at http://www.mme.gov.br/programas/proinfa/galerias/arquivos/programa/resolproinfa.pdf. Accessed on 03/Jan/2012.

[24] Federal Decree 5025 of March 30, 2004. Available at http://www.jusbrasil.com.br/legislacao/97855/decreto-5025-04. Accessed on 03/Jan/2012.

[25] ANEEL: Operating wind entrepreneurships. Available at http://www.aneel.gov.br/aplicacoes/capacidadebrasil/GeracaoTipoFase.asp?tipo=7&fase=3. Accessed on 03/Jan/2012.

[26] Wobben Windpower. Available at http://www.wobben.com.br/. Accessed on 11/Jun/2010.

[27] COPEL. Entrepreneurhips in operation. Available at http://www.copel.com/hpcopel/root/nivel2.jsp?endereco=/hpcopel/root/pagcopel2.nsf/docs/950F73FF30B18CD2032574020061FAB7. Accessed on 03/Jan/2012.

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COPEL (30%)[28]. Hence, one may affirm that *Palmas* had an environment comparable to that of *Prainha*, *Taíba* and *Mucuripe* at time of its implementation.

The second criterion used to identify the similarities between any other operational wind plant and the project activity is related to the environment with respect to investment climate. In the current Brazilian Electric Sector Model, there are two varieties of market for electricity sale in the interconnected system (SIN): the regulated market (ACR – *Ambiente de Contratação Regulado*), in which generation and distribution agents commercializes electricity in auctions, that are characterized by the lower tariff criterion, and the free market (ACL – *Ambiente de Contratação Livre*), in which generation and commercialization agents, electricity importers and exporters and free consumers can freely negotiate electricity prices. The project activity will commercialize its electricity generation in the regulated market, since the electricity generation of this project activity have been contracted the 12th Brazilian Auction of New Energy (*12º Leilão de Energia Nova - Leilão nº 02/2011*[29]). Contrastingly, *Miassaba II* Windfarm is commercializing its electricity in the free market[30], having an investment climate environmental different from the project activity.

Finally, the third criterion used to identify the similarities between any other operational wind plant and the project activity is related to scale. *IMT* and *Ventos do Brejo A-6*, cannot be considered similar to the proposed project activity taking into account the scale of the enterprises, specifically the installed capacity: *IMT* and *Ventos do Brejo A-6* have only 0.002 MW and 0.006 MW of installed capacity, respectively, which is about 201,000 times and 67,000 times smaller than Windfarm Complex Santa Vitória do Palmar and Chuí installed capacity; therefore, they cannot be considered similar to the project activity.

The remaining 4 windfarms (*Mangue Seco 1, Mangue Seco 2, Mangue Seco 3* and *Mangue Seco 5*) represent 5.6% of the operational windfarms in the country (regarding the number of enterprises), 7.3% regarding the verified installed capacity from windfarms and represent only 0.089% of the total verified installed capacity in the country.

Outcome of step 4a: in light of the facts above, it is possible to conclude that, at the moment of the conclusion of this document, there were 4 operating entrepreneurships that could be considered similar to the proposed project activity.

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

According to the “Tool for the demonstration and assessment of additionality” (version 06.0.0), sub-step 4b, “if similar activities are widely observed and commonly carried out, it calls into question the claim that the proposed project activity is financially unattractive (as contended in Step 2) or faces barriers (as

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[28] ANÁLISE CONJUNTURAL, v.28, n.11-12, p.20, nov./dez. 2006.

[29] 12th Brazilian Auction of New Energy (12º *Leilão de Energia Nova - Leilão nº 02/*2011). Available at http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=38820a6c2930f210VgnVCM1000005e01010aRCRD. Accessed on 07/Dec/2011. Reference: 12thNewEnergyAuction_Results

[30] BioEnergy inaugurates windfarm made viable in the free market. Available at http://www.jornaldaenergia.com.br/ler_noticia.php?id_noticia=8303&id_tipo=2&id_secao=13&id_pai=0. Accessed on 06/Jan/2012.

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contended in Step 3)". As discussed in sub-step 4a above, activities that could be considered similar to the project activity represent only 5.6% of the operational windfarms in the country (regarding the number of enterprises), only 7.3% regarding the verified installed capacity from windfarms and represent only 0.089% of the total verified installed capacity in the country. Hence, activities similar to the project activity are not widely observed nor commonly carried out.

Since all step above have been satisfied, the project activity is additional.

Table 13: Operating wind electricity generation entrepreneurships in Brazil.

Plant[1]	Verified installed capacity (MW)[1]	Brazilian State[1]	PROINFA's contract number[2]	CDM?	CDM status	Similar to project activity?
Albatroz	4.500	PB	**024**	No	-	No
Alegria I	51.000	RN	**052 / 052A**	No	-	No
Alegria II	1.650	RN	**044 / 044A**	No	-	No
Alhandra	6.300	PB	**016 / 016A**	No	-	No
Amparo	22.500	SC	**019**	No	-	No
Aquibatã	30.000	SC	**020**	No	-	No
Atlântica	4.500	PB	**030**	No	-	No
Bom Jardim	30.000	SC	**021**	No	-	No
Bons Ventos	50.000	CE	**051**	No	-	No
Campo Belo	10.500	SC	**018**	No	-	No
Camurim	4.500	PB	**026**	No	-	No
Canoa Quebrada	57.000	CE	**002**	No	-	No
Caravela	4.500	PB	**033**	No	-	No
Cascata	6.000	SC	**045**	No	-	No
Cerro Chato II (Ex. Coxilha Negra VI)	28.000	RS	-	**Yes**	**Validation[3]**	No
Cerro Chato III (Ex. Coxilha Negra VII)	30.000	RS	-	**Yes**	**Validation[3]**	No
Coelhos I	4.500	PB	**032**	No	-	No
Coelhos II	4.500	PB	**025**	No	-	No
Coelhos III	4.500	PB	**029**	No	-	No
Coelhos IV	4.500	PB	**027**	No	-	No
Cruz Alta	30.000	SC	**022**	No	-	No
Eólica Água Doce	9.000	SC	**001**	**Yes**	**Registered[4]**	No
Eólica Canoa Quebrada	10.500	CE	**053**	**Yes**	**Validation[5]**	No
Eólica de Bom Jardim	0.600	SC	**021**	No	-	No
Eólica de Prainha	10.000	CE	-	No	-	Should be analyzed
Eólica de Taíba	5.000	CE	-	No	-	Should be analyzed
Eólica Icaraizinho	54.600	CE	**048**	**Yes**	**Validation[6]**	No
Eólica Paracuru	23.400	CE	**049**	**Yes**	**Validation[6]**	No
Eólica Praias de Parajuru	28.804	CE	**004**	No	-	No

