MS RENOVÁVEIS WIND POWER COMPLEX: *MAR E TERRA, AREIA BRANCA, EMBUACA AND ICARAÍ*

June 2015

MS RENOVÁVEIS

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A.
PROJECT OVERVIEW

A1. PROJECT TITLE

"MS Renováveis Wind Power Project: *Mar e Terra, Areia Branca, Embuaca and Icaraí."*

A2. PROJECT TYPE

Renewable energy generation connected to the GRID. According to CDM's[1] category of project activity: Sectoral Scope 1 – Energy Industries (Renewable Source).

A3. PROOF OF PROJECT ELIGIBILITY

Proof of project eligibility is presented in Table A.1, according to ACR Standard v.3.0, Chapter 3.

Table A.1: *MS Renováveis Wind Energy Complex Project proof of eligibility.*

CRITERION	ACR REQUIREMENT	PROJECT'S PROOF OF ELIGIBILITY
Start Date	Non-AFOLU projects with a Start Date of 01 January, 2000, or later are eligible for registration. Projects whose Start Date is more than two years prior to the date of listing must provide documentation that GHG mitigation was an objective as of the Start Date.	The project start date is June 29, 2013. Even though the Start Date is prior to the date of listing, it does not reach the two-year limit mentioned by ACR.
Crediting Period	The Crediting Period for non-AFOLU projects shall be seven (7) years, unless otherwise specified in the relevant ACR sector standard or approved methodology.	The crediting period for this project is seven (7) years, with possibility for renewal.
Real	GHG reductions and removals shall exist prior to issuance.	All emissions from the project are being claimed ex-post.
Direct Emissions	Project Proponent shall own, have control, or document effective control over the GHG sources/sinks from which the emissions reductions or removals originate. If the Project Proponent does not own or control the GHG sources or sinks, the Proponent shall document that effective control exists over the GHG sources and/or sinks from which the reductions/removals originate.	MS Renováveis controls project site GHG emissions. Emisions from the National Electricity System (grid) are Brazilian Government responsibility
Offset Title	Project Proponent shall provide documentation and attestation of undisputed title to all offsets prior to registration, including chain of custody documentation if offsets have ever been sold in the past.	All necessary documentation is presented on Section G of this document.
Land Title	Proponent should provide documentation and/or attestation of land title.	All necessary documentation is presented on Section G of this document.

[1] CDM – Clean Development Mechanism.

CRITERION	ACR REQUIREMENT	PROJECT'S PROOF OF ELIGIBILITY
Additional	Every project shall use either an ACR-approved performance standard and pass a regulatory surplus test, or pass a three-pronged test of additionality in which the project must: 1) exceed regulatory/legal requirements; 2) go beyond common practice; and 3) overcome at least one of three implementation barriers: institutional, financial or technical.	Project's additionality is demonstrated in Section C, according to ACR's three-pronged test.
Project Baseline Scenario	Project Proponents shall use appropriate methodologies and tools to estimate and update project baselines.	Approved CDM methodology ACM0002, v.15.0.0 (EB 79) was used, as presented in Section B.
Permanent	For projects with a risk of reversal of GHG emission reductions/removals, Project Proponents shall assess risk using an ACR-approved risk assessment tool.	Avoided GHG emissions from this project are permanent and cannot be reversed once they have occurred, due to the nature of the project.
Net of Leakage	Project Proponents must deduct leakage that significantly reduces the GHG emissions reduction and/or removal benefit of a project.	According to CDM methodology ACM0002, v.15.0.0, EB 79, leakage must not be considered, as presented in Section E.
Independently Validated and Verified	ACR requires third-party validation and verification, by an ACR-approved verifier, at specified intervals in order to issue new ERTs.	The project shall be submitted to third party (validation and verification after ACR first screening.
Community & Environmental Impacts	Project Proponents shall document in the GHG Project Plan a mitigation plan for any foreseen negative community or environmental impacts, and shall disclose in their Annual Attestations any negative environmental or community impacts or claims of negative environmental and community impacts.	Project's community and environmental impacts are net positive, as presented in Section F.

A4. LOCATION

The MS Renováveis Wind Power Project (from this point, "The Project") is composed of four Wind Power Plants (from now on, WPP), which are located in three different municipalities:

- *Mar e Terra* and *Areia Branca* WPP are located in *Areia Branca* municipality.
- *Embuaca* WPP is located in *Trairi* municipality.
- *Icaraí* WPP is located in *Amontada* municipality.

The geographic coordinates of each site, according to ANEEL Ordinances, are presented in the Table A.2. The geographic coordinates of each wind turbine are presented from Tables A.3 to A.6. The project location – including all plants – is presented in Figure A.1.

Table A.2: *Project's geographic coordinates.*

GEOGRAPHIC COORDINATES	MAR E TERRA[2]	AREIA BRANCA[3]	EMBUACA[4]	ICARAÍ[5]
Longitude (West)	-36.9177	-36.9034	-39.3294	-39.6292
Latitude (South)	-4.9736	-4.9772	-3.2182	-3.0179

Table A.3: *Individual geographic coordinates – Mar e Terra.*

WIND TURBINE	LONGITUDE	LATITUDE	DATUM
S95 - T1	731112	9451099	SIRGAS 2000
S95 - T2	731056	9450841	SIRGAS 2000
S95 - T3	731000	9450583	SIRGAS 2000
S95 - T4	730944	9450325	SIRGAS 2000
S95 - T5	730859	9450067	SIRGAS 2000
S88 - T6	730860	9449804	SIRGAS 2000
S88 - T7	730747	9449551	SIRGAS 2000
S88 - T8	730721	9449293	SIRGAS 2000
S88 - T9	730645	9449035	SIRGAS 2000
S88 - T10	730578	9448744	SIRGAS 2000
S88 - T11	730545	9448481	SIRGAS 2000

Table A.4: *Individual geographic coordinates - Areia Branca.*

WIND TURBINE	LONGITUDE	LATITUDE	DATUM
S95 - T1	732666	9451127	SIRGAS 2000
S95 - T2	732621	9450852	SIRGAS 2000
S95 - T3	732568	9450616	SIRGAS 2000
S95 - T4	732466	9450277	SIRGAS 2000
S95 - T5	732466	9450021	SIRGAS 2000
S95 - T6	732459	9449778	SIRGAS 2000
S95 - T7	732527	9449505	SIRGAS 2000
S95 - T8	732508	9449236	SIRGAS 2000
S95 - T9	732489	9448966	SIRGAS 2000
S88 - T10	732470	9448697	SIRGAS 2000
S88 - T11	732451	9448428	SIRGAS 2000
S88 - T12	732433	9448158	SIRGAS 2000
S88 - T13	732414	9447889	SIRGAS 2000

[2] *Mar e Terra* geographic coordinates are described in ANEEL Ordinance #867, dated October 25, 2010. The document is available for consultation at the evidence list under the name *Mar e Terra_PIE.pdf*

[3] *Bela Vista* geographic coordinates are described in ANEEL Ordinance #741, dated August 19, 2010. The document is available for consultation at the evidence list under the name *Areia Branca_PIE..pdf.*

[4] *Embuaca* geographic coordinates are described in ANEEL Ordinance #732, dated August 17, 2010. The document is available for consultation at the evidence list under the name *Embuaca_PIE..pdf.*

[5] *Icaraí* geographic coordinates are described in ANEEL Ordinance #601, dated June 30, 2010. The document is available for consultation at the evidence list under the name *Icarai_PIE.pdf*.

Table A.5: *Individual geographic coordinates – Embuaca.*

WIND TURBINE	LONGITUDE	LATITUDE	DATUM
S95 - T1	463634	9645729	SIRGAS 2000
S95 - T2	463561	9645484	SIRGAS 2000
S95 - T3	463530	9645276	SIRGAS 2000
S95 - T4	463500	9645006	SIRGAS 2000
S95 - T5	463424	9644385	SIRGAS 2000
S95 - T6	463397	9644164	SIRGAS 2000
S95 - T7	463391	9643938	SIRGAS 2000
S95 - T8	463332	9643624	SIRGAS 2000
S95 - T9	463298	9643350	SIRGAS 2000
S95 - T10	463263	9643110	SIRGAS 2000
S95 - T11	463239	9642914	SIRGAS 2000
S95 - T12	463215	9642720	SIRGAS 2000
S95 - T13	463189	9642473	SIRGAS 2000

Table A.6: *Individual geographic coordinates – Icaraí.*

WIND TURBINE	LONGITUDE	LATITUDE	DATUM
S88 - T1	430830	9664781	SIRGAS 2000
S88 - T2	430872	9664968	SIRGAS 2000
S88 - T3	430818	9665133	SIRGAS 2000
S88 - T4	430834	9665337	SIRGAS 2000
S88 - T5	430193	9665441	SIRGAS 2000
S88 - T6	430227	9665672	SIRGAS 2000
S88 - T7	429540	9665713	SIRGAS 2000
S88 - T8	429539	9665891	SIRGAS 2000

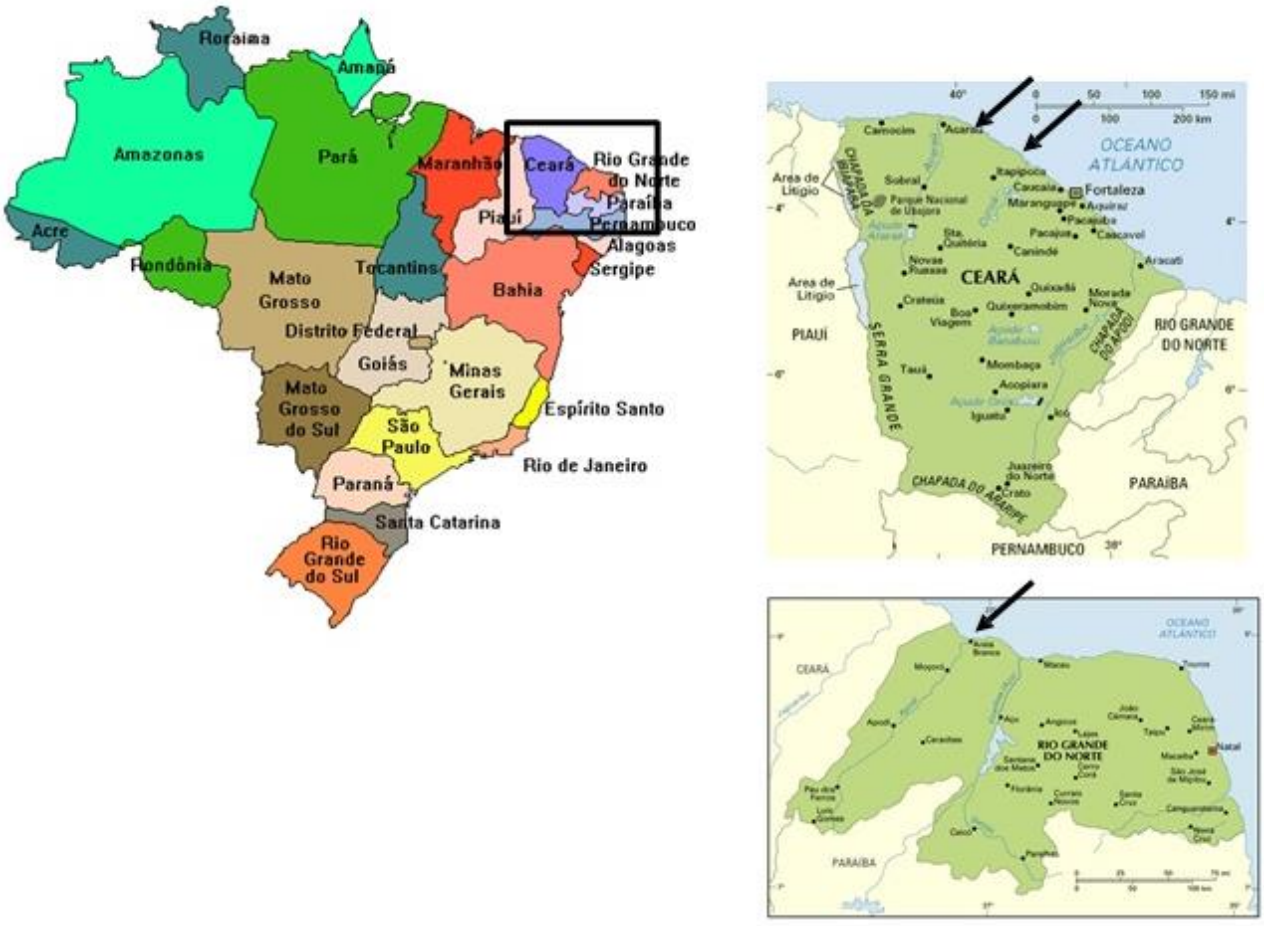

Figure A.1: *Ceará and Rio Grande do Norte states location (on the left)[6] and Trairi (CE), Amontada (CE)[7] and Areia Branca (RN)[8] municipalities (on the right).*

A5. BRIEF SUMMARY OF PROJECT

Background information

The primary objective of the Wind Power Plants considered in this Green House Gas (GHG) Project Activity is to help meet Brazil's rising demand for energy due to economic growth and to improve the supply of electricity. At the same time, it intends to contribute to the environmental, social and economic scenarios, by increasing the share of renewable energy consumption for Brazil (and for the region of Latin America and the Caribbean).

The Latin America and the Caribbean region countries have expressed their commitment towards achieving a target of 10% renewable energy for the total energy use in the region. Through an initiative

[6] Available at: < http://www.portalsaofrancisco.com.br/alfa/brasil-mapas/>.

[7] Ceará Mapas. Available at: <http://www.ceara.com.br/cepg/mapa_ceara.htm>.

[8] Portal São Francisco. Rio Grande do Norte. Available at: <http://www.portalsaofrancisco.com.br/alfa/brasil-mapas/mapa-do-rio-grande-do-norte.php >.

from the Ministers of the Environment in 2002 (UNEP-LAC, 2002)[9], a preliminary meeting of the World Summit for Sustainable Development (WSSD) was held in Johannesburg in 2002. In the WSSD final Plan of Implementation no specific targets or timeframes were stated, however, their importance was recognized to achieve sustainability in accordance with the Millennium Development Goals[10].

The privatization process initiated in 1995 arrived in conjunction with the expectation of adequate tariffs (fewer subsidies) and more attractive prices for generators. It drew the attention of investors to possible alternatives not available in the centrally planned electricity market. Unfortunately, the Brazilian energy market lacked a consistent expansion plan, with the biggest problems being political and regulatory uncertainties. At the end of the 1990's a strong increase in demand in contrast with a less-than-average increase in installed capacity caused the supply crisis/rationing from 2001/2002. One of the solutions the Government provided was flexible legislation favoring smaller independent energy producers. In addition, the possibility of being assisted by the Clean Development Mechanism of the Kyoto Protocol also drew the attention of investors regarding renewable energy projects.

In this context, the proposed project activity can be seen as another opportunity of energy supply, in order to avoid a situation similar to what happened in 2001, as well as a contribution to the Brazilian goals in sustainable development. This indigenous and cleaner source of electricity will also have an important contribution to environmental sustainability through the reduction of carbon dioxide (CO^2) emissions. The project activity reduces GHG emissions by avoiding electricity generation from fossil fuel sources, which would be generated (and emitted) in the absence of the project.

Project brief description

The proposed project activity consists of four wind power plants: *Mar e Terra*, *Areia Branca*, *Embuaca* and *Icaraí*, with 23.1 MW, 27.3 MW, 27.3 MW and 16.8 MW of installed capacity, respectively. *Mar e Terra* and *Areia Branca* WPP are located in Rio Grande do Norte State and Embuaca and Icaraí are located in Ceará State.

The Project's WPP are owned by four Specific Purpose Societies (from Portuguese, *Sociedades de Propósito Específico - SPE*):

- *Eólica Mar e Terra Geração e Comercialização de Energia S.A.* (WPP Mar e Terra);
- *Eólica Bela Vista Geração e Comercialização de Energia S.A.* (WPP Areia Branca);
- *Embuaca Geração e Comercialização de Energia S.A.* (WPP Embuaca);
- *Eólica Icaraí Geração e Comercialização de Energia Ltda* (WPP Icaraí).

MS Participações Societárias S.A. controls the SPEs.

[9] **UNEP-LAC (2002).** Final Report of the 7th Meeting of the Inter-Sessional Committee of the Forum of Ministers of Environment of Latin America and the Caribbean. United Nations Environment Programme, Regional Office for Latin America and the Caribbean. May 15 to 17, 2002, São Paulo (Brazil).

