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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Title of the project activity: **Aeolis Beberibe Wind Park**
Version number of the document: 1.2
Date (DD/MM/YYYY): 27/01/2012

A.2. Description of the project activity:

Aeolis Beberibe Wind Park CDM Project, hereinafter mentioned to as **Beberibe Project,** consists of the construction and operation of a wind power plant with 43.4 MW of installed capacity that will supply clean electricity to the National Interconnected System (In Portuguese: "Sistema Interligado Nacional – SIN"). The project is located in the northeast of Brazil, on the cost of Ceará State, in the city of Beberibe.

The implementation and operation of the CDM project activity will reduce greenhouse gases (GHG) emissions as the additional electricity generated and dispatched to the system will allow diminishing electricity generated by fossil fuelled thermal power plants at the SIN's operational margin, or by avoiding or postponing addition of new GHG intensive generation sources to the system.

This implementation is a result of the Brazilian electric energy modernization policy that began with the Brazilian Power Sector Restructuring (In Portuguese: RESEB – " Reestruturação do Setor Elétrico Brasileiro") governed by the Law 9,074 of 1995[1] which provided the unbundling of the market, the creation of the System Operator as a private entity, the creation of the Wholesale Energy Market (In Portuguese: "MAE – Mercado Atacadista de Energia"), the limitations of the Company and Power Market and the creation of the Energy Marketing operation, not allowed at that time, i.e. the Beberibe Project is a result of this modernization process.

The process of modernization had started in 1995 and after several improvements culminate in the current situation that allows the participation of private initiative and investment securely in Renewable Electricity Generation. This process results on low tariffs on the national power system and in the effective private sector participation in renewable power generation and technically viable initiatives hitherto inconceivable.

This modernization process has over time amended where necessary with a number of other industry participants, such as billing system, concessions, reduction of taxes, more attractive financing and also available resources, licensing, etc.. At last but not least, the possible eligibility of projects under the Clean Development Mechanism of the Kyoto Protocol drew the attention of investors with respect to renewable energy projects of small scale.

[1] Available in http://www.planalto.gov.br/ccivil_03/leis/L9074cons.htm accessed in 22/10/2011

As a result of this process, the Beberibe Project, consisting of five wind farms called Beberibe Aeolis I (27.3 MW), Beberibe Aeolis II (16.1 MW), Beberibe Aeolis III (25.2 MW), Beberibe Aeolis IV (25.2 MW) and Beberibe Aeolis V (27.3 MW) that will supply 121.1 MW of renewable energy to the SIN.

In spite a great potential for their development, Wind Power generation activities, such as Beberibe Project, so far only represent a small share of the Brazilian electric matrix. According to ANEEL[2](National Electric Energy Agency), wind power represents only 1% of installed capacity in the country. Given this fact, the **Beberibe Project** represents an important source and non-conventional renewable power generation and a valuable contribution to diversifying the energy matrix.

The project activity is of particular relevance given the fact is necessary to satisfy the rapidly growing electricity demand in Brazil which, according to the Ministry of Mines and Energy[3], is to be of 69.20% between 2010 and 2019. In the North / Northeast, where the project is located, this growth is even higher (84.21%) and **Beberibe Project** will contribute to the improvement of regional energy infrastructure by providing additional energy to sustain the expansion of economic activities and population growth.

Besides contributing to the diversification of the Brazilian energy matrix, Beberibe Project also promotes sustainable development in the following ways:

- It reduces the emission of greenhouse gases (GHG) from the Brazilian energy matrix;
- It generates new employment opportunities during the planning, licensing, construction, operation and maintenance of the enterprise, creating a new industry even stronger and consolidated, generating research and internal value;
- It allows a greater regional development in the municipality of Beberibe through the employment generation, local development, according to the UNDP [4](United Nations Development Programme), has the 3755º worst Human Development Index of Brazil;
- It stimulates the regional economy through new revenues to local government, local productive system (products and services) that result in a greater social capital in the region, attracting new opportunities in the local supply chain and improving the overall infrastructure, therefore, the Index Human Development to meet the basic needs of the population, thus promoting a virtuous cycle in the local economy;
- It aggregates income to property owners of wind farms since they can continue to use the area for other activities, increasing productivity and diversifying the area;

---

[2] Available in http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp accessed in 06/10/2011

[3] Available in http://www.epe.gov.br/PDEE/Forms/EPEEstudo.aspx, page 32, table 21 accessed 06/10/2011.

[4] Available in http://www.pnud.org.br/atlas/tabelas/index.php, accessed 06/10/2011.

- The economic stimulus described follows a general improvement of local infrastructure such as road transport networks, electricity and encouragement for education;

- The operation of the project requires specialized services of operators and maintenance personnel, and therefore encourages the development of a skilled service sector in the region, creating opportunities for professional training, education and employment;

- It is an important additional energy input and source diversification to the river hydro generation that is being installed.

As Brazil's hydroelectric and wind regimes are largely complementary, their combination allows partially compensation of the lack of hydroelectric power from low storage capacity of small hydropower units (PCH), minimizing the installation of thermal units of energy, while still providing energy security enough based on a complementary portfolio of these renewable sources.

The baseline scenario is the same scenario existing before the implementation of the project activity, that is, the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin calculations according to "*Tool to calculate the emission factor for an electric system*".

A.3. Project participants:

The **Beberibe Project** belongs to **Beberibe Aeolis Geração de Energia Ltda**, a Special Purpose Company (SPC) which was created especially for the construction and operation of the Beberibe Complex Wind Farms.

Name of Party involved (*) (host) indicates a host Party)	**Private and/or public entity(ies) project participants (*) (as applicable)**	**Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)**
Brazil (host)	Beberibe Aeolis Geração de Energia Ltda (private entity)	No
	BRZ Consultoria Empresarial Ltda (private entity)	No
Annex 1 Party: Italy	Electrade S.p.A. (private entity)	No
(*)In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party (ies):

Brazil

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

Region: Northeast of Brazil

State: Ceará and Piauí

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

Municipality of Beberibe (Ceará) and Luís Correia (Piauí).

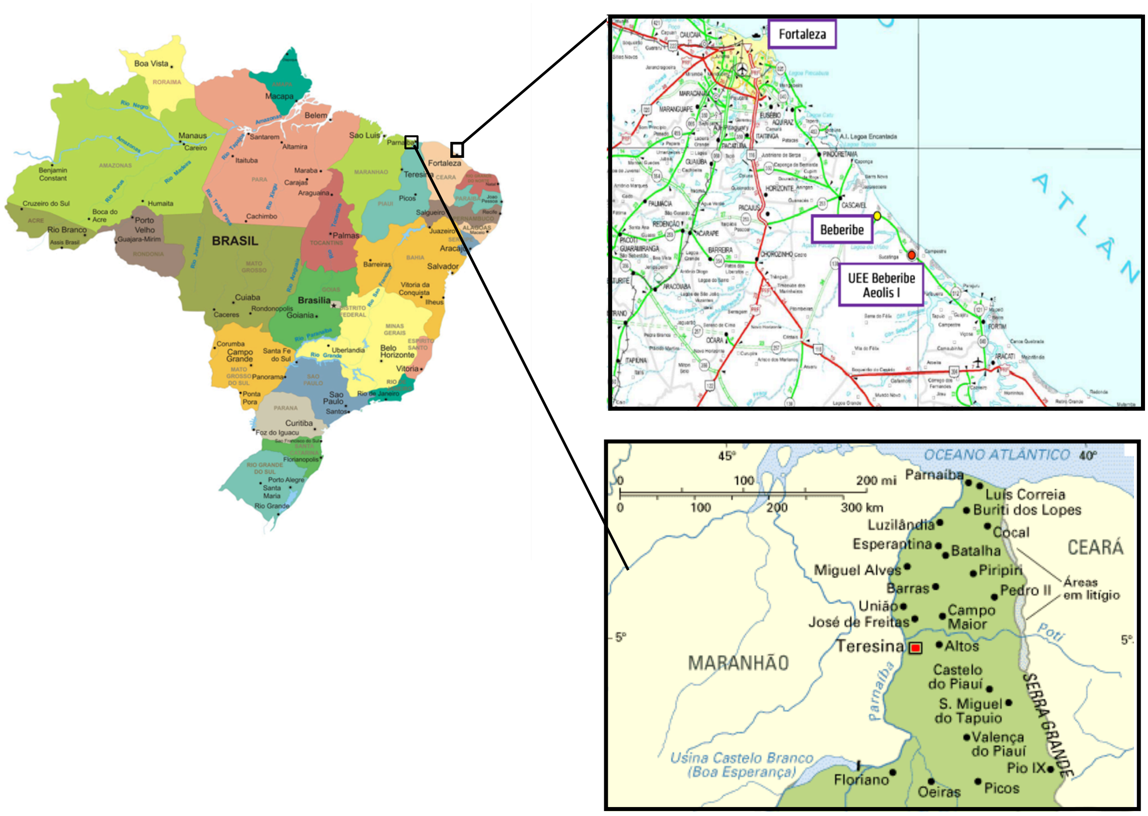
A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

The geographic coordinates of the project is presented in the table below:

Table 1 - Coordinates of the wind power plants

Wind Power Plant	Geographic Coordinates (SIRGAS 2000)	UTM Coordinates (Zone 24M)
BEBERIBE AEOLIS I	04º 16’ 34.7”S 38º 00’ 41.1”W	609.706E 9.527.259N
BEBERIBE AEOLIS II	04º 17’ 57,7”S 38º 00’ 17.9”W	610.421E 9.524.709N
BEBERIBE AEOLIS III	02º 58’ 10,7”S 41º 36’ 23.0”W	210.262E 9.671.421N
BEBERIBE AEOLIS IV	02º 58’ 32,6”S 41º 36’ 16,3”W	210.468E 9.670.748N
BEBERIBE AEOLIS V	02º 59’ 13,8”S 41º 36’ 33,6”W	209.935E 9.669.480N

Figure 1 - Map of Brazil (left side) e the municipality of Beberibe (right side)



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

Sector Scope 1 – Energy industries - Renewable Source

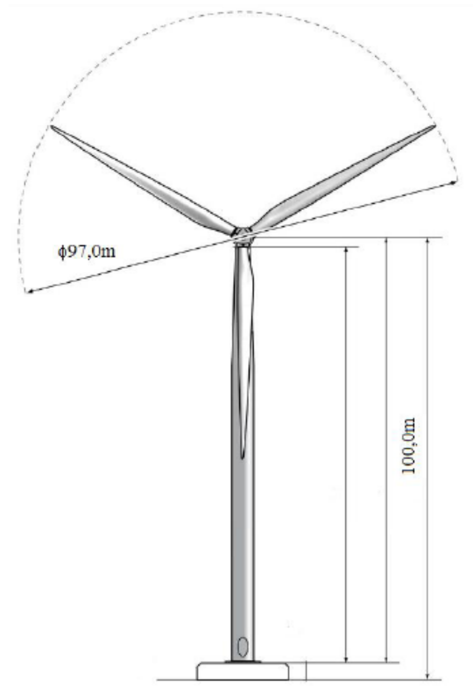
A.4.3. Technology to be employed by the project activity:

Wind energy is the energy gained by air movement (wind), which is an abundant source of clean and renewable energy.