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Eólio - Elétrica de Palmas	2.500	PR	-	**No**	**-**	Should be analyzed
Fazenda Rosário	8.000	RS	-	**Yes**	**Validation**[7]	No
Fazenda Rosário 3	14.000	RS	-	**Yes**	**Validation**[7]	No
Foz do Rio Choró	25.200	CE	**043**	**Yes**	**Validation**[6]	No
Gargaú	28.050	RJ	**035**	**Yes**	**Validation**[8]	No
Gravatá Fruitrade	4.950	PE	**039**	No	-	No
IMT	0.002	PR	-	No	-	Should be analyzed
Lagoa do Mato	3.230	CE	**054**	**Yes**	**Validation**[5]	No
Macau	1.800	RN	-	**Yes**	**Registered**[9]	No
Mandacaru	4.950	PE	**037**	No	-	No
Mangue Seco 1	26.000	RN	-	No	**-**	Should be analyzed
Mangue Seco 2	26.000	RN	-	No	**-**	Should be analyzed
Mangue Seco 3	26.000	RN	-	No	**-**	Should be analyzed
Mangue Seco 5	26.000	RN	-	No	**-**	Should be analyzed
Mataraca	4.500	PB	**031**	No	-	No
Miassaba II	14.400	RN	-	No	**-**	Should be analyzed
Millennium	10.200	PB	**023**	No	-	No
Mucuripe	2.400	CE	-	No	-	Should be analyzed
Parque Eólico de Beberibe	25.600	CE	**012**	No	-	No
Parque Eólico de Osório	50.000	RS	**009**	**Yes**	**Registered**[10]	No
Parque Eólico de Palmares	8.000	RS	**047**	No	**-**	No
Parque Eólico do Horizonte	4.800	SC	-	**Yes**	**Registered**[11]	No
Parque Eólico dos Índios	50.000	RS	**007**	**Yes**	**Registered**[10]	No
Parque Eólico Elebrás Cidreira 1	70.000	RS	**015**	No	-	No
Parque Eólico Enacel	31.500	CE	**010**	No	-	No
Parque Eólico Sangradouro	50.000	RS	**008**	**Yes**	**Registered**[10]	No
Pedra do Sal	18.000	PI	**036**	No	-	No
Pirauá	4.950	PE	**003**	No	-	No
Praia do Morgado	28.800	CE	**005**	No	-	No
Praia Formosa	104.400	CE	**034 / 034A / 034B / 034C**	**Yes**	**Validation**[6]	No
Presidente	4.500	PB	**028**	No	-	No
Púlpito	30.000	SC	**014**	No	-	No
Rio do Ouro	30.000	SC	**017**	No	-	No
RN 15 - Rio do Fogo	49.300	RN	**011**	**Yes**	**Validation**[12]	No

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Salto	30.000	SC	**013**	No	-	No
Santa Maria	4.950	PE	**041**	No	-	No
Santo Antônio	3.000	SC	**046**	No	-	No
Taíba Albatroz	16.500	CE	**050**	No	-	No
Ventos do Brejo A-6	0.006	RN	-	No	-	Should be analyzed
Vitória	4.500	PB	**040**	No	-	No
Volta do Rio	42.000	CE	**006**	No	-	No
Xavante	4.950	PE	**038**	No	-	No
Total	**1,424.7922**					

[1] National Electric Energy Agency (ANEEL - Agência Nacional de Energia Elétrica): Generation Database (BIG - Banco de Informação de Geração). Available at http://www.aneel.gov.br/aplicacoes/capacidadebrasil/GeracaoTipoFase.asp?tipo=7&fase=3. Accessed on 03/Jan/2012 (reference: BrazilianElectricityGenerationMatrix_ANEEL_20120103).
[2] Eletrobras: PROINFA. Available at http://www.eletrobras.com/elb/data/Pages/LUMISABB61D26PTBRIE.htm. Accessed on 03/Jan/2012 (reference: PROINFAContracts_20081231).
[3] Cerro Chato Wind Farm Project. Available at http://cdm.unfccc.int/Projects/Validation/DB/FAA7M14EV6MNGPASPCDLTD64Q21X0R/view.html. Accessed on 03/Jan/2012.
[4] Água Doce Wind Power Generation Project. Available at http://cdm.unfccc.int/Projects/DB/SGS-UKL1156244716.38/view. Accessed on 03/Jan/2012.
[5] Rosa dos Ventos wind energy projecy. Available at http://cdm.unfccc.int/Projects/Validation/DB/HMOI5ZUNC27YH7DVBYBCFCRPUZWQ09/view.html. Accessed on 03/Jan/2012.
[6] Icaraí Wind Energy Project. Available at http://cdm.unfccc.int/Projects/Validation/DB/HSLJUUZ9G0RMHT1A6S1F14IMVIZ45B/view.html. Accessed on 03/Jan/2012.
[7] Palmares Wind Power Plant Project (PWPPP). Available at http://cdm.unfccc.int/Projects/Validation/DB/7FJT8KR0R6Z7X9P37350KVRFZ61QD6/view.html. Accessed on 03/Jan/2012.
[8] Gargaú Wind Power Plant CDM Project Activity. Available at http://cdm.unfccc.int/Projects/Validation/DB/J6EQPTU2VOQJKGG6LHWEERQVH5Z72F/view.html. Accessed on 03/Jan/2012.
[9] Petrobras Wind Power Project for Oil Pumping at Macau, Brazil. Available at http://cdm.unfccc.int/Projects/DB/DNV-CUK1167973931.45/view. Accessed on 03/Jan/2012.
[10] Osório Wind Power Generation Project. Available at http://cdm.unfccc.int/Projects/DB/DNV-CUK1158843861.54/view. Accessed on 03/Jan/2012.
[11] Horizonte Wind Power Generation Project. Available at http://cdm.unfccc.int/Projects/DB/SGS-UKL1151534607.76/view. Accessed on 03/Jan/2012.
[12] Rio do Fogo Wind Energy Project. Available at http://cdm.unfccc.int/Projects/Validation/DB/BQQ32CCBBQ2342SUQ84SKA1T3NLEC0/view.html. Accessed on 03/Jan/2012.
[13]Palmas Wind Farm. Available at http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html. Accessed on 03/Jan/2012.