[10] WSSD Plan of Implementation, Paragraph 19 (e): *"Diversify energy supply by developing advanced, cleaner, more efficient and cost-effective energy technologies, including fossil fuel technologies and renewable energy technologies, hydro included, and their transfer to developing countries on concessional terms as mutually agreed. With a sense of urgency, substantially increases the global share of renewable energy sources. The goal is to increase its contribution to total energy supply, recognizing the role of national and voluntary regional targets, as well as initiatives, where they exist, and ensuring that energy policies are supportive to developing the countries' efforts to eradicate poverty and regularly evaluate available data to review progress to this end."*

The project contributes to sustainable development since it meets present needs without compromising the ability of future generations to meet their own needs, as defined by the Brundtland Commission (1987)[11]. In other words, the implementation of wind power plants ensures renewable energy generation, reduces the demand on the national electric system, avoids negative social and environmental impacts caused by fossil fuel fired thermo power plants, and drives regional economies, increasing the quality of life in local communities.

In summary, the proposed project activity already contributes to the sustainable development in the following aspects:

- Reducing air pollutants that are emitted from fossil fuel electricity generation from power plants connected to the Brazilian grid (specifically CO_2).
- Creating job opportunities during the project construction, operation and maintenance, improving capacity related to wind farms in Brazil, through advanced technology transferred from developed countries;
- Efficiently generating electricity, for which there is a growing demand in the country;
- Contributing towards national economic development, adding an Independent Power Producer, leading to energy diversification and creation of additional renewable energy sources.

From the above, it can be concluded that the project has reduced environmental impacts and is helping to develop the regional economy, resulting in better quality of life. In other words, environmental sustainability combined with social and economic justice, undeniably contributing to the host country's sustainable development.

A6. PROJECT ACTION

The Project activity consists of a Wind Energy Complex composed by four Wind Farms, with a total installed capacity of 94.5 MW. Wind power is the conversion of wind energy into a useful form of energy, such as using wind turbines to make electrical power, as it happens in the Project. Figure A.2 brings a simple demonstration of a WPP.

[11] **WCED (1987).** Our Common Future. The World Commission on Environment and Development. Oxford University Press.

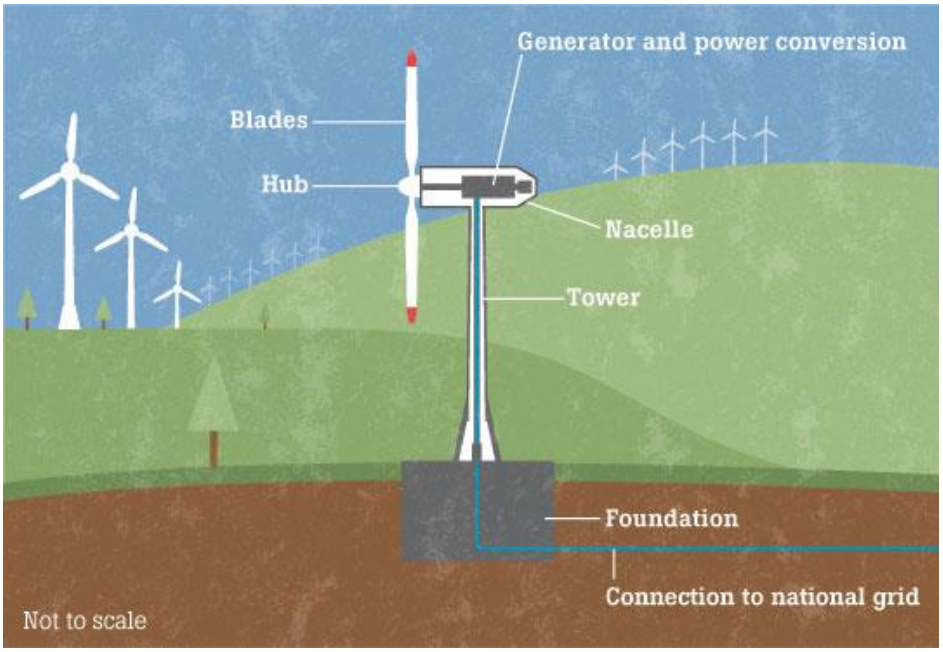

Figure A.2: *Wind power demonstration (not to scale scheme).*

The four wind power plants presented in this project activity already provide electricity to the grid through the installation of four transmission lines, located the two States where the plants are located. The description of each transmission line is detailed as follow:

- *Mar e Terra* wind power plant (23.1 MW).
  - *Mar e Terra* WPP is interconnected to the grid through a transmission line of 230 kV which connects *Areia Branca* substation to *Mossoró II* substation from the local power utility (*CHESF - Companhia Hidroelétrica do São Francisco*). The mentioned transmission line presents an extension of approximately 52 km that goes through two municipalities, *Areia Branca* and *Mossoró*.

- *Areia Branca* wind power plant (27.3 MW).
  - *Areia Branca* WPP is interconnected to the grid through a transmission line of 230 kV which connects *Areia Branca* substation of 230 kV to *Mossoró II* substation from the local power utility (*CHESF - Companhia Hidroelétrica do São Francisco*). The mentioned transmission line presents an extension of approximately 52 km and that goes through two municipalities (*Areia Branca* and *Mossoró*).
  - In addition, Areia Branca wind power plant presents a transmission line of 34.5 kV to connect *Areia Branca* wind power plant to *Areia Branca* substation 34.5/230kV. This transmission line presents an extension of approximately 1.2 km.

- *Embuaca* wind power plant (27.3 MW).
  - *Embuaca* wind power plant is interconnected to the grid through a transmission line of 34.5 kV, which is directly connected to *Faísa* substation also with 34.5 kV, located at the municipality of *Trairi*, state of *Ceará*. *Faísa* substation will be interconnected to *Pecém II*

substation (controlled by the local power utility (*Companhia Hidro Elétrica do São Francisco – CHESF*). The transmission line presents an extension of approximately 12 km.

- *Icaraí* wind power plant (16.8 MW).
  - *Icaraí* wind power plant is interconnected to the grid through a transmission line of 69 kV, which connects *Icaraí* substation of 69 kV, located at *Amontada* municipality, state of *Ceará* to *Marco,* substation from the local power utility (*COELCE – Companhia Energética do Ceará*) located at the municipality of *Marco*, also at *Ceará* state. The transmission line presents an extension of approximately 60 km.

The equipment and technology utilized in the proposed project activity has been applied to similar projects all over the world. The technology implemented in the Project is listed on Table A.8.

The chosen Project Start Date is June 29, 2013, when the first plant started operation (Table A.7).

Table A.7: *Start of operations of each Wind Power Plant.*

WIND POWER PLANT	BEGINNING OF OPERATION
Icaraí	June 29, 2013[12]
Mar e Terra	February 18, 2014[13]
Areia Branca	February 18, 2014[13]
Embuaca	March 29, 2014[14]

[12] ANEEL Ordinance #2022, dated June 28, 2013, authorizing the start of operations on June 29, 2013.
[13] ANEEL Ordinance # 356, dated February 18, 2014, authorizing the start of operations on February 18, 2014.
[14] ANEEL Ordinance #794, dated March 29, 2014, authorizing the start of operations on March 29.

Table A.8: *Project technical description according to Suzlon's Brochure[15].*

Wind Power Plant		***Mar e Terra***		***Areia Branca***		***Embuaca***	***Icaraí***
TURBINES							
General	Model	S88	S95	S88	S95	S95	S88
	Quantity	6	5	4	9	13	8
	Nominal Power (MW)	2.1	2.1	2.1	2.1	2.1	2.1
	Installed Capacity (MW)	23.1		27.3		27.3	16.8
	Manufacturer	Suzlon Energy Limited		Suzlon Energy Limited		Suzlon Energy Limited	Suzlon Energy Limited
Rotor	Diameter (m)	88	95	88	95	95	88
	High (m)	80	90	80	90	90	80
	Area swept (m²)	6,082	7,085	6,082	7,085	7,085	6,082
	Nominal revolutions (rpm)	15 to 17.6	12 to 18	15 to 17.6	12 to 18	12 to 18	15 to 17.6
	Number of blades	3	3	3	3	3	3
Operational Data	Cut-in-wind speed (m/s)	4	3.5	4	3.5	3.5	4
	Cut-out-wind speed (m/s)	25	25	25	25	25	25
	Rated wind speed (m/s)	14	11	14	11	11	14
GENERATORS							
General	Nominal output (kW)	2,100	2,100	2,100	2,100	2,100	2,100
	Quantity	6	5	4	9	13	8
	Frequency (Hz)	60	60	60	60	60	60
	Voltage (V)	600	600	600	600	600	600

[15] Turbine's specifications. Available at: http://www.suzlon.com/.

A7. *EX ANTE* OFFSET PROJECTION

Estimated GHG reductions by year are presented in Table A.9.

Table A.9: *Ex-ante estimations of the Project's GHG Emission Reductions.*

YEAR	PROJECT ACTIVITY EMISSIONS (tCO_2E)	BASELINE EMISSIONS (tCO_2E)	LEAKAGE (tCO_2E)	OVERALL EMISSION REDUCTIONS (tCO_2E)
2013 (From June 29)	14,698	20,719	19,657	13,813
2014	29,000	40,879	38,783	27,253
2015	29,000	40,879	38,783	27,253
2016	29,000	40,879	38,783	27,253
2017	29,000	40,879	38,783	27,253
2018	29,000	40,879	38,783	27,253
2019	29,000	40,879	38,783	27,253
2020 (Until June 28)	14,262	20,104	19,073	13,403
Total (tCO_2e)	0	**951,213**	0	**951,213**
Annual (tCO_2e)	0	**135,888**	0	**135,888**

A8. PARTIES

Project Participants:

1) MS PARTICIPAÇÕES SOCIETÁRIAS S.A.

COMPANY:

Description: MS Renováveis is the company responsible for the four WPP presented in this project.
Responsibilities: Each WPP included in the project is owned by one Specific Purpose Society, as already referred in Section A.5 of this document. MS Participações Societárias S.A. has control over all project operation and monitoring information.

Contact information:

Contact: Maiza Ponte (Financial Director)
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TEAM:

- Maiza Ponte – Financial Director
- Nicorray Santos – Technical Director
- Allan Lima – Engineer
- Cecília Lacerda - Financial Controller
- Maira Zanduzzo - Environment

2) EMBRASCA ENVIRONMENTAL CONSULTING

COMPANY:

Description: EMBRASCA is an environmental consulting company located in the Midwest of Brazil that has been specializing itself in the services business, which major themes are the implementation of social and environmental responsibility programs (directed to enterprises and other institutions), environmental monitoring (regarding activities with a great impact, such as construction) e environmental marketing, by guiding its clients into appropriate communications methods in the environmental scenario. Since 2002, Embrasca has chosen to work in a specialized way in the carbon market business, due to the imminent preoccupation associated with the climate change.

Responsibilities: EMBRASCA will cover all the GHG Project activities, from developing the GHG Project Plan and coordinating the steps to registration, validation, verification and certification, monitoring and communication with ACR staff.

Contact information:

EMBRASCA – Empresa Brasileira de Serviços e Consultoria Ambiental Ltda.
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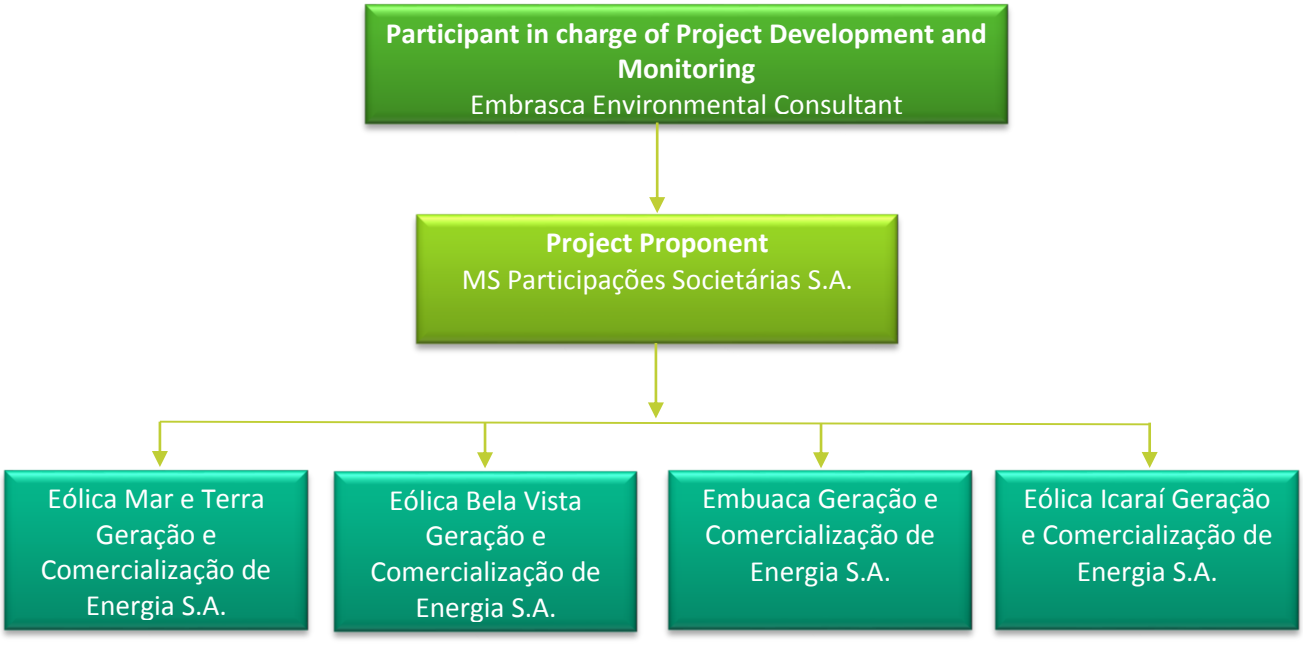
TEAM:

- Elisa da Costa Guida: Project Coordinator (Technical Responsibility Annotation attached – ANNEX IV).
- Ricardo César Fernandes: Project Manager
- Franco Grassi: Financial Director
- Engineers/Assistants: Ana Carolina de Godoy Silva / Pedro Paulo Fernandes da Silva



B.
METHODOLOGY

B1. APPROVED METHODOLOGY

According to ACR Standard v.3.0, ACR requires every project submitted for registration to use an ACR-published or ACR approved methodology. The ACR approved methodology used in this project is CDM **ACM0002, v.15.0 (EB 79): "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"**.

The CDM approved methodology is supported by the also CDM tools:

- "Combined tool to identify the baseline scenario and demonstrate additionality", v.05.0.0;
- "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", v.02;
- "Tool to calculate the emission factor for an electricity system", v.04.0 and;
- "Tool for the demonstration and assessment of additionality", v.07.0.0.
- "Guidelines on the assessment of investment analysis", v.05.

B2. METHODOLOGY JUSTIFICATION

The methodology is applicable to grid-connected renewable power generation project activities that: (a) install a greenfield power plant; (b) involve a capacity addition to (an) existing plant (s); (c) involve a retrofit of (an) existing plant(s); or (d) involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) involve a replacement of (an) existing plants(s)/unit (s).

The proposed project activity comprises four Greenfield plants corresponding to option (a).

B3. PROJECT BOUNDARIES

According to CDM approved methodology ACM0002, v.15.0, the project boundary comprises *"the spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system[16] that the project power plant is connected to".*

On May 26, 2008, the Brazilian Designated Authority published Resolution #8[17] defining the Brazilian Interconnected Grid as a single system covering all five geographical regions of the country (North, Northeast, South, Southeast and Midwest).

Figure B.1 presents the Project boundary.

[16] Refer to the latest approved version of the "Tool to calculate the emission factor for an electricity system" for definition of an electricity system.

[17] Comissão Interministerial de Mudança Global do Clima (CIMGC). Available at: <http://www.mct.gov.br/upd_blob/0024/24719.pdf>.