The main components of a wind turbine are the foundation, tower, nacelle and rotor. The tower is a set of tubular steel sections joined by bolted flanges and connected to the foundation by anchor bolts set in concrete.

At the top of the tower, the nacelle is mounted, built in fiberglass, which will house the rotor shaft, gearbox, electrical generator, cooling system and other electromechanical equipment of the turbine. The nacelle is attached to the top of the tubular tower, which also houses the cabling system, turbine control and protection, and makes inspections and maintenance easier required for the operation of the turbine.

Figure 2 - Main dimensions of the Suzlon S97 Wind Turbine



The rotor consists of a steel structure that supports the three-blade system, whose angle can be adjusted by the pitch system, with the help of electric motors, seeking the best conditions of safety and control system. The blade form is optimized to achieve the best aerodynamic conditions and acoustic performance, and they are built of plastic reinforced with fiberglass. The rotor is connected to a main shaft that transmits torque through a multiplier for the generator that produces electrical power.

The multiplier is a combination of the low-speed main shaft, power train, brake system and coupling of the rotor, and cooling systems. The main shaft is made of heat treated steel.

The engineering design of the Suzlon S97 wind turbine model, IEC Class III-A, is based on a machine with three-blade rotor, horizontal axis upwind design, i.e. the rotor operates in front of the tower, and power control for Pitch - variable pitch.

The machine is designed to produce electricity with wind speeds from 4 m / s (cut-in), reaching its rated capacity at speeds close to 13m/se interrupting his generation in wind speeds greater than 20m / s (cut- out).

The hub of the rotor 3 fixed blades that sweep a circular area of 7.386m ² and 97m in diameter. Structurally, the turbine is a tower made of tubular steel with about 96.2 m high (resulting in hub height of 100m).

The tower will be attached to the ground by means of a reinforced concrete foundation, with approximate dimensions of 16x16m. The main dimensions of the turbine are presented in Figure 5. The tower of the wind turbine must have a mass of 248.90 tons, with a total of 368.20 t. The minimum speed of the rotor is 12.0 rpm and a maximum of 15.5 rpm. The noise level of a single wind turbine at its base is 57dBA.

At times during the year, the turbine should achieve rated power. As a consequence, the capacity factor of the machine or wind farm can reach 100%.

Figure 3 - Suzlon S97 Wind Turbine Nacelle

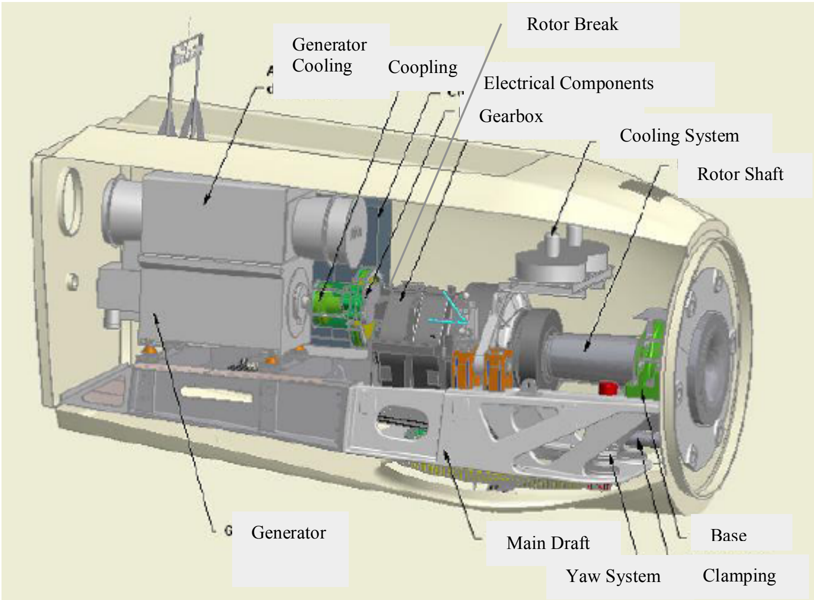


Table 2 – Technical Characteristics of Beberibe Aeolis Wind Farms

Description	Values					Reference
	Beberibe I	**Beberibe II**	**Beberibe III**	**Beberibe IV**	**Beberibe V**	
1. Electricity data						
Installed capacity (MW)	27.3	16.1	25.2	25.2	27.3	Technical Specification (“*Memorial Descritivo – Beberibe Aeolis I and II*”) and “Megajoule” certificate
Net generation (MWh / year)	71,880	42,500*	66,358*	66,358*	71,888*	
Plant load factor[5]	30.06%	30.06%*				
2. Wind Turbine						
Type	Suzlon S97	Suzlon S97	Suzlon S97	Suzlon S97	Suzlon S97	Technical Specification (“*Memorial Descritivo – Beberibe Aeolis I and II*”) and “Megajoule” certificate
Manufacturer	Suzlon Energy Ltd	Suzlon Energy Ltd	Suzlon Energy Ltd	Suzlon Energy Ltd	Suzlon Energy Ltd	
Nominal Capacity (MW)	2.100	2.300*	2.100	2.100	2.100	
# Units	13	7	12	12	13	

[5] The Plant Load factor was calculated by Braselco (Project Consulting) and certified by Megajoule (independent wind certification company), both documents are available for DOE at the validation procedures.

Frequency (Hz)	60	60	60	60	60	
Life time (years)	20	20	20	20	20	
Rotor Diameter (meters)	97	97	97	97	97	
Hub height (meters)	100	100	100	100	100	

* Estimative based on Beberibe I assumptions

The project activity for all wind farms was based on Suzlon´s equipment's and is aligned with Braselco (technical consulting company), Megajoule (wind certification company), environmental licenses and ANEEL´s registrations developed for Beberibe I. The final model and brand will be defined with the final quotation for the equipment acquisition.

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

The implementation of the **Beberibe Project** connected to the Brazilian SIN will generate an estimated average annual reduction of **125,926 tCO2e** and a total reduction of **881,485 tCO2e** during the first crediting period, of 7 (seven) years, described in the table below:

Table 3 - Estimation of Beberibe Project Emissions Reduction

Years	Annual estimation of emission reductions in tonnes of CO_2e
2013	125,926
2014	125,926
2015	125,926
2016	125,926
2017	125,926
2018	125,926
2019	125,926
Total estimated reductions (tonnes of CO_2e)	**881,485**
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	125,926

A.4.5. Public funding of the project activity:

This project does not receive any public funding.

SECTION B. Application of a baseline and monitoring methodology

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

- ACM0002 – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" - version: 12.2.0.
- Tool for the demonstration and assessment of additionality, version 06.0.0
- Tool to calculate the emission factor for an electricity system, version 2.2.1

The "*Combined tool to identify the baseline scenario and demonstrate additionality*" and the "*Tool to calculate project or leakage CO2 emissions from fossil fuel combustion*" are not applicable to the project activity, therefore are not mentioned or used.

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

The consolidated methodology ACM0002, is applicable to **Beberibe Project** because the project fulfills the following conditions:

- The project involves the installation of a new power plant at a site where no other renewable power plant installed before, according to:
  - "*Install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant)*"
- Install of a wind power plant, according to:
  - "*The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit*"
- The project activity does not involve capacity addition, retrofit or replacements, according to:
  - "*In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 11 to calculate the*

parameter $EG_{PJ,y}$): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity"

- The project is a wind power plant, therefore it is neither a hydro power plant nor a biomass fired power plant, according to:
  - "*In case of hydro power plants, one of the following conditions must apply:"* is not applied
  - "*The methodology is not applicable to the following conditions:*"
    - "*Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m^2.*"
    - "*Biomass fired power plants*"
- The project activity does not involve switching from fossil fuel at the site of the project activity, according to:
  - The methodology is not applicable to the following conditions: *"Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site*".

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

According to the methodology ACM0002, project boundary is described as "*The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.*"

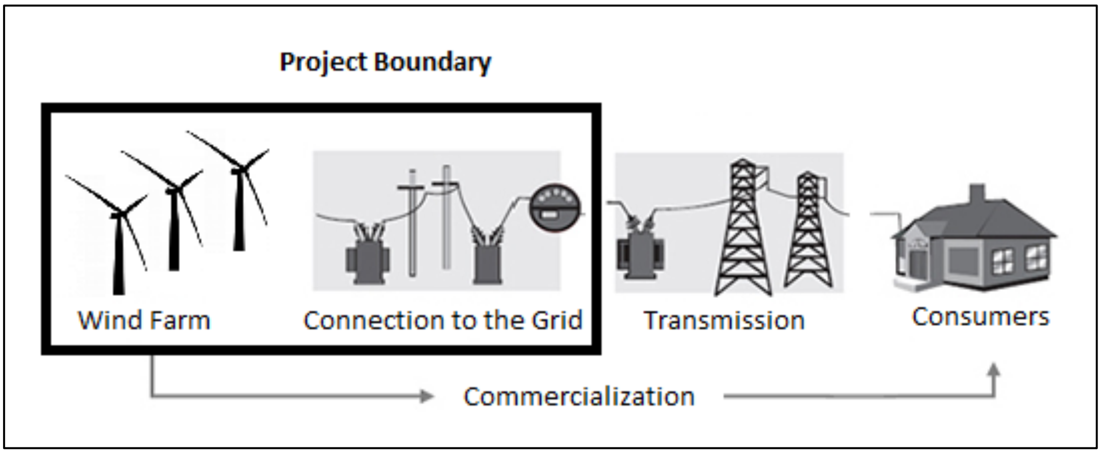
The **Beberibe Project** is connected to the SIN.

On this fact, the Brazilian Designated Authority (DNA), the National Authority designated for the Project Beberibe, published the Resolution 8 on May 26th of 2008[6] which defines the SIN as a single system that covers, according to the National Interconnected Power System Operator (In Portuguese: "Operador Nacional do Sistema – ONS"), four Interconnected Subsystem: the South, Southeast/Midwest, North and Northeast.

[6] The Resolution 8 published on May26th 2008 is available at http://homologa.ambiente.sp.gov.br/proclima/legislacao/federal/resolucao_interministerial/resolucao_n_8_26_maio_2008.pdf

The diagram of the project boundary is presented in the figure below:

Figure 4 – Project boundary



The greenhouse gases and emission sources included in or excluded from the project boundary are presented in the table below:

Table 4 - Emissions sources included in or excluded from the project boundary

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

Justification/ Explanation: The Project Activity is a zero emission wind power generation to all gases.