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B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Project emissions

As per ACM0002/Version 12.2.0, since the project activity is neither a geothermal, solar nor a hydropower plant, $PE_y = 0$.

Baseline emissions

The baseline emissions are to be calculated as follows:

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

Where:

BE_y : Baseline emissions in year y (tCO_2/yr);

$EG_{PJ,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr);

$EF_{grid,CM,y}$: Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh).

Calculation of $EG_{PJ,y}$

Since the project activity is the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield project), then:

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

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).

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

The project plants will serve Brazilian Interconnected System (SIN). The Brazilian DNA has published the delineation of SIN to be adopted for the purposes of CDM projects. As per Resolution nº 8 of the Brazilian DNA, the electric grid considered in this project activity is considered as a single system consisted by the sub-markets of SIN as the definition of the electric system of the project. Off-grid plants will not be included in the calculation of $EF_{grid,CM,y}$.

$EF_{grid,CM,y}$ will be calculated using the latest version of the "Tool to calculate the emission factor for an electricity system". The following formulae apply:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM} \cdot w_{BM} \quad (3)$$

Where:

$EF_{grid,CM,y}$: Combined margin CO_2 emission factor in year y (tCO_2/MWh);

$EF_{grid,BM,y}$: 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 (75%);

w_{BM} : Weighting of build margin emissions factor (25%).

The weighting factors for build and operating margin were selected according to guidance provided in the "Tool to calculate the emission factor for an electricity system".

For the first crediting period, the build margin emission factor will be updated annually, *ex-post*, as well as operating margin emission factor, 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.

The parameters $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ are calculated and published by the Brazilian Inter-ministerial Commission for Global Climate Change, the Brazilian Designated National Authority, according to the most recent version of the "Tool to calculate the emission factor for an electricity system". By using these published values and the yearly electricity generating ($EF_{PJ,y}$) it will be possible to calculate the associated baseline emissions (BE_y).

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Leakage

According to ACM0002, version 12.2.0, *"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

The emission reduction by the project activity during a given year y is calculated as follows:

(4) $$ER_y = BE_y - PE_y$$

Where:

ER_y : Emissions reductions of the project activity during the year y (tCO_2e)

BE_y : Baseline emissions during the year y (tCO_2e)

PE_y : Project emissions during the year y in (tCO_2e)

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

Data / Parameter:	w_{OM}
Data unit:	Fraction
Description:	Weighting of operating margin emissions factor
Source of data used:	"Tool do calculate the emission factor for an electricity system", Version 02.2.1
Value applied:	75%
Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value for wind power plants.
Any comment:	This value will be applied in the subsequent crediting periods.

Data / Parameter:	w_{BM}
Data unit:	Fraction
Description:	Weighting of build margin emissions factor
Source of data used:	"Tool do calculate the emission factor for an electricity system", Version 02.2.1
Value applied:	25%

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Justification of the choice of data or description of measurement methods and procedures actually applied:	Default value for wind power plants.
Any comment:	This value will be applied in the subsequent crediting periods.

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

Emission reductions were *ex-ante* estimated as follows:

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

Where:

BE_y: Baseline emissions in year y (640,706 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 (1,625,744 MWh/yr);

$EF_{grid,CM,y}$: Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (0.3941 tCO_2/MWh, based on data provided by the Brazilian DNA for 2010).

As per ACM0002/Version 12.2.0 for this project activity, project emissions are zero ($PE_y = 0$) and leakage emissions are not considered.

(2) $ER_y = BE_y - PE_y$

Where:

ER_y: Emissions reductions of the project activity during the year y (640,706 tCO_2e)

BE_y: Baseline emissions during the year y (640,706 tCO_2e)

PE_y: Project emissions during the year y (0 tCO_2e)

See detailed ex-ante calculation in the annex spreadsheet "SantaVitoriaPalmar-Chui_ExAnteCalculationEmissionReduction_v01_20120109.xls".

The parameters used for *ex-ante* calculations are compiled in Table 14.

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Table 14: Parameters used for ex-ante calculations.