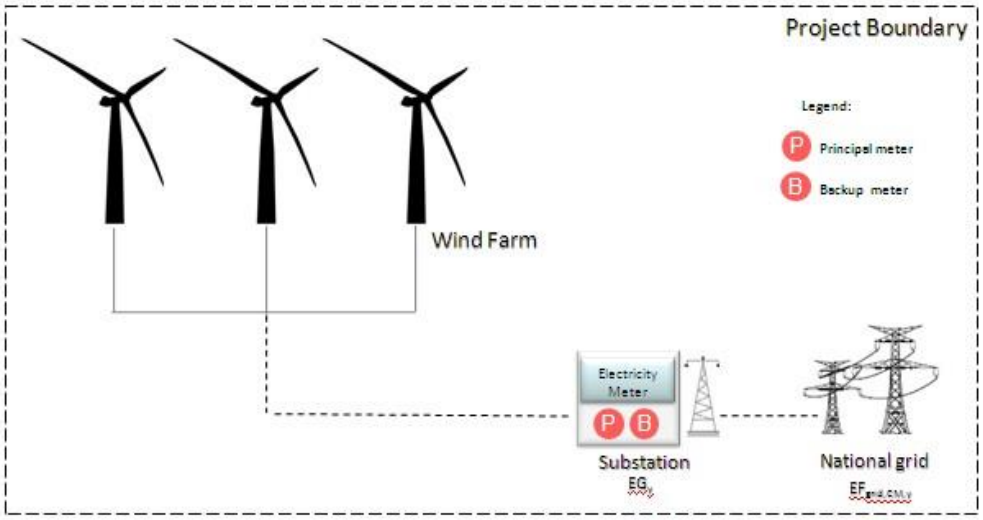


Figure B.1: *Project Boundary.*

B4. IDENTIFICATION OF GHG SOURCES AND SINKS

The GHG sources and sinks considered in the project boundary, according to CDM approved methodology ACM0002, v.15.0, are presented in Table B.1. **Wind power projects include only Baseline GHG sources, regarding CO_2 emissions.**

Table B.1: *GHG sources and sinks considered in CDM methodology ACM0002, v.15.0.*

SOURCE		GAS	INCLUDED	JUSTIFICATION/EXPLANATION
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	Yes	Main emission source
		CH_4	Yes	Main emission source
		N_2O	No	Minor emission source
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	Minor emission source
		CH_4	Yes	Main emission source
		N_2O	No	Minor emission source

B5. BASELINE

According to CDM approved methodology ACM0002, v.15.0, regarding the identification of the baseline scenario, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

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

B6. PROJECT SCENARIO

The project scenario consists of the implementation of a Wind Energy Complex, composed of four Wind Farms, with a 94.5 MW total installed capacity. The first turbine started its operations on June 29, 2013 and the last on March 29, 2014. The Start Date of the project regards the beginning of any operation, for that reason, the established **Start Date of the Project is June 29, 2013.**

Emissions related to the project, as per approved methodology ACM0002, v.15.0, for wind power plants, are not considered, even the ones related to fossil fuel consumption. Leakage emissions are not considered either. CO_2 is the only gas included in the project scenario and is related to baseline emissions.

B7. REDUCTIONS AND ENHANCED REMOVALS

At the baseline scenario, there would not be GHG reductions or removals from the atmosphere. The fossil fuel fired plants action would result in GHG emissions to the atmosphere.

The project reduces GHG emissions by avoiding those fossil fuels emissions with the implementation of four renewable energy power plants, based on wind power generation, with no emissions related to the project activity nor leakage.

In the seven-year crediting period, it is estimated at 951,213 tCO_2 of emissions reductions.

B8. PERMANENCE

The project offsets do not face any risk of reversal because the emissions reductions will occur at the electricity generation moment and cannot be reversed. For this reason, there is no need of applying a method of permanence assurance.

C.
ADDITIONALITY

ACR requires (ACR Standard, v.3.0) that every project should either pass an approved performance standard and a regulatory additionality test, or pass a three-pronged test to demonstrate that the Project Activity is: (i) beyond regulatory requirements; (ii) beyond common practice and; (iii) faces at least one of three implementation barriers (financial, technological or institutional). The three-pronged test option was chosen.

C1. REGULATORY SURPLUS TEST

The project is in accordance to the applicable Brazilians laws and regulations according the following entities:

- National Electric System Operator (ONS, from Portuguese, *Operador Nacional do Sistema Elétrico*);

  Electricity Regulatory Agency (ANEEL, from Portuguese, *Agência Nacional de Energia Elétrica*);
- Rio Grande do Norte Environmental Agency (IDEMA, from Portuguese, *Instituto de Desenvolvimento Sustentável e Meio Ambiente do Rio Grande do Norte)*;
- Ceará State Environmental Agency (SEMACE, from the Portuguese, *Superintendência Estadual do Meio Ambiente)*;

It is important to clarify that the Brazilian Institutional New Model of the Electric Sector allows the private and public agents to decide the amount of energy to be hired and the investments to be realized from the participation in auctions of power plants and systems of transmission.

This way, it can be noticed that there are no restrictions in the applicable laws and regulations to the implantation of the alternative scenarios to the project activity. It is further noticeable that the Brazilian Institutional New Model of the Electric Sector provides autonomy to the economic agents about the investments to be realized in the Brazilian electric sector, not existing, therefore, restrictions nor impositions to the project activity.

- **TEST RESULT**: THE PROJECT ACTIVITY IS NOT MANDATORY BY ANY BRAZILIAN LEGISLATION AND, THEREFORE, THE CRITERION IS SATISFIED.

C2. COMMON PRACTICE TEST

Common practice analysis was carried out according to the following documents:

- ACR Standard v.3.0;
- CDM approved "Tool for the demonstration and assessment of additionality, v.7.0.0".

According to the latest version of ACR Standard (v.3.0), "*the common practice test requires the Project Proponent to evaluate the predominant technologies or practices in use in a particular industry, sector, and/or geographic region, as determined by the degree to which those technologies or practices have penetrated the market, and demonstrate that the proposed project activity is not common practice and will reduce GHG emissions below levels produced by common technologies or practices within a comparable environment (e.g. Geographic area, regulatory framework, investment climate, access to technology financing, etc.).*

The common practice test was carried out considering the CDM approved "Tool for the demonstration and assessment of additionality, v.7.0.0". The following definitions were determined:

- **Applicable geographical area:** Brazil has an extension of 8,514,876.599 square kilometers[18] (with over 4,000 km distance in the North-South as well as in the east-west axis) and 06 distinct climate regions: sub-tropical, semi-arid, equatorial, tropical, highland-tropical and Atlantic-tropical (humid tropical). These climatic variations obviously have a strong influence in the technical aspects related to the implementation of wind farms.

[18] Available at: http://www.ibge.gov.br/home/geociencias/areaterritorial/principal.shtm.

- **Measure:** Use of renewable energies – in this case, wind power.
- **Output:** service produced by the project activity: electricity.

The analysis was carried out according to STEP 4(b) of the mentioned CDM tool.

- *Provide an analysis to which extent similar activities to the proposed CDM project activity have been implemented previously or are currently underway. Similar activities are defined as activities (i.e. technologies or practices) that are of similar scale, take place in a comparable environment, inter alia, with respect to the regulatory framework and are undertaken in the applicable geographical area, as defined above. Other CDM project activities (registered project activities and project activities that have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis. Provide documented evidence and, where relevant, quantitative information.* ***Based on that analysis, describe whether and to which extent similar activities have already diffused in the applicable geographical area.***

According to ANEEL[19], there are currently 238 wind power farms in operation, 122 under construction and 290 predicted (with licenses), but with construction not initiated. The 238 projects already in operation have an installed capacity of 5,139,489 MW, which represents 3.61% of the Brazilian electricity supply.

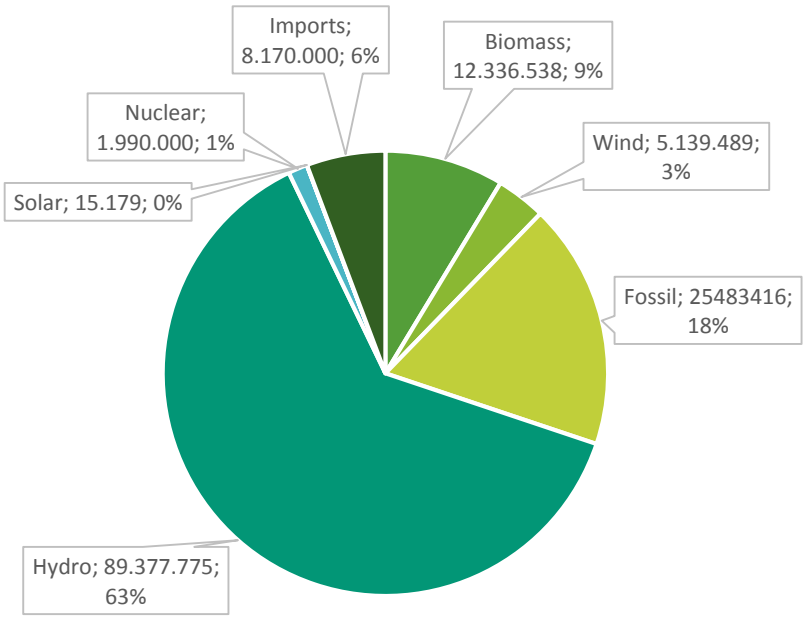


Figure C.1: *Brazilian sources of electricity supply – ANEEL[20]*

Since this database shows all projects in current days (2015), a first screening was carried out to consider only the projects which starting date was before June 29, 2013. Table C.1 presents all wind power plants that were implemented before the Project start date (90 projects, totaling 1,971.34 MW).

[19] Available at: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.cfm
[20] Available at: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoCapacidadeBrasil.cfm

Table C.1: Wind power plants in the Brazilian grid by the time of project implementation (June 29, 2013).

PLANT	INSTALLED CAPACITY (MW)	SCALE	BRAZILIAN STATE	PROINFA	CDM	CDM METHODOLOGY	CDM STATUS	START DATE
Eólica de Prainha	10,0000	SMALL	CE					1999
Eólica de Taíba	5,0000	SMALL	CE					1999
Eólio - Elétrica de Palmas	2,5000	SMALL	PR					2000
Mucuripe	2,4000	SMALL	CE	YES				2000
Eólica de Bom Jardim	0,6000	SMALL	SC					2002
Macau	1,8000	SMALL	RN		YES	AMS.I.A	REGISTERED	2003
Parque Eólico do Horizonte	4,8000	SMALL	SC		YES	AMS.I.D	ISSUED	2004
RN 15 - Rio do Fogo	49,3000	LARGE	RN	YES				2006
Millennium	10,2000	SMALL	PB	YES				2007
Parque Eólico de Beberibe	25,6000	LARGE	CE	YES				2008
Eólica Canoa Quebrada	10,5000	SMALL	CE	YES				2008
Pedra do Sal	18,0000	LARGE	PI	YES				2008
Taíba Albatroz	16,5000	LARGE	CE	YES				2008
Foz do Rio Choró	25,2000	LARGE	CE	YES				2009
Praia Formosa	105,0000	LARGE	CE	YES				2009
Lagoa do Mato	3,2300	SMALL	CE	YES				2009
Eólica Icaraizinho	54,6000	LARGE	CE	YES				2009
Eólica Praias de Parajuru	28,8000	LARGE	CE	YES				2009
Presidente	4,8000	SMALL	PB	YES				2009
Camurim	4,8000	SMALL	PB	YES				2009
Albatroz	4,8000	SMALL	PB	YES				2009
Coelhos I	4,8000	SMALL	PB	YES				2009
Coelhos III	4,8000	SMALL	PB	YES				2009
Atlântica	4,8000	SMALL	PB	YES				2009
Caravela	4,8000	SMALL	PB	YES				2009
Coelhos II	4,8000	SMALL	PB	YES				2009
Coelhos IV	4,8000	SMALL	PB	YES				2009

PLANT	INSTALLED CAPACITY (MW)	SCALE	BRAZILIAN STATE	PROINFA	CDM	CDM METHODOLOGY	CDM STATUS	START DATE
Mataraca	4,8000	SMALL	PB	YES				2009
Praia do Morgado	28,8000	LARGE	CE	YES				2010
Volta do Rio	42,0000	LARGE	CE	YES				2010
Alegria I	51,0000	LARGE	RN	YES				2010
Pirauá	4,9500	SMALL	PE	YES				2010
Gargaú	28,0500	LARGE	RJ	YES				2010
Parque Eólico Enacel	31,5000	LARGE	CE	YES				2010
Canoa Quebrada	57,0000	LARGE	CE	YES	YES	AMS.I.D	ISSUED	2010
Bons Ventos	50,0000	LARGE	CE	YES				2010
Xavante	4,9500	SMALL	PE	YES				2010
Mandacaru	4,9500	SMALL	PE	YES				2010
Santa Maria	4,9500	SMALL	PE	YES				2010
Gravatá Fruitrade	4,9500	SMALL	PE	YES				2010
Vitória	4,5000	SMALL	PB	YES				2010
Alegria II	100,6500	LARGE	RN	YES				2011
Parque Eólico Elebrás Cidreira 1	70,0000	LARGE	RS	YES				2011
Eólica Água Doce	9,0000	SMALL	SC	YES				2011
Púlpito	30,0000	LARGE	SC	YES				2011
Aquibatã	30,0000	LARGE	SC	YES				2011
Santo Antônio	3,0000	SMALL	SC	YES				2011
Cascata	6,0000	SMALL	SC	YES				2011
Rio do Ouro	30,0000	LARGE	SC	YES				2011
Salto	30,0000	LARGE	SC	YES				2011
Bom Jardim	30,0000	LARGE	SC	YES				2011
Campo Belo	10,5000	SMALL	SC	YES				2011
Amparo	22,5000	LARGE	SC	YES				2011
Cruz Alta	30,0000	LARGE	SC	YES				2011
Alhandra	6,3000	SMALL	PB	YES				2011

PLANT	INSTALLED CAPACITY (MW)	SCALE	BRAZILIAN STATE	PROINFA	CDM	CDM METHODOLOGY	CDM STATUS	START DATE
Mangue Seco 3	26,0000	LARGE	RN					2011
Mangue Seco 2	26,0000	LARGE	RN					2011
Mangue Seco 1	26,0000	LARGE	RN					2011
Mangue Seco 5	26,0000	LARGE	RN					2011
Fazenda Rosário 3	14,0000	SMALL	RS		YES	ACM0002	REGISTERED	2011
Fazenda Rosário	8,0000	SMALL	RS		YES	ACM0002	REGISTERED	2011
Cerro Chato II (Antiga Coxilha Negra VI)	30,0000	LARGE	RS					2011
Cerro Chato III (Antiga Coxilha Negra VII)	30,0000	LARGE	RS					2011
Ventos do Brejo A-6	0,0060	SMALL	RN					2011
Parque Eólico Sangradouro	50,0000	LARGE	RS		YES	ACM0002	ISSUED	2012
Aratuá I	14,4000	SMALL	RN					2012
Macaúbas	35,0700	LARGE	BA		YES	ACM0002	REGISTERED	2012
Osório 2	24,0000	LARGE	RS		YES	ACM0002	REGISTERED	2012
Barra dos Coqueiros	34,5000	LARGE	CE					2012
Dunas de Paracuru	42,0000	LARGE	CE		YES	ACM0002	REGISTERED	2012
Novo Horizonte	30,0600	LARGE	BA		YES	ACM0002	REGISTERED	2012
Seabra	30,0600	LARGE	BA		YES	ACM0002	REGISTERED	2012
Sangradouro 3	24,0000	LARGE	RS		YES	ACM0002	REGISTERED	2012
Parque Eólico Cabeço Preto	19,8000	LARGE	RN		YES	ACM0002	REGISTERED	2012
Cerro Chato I (Antiga Coxilha Negra V)	30,0000	LARGE	RS					2012
Quixaba	25,5000	LARGE	CE		YES	ACM0002	REGISTERED	2012
Miassaba II	14,4000	SMALL	RN					2012
Sangradouro 2	26,0000	LARGE	RS		YES	ACM0002	REGISTERED	2012
Parque Eólico Cabeço Preto IV	19,8000	LARGE	RN		YES	ACM0002	REGISTERED	2012
Pedra do Reino	30,0000	LARGE	BA		YES	ACM0002	REGISTERED	2013
Pedra Branca	30,0000	LARGE	BA					2013
Osório 3	26,0000	LARGE	RS		YES	ACM0002	REGISTERED	2013

PLANT	INSTALLED CAPACITY (MW)	SCALE	BRAZILIAN STATE	PROINFA	CDM	CDM METHODOLOGY	CDM STATUS	START DATE
Mel 02	20,0000	LARGE	RN		YES	ACM0002	REGISTERED	2013
Sete Gameleiras	30,0000	LARGE	BA					2013
São Pedro do Lago	30,0000	LARGE	BA					2013
Fazenda Rosário 2	20,0000	LARGE	RS		YES	ACM0002	REGISTERED	2013
Guajirú	30,0040	LARGE	CE		YES	ACM0002	REGISTERED	2013
Caminho da Praia	2,0000	SMALL	PE					2013
Clóvis Ferreira Minare	0,1560	SMALL	MG					2013
Dulio César Bianchi	0,0035	SMALL	CE					2013

Three other parameters were pointed out in this first Table (C.1), in order to enable a deeper analysis:

i. CDM PROJECTS:

According to the CDM additionality tool mentioned above, projects that already participate in the CDM, with published information in the UNFCCC platform, should not be included.

THE CDM SCREENING ruled out 21 projects (537.89 MW) that were already Registered or Issued under CDM platform, resulting in 69 eligible projects, totaling 1,433.45 MW.

ii. PROJECT SCALE:

According to CDM rules, projects with an installed capacity under 15 MW are under the SMALL SCALE category. Beyond 15 MW, all projects apply to the LARGE SCALE methodology. Since the project under analysis is a large scale project, small scale projects were not included.

The SCALE SCREENING ruled out 35 projects, totaling 187.45 MW. This way, 34 projects were left for analysis, with 1,246.00 MW.

iii. PROINFA BENEFIT:

PROINFA is a former Brazilian Program, which comprised a significant number of renewable energy projects. According to the Government rules, carbon offsets obtained by project proponents with the PROINFA benefit should be reversed to them. Therefore, all projects is this situation will not be considered.