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

According to the methodology ACM0002, the baseline scenario can be described by:

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 as described in the *"Tool to calculate the emission factor for an electricity system*".

The Combined Margin (CM) emission factor is calculated based on all power plants connected to the SIN and centrally dispatched by the ONS. Based on this generation data, provided by the ONS, the Brazilian Designed National Authority (DNA) commonly calculates emission factors of the SIN according to the "*Tool to calculate the emission factor for an electricity system*" and makes it available to the public at the website[7].

The combined margin emission factor for the SIN will be, therefore, used to calculate the emission reductions as a result of project's implementation.

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

This section is elaborated based on the *"Tool for the demonstration and assessment of additionality"* which defines a step-wise procedure to assess and demonstrate the additionality of the project.

To illustrate the context of the project development and to evidences that the CDM was seriously considered in the decision to proceed with the development and implementation of the project activity, the following table provides an overview of the project's development timeline.

Table 5 – Timeline of Beberibe Project CDM Project

Date	Type of evidence	Evidence/Reference
01/09/2011	Project Activity	CDM potential assessment report developed by BRZ Consultoria Empresarial Ltda.
12/09/2011	**Project Activity / CDM Consideration**	**Shareholders decision to develop Beberibe Project**
21/09/2011	Project Activity	CDM Consultancy agreement between BRZ Consultoria Empresarial LTDA and Beberibe Aeolis

[7] Available at http://www.mct.gov.br/index.php/content/view/74689.html accessed in 18/10/2011

		Geração de Energia Ltda.
18/10/2011	CDM Consideration	CDM Communication - Letter of Prior Consideration to UNFCCC about the decision to develop **Beberibe Project** as a CDM project activity.
18/10/2011	CDM Consideration	Communication to the MCT Interministerial Commission on Global Climate Change - CDM, the Brazilian DNA, about the intention to develop Aeolia 2011 Wind Parks as a CDM project activity.
18/10/2011	CDM Consideration	Receipt confirmation from UNFCCC
01/11/2011	CDM Consideration	Receipt confirmation from DNA Brazil

All documents and evidences were presented to the DOE at the validation.

According to the *Glossary of CDM Terms*, the starting date of the project activity is "*the earliest date at which either the implementation or construction or real action of a project activity begins*" which is commonly the date on when the project participant commits to significant expenses related to the effective implementation or construction of the project activity.

The project has not acquired its equipment or started the construction up to this moment, though it is not possible to state the commissioning date. The commissioning date will be defined after the equipment's and service´s acquisition that will be done after the **Beberibe Project** CDM Validation process by the DOE. Therefore, it demonstrates a real action towards the inclusion of CDM into the **Beberibe Project** before its implementation and construction.

According to the "*Guidelines in the demonstration and assessment of prior consideration of the CDM*" (annex 13, EB62), for projects activities with a starting date on or after 02 August 2008, Project Participants must notify the host country DNA the UNFCCC secretariat of their intention to seek CDM status. Therefore, Project Participants had forwarded the Prior Consideration of the CDM Form (F-CDM-Prior consideration) for the Brazilian Designated National Authority and to the UNFCCC secretariat in October 5th, 2011. The forms and the confirmation are available and were presented to the DOE in the validation process.

According to the "*Tool for the Demonstration and assessment of additionality*", the following steps are necessary to demonstrate and assess Project's additionality:

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

SUB-STEP 1A. Define alternatives to the project activity:

The realistic alternatives to the project activity are:

Alternative 1. Continuation of the current situation of electricity supplied by the SIN.

Alternative 2. The proposed project activity undertaken without being registered as a CDM project activity

SUB-STEP 1B. Consistency with mandatory laws and regulations:

The alternatives mentioned above are in compliance with all mandatory laws and regulations defined by the following official entities: Electricity Regulatory Agency (*Agência Nacional de Energia Elétrica -ANEEL*), ONS, Electric Energy Commercialization Chamber (Câmara de Comercialização de Energia Elétrica – CCEE), Ceará Environmental Agency (*Superintendência Estadual do Meio Ambiente – SEMACE*).

STEP 1 – SATISFIED – Proceed to Step 2

STEP 2. Investment analysis

According to the "*Tool for the demonstration and assessment of additionality*" Project Participants should determine whether the project activity is not:

a. The most economically or financially attractive; or

b. Economically or financially feasible, without the revenues from the sale of certified emission reductions (CER).

To conduct the investment analysis, the following sub-steps must be followed:

SUB-STEP 2A. Determine appropriate analysis method

Option I – Simple Cost Analysis – both the CDM project activity and the alternatives identified in Step 1 generate financial and economic benefits other than CDM related income. Therefore, it is not the most appropriate option.

Option II – Investment comparison analysis – the implementation of other technologies of renewable energy generation are not feasible alternatives in the site planned. Therefore, it is not the most appropriate option.

Option III – Benchmark analysis – according to "Guidelines on the assessment of investment analysis" paragraph 19, this is the most appropriate method to demonstrate the additionality of the proposed CDM Project Activity once 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 / economic indicator for the project activity is the Equity Internal Rate of Return (Equity IRR) calculated in the project cash-flow in real terms and it was compared, according with "Guidelines on the assessment of investment analysis", paragraph 8, to the appropriate benchmark of the electric sector, group 1, in Brazil – 11.75%.

SUB-STEP 2C. Calculation and comparison of financial indicators

The equity cash flow analysis incorporates all critical techno-economic parameters, assumptions and data that have been presented to the DOE according to "*Tool for the demonstration and assessment of additionality*". The spreadsheet used to calculate the Net Present Value has also been provided to the DOE.

General Features of the Investment Analysis and calculation of the Financial Indicator

Period of assessment: The cash flow considers an economic plant lifetime of 20 years which is in line with the operational lifetime of the wind turbines as stated by Braselco. (Brazilian consulting company to the project). According to the "*Guidelines on the Assessment of Investment Analysis*", Version 05, paragraph 03, a maximum period of 20 years will be appropriate.

Fair value of project activity assets at the end of the assessment period: In accordance with local accounting regulations, UC 590, page 209, Manual of Power Sector Asset Control published by the ANEEL[8] (In Portuguese: "Aneel – Agência Nacional de Energia"), the wind turbine depreciation is 5% p.a. therefore the fair value of project asset at the end of the assessment period is zero.

Depreciation: the period of depreciation of the assets is also 20 years according to orientations from the Manual of Power Sector Asset Control (In Portuguese: "*Manual de Controle Patrimonial do Setor Elétrico*"), published by the ANEEL. Because it is an accounting item which does not involve disbursements, depreciation has been deducted for tax calculations and added to net profit for purposes of equity cash flow IRR calculation.

Equity IRR Calculation: The purpose of Equity IRR is to determine the final return to the initial equity investment. This way, the Equity IRR calculation considers only the amount of equity investment as a cash outflow, once the debt service cost (interest and principal) is already considered as an expense, which shall not be counted twice.

Nature of the Cash Flow: The cash flow to equity analysis has been performed in real terms, i.e. without considering the impact of inflation, and after payment of taxes. The resulting financial indicator therefore is a post-tax equity IRR given in real terms and therefore compatible with the benchmark defined above.

---

[8] Available at www.aneel.gov.br/cedoc/aren2009367_2_primeira_Ver.pdf accessed in 13/10/2011

Sectorial Policies E-

In its twenty second meeting and referring to its decisions from EB 16, the CDM Executive Board reaffirmed that national and/or sectorial policies and circumstances are to be taken into account on the establishment of a baseline scenario, without creating perverse incentives that may impact host Parties' contributions to the ultimate objective of the Convention. Accordingly the Board agreed to define E policy as:

"National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs)"

Further the Board agreed that such policies should be addressed as follows:

E- Policies "that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account in developing a baseline scenario (i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectorial policies or regulations being in place).

Accordingly, the Additionality Tool includes a footnote to the calculation of financial indicators in investment analysis, which states that the inclusion of subsidies in investment analysis is subject to the guidance on such policies.
The importance of this concept has been reinforced by the CMP 5 in Copenhagen affirmed "it is the prerogative of the host country to decide on design and implementation of policies to promote low greenhouse gas emitting technologies; and the Executive Board shall ensure that its rules and guidelines do not create perverse incentives for emission reduction efforts.

According to the summary provided in sub-step 1.b, the current Brazilian energy regulations effectively offer a set of regulatory and economic incentives that aim at promoting renewable electricity sources to guarantee country's electricity expansion based on renewable and low carbon emitting technologies.
The focus on the development of non-conventional renewable sources and structuring hydropower projects was consolidated in the energy sector mitigation strategy presented by the Brazilian Government's Communication to UNFCCC during the CMP5 in December 2009, which was later endorsed by the Climate Change National Policy Law (Law 12.187 from 29 December 2009) and its Regulation Decree 7.390 from 09 December 2010. These two legal instruments established the necessary regulatory environment for the adoption of Nationally Appropriate Mitigation Actions (NAMAs) and confirmed the CDM as an important mechanism to achieve Brazilian's voluntary emission reduction targets. As a preparation for the publication of Regulation Decree 7.390, the Energy Research Company (Empresa de Pesquisa Energética – EPE) launched a detailed GHG abatement plan for the energy sector, which also emphasized the relevance of CDM, and the incentives provided by the BNDES for a cleaner expansion of the Brazilian energy matrix.

The existence of these incentives requires their adequate treatment in the additionality assessment and specifically in the investment analysis. For this purpose the following paragraphs identify and discuss the relevant regulations and define their treatment according to the rules and principles defined by EB 22.

Policy E- #01- Reduction of the Transmission Fee (Taxa de Uso do Sistema de Transmissão – TUST) for Complementary Renewable Energy sources.

Through Resolution N°77, of 18 August 2004[9], ANEEL established a discount of 50% of the applicable transmission fee for complementary renewable energy projects, such as wind power generation projects, with installed capacity injected in the grid lower or equal to 30,000 kW.

This sectorial policy was established on 18 Aug 2004, and therefore after 11 November 2001. Thus it represents a "comparative advantages to less emissions-intensive technologies over more emissions intensive technologies" and classifies as E- policy. Accordingly the incentive shall not be considered for the baseline scenario and the investment analysis, taking into consideration the "hypothetical situation without the national and/or sectorial policies or regulations being in place".

Policy E- # 02 – Financing Conditions offered by the National Bank for Economic and Social Development (BNDES – Banco Nacional de Desenvolvimento Econômico e Social)

The BNDES has historically[10] played a fundamental role in the implementation of the governmental policies for economic development by providing a long-term financing for private sector investments in general infrastructure and specifically in the national electricity sector.