Parameter	Unit	Value	Description	Comment
ER_y	tCO_2/yr	640,706	Emissions reductions in the year y	Calculated
BE_y	tCO_2/yr	640,706	Baseline emissions in year y	Calculated
PE_y	tCO_2/yr	0	Project emissions in the year y	For this project activity (wind-based electricity generation project) emissions are null, as per ACM0002/Version 12.2.0
$EG_{PJ,y}$	MWh/yr	1,625,744	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	Estimated as the average total yearly net electricity generation by the project activity, as per Inova Energy's study for Verace's facilities (reference: Verace_InovaEnergy_20110413) and per MegaJoule's study for Chuí and Minuano's facilities (reference: ChuiMinuano_MegaJoule_20110816)
$EG_{facility,y}$	MWh/yr	1,625,744	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	Estimated as the average total yearly net electricity generation by the project activity, as per Inova Energy's study for Verace's facilities (reference: Verace_InovaEnergy_20110413) and per MegaJoule's study for Chuí and Minuano's facilities (reference: ChuiMinuano_MegaJoule_20110816)
$EF_{grid,CM,y}$	tCO_2/MWh	0.3941	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"	Calculated accordingly formula (3) in section B.6.1 of this PDD, as stated in the "Tool to calculate the emission factor for an electricity system", version 02.2.1 in step 6 a (Calculate the combined margin emissions factor – Weighted average CM")
$EF_{grid,OM,y}$	tCO_2/MWh	0.4787	Operating margin CO_2 emission factor in year y	Operating margin emission factor of the National Interconnected System (2010), as published by the Brazilian DNA (http://www.mct.gov.br/index.php/content/view/327118.html#ancora, accession date 01/12/2011)
$EF_{grid,BM,y}$	tCO_2/MWh	0.1404	Build margin CO_2 emission factor in year y	Build margin emission factor of the National Interconnected System (2010), as published by the Brazilian DNA (http://www.mct.gov.br/index.php/content/view/327118.html#ancora, accession date 01/12/2011)
w_{OM}	Fraction	0.75	Weighting of operating margin emissions factor	Default value for wind-based electricity generation projects, as per "Tool to calculate the emission factor for an electricity system"

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w_{BM}	Fraction	0.25	Weighting of build margin emissions factor	Default value for wind-based electricity generation projects, as per "Tool to calculate the emission factor for an electricity system"

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

Table 15: Summary of the ex-ante estimation of emission reductions.

Year	Estimation of project activity emissions (tones of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
From January 2014	-	640,706	-	640,706
2015	-	640,706	-	640,706
2016	-	640,706	-	640,706
2017	-	640,706	-	640,706
2018	-	640,706	-	640,706
2019	-	640,706	-	640,706
Till December 2020		640,706		640,706
Total (tonnes of CO_2e)	-	**4,484,942**	-	**4,484,942**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{facility,y} = EG_{PJ,y}$
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project plant to the grid in year y
Source of data to be used:	Measurements at project activity site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1,625,744
Description of measurement methods and procedures to be applied:	This parameter will be continuously analyzed and monitored. Values will be aggregated monthly and yearly. Corresponds to the total net electricity generation by the 16 facilities of the project activity. This parameter will be monitored in meters localized in the interconnection point with the Brazilian national grid (SIN).
QA/QC procedures to be applied:	Measurement obtained in the interconnection point with the Brazilian national grid will be cross-checked with electricity generation measured by meters in the electrical substation, discounting the electrical losses that occurs in transmission lines from the substation until the interconnection to the grid (**Figure 3**).
Any comment:	*Ex-ante* estimated as the predicted average total yearly net electricity generation by the project activity, i.e. the average total yearly net electricity generation by the project activity as per Inova Energy’s study for Verace’s

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	facilities (reference: Verace_InovaEnergy_20110413) and per MegaJoule's study for Chuí and Minuano's facilities (reference: ChuiMinuano_MegaJoule_20110816)

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO_2/MWh
Description:	Operating margin CO_2 emission factor in year y
Source of data to be used:	Brazilian Interministerial Commission on Global Climate Change
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.4787
Description of measurement methods and procedures to be applied:	As per the most recent version "Tool to calculate the emission factor for an electricity system".
QA/QC procedures to be applied:	As per the most recent version of the "Tool to calculate the emission factor for an electricity system".
Any comment:	For the first crediting period, the operating margin emission factor will be updated annually, *ex-post*. *Ex-ante* estimated operating margin emission factor of the National Interconnected System (2010), as published by the Brazilian DNA (http://www.mct.gov.br/index.php/content/view/327118.html#ancora, accessed on 01/Dec/2011).

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/MWh
Description:	Build margin CO_2 emission factor in year y
Source of data to be used:	Brazilian Interministerial Commission on Global Climate Change
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.1404
Description of measurement methods and procedures to be applied:	As per the most recent version "Tool to calculate the emission factor for an electricity system".
QA/QC procedures to be applied:	As per the most recent version of the "Tool to calculate the emission factor for an electricity system".
Any comment:	For the first crediting period, the build margin emission factor will 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. *Ex-ante* estimated build margin emission factor of the National Interconnected System (2010), as published by the Brazilian DNA (http://www.mct.gov.br/index.php/content/view/327118.html#ancora, accessed on 01/Dec/2011).

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B.7.2. Description of the monitoring plan:

1. General Considerations

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emissions reductions achieved by the project activity during the whole crediting period. The entrepreneurs (that are the project developer and operator) will be responsible for the implementation of the monitoring plan, which is based in monitoring the net electricity dispatched to the grid and the emission factor of the electricity grid.

2. Data and Parameters monitored

Net electricity dispatched to the grid – $EG_{facility,y}$

Monitoring consists of metering, compiling and archiving the data that refers to the net electricity generated by the project activity and delivered to the Brazilian national grid (SIN). This data will be crosschecked with electricity generation measured by meters for each wind plant in the electrical substation, discounting the electrical losses that occurs in transmission lines from the substation until the interconnection to the grid (
Figure 3). Project operator will monitor this parameter continuously and data will be consolidated hourly and monthly. Monthly values will be used for crosschecking electricity dispatched in the interconnection point with the Brazilian national grid and electricity generation measured by meters in the electrical substation, discounting the electrical losses that occurs in transmission lines from the substation until the interconnection to the grid. Records pertaining to the meters used in the project activity (type, model and calibration reports) will be kept accordingly.