The PROINFA SCREENING ruled out other 23 projects (927.50 MW), resulting in a final number of 11 eligible projects, with 318.50 MW for Common Practice Analysis.

Observation: The database with all projects and every screening is available for consultation at the *MSRenovaveis_CommonPractice.xls* spreadsheet.

The 11 projects left will be discussed, one by one, in order to differentiate each one of them from the proposed project (Table C.2).

Table C.2: *Applicable projects for further discussion.*

PLANT	INSTALLED CAPACITY (MW)	% OF BRAZILIAN INSTALLED CAPACITY	BRAZILIAN STATE	OWNER	START DATE
MANGUE SECO 3	26.00	0.4975%	RN	Eólica Mangue Seco 3 – Geradora e Comercializadora de Energia Elétrica S.A	August 26, 2011
MANGUE SECO 2	26.00	0.4975%	RN	Eólica Mangue Seco 2 – Geradora e Comercializadora de Energia Elétrica S.A	September 24, 2011
MANGUE SECO 1	26.00	0.4975%	RN	Eólica Mangue Seco 1 – Geradora e Comercializadora de Energia Elétrica S.A.	September 30, 2011

PLANT	INSTALLED CAPACITY (MW)	% OF BRAZILIAN INSTALLED CAPACITY	BRAZILIAN STATE	OWNER	START DATE
MANGUE SECO 5	26.00	0.4975%	RN	Eólica Mangue Seco 4 – Geradora e Comercializadora de Energia Elétrica S.A.	November 1rst, 2011
CERRO CHATO II (ANTIGA COXILHA NEGRA VI)	30.00	0.5740%	RS	Eletrosul Centrais Elétricas S/A	December 30, 2011
CERRO CHATO III (ANTIGA COXILHA NEGRA VII)	30.00	0.5740%	RS	Eletrosul Centrais Elétricas S/A	July 19, 2011
BARRA DOS COQUEIROS	34.50	0.6601%	CE	Energen Energias Renováveis S.A.	September 29, 2012
CERRO CHATO I (ANTIGA COXILHA NEGRA V)	30.00	0.5740%	RS	Eletrosul Centrais Elétricas S/A	January 20, 2012
PEDRA BRANCA	30.00	0.5740%	BA	Pedra Branca S/A	March 02, 2013
SETE GAMELEIRAS	30.00	0.5740%	BA	Sete Gameleiras S/A	March 26, 2013
SÃO PEDRO DO LAGO	30.00	0.5740%	BA	São Pedro do Lago S/A	March 02, 2013

- The companies Eólica Mangue Seco 3 – Geradora e Comercializadora de Energia Elétrica S.A, Eólica Mangue Seco 2 – Geradora e Comercializadora de Energia Elétrica S.A, Eólica Mangue Seco 1 – Geradora e Comercializadora de Energia Elétrica S.A. e Eólica Mangue Seco 4 – Geradora e Comercializadora de Energia Elétrica S.A. compose the Mangue Seco Wind Complex, which is property of PETROBRAS, which is a state-run, publicly-traded company controlled by the Brazilian Government via The Ministry of Mines and Energy. Therefore, all four of the entrepreneurships have a **PUBLIC character**.
- Eletrosul Centrais Elétricas S/A is a public company, controlled by ELETROBRAS[21] and linked with the Ministry of Mines and Energy. Therefore, the three entrepreneurships owned by Eletrosul have a **PUBLIC character.**
- The companies Pedra Branca S/A, Sete Gameleiras S/A and São Pedro do Lago S/A are property of a consortium between CHESF – Companhia Hidroelétrica do São Francisco (49%), Brennand Energia S.A (50.9%) and Brennand Energia Eólica S.A (0.1%). CHESF is a state-run, publicly-traded company, subsidiary of Eletrobras and controlled by the Brazilian Government via The Ministry of Mines and Energy. For this reason, there is a strong **PUBLIC character** associated with all three wind power plants in question.

Considering that all wind power plants of MS Renováveis Complex are owned by MS Renováveis, which is not associated with any public entity, we conclude, as per the analysis presented above, that there were no similar activities implemented by the time of the project start date.

- **TEST RESULT:** PROJECT IS NOT COMMON PRACTICE IN THE SELECTED REGION.

[21] Eletrobras – Centrais Elétricas Brasileiras S.A. is a mixed capital company and publicly traded under the stock control of the Brazilian Federal Government and acts as a holding company, divided into generation, transmission and distribution.

C3. IMPLEMENTATION BARRIERS TEST

ACR requires that the project pass at least one of the barriers: financial, institutional or technological. Energy generation projects are usually additional when going under the financial barrier analysis.
The investment analysis was carried out using the following CDM guidelines and tools:

- "Tool for the demonstration and assessment of additionality, v. 7.0.0" (EB 70, Annex 08, Page 1);
- "Guidelines on the assessment of investment analysis" (EB 62, Annex 5, Page 1).

The analysis should determine whether the proposed project activity is not:
(a) The most economically attractive; or
(b) Economically or financially feasible, without the revenue from the sale of emission reductions tons (ERTs);

NOTE: This analysis will consider the Energy Auction Date as the **investment decision date**, as presented in each WPP CER (From Portuguese, *Contrato de Energia de Reserva*, which is the contract of energy sale). The four plants participated on the 2nd Auction of Reserve Energy, in December 14, 2009. But the first Power Purchase Agreement dates from **August 20, 2010**. For this reason, values from 2010 will be considered throughout the following analysis.

According to the mentioned tools, to conduct the investment analysis, certain steps should be followed:

Sub-step 2a: Determine appropriate analysis method:

Additionality is demonstrated through an investment benchmark analysis (option III). Options I and II are not applicable to the proposed project activity considering the following:

Option I – both the carbon project activity and the alternatives identified in Step 1[22] generate financial and economic benefits other than carbon related income.

Option II – the implementation of other project types of renewable energy generation - i.e. cogeneration or small hydro power plant projects - are not potential alternatives in the site where the project is planned.

In addition, in accordance with paragraph 19 of "Guidelines on the assessment of investment analysis", the benchmark analysis was identified as the most appropriate method to demonstrate the additionality of the proposed Project Activity, since the alternative to the implementation of the wind power plant is the supply of electricity from the grid.

Sub-step 2b: Option III - benchmark analysis

The financial indicator identified for the project activity is the Internal Rate of Return (IRR) calculated in the project cash flow. The IRR here presented is compared to the appropriate benchmark of the electric sector, which is the Weighted Average Cost of Capital (WACC).

[22] The assessment of alternative scenarios required in CDM approved "Tool for the demonstration and assessment of additionality, v. 7.0.0" (EB 70, Annex 08, Page 1) was not used. The benchmark analysis was identified as the most appropriate method to demonstrate the additionality of the proposed Project Activity.

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

Weighted Average Cost of Capital (WACC)

The weighted-average cost of capital (WACC) is a rate used to discount business cash flows and takes into consideration the cost of debt and the cost of equity of a typical investor in the sector of the project activity. The benchmark can be applied to the cash flow of the project as a discount rate when calculating the net present value (NPV) of the same, or simply by comparing its value to the internal rate of return (IRR) of the project (in accordance with paragraph 12, Annex 5, EB 62). The WACC considers that shareholders expect compensation towards the projected risk of investing resources in a specific sector or industry in a particular country.

The WACC calculation is based on parameters that are standard in the market, considers the specific characteristics of the project type, and is not linked to the subjective profitability expectation or risk profile of this particular project developer. Once a wind power potential is discovered, any corporate entity is able to obtain the authorization from the government to build a wind power plant. In addition to that, even after the project proponent obtains such authorization, it can be negotiated afterwards. Therefore, the use a sectorial benchmark is applicable as per the guidance provided in paragraph 13 of "Guidelines on the assessment of investment analysis",

The WACC of the sector considered is the one calculated for 2010 – i.e. commencement of the carbon Project Activity development – and is equal to 9.25%. This value was calculated through the formula below:

$$WACC = Wd \times Kd + We \times Ke$$

We and **Wd** are, respectively, the weights of equity and debt typically observed at the sector. **We** is of 32.32%, and **Wd** of 67.68%. These numbers derive from the typical leverage of similar projects in the sector in Brazil, based on the rules for available long-term loans from Brazilian Development Bank (BNDES – *from Portuguese Banco Nacional de Desenvolvimento Econômico e Social*)[23]. BNDES is the major provider of long-term loans in the country; it supplies the financing for small to large-scale projects. Long-term loans are scarcely provided by commercial banks, and in general, these entities do not have competitive rates compared to the BNDES.

Kd is the cost of debt, which is observed in the market related to the project activity, and which already accounts for the tax benefits of contracting debts In the **Kd** calculation. The marginal tax rate (**t**) is multiplied by the Cost of debt and then by the debt to total cost of capital ratio to ascertain the debt portion of the WACC formula. In the case of Brazil, and specifically to energy projects, this tax factor is 34%.[24]

The nominal rate achieved for debt is used to calculate nominal WACC, which is used to discount nominal cash flow projections. In order to achieve the real cash flow rate, the inflation targeting for Brazil is reduced from the nominal figure achieved. The inflation targeting is obtained from the Brazilian Central Bank[25] and has experienced very little variance in the past 5 years.

Kd is calculated through the following equation:

[23] Available for consultation as: *Target Debt.pdf*

[24] Available for consultation at:
http://www.aneel.gov.br/aplicacoes/audiencia/arquivo/2006/008/resultado/nota_tecnica_n%C2%BA_302_2006_wacc.pdf

[25] Available for consultation at: http://www.bcb.gov.br/pec/metas/InflationTargetingTable.pdf

$$Kd = [1 + (a+b+c) \times (1-t)]/ [(1+d) -1]$$

Values use to calculate Kd are presented in Table C.3.

Table C.3: *Cost ok debt (Kd) calculation*

COST OF DEBT (KD)	
(a) Financial cost[26]	6.44%
(b) BNDES fee[27]	0.90%
(c) Credit risk rate[28]	3.57%
(a+b+c) Pre-Cost of Debt	10.91%
(t) Marginal tax rate	34.00%
(d) Inflation forecast[29]	4.50%
After tax Cost of Debt	**2.59%p.a.**

According to the table above, **Kd** is of 2.59%

Ke is the cost of equity. As per option b) provided in the paragraph 15 of Annex 15, EB 62, it was estimated using the best financial practices through the Capital Asset Pricing Model (CAPM) with the following equation:

$$Ke = [(1+ Rf) /(1+I)-1] + \beta \times (Rm-Rf) + Rc$$

Rf stands for the risk free rate. The risk-free rate used for **Ke** calculation was a long term bond rate. This bond was issued by the Brazilian government, denominated in US dollars. Therefore the rate includes the Brazilian country risk. There is a higher risk associated to investing in Brazil, or in Brazilian bonds, compared to investing in a mature market such as the United States. This risk is reflected in higher returns expected on Brazilian government bonds compared to the mature markets government bonds. In considering the Brazilian government bond, this premium for a higher risk is captured in our calculations.

In order to adjust the risk-free rate (**Rf**) to the inflation adjusted rate, the expected inflation rate (for the United States) (**π'**) is reduced. The inflation is calculated based on the treasury through spot TIPS (Treasury Inflation Protected Securities) which are readily quoted in the market. There is no need to adjust for Brazil's expected inflation when dealing with a hurdle rate in real terms.

Beta, or **β,** stands for the average sensitivity of comparable companies in that industry to movements in the underlying market. **β** derives from the correlation between returns of US companies from the sector and the performance of the returns of the US market. **β** has been adjusted to the leverage of Brazilian companies in the sector, reflecting both structural and financial risks. **β** adjusts the market premium to the sector.

Rm represents the market premium, or higher return, expected by market participants in light of historical spreads attained from investing in equities versus risk free assets such as government bond rates, investors require a higher return when investing in private companies. The market premium is estimated based on the

[26]http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Custos_Financeiros/Taxa_de_Juros_de_Longo_Prazo_TJLP/index.html

[27] http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/bnset/Set2901.pdf

[28] http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_pt/Galerias/Arquivos/conhecimento/bnset/Set2901.pdf

[29] http://www.bcb.gov.br/pec/metas/InflationTargetingTable.pdf

historical difference between the S&P 500 returns and the long term US bonds returns. The spread over the risk-free rate is the average of the difference between those returns.

Note that in the formula above there is the factor EMBI+ (Emerging Markets Bond Index Plus), considers as the country risk premium, **Rc**. This factor accounts for the country or sovereign risk embedded in the debt of a country. Assuming that relative to the US risk-free debt market EMBI+ is 0, then Brazil's EMBI+ would calculate for the added or reduced risk relative of Brazils debt markets to the US.

Justification for the EMBI+ addition to the risk-free rate lies in the vast differences between the United States in such factors as credit risk, inflation history, politics, debt markets, and more. Ignoring these differences would result in the incorrect application of relevant environmental factors in the decision-making process of an investor in Brazil.

Values used in the cost of equity calculation are presented in Table C.4 below:

Table C.4: *Cost of equity (Ke) calculation*

COST OF EQUITY (KE) – CAPM	
(Rf) Risk-free rate[30]	3.45%
(Rm) Equity risk premium[31]	6.58%
(Rc) Estimated country risk premium[32]	2. 58%
(β) Adjusted industry beta[33]	2.91%
(I) US expected inflation[34]	1.96%
Cost of Equity with Brazilian Country Risk (p.a.)	**23.20%p.a.**

According to the table above, **Ke** is of 23.20%.

Plugging these numbers into WACC formulae, we obtain:

WACC = 67.68% x 2.59% + 32.32% x 23.20% = 9.25%

The spreadsheet used for calculation of the WACC is available (*MS Renováveis Benchmark Analysis.xls*) is available for consultation.

Financial Indicator, Internal rate of return (IRR)

As mentioned above, the financial indicator identified for the Project Activity is the project Internal Rate of Return (IRR). According to the Guidance 3 of the "*Guidelines on the Assessment of Investment Analysis*" (EB 62, Annex 5), the period of assessment should not be limited to the proposed crediting period of the carbon project activity. The calculation shall as a preference reflects the period of the wind power plants expected operational lifetime determined by the aero generators, which is estimated in 20 years. Furthermore, the auction public notice states that the electric power negotiated at the Second Reserve Energy Auction (from Portuguese 2º *Leilão de Energia de Reserva - LER*) present a PPA, which lasts 20 years. Therefore,

[30] http://pages.stern.nyu.edu/~adamodar/
[31] http://pages.stern.nyu.edu/~adamodar/
[32] http://www.cbonds.info/all/eng/index/index_detail/group_id/1/
[33] http://pages.stern.nyu.edu/~adamodar/
[34] http://www.federalreserve.gov/econresdata/researchdata.htm

considering the expected operational lifetime of the aero generators and also the period estimated in the PPA, *Mar e Terra*, *Areia Branca*, *Embuaca* and *Icaraí* wind power plants cash flows, present the investment analysis considering 20 years. **The IRR of the projects are 3.64%, 6.75%, 6.66% and 5.60%, respectively. Sources of all input values used to estimate the IRR of the project are detailed in the IRR calculation spreadsheet, which is available for consultation.**

The paragraph 6 from the "Guidelines on the Assessment of Investment Analysis" (EB 62, Annex 5) states that: "*Input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant*". Considering the investment decision date mentioned before, the input values applied in the investment analysis refer to the year of 2010.

In Brazil, there are two income taxes: (a) the corporate income tax (IRPJ) and (b) the social contribution tax on profits (CSLL) (see KPMG report "Investment in Brazil"[35]). There are also three methods provided by legislation to calculate corporate income tax and social contribution tax due on profits: Actual Profit, Presumed Profit and Arbitrated Profit.

For the Presumed Profit eligibility, corporate entities revenues must be under R$ 48 million per year (Article #13, Law #9.718/1998)[36]. Since *Mar e Terra*, *Areia Branca*, *Embuaca* and *Icaraí* revenues are under R$ 48 million per year, they were able to choose for the Presumed Profit system. For the Presumed Profit system, 8% of gross sales in addition to financial revenues/earnings are used as basis for the income tax calculation. To this figure, a 25% rate is applied resulting in the final income tax value. For the social contribution calculation, 12% of gross sales in addition to financial revenues/earnings are used as a basis for the calculation. To this figure, a 9% rate is applied resulting in the final social contribution value as per Article #518 of the Federal Decree #3000, dated 26 March 1999. Table C.5 presents an example.

Table C.5: *Income tax and Social Contribution (illustrative calculation)*

INCOME TAX	**$**
Gross Sales	1.000
Presumed Profit for income tax (8%)	80
Financial revenue	500
Total Presumed for income tax	580
Income tax due (app. 25%)	145
Social contribution	$
Gross Sales	1.000
Presumed Profit for income tax (12%)	120
Financial revenue	500
Total Presumed for income tax	620
Social contribution due (9%)	55.80

Source: KPMG. "Investment in Brazil: tax." (2008).