In the years after the privatization of the electric sector and especially after the launch of the new regulatory model of the sector, BNDES' key priority was financing the expansion of the energy supply and consequently assuring security of supply and unconstrained economic growth. During this period the bank did not have a general policy to offer different conditions for any kind of electricity source, apart from its limited activity in the PROINFA program where differential financing conditions were applied.

Now as from 2007 and in light of the increasing participation of fossil fueled thermal power plants, the BNDES started to revise its policy by differentiating financing conditions with a clear objective to promote renewable and low GHG intensive energies in the detriment of coal and oil fired thermal power plants.

The bank's central role shall be assessed in the context of the Brazilian Climate Change Policy. The fact that BNDES is an instrument of Brazilian policy and, specifically, of the Climate Change Mitigation Policy[11] (Política Nacional de Combate às Mudanças Climáticas) is referenced by the Climate Change National Plan (Plano Nacional de Mudanças Climáticas) and by the Climate Change National Policy Law

---

[9] ANEEL (2004). Normative Resolution n° 77, 18 August 2004. Available at: http://www.aneel.gov.br/cedoc/ren2004077.pdf. Last accessed: March 2012

[10] Lage de Sousa (BNDES) and Ottaviano (Bolonha University): The effects of BNDES loans on the productivity of Brazilian manufacturing firms, July 2009, available at http://bibliotecadigital.fgv.br/ocs/index.php/sbe/EBE09/paper/view/1023/354, last accessed on March 6th, 2012

[11] This plan cited directly in the page 115 a summary financing lines, found and BNDES financing instruments related the climate changes combat. The PNMC is available at: http://www.dialogue4s.de/_media/Brazil_National_Climate_Change_Plan.pdf. Accessed on March 8th, 2012

(Política Nacional Sobre Mudança do Clima – PNMC)[12]. The specific activity in the electricity sector is further referenced by the Energy Research Company (EPE – Empresa de Pesquisa Energética), institution related to the Brazilian Ministry of Mines and Energy, which has issued the policy paper "Abatement of GHG emissions due to the production and use of energy in Brazil up to 2020". The publication clearly describes the importance of the BNDES to implement the Brazilian mitigation policies and to pursue a clean expansion trajectory in the energy sector.

In order to analyze the evolution of the operational policies which define the financing conditions offered by the BNDES, it is necessary to understand the individual items which compose the financial conditions offered by the bank:

Total financing cost = financing cost + basic spread + credit spread risk

Where:

- Financing cost - corresponds to the actual cost of BNDES financing, in other words, it is the interest actually paid by the bank to obtain funds necessary to its operations. This cost is primarily defined by the remuneration of the long-term interest rate (TJLP) released by the Brazilian Ministry of Finance.
- BNDES Basic Spread – represents the standard return required by BNDES to finance a specific investment. It is the main political tool for financing since it allows the bank to fix remuneration according to its priorities and strategies.
- Credit Risk – represents the risk spread required to remunerate the bank for incurring the credit risk of a certain project. As such, it reflects the perception of the creditor's (investors) insolvency risk on the basis of the evaluation of the project's cash flow and the capability to provide additional guarantees. Consequently, this is a project specific variable defined on the basis of the technical terms and not subject to any specific policy.

As can be referenced for all variables presented above, in 2006 and before, the BNDES applied identical conditions and criteria for all energy sources and there was no preference for coal, oil or gas fired thermal sources, neither for renewable sources. This means that Financing Cost, Basic Spread and the criteria for the definition of the Credit Risk Spread as well as period for amortization and maximum participation were always equal for all type of energy sources, regardless of their GHG intensity.

Table 06, below, provides an overview of the conditions applicable in 2006.

In 2007, BNDES then subsequently started to improve financing conditions for the renewable energy sector, first for large hydropower and them, in 2008, for all renewable energy sources and GHG efficient gas cogeneration projects. As a result, the bank increased the rate used for coal and oil thermal to 1.8% and reduced the basic remuneration to other sources with low GHG intensity, such as wind power plants and small and medium-sized hydroelectric plants, to 0.9%.

---

[12] Article 6º of Law 12,187 that Climate Change National Policies establishing.

In addition, the operational policy of BNDES defined a financial cost of funding of 100% TJLP for GHG efficient energy and renewable sources, while coal and oil fueled power plants are financed on the basis of a mix of 50% TJLP and 50% TJ-452[29]. According to data provided by the BNDES website, the TJ-452 is equal to TJLP + 1%[30], resulting in a slightly higher financial cost.

On the other hand, there is no difference in credit risk rates between the different types of technologies. These rates vary depending on the specific project and are not directly related to the incentive policy of the bank.

The following table represents the evolution of the financing conditions provided by the BNDES.

Table 6 - Evolution of BNDES Financing Condition (2006-2010)

Analysis Component	Evolution of BNDES policies and comparative advantages to Electricity Sources less GHG emissions intensive	
	2006	**2010**
Financing Cost		
BNDES financing cost for GHG intensive energy sources	80% TJLP and 20% IPCA (NTN-B)	50% TJLP and 50% TJ-452
BNDES financing cost for GHG efficient energy sources	80% TJLP and 20% IPCA (NTN-B)	100% TJLP
Comparative advantages for GHG efficient energy sources	**0**	100% TJLP
BNDES Remuneration		
BNDES remuneration for GHG intensive energy sources	1.5%	1.8%
BNDES remuneration for GHG efficient energy sources	1.5%	0.9%
Comparative advantages for GHG efficient energy sources	0%	0.9%
Credit Risk		
Credit risk for GHG intensive energy sources	Calculated according credit risk, of 0.8% to 1.8%	Calculated according credit risk, of 0.46% to 3.57%
Credit risk for GHG efficient energy sources		
Comparative advantages for GHG efficient energy sources	**0**	**0**

Source: Based on Siffert Filho (2006, 2007 and) and BNDES

The result of the best conditions offered by BNDES since 2007 was the increased participation of renewable energy projects and, for the first time, the participation of Wind Energy outside of the PROINFA, as initiated by the successful Reserve Auction in December 2009.

Due to the structural capital intensity of renewable energy sources the financing policy defined by the BNDES and the resulting comparative advantage gained by clean and renewable generation sources, together with the revenues from the Clean Development Mechanism have an important role in the expansion trajectory of the Brazilian energy matrix. The results obtained show that the Brazilian mitigation strategies as defined in reference documents such as PNE 2030, the National Climate Change Plan and the "Abatement of GHG Emissions due to the production and use of energy in Brazil up to 2020". Further they are fully in line with the national communication that was provided to the UNFCCC as part of the Copenhagen accord and the applicable national legislation which defines the National Policy on Climate Change, as they all defined that the CDM shall continue to be a complementary tool for the implementation of the mitigation policies and for the achievement of the voluntary GHG reduction targets (Brazilian NAMAs).

Thus, in the case of the financing conditions provided by BNDES, the comparative advantage offered for less GHG intensive energies is the lower cost of debt in comparison with the cost for financing more GHG intensive energies, which is measured by the difference between the respective rates. Consequently, the comparative advantage presented by the policy can be eliminated from the financial analysis through the use of the financing conditions offered by BNDES to more GHG intensive technologies

Following the requirements of the Additionality Tool and the guidelines of the CDM Executive Board for E- policy, project developers excluded the subsidies offered to less GHG intensive technologies by the BNDES by assuming financing conditions offered to GHG intensive technologies. With this adjustment, it is possible to ignore the effect of comparative advantage that is provided by the Brazilian Government for projects that contribute to the ultimate goals of UNFCCC.

The following table compares the different financing conditions as offered by the BNDES.

Table 7 - Main Differences between conditions to intensive and efficient GHG energies sources

Conditions	Conditions for GHG efficient energy sources	Conditions for GHG intensive energy sources	Conditions applied to the CDM Project investment analysis
Financing Cost	100% TJLP	50% TJLP + 50% TJ-452	50% TJLP + 50% TJ-452
BNDES Remuneration	0.9% per year	1.8% per year	1.8% per year

Assumptions used in the Cash Flow

Table 8 – Assumptions used in the cash flow analysis

Parameter / Unit	Description	Value
Installed Capacity (MW)	Based on optimized project design of the wind farms.	121.1 MW

Plant Load Factor*[13]	The Plant Load Factor is the relation of available output capacity per installed capacity.	30.06% on average
Available energy for sale (MWh / year)	According to the "*Guidelines for the reporting and validation of plant load factors*", the electricity generation was projected on the basis of the Plant Load Factor of each individual Wind Power Plant determined by Braselco, a wind specialized consulting company. The available energy for sale was certified by Megajoule in 13/04/2011 and also by ANEEL.[14]	318,984 MWh
Loan	BNDES remuneration for GHG intensive energy sources (Type E-policy)	1.8%
Loan	BNDES financing cost for GHG intensive energy sources (Type E-policy)	50% TJLP and 50% TJ-462 [15] that totals 6.5% p.a.
Loan	Credit risk for GHG intensive energy sources	Calculated according credit risk, from 0.46% up to 3.57%. It was considered 1% that is half of the average as to be conservative.
PPA price (R$[16]/MWh)	Energy can be sold in the governmental auction planned for December 2012 or later and the price considered was the last auction realized in August 2011	R$99.58[17]
IPI	IPI is a tax over industrialized products. Since 2009 the federal government agreed to exempt wind turbines from pay IPI. Considering this policy creates incentives for less GHG emission intensive technology (Type E- policy), the exemption was not considered.	Commercial Proposal for the equipment's supply does not include IPI tax.

[13] All winds farms used the plant load factor of Beberibe I, equal to 30.06%(according to the explanation in section A.4.3. Table 2)

[14] All documents are available and were presented to the DOE at the validation

[15] Available at http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Produtos/FINEM/energia_eletrica_geracao.html accessed on 18/10/2011

[16] Reais is the Brazilian currency, Exchange rate estimated in 1.8265 available at: http://www4.bcb.gov.br/pec/taxas/batch/taxas.asp?id=txdolar

[17] Available at http://www.epe.gov.br/leiloes/Paginas/Leil%C3%A3o%20de%20Energia%20A-3%202011/Leil%C3%A3odeenergiapara2014contrata51usinas,somando2744MW.aspx?CategoriaID=6734 accessed on 18/10/2011

TFSEE (R$/kW)	Defined by Aneel[18]	385.73
Investment / Capex (R$ MM)	Quotations from Suzlon	To be disclosed during the validation
Land Lease (% gross revenue)	According to contract established with land owners.	1.6%
Operation and Maintenance costs (R$ / MW)	Budgeted according to Suzlon's recommendations	Year 1 – 3 = R$0 / MW Year 4 – 10 = R$95,002.86 / MW
PIS/COFINS	Based on presumed profit[19]	3.65%
TUSD – G (R$ / KWh month)	Defined according to Aneel, Resolution 968 of April 19th[20], 2010 and Resolution 1,141 of April 19th, 2011[21].	From 2012 up to 2031 – 6.46
Income Tax	Income Tax based on the presumed profit	Up to 240,000 – 15% More than 240,000 – 25%
Social contribution	9% of the gross revenue basis[22]	9%

Investment Analysis results

The Equity Internal Rate of Return, in real terms, resulting of the cash flow elaborated based on the assumptions doesn't exist or is negative.