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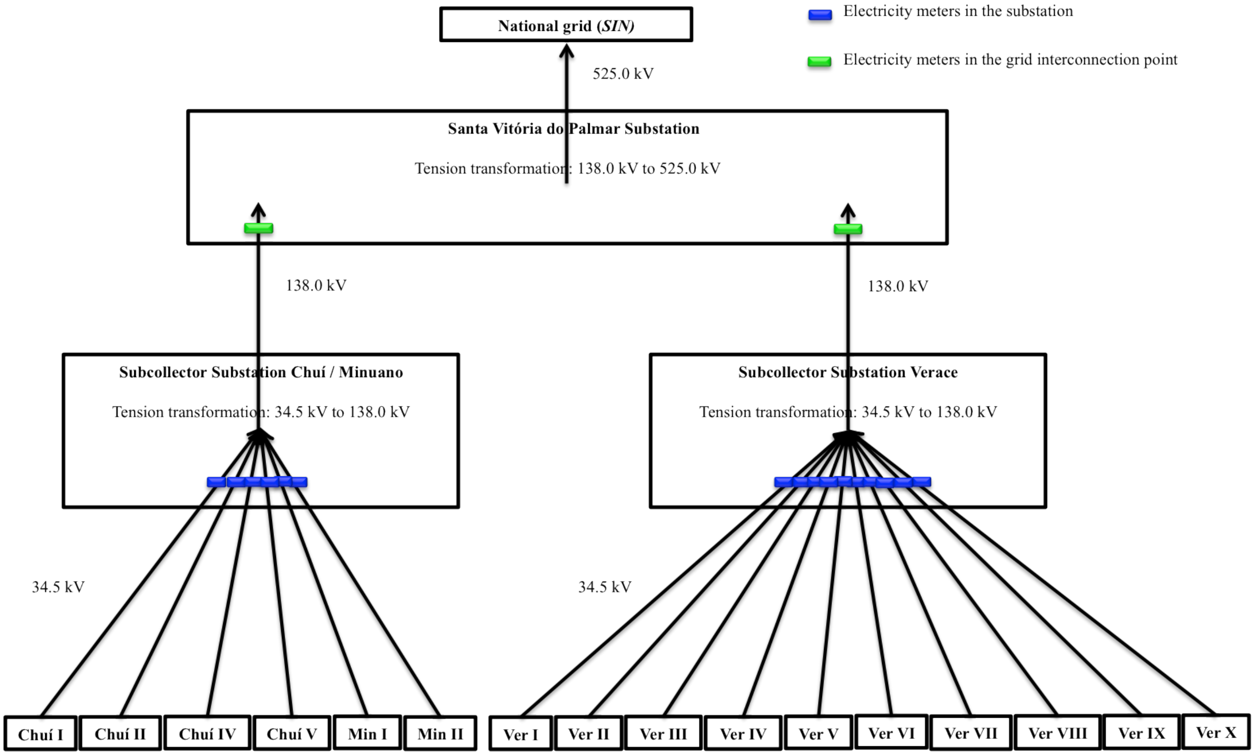

Figure 3: Simplified wiring diagram indicating the delivery point, location of the meters and tension transformation. Electricity meters in the interconnection point will be utilized in the emission reduction calculations; meters localized in the substation will be utilized for crosschecking.

The National Operator of the Electric System (*Operador Nacional do Sistema Elétrico - ONS*) regulates, by means of its Grid Procedures[31] (*Procedimentos de Rede*), *inter alia*, the measurements of electricity production for invoicing (12th module). For information related to this module, it is necessary to maintain the Measurement for Invoicing System (*Sistema de Medição para Faturamento – SMF*) according to the standard specified in the document Technical Specifications of Measurement for Invoicing (*Especificação Técnica das Medições para Faturamento*) to assure not only the control of energy accounting process by CCEE, but also the determination of demands by ONS[32].

Generally, SMF is a system composed of the main and backup measurers, by the potential and current transformers, the channels of communication between energy agent/project participant and CCEE, and the system for data collection and measurement for invoicing[33].

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[31] National Operator of the Electric System (*Operador Nacional do Sistema Elétrico* - ONS). Grid Procedures (*Procedimentos de Rede*). www.ons.org.br/procedimentos/index.aspx. Accessed in 14/07/2010.

[32] National Operator of the Electric System (*Operador Nacional do Sistema Elétrico* - ONS). Grid Procedures (*Procedimentos de Rede*). Module 12 – Submodule 12.1 (*Módulo 12 - Submódulo 12.1*). www.ons.org.br/download/procedimentos/modulos/Modulo_12/Submodulo%2012.1_Rev_1.1.pdf.

[33] National Operator of the Electric System (*Operador Nacional do Sistema Elétrico* - ONS). Grid Procedures (*Procedimentos de Rede*). Module 12 – Submodule 12.2 (*Módulo 12 - Submódulo 12.2*). www.ons.org.br/download/procedimentos/modulos/Modulo_12/Submodulo%2012.2_Rev_1.1.pdf.

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According to the ONS Grid Procedures – Submodule 12.1, the SMF should be installed in the connection of the plants with the energy grid to measure the net generation of these plants, which will be used for accounting and settlement of electricity in the CCEE.

Data stored on the meters is collected by the System of Energy Data Collection (*Sistema de Coleta de Dados de Energia – SCDE*) of CCEE, remotely and automatically through direct access to the meters of the project participant. These collected data are processed in SCDE for electricity accounting by CCEE and are available to all energy market participants to control their respective incomes[33].