[35] KPMG. Investment in Brazil: tax. São Paulo: Escrituras Editora, 2008. Publicly available in English at: <http://www.kpmg.com.br/publicacoes/livros_tecnicos/Investment_in_Brazil10_out08.pdf>.

[36] Publicly available in Portuguese at: <http://www.receita.fazenda.gov.br/legislacao/leis/Ant2001/lei971898.htm>.

Therefore, a corporate entity that opts for the presumed profit scheme pays the same rate of income tax and social contribution regardless of its costs, expenses, other cash items such as payable interest and non-cash items such as depreciation, because these elements are not deductible under this system.

The relevant assumptions made are in accordance with paragraph 6 of the *Guidelines on the Assessment of Investment Analysis* (Version 05). Table C.6 provides a summary of the main input values as well as a brief justification for their use, considering the time of the investment decision. Documents evidencing all input values mentioned below which were used to estimate the IRR are available for consultation at validation. Besides, the IRR calculation spreadsheet presenting all values and assumptions considered is also attached to this document, under the name of *MS Renovaveis Investment Analysis.xls.*

Table C.6: *Data and justification of the data used in the investment analysis and comparison c between Project's IRR and WACC of the sector.*

PARAMETER	MAR E TERRA	AREIA BRANCA	EMBUACA	ICARAÍ	JUSTIFICATION/SOURCE OF INFORMATION USED
Installed Capacity (MW)	23.10	27.30	27.20	16.80	Based on each plant ANEEL Ordinance, authorizing beginning of commercial operations.
Assured Energy (MW)	8.3	11.7	11.1	7.8	Based on the Auction Contract (CER – *Contrato de Energia de Reserva*) values.
Generated Electricity (MWh/year)	72,708.00	102,492.00	97,236.00	68,328.00	Consists of the multiplication of the assured energy by the number of hours in a complete year (8760).
Auction Price (R$/MWh)	152.64	152.63	151.07	151.08	This value represents the price obtained by the project owner in the 2nd Reserve Energy Auction (from the Portuguese 2º *Leilão de Energia de Reserva - LER*), which occurred on December 14, 2009.
TUST (% over revenue)	10.39	9.00	4.14	9.54	Based on values up to April 2014 (when all four plants were operating) comparing income to transmission costs (TUST). [37]
Insurance(% of investment)	0.54%	0.38%	0.78%	0.94%	The value applied was proposed according to the project insurance (social responsibility + operations) documentation, in comparison with the plant's revenues.
Property lease (% of gross revenue)	1.7%	1.7%	1.5%	1.5%	The land rent was determined by a contract signed between the landowner and the energy producer company. Information is available at each land use contract.
CEEE fee (BRL/ month)	223.84	229.74	208.08	330.85	The *CCEE* fee is based on paragraph 4 of article 4 of Law nr. 10,848 dated March 15, 2004 and regulated by the Decree nr. 5,177 dated August 12, 2004. The fee varies year to year and is estimated dividing the *CCEE* costs (operational and investment) by the electricity produced and dispatched in the Interconnected Electricity System (from the Portuguese *Sistema Interligado Nacional – SIN*) [MWh] dividing proportionally by each energy producer. Calculations were based in existing information provided by MS Renováveis team.
ONS fee (BRL/month))	174.98	206.8	206.8	127.26	The *ONS* fee is based in the Article 13 of the law nr. 9,648, dated May 27, 1998. Calculations were based in existing information provided by MS Renováveis team.
ANEEL fee – TFSEE (BRL/year)	41,961.15	49,590.45	49,590.45	30,517.2	It corresponds to the value fixed by ANEEL regarding the Supervision Tax on Electricity Power Services (from the Portuguese *Taxa de Ficalização de Serviços de Energia Elétrica – TFSEE)* implemented by the Law nr. 9,427 dated December 12, 1996 and regulated by the Decree nr. 2,410 issued on November 28, 1997. The TFSEE aims to compose the ANEEL revenue in order to cover its administrative and operational costs. The Dispatch nr. 4,774, dated December 22, 2009 defined the available data for *TFSEE* at the time of the investment decision, *i.e.*, for 2010.
Taxes (PIS/COFINS) (% over gross revenue)	3.65%	3.65%	3.65%	3.65%	The revenue deductions concerns to the Integration Social Program (from Portuguese *Programa de Integração Social – PIS*) given by Law nr. 10,637 [38], dated December 30, 2002 and the Contribution to the Social Security Financing (from the Portuguese *Contribuição para o*

[37] Explanation of transmissions costs in Brazil: http://www.aneel.gov.br/area.cfm?idArea=97

[38] Available at: http://www.planalto.gov.br/ccivil_03/leis/2002/L10637.htm

PARAMETER	MAR E TERRA	AREIA BRANCA	EMBUACA	ICARAÍ	JUSTIFICATION/SOURCE OF INFORMATION USED
					Financiamento da Seguridade Social - COFINS) given by Law nr. 10,833[39], dated, December 29, 2003.
Deduction (Income Tax and Social Contribution)	9% and 25%	9% and 25%	9% and 25%	9% and 25%	The Income Tax percentage is determined by the Decree nr. 3,000[40], dated March 26, 1999, in its Article #518. The Social Contribution percentage is given by the Law 11,727[41], dated June 23, 2008 in its Article #17.
O&M Costs(BRL/year)	181,500.00	214,500.00	214,500.00	132,000.00	The Annex 16 of the EPC Contract signed on November 30, 2010 determines the O&M. Calculations were based in existing information provided by MS Renováveis team.
Investment (1,000BRLBRL)	98,445.00	111,820.00	111,433.00	79,486.00	SUDENE letter defines the investment value applied. It represents the total costs related to the wind power plans including the EPC Contract, the project development costs, environmental studies, the transmission line installation costs and administrative expenses. Calculations were based in existing information provided by MS Renováveis team.
Depreciation	5%	5%	5%	5%	A five percent depreciation rate was applied.
IRR (%)	3.64	6.75	6.66	5.60	**See the IRR´s spreadsheets attached.**
WACC (%)	9.25				**See the WACC´s spreadsheet attached.**

[39] Available at: http://www.planalto.gov.br/ccivil_03/leis/2003/L10.833.htm
[40] Available at: http://www.planalto.gov.br/ccivil_03/decreto/d3000.htm
[41] Available at: http://www.receita.fazenda.gov.br/Legislacao/Leis/2008/lei11727.htm#Art. 17.

The project IRR, as presented to the DOE, ranges from 3.64 to 6.75%, i.e., lowers than the WACC of the sector. Therefore, this number shows that the project activity is not financially attractive to the investor. The results are summarized in the Table C.7.

Table C.7: Comparison between Project IRR and the Weighted Average Cost of Capital.

WPP	IRR (%)	WACC (%)
Mar e Terra	3.64	9.25
Areia Branca	6.75	
Embuaca	6.66	
Icaraí	5.60	

Sub-step 2d: Sensitivity analysis

A sensitivity analysis was conducted by altering the following parameters:

- Increase in electricity generation, which may increase the project revenues;
- Increase in electricity tariff, which may also influence project revenues;
- Reduction in expected investments;
- Reduction in O&M costs.

Those parameters were selected as being the most likely to fluctuate over time. In addition, these variables constitute more than 20% of either total project costs or total project revenues (paragraph 20 of Annex 5, EB62). As verified at the wind power plant cash flows the revenue is obtained exclusively from the energy generation. Therefore the sensitivity analysis carried out considering the variation in the electricity generation and the electricity tariff corresponds to more than 20% of the total Financial analyses were performed altering each of these parameters by 10%, and assessing what was the impact on project's IRR (paragraph 21 of Annex 5, EB62). The results of the sensitivity analysis, considering a variation of the selected parameters by 10%, are presented below in Table C.8.

Table C.8: *Sensitivity analysis – 10% variation.*

Scenario	IRR %			
	Mar e Terra	**Areia Branca**	**Embuaca**	**Icaraí**
Original	3.64%	6.75%	6.66%	5.60%
Increase in electricity generation	4.87%	8.06%	7.98%	6.89%
Increase in the tariff	4.87%	8.06%	7.98%	6.89%
Reduction in project investment	4.97%	8.18%	8.09%	7.00%
Reduction in O&M Costs	3.66%	6.76%	6.68%	5.62%

As it can be seen from the results presented above, the IRR of the projects do not surpass the benchmark considering the variation of the selected parameters by 10%. Yet, a simulation was conducted in order to verify possible scenarios where the IRR of each plant would equal the benchmark. The results for each plant are presented and discussed from Tables C.9 up to C.12.

Table C.9: *Scenarios when IRR of the project equals the benchmark (11.65%) – Mar e Terra.*

	IRR %	PRICE (BRL/MWh)	COST (1,000BRL)	ELECTRICITY (MWh/yr)	Variation (%)
Original	3.64%	152.64	98.445.00	72.708	N/A
Price	9.25%	231.00	98.445.00	72.708	51.34%
Investment	9.25%	152.64	64.580.00	72.708	52.44%
Electricity	9.25%	152.64	98.445.00	110.056	51.37%

Table C.10: *Scenarios when IRR of the project equals the benchmark (11.65%) – Areia Branca.*

	IRR %	PRICE (BRL/MWh)	COST (1,000BRL)	ELECTRICITY (MWh/yr)	Variation (%)
Original	6.75%	152.63	111.820.00	102.492	N/A
Price	9.25%	182.50	111.820.00	102.492	19.57%
Investment	9.25%	152.63	93.300.00	102.492	19.85%
Electricity	9.25%	152.63	111.820.00	122.500	19.52%

Table C.11: *Scenarios when IRR of the project equals the benchmark (11.65%) – Embuaca.*

	IRR %	PRICE (BRL/MWh)	COST (1,000BRL)	ELECTRICITY (MWh/yr)	Variation (%)
Original	6.66%	151.07	111.433.00	97.236	N/A
Price	9.25%	181.70	111.433.00	97.236	20.28%
Investment	9.25%	151.07	92.350.00	97.236	20.66%
Electricity	9.25%	151.07	111.433.00	116.960	20.28%

Table C.12: *Scenarios when IRR of the project equals the benchmark (11.65%) – Icaraí.*

	IRR %	PRICE (BRL/MWh)	COST (1,000BRL)	ELECTRICITY (MWh/yr)	Variation (%)
Original	5.60%	151.08	79.486.00	68.328	N/A
Price	9.25%	196.70	79.486.00	68.328	30.20%
Investment	9.25%	151.08	60.817.00	68.328	30.70%
Electricity	9.25%	151.08	79.486.00	88.930	30.15%

The analysis performed confirm that a 10% variation of all the main parameters that could influence the project financial outcome does not approximate, significantly, the results to the calculated benchmark. In order to prove that, separated calculations, as presented in Tables C.9, C.10, C.11 and C.12, confirm that it would take a significant increase in the parameters in order to reach the benchmark. The following discussions are in order:

- **Increase in electricity generation:** the Power Purchase Agreement (PPA) states that, if the generated electricity by the wind power plants is higher than the electricity negotiated at the auction, the project sponsor is not able to sell the electricity surplus. The *CCEE* shall count all the generated electricity and acts according to the established in the PPA. An increase in the electricity generation is unlikely.

- **Increase in the price:** the PPAs will have a duration of 20 years, will remain fixed throughout the years, and will be adjusted accordingly to the Amplified Consumers Price Index (from the Portuguese *Índice de Preços ao Consumidor Ampliado*), which is the official index that measures the inflation in Brazil. The electricity tariff of the wind power plants were adjusted by the *IPCA*

index according to the investment analysis conducted and kept fixed through the years of the investment analysis. A significant increase in the price is unlikely.

- **Reduction in project investment/Reduction in O&M costs:** the total investment necessary to build the plants as it is presented in the cash flows is based on the SUDENE letter. It corresponds to the total costs related to the implementation of the wind power plants as stated at Table 10 above, including the EPC Contract (which also regards O&M). A reduction in the project investment in unlikely, as well as in O&M.

Test result: Considering the data and information exposed above, it can be concluded that the project financial indicator, for all the four plants, are not likely to reach the benchmark. This evidences that the project activity is not financially attractive, therefore, the project passes the INVESTMENT BARRIER TEST.

The project passes all the three tests proposed by ACR Standard v.3.0. Therefore:

THE PROJECT IS ADDITIONAL

D.
MONITORING PLAN

D1. MONITORED DATA AND PARAMETERS

Monitored parameters, as per approved CDM methodology ACM0002, v.15.0, are presented as follows. Monitoring plan for all plants are available for consultation.

Data or Parameter Monitored	$EG_{m,y}$ *and* $EG_{k,}$
Unit of Measurement	MWh
Description	Net electricity generated by power plant/unit *m* or *k* in year *y*
Data Source	Energy Official Generation Reports.
Measurement Methodology	Meters installed substations.
Data Uncertainty	<5%
Monitoring Frequency	At least monthly.
Reporting Procedure	Official reports.
QA/QC Procedure	Crosscheck reports results with meters information.
Notes	-

Data or Parameter Monitored	$EF_{grid,OM-adj,y}$
Unit of Measurement	tCO2/MWh
Description	Simple adjusted operating margin CO_2 emission factor in year *y*
Data Source	Official country values, calculated and published by the Science and Technology Ministry (from Portuguese, *MCT – Ministério de Ciência e Tecnologia*). Available at: http://www.mct.gov.br/index.php/content/view/74689.html
Measurement Methodology	Official data calculated by Brazilian Government.
Data Uncertainty	< 5%
Monitoring Frequency	Annual.
Reporting Procedure	Official data calculated by Brazilian Government.
QA/QC Procedure	-
Notes	-

Data or Parameter Monitored	$EF_{grid,BM,y}$
Unit of Measurement	tCO2/MWh
Description	Build Margin CO_2 emission factor in year *y*
Data Source	Official country values, calculated and published by the Science and Technology Ministry (from Portuguese, *MCT – Ministério de Ciência e Tecnologia*). Available at: http://www.mct.gov.br/index.php/content/view/74689.html
Measurement Methodology	Official data calculated by Brazilian Government.
Data Uncertainty	< 5%
Monitoring Frequency	Annual.
Reporting Procedure	Official data calculated by Brazilian Government.
QA/QC Procedure	Crosscheck daily, monthly and annual data.
Notes	-

Data or Parameter Monitored	$EF_{grid,CM,y}$
Unit of Measurement	tCO2/MWh
Description	Combined Margin CO_2 emission factor in year *y*
Data Source	Calculated according to CDM Methodology ACM0002 v.15.0, using the building and operating margin emission factors.
Measurement Methodology	Calculations.
Data Uncertainty	< 5%
Monitoring Frequency	Annual.
Reporting Procedure	Verification report.
QA/QC Procedure	Crosscheck daily, monthly and annual data.
Notes	-

E.
QUANTIFICATION

E1. BASELINE

ACM0002 v.15.0 establishes that baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.

The methodology assumes that existing grid-connected power plants and the addition of new grid-connected power plants would have generated all project electricity generation above baseline levels.

The baseline emissions are calculated as follows:

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

(Equation 3)

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 CO2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"	(tCO_2/MWh)

Calculation of $EG_{PJ,y}$:

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

$$EG_{PJ,y} = EG_{facility}$$

(Equation 4)

Where:

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

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

To calculation $EF_{grid,CM,y}$, the Brazilian DNA makes available data of the Dispatch Data analysis operating and build margin emission factors, following the steps from the CDM latest version of "Tool to calculate the emission factor for an electricity system" Version 04.0.0.

The Dispatch Analysis was chosen because, according to the Brazilian DNA[42], it is the most accurate and recommended method if information available. For this reason, the emission factor ex-post must be updated annually during monitoring and verification processes.

[42] Designated National Authority.

The CO_2 emission factors resulting from the power generation in the Brazilian National Interconnected System are calculated based on the generation records of plants centrally dispatched by ONS. The procedures for calculation were elaborated in cooperation between ONS, the Ministry of Mines and Energy and the Ministry of Science and Technology. When calculating the operating margin and build margin emission factors, only grid power plants were considered.

To guarantee an accurate analysis, CDM Guidelines recommend that a three-year database should be used, The Brazilian Government has published the national grid emission factor since the year of 2006. Although the project Start Date is June 29, 2013, we chose to use the most recent available data, from complete years. Therefore, the emissions factors from the complete years of 2011, 2012 and 2013 were adopted.

All data used to calculate the ex-ante building and operating margin emissions factor in the Brazilian Designated National Authority website[43].

Regarding the cohort of the power units to be included in the building margin, in terms of vintage of data, project participants can choose between one of the following options:

Option 1: For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group at the time of GHG Project Plan submission to the DOE[44] for validation. For the second crediting period, the build margin emission factor should be updated on the most recent information available on units already built at the time of the submission of the request for renewal of the crediting period to the DOE. For the third crediting period and beyond, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

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

Option 2 was selected.