The investment analysis was conducted according to option III of the *"Tool for the demonstration and assessment of additionality"* and the result shows that project's financial indicator is less favorable than the benchmark. Consequently it can be concluded, that the Project Activity without CDM revenues cannot be considered as financially attractive.

SUB-STEP 2D. Sensitivity analysis

Table 9 - Sensitivity Analysis of the Beberibe Project

ELECTRICITY PRICE VARIATION	ENERGY VOLUME VARIATION

[18] Available at http://www.aneel.gov.br/cedoc/dsp20104080.pdf and http://www.aneel.gov.br/cedoc/dec19972410.pdf accessed in 13/10/2011

[19] Available at http://www.receita.fazenda.gov.br/pessoajuridica/dipj/2000/orientacoes/determinacaolucropresumido.htm accessed in 20/10/2011

[20] Available at http://www.aneel.gov.br/cedoc/reh20111141.pdf accessed in 20/10/2011

[21] Available at http://www.aneel.gov.br/cedoc/reh20111141.pdf accessed in 20/10/2011

[22] Available at http://www.planalto.gov.br/ccivil_03/leis/L7689.htm access in 20/10/2011

Scenario	Scenario	Equity IRR	Equity IRR
0%	n/a	**0%**	n/a
10%	0%	**10%**	0%
-10%	n/a	**-10%**	n/a
CAPEX VARIATION		**O&M COST VARIATION**	
Scenario	**Scenario**	**Equity IRR**	**Equity IRR**
0%	n/a	**0%**	n/a
10%	n/a	**10%**	n/a
-10%	-1.13%	**-10%**	-2.44%

The sensitivity analysis was carryout by altering the most relevant and possible variables in the project that could affect its result. Those parameters were also selected as being the most likely to fluctuate over time. And constitute more than 10% of either project costs or total revenues, according to "Guidelines on the assessment of investment analysis".

a. The energy price

b. The volume of energy generated

c. The CAPEX

d. The O&M cost (OPEX)

The Energy Price

The wind power project's revenue depends solely on two factors: the electricity generated and the electricity sales price. The sales price will hardly change over the time according to the last auctions.

With regards to the price, for the purpose of investment analysis, the average price of the last auction prior to the time of the investment decision was used for the cash flow projection. Although the project is exposed to price changes, especially due to the auctions results, it must be assumed that the energy price will hardly change in the PPA Establishment. Consequently the average price achieved before the investment decision of our project activity is an appropriate reference for the present evaluation.

Looking at the data above, it is notably unlikely that the scenario of Energy Price will be consistently 10% above those projected in the investment analysis. Now even if this would occur for an unexpected reason, effective revenue of 61.77% above the one projected is necessary to achieve the benchmark. In other words, the price would have to be on average 61.77% above the value projected for the entire lifetime of the project activity. These calculations demonstrate that it is very unlikely that variations in the revenue could lead to profitability above the equity IRR benchmark defined.

The Volume of Energy

Regarding to the volume of energy generated the project incurs in significant uncertainties and risk. According to information provided by Eletrobrás[23], in 2009 and 2010 the performance of the wind power generation projects of the PROINFA (41 out of 49 wind power projects in operation in the country participate in the program as it will be shown in the common practice analysis section) is significantly below the volume of energy expected and sold under the PROINFA by these investments. Such underperformance is a material risk in the PPA contracts.

Looking at the data above, it is notably unlikely that the scenario of revenue generation will be consistently 10% above those projected in the investment analysis. Now even if this would occur for an unexpected reason, effective revenue of 61.77% above the one projected is necessary to achieve the benchmark. In other words, the volume of electricity sold would have to be on average 60.33% above the value projected for the entire lifetime of the project activity. These calculations demonstrate that it is very unlikely that variations in the revenue could lead to profitability above the equity IRR benchmark defined.

The CAPEX

Infrastructure investments are prone to cost overruns due to unforeseen events, while significant cost savings are not very common. Consequently, a sensitivity of 10% reduction in capital expenditure is a reasonably conservative assumption in the context of the CDM. Under such a scenario, the equity IRR would increase, but not reach the benchmark. This would only occur if the CAPEX were 54.01% below the original projections, which is not a realistic scenario due to the fact that main construction and equipment supplying proposals have already been received. On the other hand, an increase in 10% in the capital invested, which is a much more probable scenario, would further deteriorate the Project's IRR as expected in the base case.

The O&M cost (OPEX)

The operational costs include Transmission Costs, sectorial taxes, costs for Operation &Maintenance, regular overhaul and land lease expenses. The result of the sensitivity analysis shows that a 10% reduction in all these costs when compared to the base case assumption would not materially affect the Project's return. In fact even if zero operational costs would be assumed, this would not elevate the Project IRR to the required benchmark.

The sensitivity analysis shows that the **Beberibe Project** is not financially attractive, because its equity internal rate of return (IRR) is lower than the benchmark in all scenarios analyzed.

The "*Tool for demonstration and assessment of additionality*" indicates that:

- "If after the sensitivity analysis it is concluded that the proposed CDM project activity is unlikely to be the most financially attractive (item 2.c – 8.a) or is unlikely to be financially attractive (item 2c-8b), then proceed to Step 4 (Common practice analysis)."

---

[23] Available at http://www.eletrobras.com/elb/data/Pages/LUMISABB61D26PTBRIE.htm#Dados accessed in 13/10/2011 - Annual Plan of the PROINFA – PAC 2011.

This way, as the sensitivity analysis showed that the proposed activity is not attractive from a financial point of view, it must proceed to Step 4 (Common Practice Analysis).

STEP 2 – SATISFIED – Proceed to Step 4

STEP 3. Barrier Analysis

SUB-STEP 3A. Identify barriers that would prevent the implementation of type of the proposed project activity

Not applicable: Step 2 determined projects additionality

SUB-STEP 3B. Show that the identified barriers would not prevent the implementation of at least one of the alternatives

Not applicable: Step 2 determined projects additionality

STEP 3 – NOT APPLICABLE - Proceed to Step 4

STEP 4. Common practice analysis

SUB-STEP 4A. Analyze other activities similar to the proposed project activity

According to the Guidelines on common practice, version 1, EB63, annex 12, a proposed project activity is considered a "Common Practice" within a sector in the applicable geographical area if the factor F ($F=1-N_{diff}/N_{all}$) is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3.

The guideline also suggests a stepwise approach based on 4 (four) steps to perform the Common Practice Analysis that are the following:

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

Project Activity: 121.1 MW

Output Range as +/-50% of the Project Activity: **from 60.55 MW up to 181.65 MW**

STEP 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project.

Note: number N_{all}. Registered CDM project activities shall not be included in this step;

According to the guideline, the applicable geographical area covers the entire host country as a default. **Beberibe Project** will be connected to the SIN, thus the boundary to identify similar activities in the host country is the Brazilian interconnected grid.

Therefore, projects from 60.55 MW to 181.65 MW, connected to the SIN, are considered and mentioned in the Table below:

Table 6 – Projects registered at ANEEL with more from 60.55 MW up to 181.65 MW[24]

Wind Power Plant	Output MW
Parque Eólico Elebrás Cidreira 1	70
Praia Formosa	105

According to the Step 2, registered CDM project activities shall not be included in this analysis and the following CDM Project Activities were identified as follows:

- Praia Formosa
  - http://cdm.unfccc.int/Projects/Validation/DB/AI2PYN6O2DPDHCZWPCI6KLWF2UZ9S0/view.html

The remaining Wind Power Plants with similar characteristics to Beberibe Project mentioned in the previous criterion analyze based on this STEP is:

- Parque Eólico Elebrás Cidreira 1

Therefore, N_{all} = 1.

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

However, governmental subsides and incentives from PROINFA were received by Parque Eólico Elebrás Cidreira 1 according to PROINFA database. As previously described, the Program for the Support of Alternative Energy Sources (is a federal government program that defined attractive feed in tariffs for investments in complementary energies such as biomass, small hydropower and wind energy. Hence, this project have only been materialized with special contractual arrangements, improved financing conditions and privileged access to the wind technology, which was still an incipient technology option at that moment in time. Therefore, the mentioned project is different from Beberibe Project Activity.

$N_{diff} = 0$

Step 4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

[24] Available in http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoGeracaoTipo.asp?tipo=7&ger=Outros&principal=E%C3%B3lica. Accessed in 05/01/2012.

$$F = 1 - \frac{N_{diff}}{N_{all}}$$

$$F = 1 - \frac{0}{1}$$

$$F = 1$$

As a conclusion, the proposed project activity would be considered as "common practice" within a sector in the applicable geographical area if the factor F was greater than 0.2 and N_{all}-N_{diff} is greater than 3.

As $N_{all} - N_{diff} = 1 - 0 = 1$

Therefore, we conclude that the project activity is not a "common practice".