The energy meters shall be: multi-phase, 3 elements, 4 wire (for 4 wire systems), of system rated frequency, rated current according to the secondary of current transformer, nominal voltage according to the secondary of potential transformer. The meters shall have independence of elements and sequence of phases, ensuring the same performance in monophasic and three-phasic testing[33].

The measurement systems are designed and implemented in accordance with the standards of the Brazilian Association of Technical Standards (*Associação Brasileira de Normas Técnicas – ABNT*) or International Electrotechnical Commission - IEC, ensuring the quality of the system. 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*)[33].

Regarding the class of accuracy of energy meters, they will meet all relevant metrological requirements prescribed in Metrological Technical Regulation (*Regulamento Técnico Metrológico – RMT*) for Class 0.2 of energy meters, approved by INMETRO. Class 0.2 of energy meter, also identified as index D energy meters admits error in measurements of up to ±0.2%[33].

The energy meters possess mass memory capable of storing the data of active, reactive and demand energy in a bidirectional manner, voltages and currents at intervals of integration programmable from 5 to 60 minutes during the minimum period of 32 days. These meters will also be equipped with a system of preservation and salvage of records in case of power loss, storing data in non-volatile memory for at least 100 hours. In addition, they possess at least two independent communication ports with concurrent access or that allow the prioritization of one of them. One will be for the exclusive use of the CCEE and the other for access of agents involved in the measurement point. The CCEE communication port will be coupled to a stable and good performance internet channel, which will be established under a VPN tunnel (Virtual Private Network) between the meter and the CCEE. The meters will be able to manage concurrent access to its communications ports in order to allow full time access to mass memory records of meters via CCEE communication port[33].

Besides electricity measurements are performed by the project owners, all the electricity dispatched to the grid by the project activity will be monitored online by CCEE. This entity is responsible for the monthly readings and keeping the records of the energy generated. If any problem happens at the local meter level, the reading lecture corresponding to the amount of energy during the time of the problem will not be lost due to online reading performed by CCEE. As mentioned before, in order to assure the quality of data used in the emission reductions calculation, the project proponents will provide access to the DOE of the records of CCEE databank, because the data from this entity will serve to crosscheck the electricity dispatched to the grid.

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Backup meters are equal or equivalent to the main meters, installed on the same panel, with the same information for current and voltage and under the same technical standards.

In order to ensure the effectiveness operation of SMF, preventive maintenance must be carried out and, where necessary, also corrective maintenance. Inspections are also conducted in order to verify the correct operation of meters[33].

The frequency for preventive maintenance of the SMF is a maximum of two years. This schedule may be changed based on the historical occurrence observed in all plants, considering the schedule of stops. The meter that after calibration displays errors outside the range specified by the standard must be replaced[34].

The calibration of meters shall be conducted by a qualified organization that must comply with national standards and industrial regulations to ensure the accuracy. After calibration, the meters must be sealed to assure the safety and the calibration certificates must be archived with the other monitoring records. The deadline for meter's calibration follows, therefore, the "Grid Procedures" from the ONS Module 12, Sub-module 12.3. By the time of completion of this document, the frequency of calibration is a maximum of two years, but in the case of any changes occurred in the ONS Grid Procedures, the project owners shall follow the rules from the relevant sector organizations (e.g. ONS, ANEEL, CCEE, etc).

All the meters installed will be tested and calibrated in accordance with regulations provided by CCEE. Moreover if any errors are detected in the measuring device, it will be immediately replaced by the backup meter, which will be previously calibrated. The damaged measuring device will be repaired, recalibrated and will return to the monitoring system.

In the case of any changes occurred in the ONS Grid Procedures and related documents, the project owners shall follow the rules from the relevant sector organizations (e.g. ONS, ANEEL, CCEE, etc) in the net electricity dispatched to the grid ($EG_{facility,y}$) monitoring. The monitoring procedure described above reflects what is demanded today by ONS. In case of changes of these requirements, the new procedures will supersede what is described here.

Emission Factor – $EF_{grid,OM,y}$, $EF_{grid,BM,y}$ and $EF_{grid,CM,y}$

The monitoring plan also includes parameters such as the operating margin CO_2 emission factor for power units in the top of the dispatch order ($EF_{grid,OM,y}$), the build margin CO_2 emission factor ($EF_{grid,BM,y}$) of SIN and the combined margin CO_2 emission factor ($EF_{grid,CM,y}$). These parameters will be obtained from the Brazilian Interministerial Commission for Climate Change (Brazilian DNA), which calculates and publishes $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ according to the most recent version of the "Tool to calculate the emission factor for an electricity system". These published parameters will be used for the calculation of the yearly combined margin ($EF_{grid,CM,y}$) and, ultimately, for the calculation of the emission reductions achieved by the project activity. In case the DNA ceases to publicize $EF_{grid,OM,y}$,

[34] National Operator of the Electric System (*Operador Nacional do Sistema Elétrico* - ONS). Grid Procedures (*Procedimentos de Rede*). Module 12 – Submodule 12.3 (*Módulo 12 - Submódulo 12.3*). http://www.ons.org.br/download/procedimentos/modulos/Modulo_12/Submodulo%2012.3_Rev_1.1.pdf.

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$EF_{grid,BM,y}$ and/or $EF_{grid,CM,y}$, project proponents may choose to use its own or third-party calculated Emission Factors, which follow the "Tool to calculate the emission factor for an electricity system."

All data collected as part of monitoring will be archived and kept at least for 2 years after the end of the crediting period or 2 years after the last issuance of CER for this project activity, whichever occurs later.

3. Monitoring Structure

The operational and management structure that the project operator will implement in order to monitor emission reductions achieved by the project activity is as given in the flowchart in Figure 4.