The combined margin emission factor is calculated as follows:

$$EF_{Grid,CM,y} = EF_{Grid,OM,y} x W_{OM} + EF_{Grid,BM,y} x W_{BM}$$

(Equation 5)

Where:

$EF_{Grid,OM,y}$	=	Operating 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)
W_{OM}	=	Weighting of operating margin emissions	%

[43] http://www.mct.gov.br/index.php/content/view/72764/Fatores_de_Emissao_de_CO_sub_2_sub__pela_geracao_de_energia_eletrica_no_Sistema_Interligado_Nacional_do_Brasil.html

[44] Designated Operational Entity

W_{BM}	=	Weighting of build margin emissions	%

The tool to calculate the emission factor for an electricity system recommends that the following default values should be used for W_{OM} and W_{BM}:

(a) Wind and solar power generation project activities: W_{OM} = 0.75 and W_{BM} = 0.25 for the first crediting period and for subsequent crediting periods.

(b) All other projects: W_{OM} = 0.5 and W_{BM} = 0.5 for the first crediting period and W_{OM} = 0.75 and W_{BM} = 0.25 for subsequent crediting periods, unless otherwise specified in the approved methodology which refers to this tool.

The following emisions factors were applied:

- EF_{GRID, CM_2011}= 0.2454 tCO_2e/MWh
- EF_{GRID, CM_2012} = 0.4385tCO_2e/MWh
- EF_{GRID, CM_2013} = 0.5127 tCO_2e/MWh
- $EF_{GRID, CM\_2014 - 2016}$ = 0.3989 tCO_2e/MWh

The quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year *y* was calculated considering the assured energy and the number of hours of **project operation, of a complete year. The results are presented in Table E.1.**

Table E.1: *Net electricity generation by the wind plants of the Project Activity.*

WIND POWER PLANT	ASSURED ENERGY (MWavg)	NET ELECTRICITY GENERATION (MWH)
Mar e Terra	8.3	72,708
Areia Branca	11.7	102,492
Icaraí	11.1	97,236
Embuaca	7.8	68,328
Total	38.9	**340,764**

$EG_{PJ,y}$ = 340,764 MWh

Finally, baseline emissions for the whole 7-years crediting period result in:

BE_y = 951,213 tCO_2e

Calculation are provided in Microsoft Excel spreadsheet *MS Renovaveis ERT Calculations.xls* attached.

E2. PROJECT SCENARIO

According to the approved methodology ACM0002, v.15.0.0, the project emissions by the proposed project activity are **zero.**

PE_Y = 0 tCO_2e

E3. LEAKAGE

For wind power projects, leakage is not considered.

LE_y = 0 tCO_2e

E4. UNCERTAINTY

Uncertainty was accounted for using the instructions of "IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gases Inventories", Decisions trees presented in Figures 2.1 and 2.2 of the publication were followed to select best methods to calculate CO_2 emissions from stationary combustion and net calorific values,

According to the publication consulted [45], uncertainty arises from : the adequacy of the statistical coverage of all sources categories and the adequacy of the coverage of all fuels.

As per IPCC Good Practice Guideline, overall uncertainty in activity data is a combination of both systematic and random errors. According to experts, uncertainty resulting from the two errors is probably in the range of ± 5%. For places with less-developed energy data systems, this could be considerably larger, probably 10%.

Fortunately, the energy data system applied in this project is the one regularly monitored and provided by the major entity responsible for the plants included in the National Interconnected System and, for this reason, the data can be considered in the ± 5% range.

Uncertainty should also be addressed regarding energy generation data. For this matter, the equipment precision was analyzed guarantee the confidence level required. The information is presented in Table E.2.

Table E.2: *Equipment uncertainty demonstration.*

EQUIPMENT	MANUFACTURER	MODEL/TYPE	ACCURACY (%)	NOTE
MAIN METERS	SCHNEIDER ION	8600C PT-	0.2	-
BACK UP METERS	SCHNEIDER ION	8600C PT-	0.2	-
VOLTAGE TRANSFORMERS	ARTECHE/12	DFK-245	0.3	First and second windings.
CURRENT TRANSFORMERS	ARTECHE/12	CA-245	0.3	First and second windings.

We conclude that the calculations uncertainty meets ACR 10% requirement.

Both data necessary for ERT calculations carry a great level of confidence, since the Emission Factors are supplied by the Government and Energy Generation data is also controlled by Government bodies (in case of Brazil – National Operator of the System – ONS). For this reason, it is certain to assure that uncertainty is addressed.

At the time of project verification, in order to calculate Ex-post emissions reductions, all data will be required in order to carry out a more specific statistical analysis.

Evidence presenting equipment information is available at validation.

[45] IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gases Inventories – Vol. 2 Energy – page 2,15.

E5. REDUCTIONS AND REMOVAL ENHANCEMENTS

Table E.3 presents the reductions calculations according to ACM0002 v.15.0.

Table E.3: *Project Activity emissions reductions calculations.*

ERy = BEy - PEy - Ley					
PEy = 0 and LEy =0					
	Mar e Terra	**Areia Branca**	**Embuca**	**Icaraí**	**Total**
2013 (From Jun 29)	14,698	20,719	19,657	13,813	14,698
2014	29,000	40,879	38,783	27,253	29,000
2015	29,000	40,879	38,783	27,253	29,000
2016	29,000	40,879	38,783	27,253	29,000
2017	29,000	40,879	38,783	27,253	29,000
2018	29,000	40,879	38,783	27,253	29,000
2019	29,000	40,879	38,783	27,253	29,000
2020 (Until Jun 28)	14,262	20,104	19,073	13,403	14,262
TOTAL (tCO2e)	0	**951,213**	0	**951,213**	0
TOTAL FOUR PROJECTS (tCO2e)			**951,213**		
ANNUAL FOUR PROJECTS (tCO2e)			**135,888**		

All detailed calculations are provided Excel Spreadsheet attached to this document (*MS Renovaveis ERT Calculations.xls*).

E6. EX-ANTE ESTIMATION METHODS

The project consists of the implementation of four wind power plants of 94.5 MW total installed capacity. The ex-ante emission reduction estimates were calculated based on the Brazilian National Interconnected System emission factors data provided by the Brazilian DNA, annually updated.

The calculation of total energy generated was based on the project proponent documentation, such as executive project data, and equipment specifications.

F.
COMMUNITY & ENVIRONMENTAL IMPACTS

F1. NET POSITIVE IMPACTS

The proposed Project Activity consists of the implementation of wind power to integrate the Brazilian Grid. Wind energy - produced from wind power - is abundant, renewable, clean and available in many places. This energy is generated by wind turbines, in which propellers capture the wind connected to a turbine that drives an electric generator. The amount of energy transferred is a function of air density, the area covered by the rotation of the blades (vanes) and the wind speed.

The most favorable applications of this energy source in Brazil are in the integration of large blocks of generation at sites of greatest potential to the interconnected system. In certain regions, such as the Northeast, in the São Francisco River Valley, a convenient situation of complementarity of wind generation with the water regime can be observed: both in the generation seasonal period or in the end system – i.e. the wind profile observed in the dry period of the Brazilian electrical system shows greater capacity to generate electricity at the very moment that the hydrological affluence in hydroelectric reservoirs is reduced. On the other hand, the wet season the Brazilian electrical system, characterized by greater filling these reservoirs, the potential for wind electricity generation shows less.

Figure F.1 shows that the Brazilian energy matrix is mostly composed by hydro and thermoelectric power. The wind power installed capacity represents only 2.89% of the total, only behind Photovoltaic, Micro Hydropower and Thermonuclear power plants.

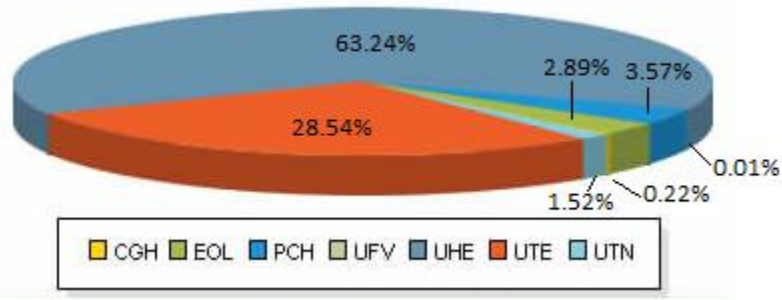


Figure F.1: *Brazilian installed capacity distribution, by type of plant.*

Legends:
CGH: From Portuguese, *Central Geradora Hidrelétrica*, which are hydropower plants with up to 1 MW of installed capacity.
EOL: From Portuguese, *Eólica*, it means Wind Power plant.
PCH: From Portuguese, *Pequena Central Hidrelétrica*, it means Small Hydropower plant, which can have from 1 to 30 MW of installed capacity.
UFV: From Portuguese, *Usina Fotovoltáica*, it means Photovoltaic Plant.
UHE: From Portuguese, *Usina Hidrelétrica*, it means Hydropower Plant, with more than 30 MW of installed capacity.
UTE: From Portuguese, *Usina Termelétrica*, it means Thermoelectric Power Plant.
UTN: From Portuguese, *Usina Termonuclear*, it means Thermonuclear Power Plant.

There are innumerous advantages to the implementation of wind power plants, such as: improvement in the energy offer (which contributes to the region social and economic development and population welfare); costs reductions of the Federal Government with oil supply to thermoelectric plants; reducing Brazilian dependency on the large-scale hydro potential and fossil generation, allowing a more distributed and low-impact generation.

Although it is inserted within the global context of incentive for electricity generation less harmful to the environment technologies, like any other technology for power generation, the use of wind to produce electricity also results in some negative impacts - such as electromagnetic interference, visual impact, noise or damage to the fauna, for example. **Currently, these occurrences can now be minimized and even eliminated through proper planning, training and technical training, and use of technological innovations.**

The environmental aspects associated to the operation of a wind power plant are[46]:

EMISSION OF POLLUTANT GASES:

Brazil, for possessing an array of power generation predominantly composed of renewable sources - mainly from hydroelectric power - has major advantages in terms of avoided emissions of CO_2.

Of the available technologies with CO_2 emissions below the level of wind energy, only large hydro are commercially competitive today. However, the use of large dams has been discussed in countries like Canada and Brazil (two countries that have large hydroelectric plants located farther away from consumers), where the decomposition of submerged vegetation in large reservoirs produces a substantial amount of methane, which records a global warming potential 50 times greater than CO_2.

Although CO_2 emissions resulting from large dams do not reach the level of CO_2 emissions originated from fossil fuels combustion, gases such as CH_4 and N_2O - derived from the decomposition of organic material - have respectively a global warming potential 56 and 280 times higher than CO_2, for a time horizon of 20 years.

LAND USE AND SUITABILITY OF THE TOPOGRAPHY

Visual Pollution

The visual response to wind structures varies from person to person. This is an effect that should be taken into account to the extent that the increased efficiency of wind turbines is accompanied by increase in its size and height of the towers. Consequently, the required space between the turbines become larger, thus decreasing the density in the wind farm - which enables the use of land for alternative uses near the project.

Among the differences in perception of these enterprises, the wind turbine can be seen as a symbol of clean energy and welcome, or negatively, as a change of scenery. The form of perception of communities visually affected by wind farms also depends on the relationship of the population and the environment. In addition, the economic benefits generated by the implementation of the wind farm are often crucial to mitigate potential negative perceptions or attitudes towards technology. The landscape modified by wind farms brings another possibility: to attract tourists, which is a factor of generation of employment and income.

[46] Information from the Brazilian Ministry of Environment, available at: http://www.mma.gov.br/clima/energia/energias-renovaveis/energia-eolica.

IMPACT ON WILDLIFE

One of the environmental aspects to be emphasized concerns the location of wind farms in birds' migration routes. The behavior of birds and mortality rates tend to be specific for each species and for each place.

When analyzing the impact studies in winged fauna, it is observed that wind farms can have negative impacts for some species. However, these impacts can be reduced to a tolerable level by planning the future of wind generation, considering aspects of nature conservation as "preventing the installation of wind farms in important habitat areas, avoiding areas of corridor migration; adopt proper arrangement of the turbines in the wind farm, use appropriate types of towers (tubular), and use of underground transmission systems."

Noise is another factor that deserves to be mentioned, not only due to the perturbation caused to the inhabitants of the areas where wind farms are located, but also in the local wildlife projects – e.g., the interference in the turtle's reproductive process.

OTHER ENVIRONMENTAL ASPECTS

The ground impact occurs in a timely manner to the installation area of the concrete base where the turbine is installed. Several tests of soil compaction are made to assess the conditions of installation of each turbine. Because there is no use of fossil fuels, the risk of soil contamination by liquid waste due to the operation and maintenance of wind farms is low or almost null. This feature also minimizes the risk of groundwater contamination.

It is important to remember that the occupancy rate in the soil of a wind turbine is restricted to the small area for the construction of the concrete base for support of the whole machine: the area around the concrete base is fully available for agricultural or livestock use; and vegetation around the wind turbine can be kept intact.

Assessment of the Project Activity Impacts

The Project Activity, composed by the WPP Mar e Terra, Areia Branca, Embuaca and Icaraí consists in harnessing of the kinetic energy contained in the masses of moving air (wind) for power generation designed for exportation to the National GRID. The activity contributes to the country's sustainable development goals, increasing the percentage of renewable generation in the energy matrix. The exploitation occurs through the conversion of the kinetic energy into translational kinetic energy of rotation, with the use of wind turbines to generate electricity, or windmills, for mechanical work such as pumping water.

Renewable energy sources, such as wind power, do not emit greenhouse gases (GHG), nor other pollutants (SO_2 and NO_x). Hence, it is safe to say that the diffusion of the renewable energy use is essential to achieve the necessary reduction in GHG emission in the atmosphere and to practice the sustainable development.

Between a wide group of factors, the following aspects that contribute to the local sustainability can be highlighted:

- Wind power does not cause air, land and water contamination problems and does not consume non-renewable natural resources;
- Wind power is usually unrelated to physical-chemical changes in soil and water and does not have great influence in the erosive processes, such as other energy entrepreneurships;
- Elimination of impacts caused by fossil fuel combustion (gas, oil, coal);
- Contribution to GHG emissions reductions;

- The implementation of a wind power plant is a reversible process. After finishing its lifetime, the structure will be disassembled and the landscape will return to its original appearance and no waste will be left in the area;
- By exploring the natural aspect of the area, it will become more productive.

The wind farms implemented in this Project Activity meet all environmental requirements imposed by the local environmental offices – IDEMA (from Portuguese, *Instituto de Desenvolvimento Sustentável e Meio Ambiente* – Rio Grande do Norte - Institute of Sustainable Development and Environment) and SEMACE (from Portuguese, *Superintendência Estadual do Meio Ambiente* – Ceará – State Superintendent of Environment.

For *Mar e Terra* and *Areia Branca*, located in Rio Grande do Norte State, the required environmental study for purposes of licensing is a Simplified Environmental Report (from Portuguese, *Relatório Ambiental Simplificado*). For the plants located in Ceará State, *Embuaca* and *Icaraí*, a complete Environmental Impact Study (from Portuguese, *Estudo de Impacto Ambiental*) is necessary. All documents are available for consultation at validation.

All plants are properly licensed by local environmental agencies (IDEMA and SEMACE) as evidence presented in Annex II of this document. The number and date of issuance of the operating licenses are presented in Table F.1.

Table F.1: *Date of issuance and validity of the plans operating licenses.*

PLANT	OPERATING LICENSE DATE OF ISSUANCE	VALIDITY
Mar e Terra	August 5, 2013	August, 5, 2017
Areia Branca	August 5, 2013	August, 5, 2017
Embuaca	November 18, 2013	November 17, 2017
Icaraí	February 26, 2013	February 25, 2017

All the projects went through some king of environmental assessment. For the projects located in Ceará State (Icaraí and Embuaca), a complete environmental impact assessment (EIA) was required. For the projects located in Rio Grande do Norte State (Areia Branca and Mar e Terra), a simplified environmental study (RAS, from Portuguese – *Relatório Ambiental Simplificado*) was required. The differences are due to each State Environmental Legislation. All the information presented from now on is available in the mentioned studies.

The environment studies consist of a large amount of information. In both EIAs, the impacts were analyzed by project phase. For this reason, the same impact is often repeated, some time with different classifications.

In EMBUACA EIA, 230 impacts were identified, **from which 127 (55.22%) are positive** and 103 (44.78%) are negative. From those, 159 (69.13%) represent a low magnitude, 64 (25.03%) medium magnitude and 04 (1.58%) high magnitude. The majority of the impacts come from the implementation phase (60.43%).

In ICARAÍ EIA, 253 impacts were identified, **from which 135 (53.36%) are positive** and 118 (46.64%) are negative. From those, 185 (73.12%) represent a low magnitude, 62 (26.72%) medium magnitude and 04 (1.72%) high magnitude. The majority of the impacts come from the implementation phase (59.68%).

In AREIA BRANCA RAS, 189 impacts were identified, **from which 108 (57.14%) are positive** and 81 (42.86%) are negative. From those, 144 (76.19%) represent a low magnitude, 41 (21.69%) medium

magnitude and 04 (2.12%) high magnitude. The majority of the impacts come from the implementation phase (61.38%).