Table 10 - Characteristics and exclusion criteria of the Wind Power Plants in operation in Brazil

Wind Power Plant	Output MW	CDM	In the range from 60.55 MW up to 181.65 MW
Parque Eólico Elebrás Cidreira 1	70		X
Praia Formosa	105		X
Cerro Chato II	30	X	
Eólica Praias de Parajuru	29	X	
Foz do Rio Choró	25	X	
Mangue Seco	26	X	
Mangue Seco 1	26	X	
Parque Eólico de Beberibe	26	X	
Praia do Morgado	29	X	
Gargaú	28	X	
Cerro Chato III	30	X	
Eólica Icaraizinho	55	X	
Parque Eólico de Osório	50	X	
RN 15 - Rio do Fogo	49	X	
Albatroz	5		
Alegria I	21		
Alhandra	6		
Atlântica	5		
Camurim	5		
Caravela	5		
Coelhos	5		
Coelhos II	5		
Coelhos III	5		
Coelhos IV	5		
Eólica Água Doce	9		
Eólica Canoa Quebrada	11		
Eólica de Bom Jardim	1		
Eólica de Prainha	10		
Eólica de Taíba	5		

Wind Power Plant	Output MW	CDM	In the range from 60.55 MW up to 181.65 MW
Eólio - Elétrica de Palmas	3		
Fazenda Rosário	8		
Fazenda Rosário 3	14		
Gravatá Fruitrade	5		
IMT	2		
Lagoa do Mato	3		
Macau	2		
Mandacaru	5		
Mataraca	5		
Millennium	10		
Mucuripe	2		
Parque Eólico de Palmares	8		
Parque Eólico do Horizonte	5		
Pedra do Sal	18		
Pirauá	5		
Presidente	5		
Santa Maria	5		
Santo Antônio	3		
Taíba Albatroz	17		
Ventos do Brejo	6		
Vitória	5		
Xavante	5		
Canoa Quebrada	57		
Eólica Paracuru	25		
Parque Eólico dos Índios	50		
Parque Eólico Enacel	32		
Parque Eólico Sangradouro	50		
Púlpito	30		
Rio do Ouro	30		
Volta do Rio	42		
Bons Ventos	50		

B.6. Emissions reductions

B.6.1. Explanation of methodological choices:

Emission Reductions (ERy)

According to ACM0002 emission reductions by the proposed project activity are calculated as follows:

(Equation 1) $ER_y = BE_y - PE_y$

Where:

$\mathbf{ER_y}$	=	Emission reductions in year *y* (t CO_2e/yr)
$\mathbf{BE_y}$	=	Baseline emissions in year *y* (t CO_2/yr)
PE_y	=	Project emissions in year *y* (t CO_2e/yr)

Baseline emissions (BEy)

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 all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

(Equation 2) $\mathbf{BE_y = EG_{PJ,y} \times EF_{grid,CM,y}}$

Where:

$\mathbf{BE_y}$	=	Baseline emissions in year *y* (tCO_2/yr)
$\mathbf{EG_{PJ,y}}$	=	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)
$\mathbf{EF_{grid,CM,y}}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

In Greenfield projects, as the proposed project activity, the $\mathbf{EG_{PJ,y}}$ is determined as follows:

(Equation 3) $\mathbf{EG_{PJ,y} = EG_{facility,y}}$

Where:

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

The Quantity of net electricity generation supplied by the project plant/unit to the grid ($\mathbf{EG_{facility,y}}$) was estimated below in section B.6.3.

Regarding $\mathbf{EF_{grid,CM,y}}$, provided by the Brazilian DNA was used to provide the operating margin emission and the build margin emission factors by dispatch analysis by using the "*Tool to calculate the emission factor for an electricity system*.". Moreover, in case the Brazilian DNA discontinues the publication of these data during the monitoring period, they will be calculated by the project participants.

The 6 steps recommended by "*Tool to calculate the emission factor for an electricity system",* are discussed below:

STEP 1: Identify the relevant electricity systems

According to the tool, "*If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. If this information is not available, project participants should define the project electricity system and any connected electricity system, and justify and document their assumptions in the CDM-PDD.*"

The Brazilian Designated Authority (DNA) published the Resolution 8 on May 26th of 2008[25] which defines the SIN as a single system that covers, according to the ONS, four Interconnected Subsystem: the South, Southeast/Midwest, North and Northeast. Based on it, the baseline emission factor of the grid was calculated.

STEP 2: Choose whether to include off-grid power plants in the project electricity systems

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

Option I: Only grid power plants are included in the calculation.

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

The option I was chosen for the project activity, once the Operation Margin and Build Margin emission factor calculated by the Designated Brazilian DNA or alternatively calculated by the project developer are based on the data of plants connected to the grid.

STEP 3 - Select a method to determine the operating margin (OM)

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

(a) Simple Operation Margin; or

(b) Simple adjusted Operation Margin; or

(c) Dispatch data analysis Operation Margin; or

[25] Available at http://homologa.ambiente.sp.gov.br/proclima/legislacao/federal/resolucao_interministerial/resolucao_n_8_26_maio_2008.pdf accessed in 15/10/2011

(d) Average Operation Margin.

- The Simple Operating Margin can only be used where low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of 5 most recent years, or 2) based on long-term normal for hydroelectricity production. The Table 9 shows the share of hydroelectricity in the total electricity production for the SIN. However, the results show the non-applicability of the simple operating margin to the proposed CDM Project Activity.

Table 11 – Share of hydroelectricity generation in the SIN

Year	Share of Hydraulic Electricity
2011	91%
2010	87%
2009	93%
2008	87%
2007	92%
2006	91%

Source: ONS / Operador Nacional do Sistema: Histórico de Geração, 2011. Available at http://www.ons.org.br/historico/geracao_energia.aspx accessed in 13/10/2011

The method chosen to the calculation Operation Margin emission factor of the Wind Power Plant is the dispatch data analysis operation margin method.

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

The method chosen for the calculation of the operation margin emission factor of the Beberibe Wind Farm is the Dispatch Data Analysis Operation Margin method calculated on an ***ex-post*** basis for the operation margin.

The Brazilian DNA conducts the ex-post Emission Factor OM ($\mathbf{EF_{grid,OM-DD,y}}$), as previously stated, in accordance with the dispatch data provided by the ONS, which will be used in the calculation.

Dispatch data OM emission factors for 2010 will be used for an ***ex-ante*** estimation of CERs that will be generated as a result of project's implementation. All data used to calculate the operating margin emission factor are available in the annex 3 of this PDD.

Step 5: Calculate the build margin emission factor

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

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

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ***expost***, 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, the built margin emission factor calculated for the second crediting period should be used.

The option that was chosen by project participants was Option 2.

The build margin emission factor is calculated by Brazilian DNA and in case the Brazilian DNA discontinues the publication of these data during the monitoring period, the required data will be calculated by the project participants.

Build Margin emission factor for 2010, as published by the Brazilian DNA[26], will be used for an ***ex-ante*** estimation of CERs that will be generated as a result of project's implementation. The 2010 data vintage was adopted for build margin calculation as they are the latest data available.

Step 6: Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor ($\mathbf{EF_{grid,CM,y}}$) is based on one of the following methods:

(a) Weighted average Combined Margin; or

(b) Simplified Combined Margin.

Beberibe Wind Farm project activity used option (a) to calculate the combined margin emission factor.

The combined margin emission factor is calculated according to the following equation:

(Equation 4)

$$\mathbf{EF_{grid,CM,y}} = \mathbf{EF_{grid,OM,y}} \times \boldsymbol{W_{OM}} + \mathbf{EF_{grid,BM,y}} \times \boldsymbol{W_{BM}}$$

[26] Available at: http://www.mct.gov.br/index.php/content/view/74689.html accessed in 15/10/2011

Where:

$\mathbf{EF_{grid,CM,y}}$	=	Combined margin (CM) emission factor in year *y* (tCO2/ MWh)
$EF_{grid,OM,y}$	=	Operating margin CO2 emission factor in year y (tCO2/MWh);
$\boldsymbol{W_{OM}}$	=	Weighting of operating margin emissions factor (%)
$\mathbf{EF_{grid,BM,y}}$	=	Build margin CO2 emission factor in year *y* (tCO2/ MWh)
$\boldsymbol{W_{BM}}$	=	Weighting of build margin emissions factor (%)

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}:

- Wind and Solar power generation project activities: $\boldsymbol{W_{OM}}$ = 0.75 and $\boldsymbol{W_{BM}}$ = 0.25 for the first crediting period and for subsequent crediting periods;

This way, for Beberibe Aeolis Wind Farm was adopted the following weights:

- $\boldsymbol{W_{OM}}$ = 0.75
- $\boldsymbol{W_{BM}}$ = 0.25

Project emissions (PEy) in year y (tCO_2e/yr)

According to the methodology adopted, for most renewable power generation project activities, PEy = 0. However some project activities may involve project emissions that can be significant. These emissions shall be accounted as project emissions by using the following equation:

(Equation 5)

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

$\mathbf{PE_y}$	=	Project emissions in year *y* (tCO_2e/yr)
$\mathbf{PE_{FF,y}}$	=	Project emissions from fossil fuel consumption in year *y* (tCO_2/yr)
$\mathbf{PE_{GP,y}}$	=	Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e/yr)
$\mathbf{PE_{HP,y}}$	=	Project emissions from water reservoirs of hydro power plants in year *y* (tCO_2e/yr)

Emissions from fossil fuel combustion ($PE_{FF,y}$)

According to the methodology, only geothermal and solar thermal projects have to account emissions from the consumption of fossil fuels. Therefore, in the case of the proposed project activity, $PE_{FF,y}$ = 0 tCO_2/year.

Emissions from the operation of geothermal power plants due to the release of non-condensable gases ($PE_{GP,y}$)

Considering that the proposed project activity consists on the construction of a wind power plant, there are no emissions related to non-condensable gases from the operation of geothermal power plants. Therefore, $PE_{GP,y}$= 0 tCO_2/year.

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

New hydro electric power projects resulting in new reservoirs, shall account for CH_4 and CO_2 emissions from reservoirs. Considering that the proposed project activity consists of the construction of a wind power plant, there are no emissions from water reservoirs. Therefore, $PE_{HP,y}$ = 0 tCO_2/year.

Leakage calculation (LE_y)

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

Therefore, leakage emissions related to the implementation of the proposed project activity are 0 tCO_2.

For Beberibe Wind Farm $PE_{FF,y}$, $PE_{GP,y}$, $PE_{HP,y}$and LE_y are zero, therefore, the project do not generate any associated project emissions.

As a conclusion, the emission reductions generated by the project activity are calculated as the simple product between the quantity of net electricity supplied by the project to the grid and the combined margin emission factor, where the operating margin emission factor will be calculated according to the Dispatch Data Analysis operation margin and the build margin emission factor, both of them updated annually (ex-post).

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

According the consolidated baseline methodology ACM0002, there are no data and parameters available at validation for Wind Power Plants.

The following parameters were used on an ex-ante basis:

Data / Parameter:	$\mathbf{EF_{OM,grid,y}}$
Data unit:	tCO_2/MWh
Description:	Dispatched Data Operation Margin CO_2 emission factor in year *y*
Source of data used:	The daily data for operation margin emission factor of 2010, the last year available, is available at: http://www.mct.gov.br/index.php/content/view/327118.html#ancora.
Value applied:	0.4795
Justification of the choice of data or description of measurement methods and procedures actually applied :	The *ex-ante* calculation vintage of this parameter was chosen as per the procedures of the *"Tool to calculate the emission factor for an electricity system"*.
Any comment:	For methodological choices details, please refer to section B.6.1.

Data / Parameter:	$\mathbf{EF_{BM,grid,y}}$
Data unit:	tCO_2/MWh
Description:	Build Margin CO_2 emission factor in year *y*
Source of data used:	The daily data for operation margin emission factor of 2010, the last year available, is available at: http://www.mct.gov.br/index.php/content/view/327118.html#ancora.
Value applied:	0.1404
Justification of the choice of data or description of measurement methods and procedures actually applied :	The *ex-ante* calculation vintage of this parameter was chosen as per the procedures of the *"Tool to calculate the emission factor for an electricity system"*.
Any comment:	For methodological choices details, please refer to section B.6.1.