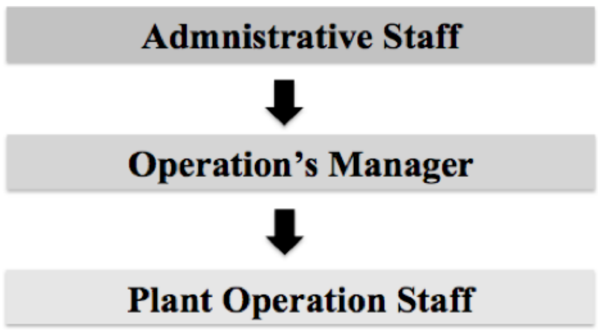

Figure 4: Operational and management structure that the project operator will implement in order to monitor emission reductions achieved by the project activity.

The roles and responsibilities within the structure outlined in Figure 4 are described in detail in the paragraphs below.

Administrative Staff: Responsible for go along with the auditor during the verification visit and provide all necessary documents related to the records of the net electricity supply to the grid. If applicable, at the time of verification by DOE, the Administrative Staff will provide access to the records of CCEE databank in order to demonstrate that electricity generation data is consistent and accurate. The Administrative Staff will forward all electronic media-based information to the CDM Consultancy Company at a minimum bimonthly frequency.

Operation's Manager: Responsible for the record keeping and indexing of the data pertaining to the net electricity supply to the grid. Its attributions also include ensuring that the monitored data pertaining to the net electricity generation is continuously sent (online) to the Electric Energy Commercialization Chamber (*CCEE – Câmara de Comercialização de Energia Elétrica*).

Plant Operation Staff: Responsible for the general supervision of the plant operation and for the supervision of the metering. Its attributions also include ensuring that meters included in the present monitoring plan are calibrated and undergo maintenance as per the applicable regulations and manufactures' recommendations. Any meter calibration procedures will be reported to the Administrative Staff.

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Training procedures

In order to ensure accuracy of the monitored data and to guarantee the quality of the monitoring plan, the Administrative Staff will receive training on monitoring methodologies, procedures and archiving by WayCarbon Soluções Ambientais e Projetos de Carbono Ltda. Then, the CDM Manager will train the project staff in respect to the CDM monitoring. The training course covers initial training on CDM, monitoring methodology, monitoring procedures and requirements and archiving.

4. **Compilation of Monitoring Reports**

As previously mentioned, monitored data will be forwarded to the CDM Consultancy Company (WayCarbon Soluções Ambientais e Projetos de Carbono Ltda.) at a minimum bimonthly basis. Besides being responsible for collecting the information pertaining to the calculation of the grid emission factor ($EF_{grid,OM,y}$ and $EF_{grid,BM,y}$), the CDM Consultancy Company will compile monitoring reports and will be responsible for the calculation of the emission reductions achieved by the project activity.

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

Date of completion of the application of the baseline and monitoring methodology: 10/01/2012.

Responsible staff:
Mr. Fábio Weikert Bicalho;
Miss. Juliana Miranda Mitkiewicz;
Miss. Luísa Guimarães Krettli.

WayCarbon Soluções Ambientais e Projetos de Carbono Ltda. (Project Participant)
Av. Av. Paulista, 37
10º andar – Bela Vista
01311-902- São Paulo - SP
Tel: +55 (11) 3372-9572
E-mail: contato@waycarbon.com
URL: http://www.waycarbon.com

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

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The **project starting date has not occurred yet** for this project activity. During the 12th Brazilian Auction of New Energy (*12º Leilão de Energia Nova - Leilão nº 02/2011*[35]), the wind electricity generation of this project activity have been contracted; nevertheless, the Power Purchase Agreement (PPA) established in the auction do not necessarily commit the entrepreneurs to the wind electricity generation facilities' implementation, since it is possible to sell the PPA to other part yet. During the auction, the entrepreneurs negotiated the costs of the Windfarm Complex implementation and finally dealt the final costs with the equipment suppliers and with the company responsible for implementing the facilities. However, these deals have not been officialised yet (i.e. there is no official contracts that commit the entrepreneurs to the equipment suppliers and to the companies responsible for implementing the facilities). The project developers and the involved parts are drawing up the contracts.

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

20 years and zero months[36].

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

C.2.1. Renewable crediting period:

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

01/01/2014

C.2.1.2. Length of the first crediting period:

7 years and zero months.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not Applicable

C.2.2.2. Length:

Not Applicable

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[35] 12th Brazilian Auction of New Energy (12º *Leilão de Energia Nova - Leilão nº 02/*2011). Available at http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=38820a6c2930f210VgnVCM1000005e01010aRCRD. Accessed on 07/Dec/2011. Reference: 12thNewEnergyAuction_Results

[36] ANEEL (*Agência Nacional de Energia Elétrica* – Brazilian Electricity National Agency) Electrical Sector Endowment Management Handbook (ElectricalSectorEndowmentManagementHandbook_ANEEL_2009, in page 215) establishes a 5%-per-year depreciation tax to aerogenerators, which corresponds to a lifetime of 20 years.

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SECTION D. Environmental impacts

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

Environmental Licensing is the major tool in environmental policies implementation in Brazil, with the main objective of standardizing environmental impacts assessments and establishing control plans for polluting enterprises. The Brazilian Environmental National Council (CONAMA – *Conselho Nacional de Meio Ambiente*) Normative Deliberations numbers 01/86 and 237/97 state that environmental impact assessments must be undertaken before the installation of new entrepreneurships or before the expansion/modification of existing activities. The construction and operation of these entrepreneurships are not allowed until the issuance of environmental permits. According to Federal Regulation 9.433/1997, article 52nd, the State or Municipal environmental agencies are the authorities in charge to issue Environmental Licenses within each Federative Unit (States or Municipalities), or by the Federal environment agency (*Instituto Brasileiro de Meio Ambiente e dos Recursos Naturais Renováveis* – IBAMA – Brazilian Environmental and Renewable Natural Resources Institute) depending on the scope, scale and boundaries of the activity. In the Rio Grande do Sul State, the Environmental Protection Foundation of the Rio Grande do Sul State (*Fundação Estadual de Proteção Ambiental do Rio Grande do Sul - FEPAM*) is responsible for environmental licensing in the State level.