In MAR E TERRA RAS, 189 impacts were identified, **from which 108 (57.14%) are positive** and 81 (42.86%) are negative. From those, 144 (76.19%) represent a low magnitude, 41 (21.69%) medium magnitude and 04 (2.12%) high magnitude. The majority of the impacts come from the implementation phase (61.38%).

The transmissions lines (TL) also required environmental studies, but not complete Environmental Impact Assessment – EIA. Instead, Simplified Environmental Reports were carried out. They bring the impacts diagnosed for each TL and the associated mitigating measures.

For all the transmission lines, 06 impacts were diagnosed for the implementation phase and 01 for the operation phase, regarding mostly temporary impacts, such as waste generation, atmospheric pollution, risk of forestry fires and visual impact.

All foreseen impacts were properly addressed, with individual mitigation/prevention measures, as presented in the mentioned studies. Overall, the impacts of the transmission lines have a low magnitude.

During the environmental licensing process, plans and programs were created to help preventing, controlling, minimizing, restoring and compensating the possible impacts, which were previously identified in the mentioned studies.

- **ENVIRONMENTAL MANAGEMENT PLAN:** it aims at providing the entrepreneurship with efficient mechanisms that ensure the execution and control of the planned actions and their correct environmental conduction. It was created to maintain a high quality standard in the project implementation and operation.
- **ENVIRONMENTAL PLAN FOR CONSTRUCTION:** it presents the criteria and techniques to be employed at the plants construction, aiming at environmental quality preservation of the areas that suffer intervention, as well as neighborhood communities and the employees.
- **PLAN OF HEALTH AND SAFETY IN THE WORK ENVIRONMENT:** this plan is divided in two distinct stages. The first one is related to the installation of the wind turbines. The second refers to the operation phase of the plants. In both stages, the plan was created to ensure the health and safety of the work environment.
- **RECOVERY OF DEGRADED LAND PLAN:** this is a separated plan to recover degraded lands.
- **PRESERVATION OF WATER RESOURCES AND LANDSCAPES PLAN:** this plan is based on the environmental legislation associated with the guidance on the land use and occupation of Trairí City. Its objectives are to avoid changes in the environmental aspects of the area, as well as ensure the quality of the ground water.
- **DEFORESTATION CONTROL PLAN:** this plan was created to ensure that the impacts resultant from deforestation would be mitigated to the maximum.
- **WILDLIFE MONITORING PLAN:** it consists of a control activity that is carried out through frequent data collection and analysis, which can indicate scenarios in the project and possible interventions. The monitoring is realized separately for each kind of fauna (birds, reptiles, etc.) and indicators are created in order to evaluate situations.

- **MONITORING OF NOISES AND VIBRATION PLAN:** this plan supports the control of the noise level generated during implementation and operation phases, as well as vibration. Monitoring should indicate mitigation measures to be applied, by identified sources.
- **WATER QUALITY MONITORING PLAN:** this plan contemplates the superficial water quality monitoring and evaluation, as well as ground water, of the affected area. Specific parameters are monitored, in accordance of Federal and State Legislation.
- **SOIL QUALITY MONITORING PLAN:** this plan aims to identify changes in the physical and chemical soil characteristics arising from implantation and operation of the three WPP.
- **RISK MANAGEMENT PLAN and EMERGENCY ACTIONS PLAN:** this plan includes all operations and equipment and creates a system to establish general management orientations aiming at accident prevention. The following procedures are involved: consequence analysis; vulnerability analysis; processes safety information; processes risk revision; changes management; maintenance and integrity guarantee of critical systems; operating procedures; human resource qualification; incidents investigation; emergency actions plan; auditions.
- **PROGRAM OF HEALTH TO THE SURROUNDING NEIGHBORHOODS:** this plan was elaborated to diagnose and monitor the surrounding neighborhoods health effects, especially those effects related to the actions during the implantation phase.
- **ENVIRONMENTAL EDUCATION PLAN:** it was created to provide basic instructions to the project stakeholders, regarding environmental preservation and control. The plan includes workshops and activities with the employees and neighborhoods.
- **SOCIAL COMMUNICATION PLAN:** it aims at disclosuring information about the undertaking stages and actions to the affected communities, establishing a permanent link with the entrepreneur. Its main goal is the conflict resolution.
- **IDENTIFICATION OF ARCHAEOLOGICAL SITES PLAN:** this plan meets the need to safeguard historic and archaeological sites exposed during the archaeological prospection phase, coincident with implantation phase.
- **ENVIRONMENTAL AUDITING PLAN:** this plan seeks to detect and organize all environmental technical problems, through the analysis of each WPP performance, combined with of policies and guidelines of the project and each one involved in the management process.
- **PLAN OF DEACTIVATION OF THE PLANT:** this plan aims to describe all stages at the project final phase, in order to deactivate each WPP at the end of the concession period. In addition, the Plan contemplates the final disposal of the wind turbines components.

As mentioned before, most of the predicted impacts are associated with the implementation and construction phase of the plants. Monthly reports up to the end of 2013 show that the programs were successfully implemented and that the impacts were mitigated and/or prevented. The documentation if available for consultation at validation.

Even though there is a list of negative impacts, the monitoring reports up to this date have proven that they were not significant.

Regarding the remaining impacts associated to the operational phase, they are the ones discussed before. There are a few reports regarding this phase, since the last plant has begun its operations on the end of

March 2014. However, the social communication campaigns realized focused on understanding the effect of the plants in the population and if the predicted impacts were disturbing them.

The operational phase continues to monitor the most concerning impacts: noise, fauna and erosive processes. In addition, the Social Communication Program and the Environmental Education Program are permanent and produce biannual reports.

According to the latest results, from June 2014[47], we have the following:

- **Noise Monitoring:** Continuously monitoring has been carried out since the beginning of the operations, in accordance with ABNT requirements (NBR 10.151 and NBR 10.152) and State Legislation N. 6.621. So far, the results meet the requirements and there has been no complaints from the affected population nor the plant's employees. The highest values found refer to the wind and not the equipment. All the reports are available for consultation.
- **Erosive Processes Monitoring:** Erosive processes are still observed in the project areas due to the construction phase. However, mitigation measures determined in the first environmental studies are covered by the Control of Erosive Processes Plan, which is controlled by frequent monitoring. This impact is also covered by three other environmental plans: Deforestation Control Plan, Control of Surface Drainage and Plateaus Plan and Recovery of Degraded Lands Plan. All the reports are available for consultation.
- **Fauna Monitoring:** Latest results from the campaigns show that no Brazilian species in danger or in future danger were found in the project influence area and there were no carcasses of bats and birds in the area, which indicates that the impact of the wind turbines is small or inexistent. The migratory fluxes are explained by normal timing, as usually observed. All the reports are available for consultation.

In what concerns visual pollution, no complaints were ever registered or observed.

Regarding the Social and Environmental Education Program, the Social Communication Program realizes workshops with themes proposed by the community, such as senescence.

Considering the explained above, it can be concluded that the Project Activity does not generates significant negative impacts to the community and the environment, since the monitoring reports have not showed any important change in the parameters observed.

It is important to state that the locations where the projects are implemented already have other wind power entrepreneurships. For this reason, it is safe to say that the population is used to having the wind turbines and they see an advantage in the touristic growth.

In addition, the implementation of this type of project brings very positive impacts, regarding the economic growth of the region.

There was no population relocation and any negative impact over the communities or the environment have or is being addressed. Please see attached a signed letter from a MS Renováveis

[47] Reports from Embuaca are still being developed.

representative confirming that it has disclosed and mitigated any and all negative community and environmental impacts (ANNEX II).

We concluded that the Project Activity impacts are, overall, net positive.

All environmental studies were performed by Geoconsult – whose qualifications were made available for consultation.

All the reports and monitoring is being developed by the environmental consultancy Bioconsultants.

All the reports are available for consultation in separate folders by plant and will be disclosed at validation. ACR is free to request all data needed in order to confirm the information presented.

F2. STAKEHOLDER COMMENTS

Stakeholders Consultation at the Time of CDM Project Development

The Project has already been submitted to CDM Mechanism and followed all the rules established by it. At the time of the Project Design Document (PDD) development, Stakeholders Consultation was carried out according to Resolution nr. 7, issued on March 5, 2009 by the Brazilian Designated National Authority (*Comissão Interministerial de Mudanças Globais do Clima – CIMGG*). The DNA required evidence of stakeholders consultation, in form of letters.

According to the same Resolution, the project proponent must invite for comments, at least, certain agents involved in and affected by the project activity. For this reason, at the time of the project development, the following agents were consulted:

- *Prefeitura de Areia Branca* (Areia Branca City Hall)
- *Prefietura de Trairi* (Trairi City Hall)
- *Prefeitura de Amontada* (Amontada City Hall)
- *Câmara Municipal de Areia Branca* (Municipal Assembly of Areia Branca)
- *Câmara Municipal de Trairi* (Municipal Assembly of Trairi)
- *Câmara Municipal de Amontada* (Municipal Assembly of Amontada)
- *Secretaria Municipal de Agricultura, Abastecimento e Recursos Hídricos* (Environmental Agency of Areia Branca)
- *Secretaria Municipal do Turismo e Meio Ambiente de Trairi* (Environmental Agency of Trairi)
- *Secretaria de Cultura, Turismo e Meio Ambiente de Amontada* (Environmental Agency of Amontada)
- *Sindicato dos Trabalhadores Rurais de Areia Branca* (Communitarian Association of Areia Branca)
- *Sindicato dos Trabalhadores Rurais de Trairi* (Comunitarian Association of Trairi)

The invitation was made by letters and the PDD was published in a website for Public Consultation in a Portuguese version.

Result: No comments were received.

Considering that this process has happened while the Project was aiming at the Clean Development Mechanism and the former Project Design Document was prepared by a different consultancy, the letters are no longer available.

However, the consent of the three municipalities' governments are available for consultation at validation.[48]

In addition, in accordance with Ceará State legislation, Public Hearings were performed for both Icaraí and Embuaca projects. For this procedure, there was an official invitation. Each public hearing occurred in different dates – May 2nd 2011 for Embuaca and August 31rst 2011 for Icaraí. Video records are available for consultation.

Compliance with ACR Standard:

To attend an ACR Standard demand, the National Designated Authority of Brazil was notified of the development of a voluntary carbon project within ACR. A letter was sent to the Interministerial Committee on Global Climate Change (a division of the Science and Technology Ministry). The notice of receive is attached in ANNEX I.

[48] Files: *Anuencia Mar e Terra.pdf, Anuencia Areia Branca.pdf, Anuencia Embuaca.pdf, Anuencia Icarai.pdf.*

G.
OWNERSHIP AND TITLE

G1. PROOF OF TITLE

Land Title:

All the lands were the four WPP are located are owned by each SPE, which are all property of MS RENOVÁVEIS PARTICIPAÇÕES S.A. Proof of title is presented in the following documents, available for consultation at validation:

- *Contrato Concessão e Uso Areia Branca.pdf*
- *Contrato Concessão e Uso Embuaca.pdf*
- *Contrato Concessão e Uso Icaraí.pdf*
- *Contrato Concessão e Uso Mar e Terra.pdf*
- *Matrícula Embuaca.pdf*
- *Aditivo Concessão Areia Branca.pdf*

Offsets Title:

As per ACR Standard v.3.0:

Definition:

"Offset title is a legal term representing rights and interests in an offset, a future stream of offsets, or a project delivering offsets."

Requirement:

"Project Proponent shall provide documentation and attestation of undisputed title to all offsets prior to registration, including chain of custody documentation if offsets have ever been sold in the past. Title to offsets shall be clear, unique, and uncontested."

To determine Offset Title, it is necessary to understand properly how the BRAZILIAN ELECTRICITY MARKET.

- **How it works:**

The companies responsible for energy generation and transmission compose the National Interconnected System (SIN[49])**.** In this system the negotiations of purchase and sales of energy occur. That means that, once a market agent (distributor, producer, retailer, and consumer) becomes a SIN member, it may negotiate energy with any other agent, regardless of any generation and transmission physical restrictions.

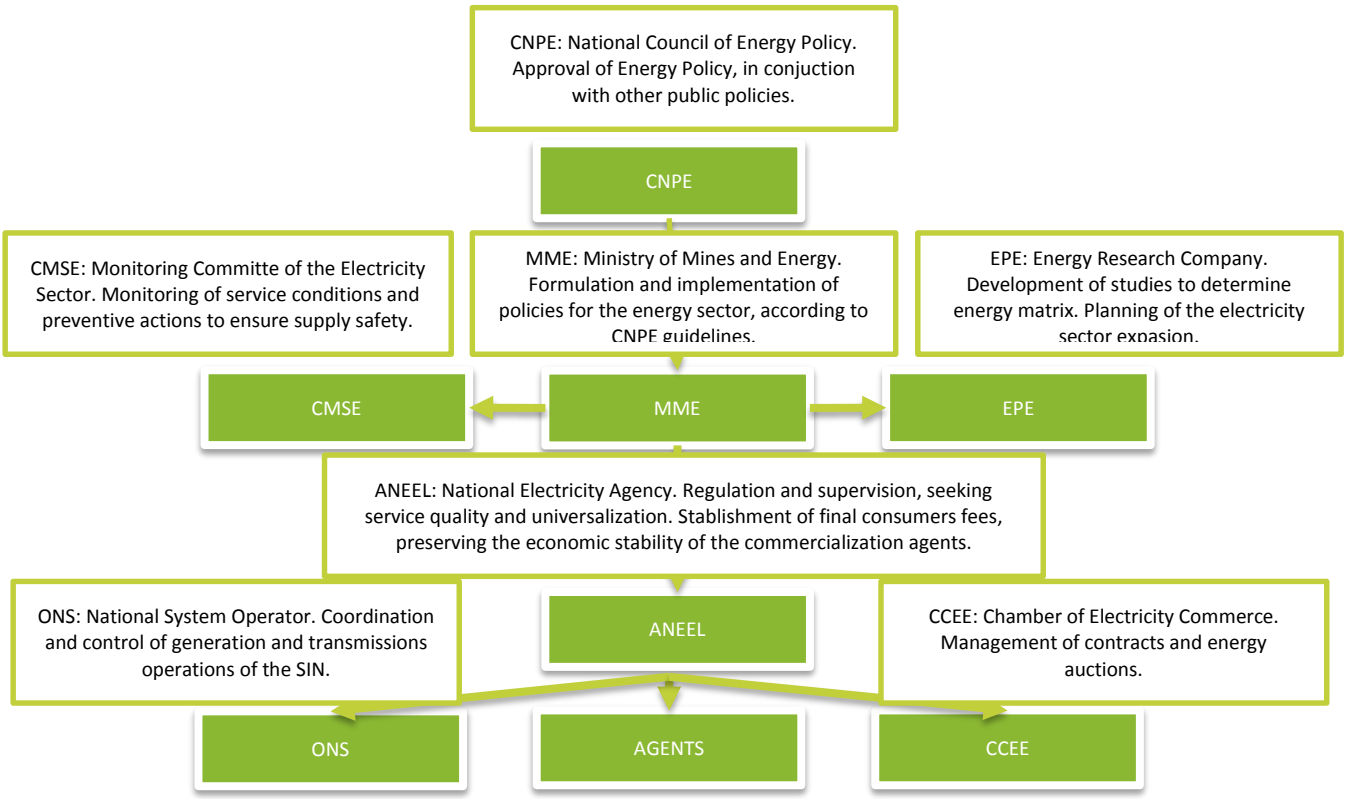
Trade relations in the current model are established in two spheres: the Regulated Market (ACR[50]) and the Free Market (ACL[51]). For purposes of this project, the Regulated Market will be described.

The purchase and sale of energy in the regulated environment is formalized through contracts between generators and distributors who participate in the purchase and sale of energy auctions. Contracts of this environment have specific regulation on issues such as energy prices, submarket contract registration and

[49] From Portuguese – *Sistema Interligado Nacional.*
[50] From Portuguese – *Ambiente de Contratação Regulada*.
[51] From Portuguese – *Ambiente de Contratação Livre.*

duration of supply, not subject to bilateral changes by agents. Those contracts consists of the Power Purchase Agreements.

The Brazilian Electricity System is supported by different agencies, as presented in Figure G.1.



The agents, such as MS Renováveis, are mainly associated with ANEEL, ONS and CCEE. Those three entities will be responsible for legislating, coordinating operations and measuring energy production to determine monthly income. For this reason, it is safe to say that a company that decides do become a member of the SIN will be fully regulated by the Brazilian Government.

- **Discussion about title:**

After the evolution of carbon markets in the world, some countries have regulated offset title. The Brazilian Government have not yet done that, however, specifically for the energy sector, as closed and controlled as it is, there has been clear understanding that the energy producer is entitled to the generated offsets.

That seems obvious to conclude if we think about additionality requirements. The implementation barriers test represents any factor that would prevent the adoption of the project activity proposed by the Project Proponent (PP), which can be: financial, technological or institutional. To prove additionality, the PP must be capable to demonstrate at least one of those barriers.