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

As previously stated, project activity emissions reduction will be calculated based on equation 1, where both PEy and the Leakage are considered to be 0 (zero). Therefore, the emissions reduction will be calculated according equation 2, as follows:

(Equation 5) $ER_y = BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$

Where:

ER_y = Emission reductions in year *y* (t CO_2e/yr)

BE_y = Baseline emissions in year *y* (t CO_2/yr)

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

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

Table 12 - Net electricity generation by the wind plants of the CDM Project Activity

Project Name	Beberibe I	Beberibe II	Beberibe III	Beberibe IV	Beberibe V	TOTAL
Location	*Beberibe*	*Beberibe*	*Beberibe*	*Beberibe*	*Beberibe*	-
Installed capacity (MW)	27.3	16.1	25.2	25.2	27.3	121.1
Capacity Factor	30.06%	30.06%	30.06%	30.06%	30.06%	-
Assured Power (MW)	8.21	4.84	7.58	7.58	8.21	36.4
EGy (MWh/year)	71,880	42,500	66,358	66,358	71,888	318,984

The quantity of net electricity generation supplied by the project' plant to the grid in year *y* ($EG_{faciclity,y}$ in MWh/yr) was determined, for the purpose of ex-ante estimative as being equal to the installed capacity of each plant multiplied by the capacity factor.

Emission Factor calculation ($EF_{grid,CM,y}$)

According to the "*Tool to calculate the emission factor for an electricity system*", the calculation of the combined margin CO_2 emission factor for grid connected power generation ($EF_{grid,CM,y}$) should follows the steps:

STEP 1 - Identify the relevant electric power system

Following Resolution #8[27], issued by the Brazilian DNA on 26/05/2008, the SIN corresponds to the system to be considered. It covers all the five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest) as presented in the figure below.

---

[27] Available at http://www.cetesb.sp.gov.br/mudancas-climaticas/biogas/Legisla%C3%A7%C3%A3o/www.cetesb.sp.gov.br/mudancas-climaticas/biogas/Legisla%C3%A7%C3%A3o/214- accessed in 20/10/2011

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

Option I was chosen and only grid connected power plants are considered.

STEP 3 - Select a method to determine the operating margin (OM)

The simple adjusted operating margin was chosen method for the calculation of this parameter. Please refer to section B.6.1. for the proper justification.

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

A spreadsheet containing all data used to determine the operation margin is mentioned in Annex 3 and was supplied to the DOE . The result is presented below.

$\mathbf{EF_{grid,OM-adj,y} = 0.4795}$ CO_2e/MWh

STEP 5 - Calculate the build margin (BM) emission factor

The build margin was calculated following the same approach described above in step 4. This parameter will be validated since the *ex-ante* option was chosen. The sample group of power units *m* used to calculate the build margin are identified in the spreadsheet supplied to the DOE which is also attached to the PDD. The result for the build margin emission factor is presented below.

$\mathbf{EF_{grid,BM,y} = 0.1404}$ tCO_2e/MWh

STEP 6 – Calculate the combined margin (CM) emissions factor *EFy.*

According to the equation 4:

(**Equation 4**) $$\mathbf{EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM}}$$

Applying the results presented above in STEPS 4 and 5 above to the Equation 4 we will have the following:

$$\mathbf{EF_{grid,CM,y} = 0.479565 \times 0.75 + 0.1404 \times 0.25}$$

$$\mathbf{EF_{grid,CM,y} = 0.3948}$$

Finally, baseline emissions can be determined by Equation 5:

(Equation 5) $$\mathbf{BE_y = EG_{PJ,y} \times EF_{grid,CM,y}}$$

$$\mathbf{BE_y = 318,984 \times 0.3948}$$

$\mathbf{BE_y = 125,926}$ tCO_2e/MWh

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

Table 13 - Summary of the *ex-ante* Estimation of Emission Reduction

Year	Estimation of project activity emissions (tonnes of CO2e)	Estimation of baseline emissions (tonnes of CO2e)	Estimation of leakage (tonnes of CO2e)	Estimation of overall emission reductions (tonnes of CO2e)
2013	0	125,926	0	125,926
2014	0	125,926	0	125,926
2015	0	125,926	0	125,926
2016	0	125,926	0	125,926
2017	0	125,926	0	125,926
2018	0	125,926	0	125,926
2019	0	125,926	0	125,926
Total (tonnes of CO2e)	**0**	**881,485**	**0**	**881,485**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$\mathbf{EG_{facility\ I,II,III,IV\ and\ V,y}}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant/unit Beberibe I, Beberibe II, Beberibe III, Beberibe IV and Beberibe V to the grid in year *y*
Source of data to be used:	Project Activity Site
Value of data applied for the purpose of calculating expected emission reductions in	The value used to calculate the expected emission reductions is 318,984 MWh/yr. This data was defined accordingly to the Plant Load Factor of the Aeolis Beberibe I Wind Farm

section B.5	
Description of measurement methods and procedures to be applied:	The information can be confronted with information of generation provided by CCEE – Electric Energy Commercialization Chamber. Class 0.2S power meters will be used in accordance with the established grid procedures defined by the ONS and CCEE. Continuous measurement and, at least monthly, recording will be the monitoring frequency.
QA/QC procedures to be applied:	The level of uncertainty of these data is low. They will be used to calculate emission reductions. Data of electricity generation will be monitored by Beberibe Aeolis Geração de Energia and counter-checked with spreadsheets provided by CCEE.
Any comment:	

Data / Parameter:	$\mathbf{EF_{grid,CM,y}}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".
Source of data to be used:	***Ex-post*** emission factor will be calculated by the Brazilian DNA, or by Beberibe Aeolis Geração de Energia or third parties, through ONS data. The variables $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$, necessary for $EF_{grid,CM,y}$ calculation, will also be monitored and calculated through the Dispatch Data of the SIN. In case the Brazilian DNA discontinues the publication of these data during the monitoring period, they will be calculated by the project participants.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The value of Combined Margin CO_2 Emission Factor ($EF_{grid,CM,y}$) which was used for ***ex-ante*** estimation of emission reductions of Beberibe Wind Farm Project is **0.3948,** as per the Brazilian DNA.
Description of measurement methods and procedures to be applied:	As per the "*Tool to calculate the emission factor for an electricity system*".
QA/QC procedures to be applied:	As per the "*Tool to calculate the emission factor for an electricity system*". The uncertainty level for these data is low.
Any comment:	

B.7.2. Description of the monitoring plan:

The Monitoring Plan was elaborated according to the Monitoring Methodology presented in the consolidated baseline methodology for grid-connected electricity generation from renewable sources ACM0002.

Monitoring General Organization

Overall responsibility for the monitoring and reporting activities lies within Beberibe Aeolis Geração de Energia Ltda. The staff allocated for conducting monitoring activities will be directly involved with plants daily operation, supervision of the collection, storage, review and reporting of measured project data and other monitoring activities, such as maintenance, follow-up of calibration procedures and calculation of emission reductions as per this monitoring plan.

Process Description

I – Procedure for Collection of Generation Data:

Measurements of the electricity consumed and generated and provided to the grid will be electronically monitored through the use of on-site metering equipment (bidirectional). The procedure will continuously monitor the electricity consumed and supplied to the grid ($EG_{facility}$) by following up and automatically storing data from the (main and backup) metering devices. Data stored on the meters is also collected by the System of Energy Data Collection (*Sistema de Coleta de Dados de Energia – SCDE*) of CCEE, remotely and automatically through direct access to the meters of the project participant. These collected data are processed in SCDE for electricity accounting by CCEE and are available to all energy market participants.

II – Data Storage:

Generation data will be electronically stored by the Operation Department of Beberibe Aeolis. In order to assure that relevant generation is appropriately and secured stored and, the Information Technology Area will conduct an insurance *backup* for all company`s data through a Data Server *backup.* Following these procedures, Project participants will assure that all relevant data is kept at least 2 years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

III – Procedure for Reporting of Generation Data:

In the first day of each month, the Operation Department will generate a spreadsheet file with generation data. Information of this spreadsheet does not account for losses until the delivery point. Therefore, it can be considered that the spreadsheet provides "gross electricity" data. CCEE reports/invoices provides information regarding electricity after losses. This information will be provided to Beberibe Aeolis team for allowing the calculation of project activity's emission reductions on a monthly basis.

IV – Procedure for Controlling of Generation Data:

The generation data collected and recorded by the project owners can be monthly cross-checked with the energy readings performed by the CCEE. Reports/Invoices of CCEE provides information of "gross electricity", losses until the delivery point and net electricity supplied to the grid. Besides, as an additional QA/QC procedure, generation data can be cross-checked with records for energy sold, if deemed necessary.

V – Meters Accuracy and Calibration Procedures:

Regarding the class of accuracy of energy meters, they will meet all relevant metrological requirements prescribed in Metrological Technical Regulation[28] (In Portuguese: Regulamento Técnico Metrológico – RMT) for Class 0.2 of energy meters, approved by INMETRO[29] (In Portuguese: "Instituto Nacional de Metrologia, Qualidade e Tecnologia".

Calibration of energy meters is regulated by the ONS[30] (In Portuguese: "Operador Nacional do Sistema Elétrico") and shall be conducted by a qualified organization in compliance with national standards and industrial regulations to ensure accuracy. ONS Grid Procedures[31] (Sub-module 12.3) establishes calibration frequency and other maintenance procedures. By the time of completion of this document, the frequency of calibration is a maximum of two years, but in the case of any changes occurred in the ONS Grid Procedures, the project owners shall follow the rules from the relevant sector organizations (e.g. ONS, ANEEL, CCEE).

The plant has two electricity meters (main and backup meters) located at the collector substation and other two metering devices installed at the grid connection point. These two meters located at the grid connection point will register the electricity dispatched to the grid by the Beberibe Project, the five wind power plants that compose the Beberibe Project (Aeolis Beberibe I, Aeolis Beberibe II, Aeolis Beberibe III, Aeolis Beberibe IV and Aeolis Beberibe V).

VI - Emission Factors Calculation:

Beberibe Aeolis Geração de Energia team or third party will be responsible for GHGs emission reductions calculation during the monitoring period of the project, as described in the item B.6.1. For emission factors calculation, it will be used data supplied by the Brazilian DNA. In case the Brazilian DNA discontinues the publication of these data during the monitoring period, they will be calculated by the project participants.

VII - Project Emission Reductions Calculation:

Emission reductions will be monitored monthly by Beberibe Aeolis Geração de Energia Ltda team based on the spreadsheet provided by the operation department. The emission reductions calculation will follow the equations described in this PDD.