According to the Federal Resolution CONAMA 001/86, activities that utilize natural resources and that are considered as entrepreneurships with high degradation or pollution potential must have their environmental impact assessment and environmental impact report elaborated to obtain the environmental licenses. Electricity generation, independently of the energy source, with potential higher than 10 MW, is amongst these activities.

Therefore the project activity Simplified Environmental Reports (*Relatório Ambiental Simplificado* – RAS)[37], that describes environmental impacts that may be caused by project design, implementation and operation, were submitted to FEPAM (Chuí and Verace's facilities) or to IBAMA (Minuano's facilities), in order to obtain the Prior License (*Licença Prévia* – LP).

The RAS enumerate the environmental impacts that may be associated to the project activity, and propose corresponding mitigation actions and programs, when necessary. The Prior License also presents mandatory actions to prevent or reduce the environmental impacts when designing the project activity's facilities. The main impacts associated to the project activity's operation are:

- Noise pollution: according to RAS, noise produced by aerogenerators does not reach large distances, affecting only Windfarm Complex's immediate vicinity. For that reason, aerogenerators will be installed at least 400 m apart from permanently occupied residences;
- Avifaunal losses: although the area directly affected by the entrepreneurship is outside the assessed birds' migratory routes, the aerogenerators will be installed at least 600 m apart from avifaunal relevant habitat. Furthermore, avifaunal corridors will be implemented in case of

[37] The Simplified Environmental Reports (*Relatório Ambiental Simplificado*) assesses the environmental impacts of project activity and is required by FEPAM and IBAMA for the Prior License (LP) granting in this type of project activity (references: Chui_RAS; Minuano_RAS; Verace_RAS).

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aerogenerators are located between two important avifaunal habitats located in the vicinity of the Windfarm Complex.

FEPAM (Chuí and Verace's facilities) or IBAMA (Minuano's facilities) emitted the Environmental Licenses for the project activity's facilities, identified as:

- Chuí I, Chuí II, Chuí IV and Chuí V: Prior License n° 1643/2008-DL, issued on 21/Nov/2008 and valid until 20/Nov/2010 (reference: LP_Chui);
- Minuano I and Minuano II: Prior License n° 355/2010, issued on 29/Jun/2010 and valid until 28/Jun/2012 (reference: LP_Minuano);
- Verace I, Verace II, Verace III, Verace IV, Verace V, Verace VI, Verace VII, Verace VIII, Verace IX and Verace X:
    - Prior License n° 201/2010-DL, issued on 25/Feb/2010 and valid until 02/Feb/2011 (reference: LP_Verace);
    - Installation License n° 314/2011-DL, issued on 16/Mar/2011 and valid until 15/Mar/2016 (reference: LI_Verace).

By means of the Prior Licensing, the environmental agency evaluates the entrepreneurship's localization and conception, attesting the environmental viability and establishing the basic requirements to the next phases of licensing.

The Installation License authorizes the beginning of the entrepreneurship's implementation, in accordance with the plans and projects approved, including the environmental control procedures and other constraints imposed by FEPAM or IBAMA.

Simplified Environmental Reports (RAS) and Prior and Installations Licenses were made available to DOE during validation.

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

In case of a wind power plant, the environmental impact is very small when compared to other alternatives for power generation. The interventions on the physical environment by the project activity in its planning, implementation and operation phases were categorized and their associated environmental impacts were identified in the RAS, as required by the environmental agencies (FEPAM and IBAMA); actions to prevent, mitigate or compensate them were proposed in this document.

SECTION E. Stakeholders' comments

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

Stakeholders' comments were invited in 23/12/2011[38] following the Designated National Authority procedures for such purpose, defined by Resolution n° 07 of the Interministerial Comission for Global Climate Change (CIMGC).

[38] Invitation letters: SantaVitoriaPalmarChui_StakeholdersInvitationLetters_ 20111223.

Post office's confirmation of letters receipt: SantaVitoriaPalmarChui_PostOfficeConfirmation_2011-2012

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Accordingly, the relevant stakeholders were mapped and invited to visit the website http://www.munduscarbo.com/projetos.htm in order to access the project documentation which includes the CDM-PDD and a correspondent version in Portuguese. This documentation will be accessible on the above mentioned website along the whole registration period.

The following stakeholders received letters communicating the CDM project activity:

- Mayors from project activity Municipalities;
- Representatives of the Legislative Chambers from project activity Municipalities;
- State environmental agencies;
- Municipal environmental agencies;
- Brazilian Forum of NGOs and Social Movements for the Environment and Development (FBOMS);
- Local community associations;
- State and Federal Prosecutors.

E.2. Summary of the comments received:

Up to the date of conclusion of this document, no comments have been received.

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

Considering the Section E.2 of the PDD, no action shall be taken by the project participants.

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Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Postcode/ZIP:	88040-901
Country:	Brazil
Telephone:	55 48 32317000
FAX:	55 48 32344040
E-Mail:	jose.vieira@eletrosul.gov.br
URL:	-
Represented by:	José Renato Vieira
Title:	-
Salutation:	Mr.
Last name:	Vieira
Middle name:	-
First name:	José Renato
Department:	-
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CDM – Executive Board

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CDM – Executive Board

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Represented by:	Matheus Lage Alves de Brito
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First Name::	Matheus
Departament:	-
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CDM – Executive Board

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Not Applicable. No public funding was granted to the project activity.

CDM – Executive Board

Annex 3

BASELINE INFORMATION

All pertinent information is provided throughout the text.

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Annex 4

MONITORING INFORMATION

All pertinent information is provided throughout the text.

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