The project implementation faces at least one barrier, whose risk is responsibility of the PP – who will expend human, technological and financial resources to surpass it (or them) and, for that reason, is worthy

of the carbon offsets. According to that logic, it is unreasonable to think that the offset title should be of anyone else that not the PP.

Of course, we are talking about a situation where all investments and decisions are made by the PP. Financial benefits, such as PROINFA, a former incentive program of Brazil for renewable energy; make room for argument, once the investment risk is shared with the Brazilian Government.

The worry about double counting of carbon is not justified. Once the energy is sold in the Brazilian Electricity Market, it will be always controlled by the Brazilian Government, even though is not owned by it. Electricity distributor are registered within the system and in case they carry out their GHG Inventories, the renewable energy acquired cannot be accounted for as Scope 1 Emissions, because they are controlled by them, but by the Energy Producer, which is also registered within the national GRID.

If an offsetting program should be conceived, it would also be validated by a third party, which would have to check all sources of offsets.

Up to this date, all energy projects developed in Brazil, in regulated and voluntary markets – without any incentives or benefits for the project implementation – have been entitled to the offsets generated.

For this reason, we believe that a formal Offset Title Attestation Letter, signed by MS Renováveis representatives, is enough of proof of offset title of this particular project activity.

The letter is available for consultation under the name *ACR Title Attestation MS Renovaveis.pdf*.

G2. CHAIN OF CUSTODY

At the time of this project registration, no forward option contract was established.

G3. PRIOR APPLICATION

The proposed project is a former CDM Project, under the Project ID number 7682 and name: “Rio Grande do Norte and Ceará Wind Energy Complex Project Activity”.

The project was rejected by the board because it did not explain clearly the investment decision date and the project start date.

The DOE is requested to further validate the suitability of the input values used at the time of investment decision considering that the presented source (funding request letter) is dated 13 July 2011, while the project start date is 20 August 2010. Please refer to VVM v 1.2 paragraph 110 and 114 (a).

The project has been reviewed, according to ACR’s and CDM latest Standard and Methodologies and according to ACR’s first screening guidance.

H.
PROJECT TIMELINE

H1. START DATE

The Project consists of four WPP, which have started commercial operation in different dates, as follows:

- WPP Icaraí: June 29, 2013;
- WPP Mar e Terra and WPP Areia Branca: Feb 18, 2014;
- WPP Embuaca: March 29, 2014.

As per the ACR Standard definition (v.3.0), the project Start Date must correspond with a date on which *the project began to reduce GHG emissions against its baseline*. Therefore, the date of the first operation is considered: **June 29, 2013.** Annex III presents ANEEL Ordinance presenting proof of project start date.

H2. PROJECT TIMELINE

Table H.1: *Project Timeline.*

ACTIONS	MAR E TERRA	AREIA BRANCA	EMBUACA	ICARAÍ
Power Purchase Agreement (PPA)	January 1rst, 2011	October 13, 2010	October 13, 2010	August 20, 2010
Major Equipment Orders – EPC Contract signature	November 30, 2010	November 30, 2010	November 30, 2010	November 30, 2010
Financing Agreement	November 21, 2011	November 21, 2011	November 21, 2011	November 21, 2011
Starting date of operation	**Feb 18, 2014**	**Feb 18, 2014**	**March 30, 2014**	**June 29, 2013**

ANNEX I

Embrasca

Ministério da Ciência, Tecnologia e Inovação
Comissão Interministerial de Mudança Global do Clima
A/C Gustavo Luedemann
Coordenador Geral de Mudanças Globais de Clima
Esplanada dos Ministérios, Bloco E
CEP: 70067-900, Brasília, DF

Objeto: Notificação de desenvolvimento de projeto de carbono no mercado voluntário.

A EMBRASCA – Empresa Brasileira de Serviços e Consultoria Ambiental, situada no município de Goiânia-GO vem, através desta, notificar à Comissão Interministerial de Mudança Global do Clima a realização de um projeto de créditos de carbono referente à implementação de um complexo eólico nos Estados do Ceará e Rio Grande do Norte.

O complexo, de capacidade instalada total de 94.5 MW, é composto pelos quatro parques eólicos apresentados a seguir:

Nome	Empresa	Localização	Potência instalada (MW)
Eólica Mar e Terra	*Eólica Mar e Terra Geração e Comercialização de Energia S.A*	Areia Branca	23,1
Eólica Areia Branca	*Eólica Bela Vista Geração e Comercialização de Energia S.A.*	Areia Branca	27,3
Eólica Embuaca	*Embuaca Geração e Comercialização de Energia S.A.*	Trairí	27,3
Eólica Icaraí	*Eólica Icaraí Geração e Comercialização de Energia*	Amontada	16,8

Os quatros parques são de propriedade da MS Renováveis Participações S.A., sob forma de Sociedades de Propósito Específico (SPEs). A MS Renováveis é a proponente principal do projeto.

O início das operações comerciais dos empreendimentos iniciou em 29 de Junho de 2013, com a EOL Icaraí, seguida das EOL Mar e Terra e Areia Branca, em 18 de Fevereiro de 2014 e finalmente em 30 de Março de 2014. Por este motivo, considera-se como data de início do projeto o dia 1º de Abril de 2014, para facilitação da contabilidade das certificações.

O registro será efetuado no mercado voluntário junto à entidade norte-americana de registro *American Carbon Registry*, sob o nome **"MS RENOVÁVEIS WIND POWER PROJECT: MAR E TERRA, AREIA BRANCA, EMBUACA AND ICARAÍ"** e a estimativa de reduções de emissões para o primeiro período de crédito de 7 anos é de 805,982 tCO_2e, de Abril de 2014 a Março de 2021.

A EMBRASCA é a responsável pelo desenvolvimento do plano de projeto e acompanhamento das etapas no mercado voluntário e, portanto, quaisquer esclarecimentos, dúvidas ou comentários deverão ser requeridos à mesma.

Atenciosamente,

Ricardo César Fernandes
Diretor Sócio

Goiânia, 15 de Setembro de 2014

CORREIOS BRÉSIL
AVISO DE RECEBIMENTO AR
AVIS CN07
(CÓDIGO DE BARRAS OU Nº DE REGISTRO DO OBJETO)
DATA DE POSTAGEM / DATE DE DÉPÔT ___/___/_____
UNIDADE DE POSTAGEM / BUREAU DE DÉPÔT
TENTATIVAS DE ENTREGA / TENTATIVES DE LIVRAISON
PREENCHER COM LETRA DE FORMA
ENDEREÇO PARA DEVOLUÇÃO RETOUR
NOME OU RAZÃO SOCIAL DO REMETENTE / NOM OU RAISON SOCIALE DE L'EXPÉDITEUR: EMBRASCA
RUA CÓRDOBA, Qd. 251 LT 3 CS 1
ENDEREÇO PARA DEVOLUÇÃO / ADRESSE: PARQUE AMAZÔNIA
GOIÂNIA
CIDADE / LOCALITÉ: GOIÂNIA UF GO BRASIL
74835-030
(ETIQUETA OU CARIMBO MP)

Figure I.A: Notification of project development to the Brazilian DNA: MCT – Ministry of Science and Technology.

PREENCHER COM LETRA DE FÔRMA

AR

DESTINATÁRIO DO OBJETO / *DESTINATAIRE*

NOME OU RAZÃO SOCIAL DO DESTINATÁRIO DO OBJETO / *NOM OU RAISON SOCIALE DU DESTINATAIRE*

MINISTÉRIO DA CIENCIA E TECNOLOGIA

ENDEREÇO / *ADRESSE*

ESPLANADA DOS MINISTÉRIOS BL "E"

CEP / *CODE POSTAL*	CIDADE / *LOCALITÉ*	UF	PAÍS / *PAYS*
70067-900	BRASÍLIA	DF	BRASIL

DECLARAÇÃO DE CONTEÚDO (SUJEITO À VERIFICAÇÃO) / *DISCRIMINACION*

NATUREZA DO ENVIO / *NATURE DE L'ENVOI*

☐ PRIORITÁRIA / *PRIORITAIRE*

☐ EMS

☐ SEGURADO / *VALEUR DÉCLARÉ*

ASSINATURA DO RECEBEDOR / *SIGNATURE DU RÉCEPTEUR*: marina

DATA DE RECEBIMENTO / *DATE DE LIVRATION*: 24/09/14

CARIMBO DE ENTREGA UNIDADE DE DESTINO / *BUREAU DE DESTINATION*

NOME LEGÍVEL DO RECEBEDOR / *NOM LISIBLE DU RÉCEPTEUR*: Marina

Nº DOCUMENTO DE IDENTIFICAÇÃO DO RECEBEDOR / ÓRGÃO EXPEDIDOR

RUBRICA E MAT. DO EMPREGADO / *SIGNATURE DE L'AGENT*

de Albuquerque

de Correios

CDD BRASÍLIA/CENTRO

24 SET 2014

ENDEREÇO PARA DEVOLUÇÃO NO VERSO / *ADRESSE DE RETOUR DANS LE VERS*

75240203-0

FC0463 / 16

114 x 186 mm

Figure I.B: *Confirmation notice received on September 24, 2014.*

ANNEX II

MS RENOVÁVEIS

TO THE AMERICAN CARBON REGISTRY

Fortaleza, October 22, 2014

Subject: **Attestation letter regarding disclosure and mitigation of negative and community environmental impacts.**

In name of MS Renováveis Participações S.A., I, Maiza Rodrigues Ponte Parente, director in charge of the Voluntary Carbon Project regarding the four wind power plants *Mar e Terra*, *Areia Branca*, *Embuaca* and *Icaraí*, under the ID ACR 171 and name ***"MS Renovaveis Wind Power Complex: Mar e Terra, Areia Branca, Embuaca and Icarai"***, confirm that all plants, transmission lines and substation are in accordance with environmental laws of Brazil and Rio Grande do Norte and Ceará State.

In addition, all impacts foreseen in the preliminary studies were addressed, through the implementation of specific programs, regarding the environment and the communities. Frequent monitoring is carried out, including the social communication program, where the population participates in discussions and environmental education programs, contributing with suggestions or any observations regarding the entrepreneurship. So far, no complaints were registered.

The project did not result in population relocation and the population was not affected negatively by any activity in the construction phase whatsoever. Continuously monitoring will be carried out to ensure that there will be no negative impacts on the population or the environment.

Regards,

Maiza Rodrigues Ponte Parente
MS Renováveis
Financial Director

TABELIONATO PERGENTINO MAIA
3o. Ofício de Notas
Av. Pe. Antonio Tomas, 920 - Aldeota
Fortaleza-CE - Tel: (85) 3304-9444
Reconheço por SEMELHANCA a(s) firma(s) de:
[illegible]-MAIZA RODRIGUES PONTE PARENTE
Dou fé. Us: 077
Fortaleza-CE, 22 de Outubro de 2014.
Em testemunho da verdade.

TRIBUNAL DE JUSTIÇA DO ESTADO DO CEARÁ
RECONHECIMENTO DE FIRMA
Nº BR 730.183

Razão Social: MS Participações Societárias S.A.
CNPJ: 10.288.617/0001-08
Inscrição Estadual: 06.412.422-3
Endereço: Av. Senador Virgílio Távora, 1701/1302, Aldeota – Fortaleza – CE. CEP 60.170-251

Figure II.A: *Signed letter confirming that MS Renováveis has disclosed and mitigated any negative community and environmental impacts.*

ANNEX III

AGÊNCIA NACIONAL DE ENERGIA ELÉTRICA - ANEEL

DESPACHO Nº 2.022, DE 28 DE JUNHO DE 2013.

Texto Original

O SUPERINTENDENTE DE FISCALIZAÇÃO DOS SERVIÇOS DE GERAÇÃO DA AGÊNCIA NACIONAL DE ENERGIA ELÉTRICA – ANEEL, no uso das atribuições conferidas pela Resolução ANEEL nº 433, de 26 de agosto de 2003, e considerando o que consta do Processo nº 48500.003823/2010-62, resolve liberar as unidades geradoras UG1 a UG8, totalizando 16.800kW, da EOL Icaraí, localizada no Município de Amontada, Estado do Ceará, de titularidade da empresa Eólica Icaraí Geração e Comercialização de Energia S.A., para início da operação comercial a partir do dia 29 de junho de 2013, quando a energia produzida pelas unidades geradoras deverá estar disponível ao sistema.

ALESSANDRO D'AFONSECA CANTARINO

Figure III.A: *Proof of project start date. ANEEL Ordinance 2022 from July 28, 2013, authorizing WPP Icaraí to start operations on July 29, 2013.*

ANNEX IV

Anotação de Responsabilidade Técnica - ART
Lei nº 6.496, de 7 de dezembro de 1977

CREA-GO

ART Obra ou serviço
1020150021775

Conselho Regional de Engenharia e Agronomia de Goiás

1. Responsável Técnico

ELISA DA COSTA GUIDA — RNP: **1410435490**
Título profissional: **Engenheira Ambiental** — Registro: **147902/D-MG**
Empresa contratada: **10464 - EMBRASCA EMPRESA BRASILEIRA DE SERV.E CONSULT.AMBIENTAL LTDA**

2. Dados do Contrato

Contratante: **MS PARTICIPAÇÕES SOCIETÁRIAS S.A** — CPF/CNPJ: **10.288.617/0001-08**
Avenida Senador Virgilio Távora, Nº 1701 — Bairro: Aldeota — CEP: 60170-251
Cidade: Fortaleza-CE — Complemento: Sala 703
E-Mail: maiza.ponte@msrenovaveis.com.br — Fone: (85)34527331
Contrato: 0 — Celebrado em: 10/02/2014 — Valor Obra/Serviço R$: 1.195.435,00
Tipo de contratante: Pessoa Jurídica de Direito Privado
Ação institucional: Nenhuma/Não Aplicável

3. Dados da Obra/Serviço

Avenida Senador Virgilio Távora, Nº 1701 — Bairro: Aldeota — CEP: 60170-251
Cidade: Fortaleza-CE — Complemento: Sala 703
Data de início: 10/02/2014 — Previsão término: 09/02/2021
Finalidade: **Infra-estrutura**
Proprietário: **MS PARTICIPAÇÕES SOCIETÁRIAS S.A** — CPF/CNPJ: **10.288.617/0001-08**
E-Mail: maiza.ponte@msrenovaveis.com.br — Fone: (85) 34527331

4. Atividade Técnica

	Quantidade	Unidade
ASSESSORIA, CONSULTORIA OU ASSISTENCIA RELATORIO MEIO AMBIENTE	1.680,00	HORAS

As informações constantes desta ART são de responsabilidade do(a) profissional e estão sujeitas a análise futura
Após a conclusão das atividades técnicas o profissional deverá proceder a baixa desta ART

5. Observações

Concepção, monitoramento e acompanhamento do projeto voluntário de créditos de carbono do Complexo Eólico MS Renováveis, composto pelos parques eólicos AREIA BRANCA, MAR E TERRA, ICARAÍ E EMBUACA, totalizando 94,5 MW de potência instalada. Registro junto ao mercado American Carbon Registry e acompanhamento nas demais fases do projeto. Demais profissionais da equipe técnica: Ricardo Cesar Fernandes - Administrador - CRA 2.234/GO; Ana Carolina de Godoy Silva - Eng. Ambiental – CREA 5069185269/D-SP; Pedro Paulo Fernandes da Silva - Estagiário em Eng. Ambiental. Estagiário em Eng. Ambiental

6. Declarações

Acessibilidade: Sim: Declaro atendimento às regras de acessibilidade previstas nas normas técnicas da ABNT, na legislação específica e no Decreto nº 5.296, de 2 de dezembro de 2004.

7. Entidade de Classe

NENHUMA

8. Assinaturas

Declaro serem verdadeiras as informações acima

_____, ____ de _____ de _____
Local — Data

_____
ELISA DA COSTA GUIDA - CPF: 934.271.742-04

_____
MS PARTICIPAÇÕES SOCIETÁRIAS S.A - CPF/CNPJ: 10.288.617/0001-08

9. Informações

- A ART é válida somente após a conferência e o CREA receber a informação do PAGAMENTO PELO BANCO.
- A autenticidade deste documento pode ser verificada no site www.crea-go.org.br.
- A guarda da via assinada da ART será de responsabilidade do profissional e do contratante com o objetivo de documentar o vínculo contratual.
- Não é mais necessário enviar o documento original para o CREA-GO. O CREA-GO não mais afixará carimbo na nova ART.

www.crea-go.org.br atendimento@crea-go.org.br
Tel: (62) 3221-6200 Fax: (62) 3221-6277

CREA-GO

Registrada em	Valor Pago	Boleto	Situação		Não Possui CAT
06/02/2015	R$ 178,45	0115021648	Registrada/OK		

Figure IV.A: *Carbon Project Technical Responsibility Annotation – Environmental Engineer Elisa Guida.*