---

[28] Available at http://www.inmetro.gov.br/legislacao/rtac/pdf/RTAC000804.pdf accessed in 22/10/2011

[29] Available at http://www.inmetro.gov.br accessed in 04/01/2012

[30] Available at www.ons.org. accessed in 04/01/2012

[31] Available at http://www.ons.org.br/download/procedimentos/modulos/Modulo_12/Submodulo%2012.3_Rev_1.0.pdf accessed in 22/10/2011

Team Structure:

1. Local Data Collection responsable
2. Desk Review responsable: Compare Data (step 1) with Aneel / CCEE data provided
3. Emission Report responsable

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

Date of completing the final draft of this baseline section and the monitoring methodology (DD/MM/YYYY): 03/11/2011.

Responsible for the project information:

BRZ Consultoria Empresarial Ltda
Rua Batataes 324 / 42 - 01411-000
São Paulo - Brazil
+55 (11) 3867-9502
marco@marcogalhardo.com
www.marcogalhardo.com

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

According to the CDM Glossary of Terms the starting date of a CDM project activity is "*the earliest date at which either the implementation or construction or real action of a project activity begins*". Furthermore the guidance also clarifies that "*the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity (…), for example, the date on which contracts have been signed for equipment or construction/operation services required for the project activity*".

The starting date of the project activity is 12/09/2011., according to section B.5, table 5..

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

20 years 0 months

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

C.2.1. Renewable crediting period:

7 (seven) years

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

01/01/2013 or the project's registration date (whichever is later).

C.2.1.2. Length of the first crediting period:

7 years 0 months

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable.

C.2.2.2. Length:

Not applicable.

SECTION D. Environmental impacts

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

The main regulatory standards relating to the implementation and operation development of power generation and related activities, in terms environmental law will be presented according to federal, state and municipal levels.

In Brazil, the sponsor of any project that involves construction, installation, expansion or operation of any polluting or potentially polluting activity or any other capable to cause environmental degradation is obliged to secure a several permits from the relevant environmental agency (federal and/or local, depending on the project).

The environmental impact of the Project is considered small given the other sources of electricity generation.

Power plants project with installed capacity greater than 10 MW must do the environmental impact assessment and respective environmental impact report in order to obtain the necessary licenses to the project.

Licenses required by the Brazilian environmental regulation (National Environmental Council Resolution – from the Portuguese CONAMA - *Conselho Nacional do Meio Ambiente* nr. 237/0140[32]) are:

- The preliminary license (*Licença Prévia* or LP);
- The construction license (*Licença de Instalação* or LI); and
- The operating license (*Licenca de Operação* or LO).

The process starts with a previous analysis (preliminary studies) by the local environmental department. After that, if the project is considered environmentally feasible, the sponsors have to prepare the Environmental Assessment.

The result of those assessments is the Preliminary License (LP), which reflects the environmental local agency positive understanding about the environmental project concepts. In Ceará State, where the wind farms are located, this first permit is called Preliminary License (LP).

In order to obtain the Construction License (LI) it is necessary to present (a) additional information about previous assessment; (b) a new simplified assessment; or (c) the Environmental Basic Project, according to the environmental agency decision informed at the LP.

[32] Available at http://www.mma.gov.br/port/conama/res/res97/res23797.html accessed in 22/10/2011

The Operation License (LO) is a result of pre-operational tests during the construction phase to verify if all exigencies made by environmental local agency were completed.

According to the Modalities and Procedures, paragraph 37.c., the Beberibe Project wind plants Beberibe Aeolis I, II, III, IV and V have developed all required environmental studies.[33]

The plants possess the following Preliminary Licenses:

- Beberibe Aeolis I – 433/2011, dated 29/12/2011, valid until 28/12/2013;
- Beberibe Aeolis II – 21/2012, dated 19/01/2012, valid until 18/01/2014;
- Beberibe Aeolis III, IV and V have developed all required environmental studies for the Preliminary license to be evaluated by the local environmental agency.

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

The area of influence of the project covers an area of direct influence and indirect influence of an area, where the set consists of two functional area of influence.

The area of direct influence refers to the area where the interference of the project can generate direct changes in environmental components, either during the deployment phase, or during the operation. Therefore it is considered as an area of direct influence the area of physical interference of the project and its immediate surroundings.

The area of indirect influence can be defined as a more regional area, where the effects are induced by the existence of the enterprise and not as a result of a specific action of the same, emphasizing the criticality and magnitude of the odds decrease as you move away from the source, i.e., the area of direct influence. It is, therefore, as an area of indirect influence, the surrounding areas, covering the city of Beberibe.

It is noteworthy, however, that the project could trigger impacts of regional scope reflected on socio-economic changes in the municipal and state, since the installation of an enterprise of this order generates cash flow and growth of related activities, resulting in economic growth for the city and the state of Ceará.

Based on the principle that an environmental study should converge the diagnosis of current environmental conditions and the prognosis on the evolution of the area with the project, defining the area

[33] All enviromental studies were presented and are available at the DOE validation procedures.

of influence of the UEE AEOLIS I and II will allow an interpretative analysis of specific parameters physical, biotic and anthropogenic actions affected by deployment, maintenance and operation.

Within the current trend of environmental studies, areas of influence will be analyzed using thematic concepts that can produce a better assessment of environmental impacts. The concept adopted allowed within each sector theme studied, areas of influence to be specified, since the scope of the study could lead to an unnecessary dispersion of effort, since some information could be important to study a particular theme, but unnecessary to another. As an example for better understanding, we can say that, while the anthropic studies have commitments with the scope for local social and economic factors, the same does not occur in the context of the physical and biotic, governed and controlled by natural boundaries.

Following this definition, areas of specific influences were defined as the following guidelines:

- Physical Environment: The area of influence was defined considering the aspects of atmospheric, geological characterization, geomorphologic, pedagogical, hydro geological and hydrological. The characterization of each component of the physical part of the regional aspects, using the definitions already established in the scientific literature, the level area of indirect influence (AII), to a breakdown of these components in the area of direct influence (AID);

- Biotic Environment: The area of influence is related to the ecosystems found in the area of influence functional project, which addressed broader aspects. Within the area of the physical influence of the enterprise local aspects are detailed.

- Anthropic Environment: aspects of population, physical and social infrastructure, and economy are from the municipality of Beberibe, considering the area of indirect influence, as well as the locations Quixaba, Majorlândia, and the area comprising the Direct Influence of the project area and the localities of Córrego do Retiro e Córrego da Ubaranas.

The Beberibe Wind Farm Environmental Report is available to DOE which will validate the project.

SECTION E. Stakeholders' comments

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

As requested by Resolution nr. 7[34], issued on 05/03/2008, Local Stakeholders comments were invited by Project Proponents in an open and transparent manner through a survey.

The Local Stakeholders received an invitation through traditional mail and delivery confirmation with detailed instructions on how to send its comments by phone, email or traditional mail.

A version of the PDD in Portuguese (local language) and a declaration stating how the project contributes to the sustainable development of the country was also made available to these stakeholders at least 15 days previous to the starting of the Global Stakeholder Process (GSP).

The Portuguese version of the PDD was published at the internet website <https://sites.google.com/site/consultamdl/> on 18/10/2011 which is also the date when the invitation letters were sent to the following agents:

- Federal Attorney for the Public Interest;
- State Attorney for the Public Interest of Ceará;
- Environmental Agency of Ceará (SEMACE);
- Brazilian Forum of NGOs and Social Movements for Environment and Development;
- City Hall of Beberibe;
- City Council of Beberibe;
- Environmental Agency of Beberibe;
- Community Associations of Beberibe;

- State Attorney for the Public Interest of Piauí;
- Environmental Agency of Piauí (SEMAR);
- City Hall of Luís Correia;

[34] Available at http://www.cetesb.sp.gov.br/mudancas-climaticas/biogas/Legisla%C3%A7%C3%A3o/www.cetesb.sp.gov.br/mudancas-climaticas/biogas/Legisla%C3%A7%C3%A3o/214- accessed in 20/10/2011

- City Council of Luís Correia;
- Environmental Agency of Luís Correia;
- Community Associations of Luís Correia;

Copies of the letters and post office confirmation of receipt are available upon request and will be submitted to the DOE during the validation of the Project Activity.

E.2. Summary of the comments received:

So far, it has not been received any comment about the project

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

So far, it has not been received any comment about the project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Beberibe Aeolis Geração de Energia Ltda.
Street/P.O.Box:	Avenida Barão de Studart, nº 207, 1º Andar.
Building:	
City:	Fortaleza
State/Region:	Ceará
Postcode/ZIP:	60.120-000
Country:	Brazil
Telephone:	+55 85 3248-5700
FAX:	
E-Mail:	tecnica@nasserhissa.com.br
URL:	www.nasserhissa.com.br
Represented by:	José Nasser Hissa
Title:	
Salutation:	Mr.
Last name:	Hissa
Middle name:	Nasser
First name:	José
Department:	
Mobile:	
Direct FAX:	
Direct tel:	+55 85 3248-5700
Personal e-mail:	josehissa@Beberibeaeolis.com

Organization:	BRZ Consultoria Empresarial Ltda
Street/P.O.Box:	Rua Batataes 324 / 42
Building:	
City:	São Paulo
State/Region:	São Paulo
Postcode/ZIP:	01423-010
Country:	Brazil
Telephone:	+55 11 3867-9502
FAX:	
E-Mail:	marco@marcogalhardo.com

URL:	www.marcogalhardo.com
Represented by:	Marco Henrique Galhardo Cardoso
Title:	Mr.
Salutation:	
Last name:	Cardoso
Middle name:	Henrique Galhardo
First name:	Marco
Department:	
Mobile:	+55 11 8228-2882
Direct FAX:	
Direct tel:	+55 11 3867-9502
Personal e-mail:	marcohgc@gmail.com

Organization:	Electrade S.p.A.,
Street/P.O.Box:	Via Verci 8
Building:	
City:	Bassano del Grappa
State/Region:	Vicenza
Postcode/ZIP:	36061
Country:	Italy
Telephone:	+39 02 87394996
FAX:	+39 02 37641065
E-Mail:	carbonmarket@electrade.it
URL:	www.electrade.it
Represented by:	Lorenzo Monaco
Title:	
Salutation:	Mr.
Last name:	Monaco
Middle name:	
First name:	Lorenzo
Department:	
Mobile:	
Direct FAX:	
Direct tel:	+39 02 87394996
Personal e-mail:	lorenzo.monaco@electrade.it

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding coming from annex I countries was used in this project.

Annex 3

BASELINE INFORMATION

For more details, please refer to section B.6.1. and B.6.3. above.

Operating Margin												
Average Emission Factor (tCO_2/MWh) - **MONTH**												
2010	MÊS											
	January	February	March	April	May	June	July	August	September	October	November	December
	0,2111	0,2798	0,2428	0,2379	0,3405	0,4809	0,4347	0,6848	0,7306	0,7320	0,7341	0,6348
days	31	28	31	30	31	30	31	31	30	31	30	31
	6,544	7,834	7,527	7,137	10,556	14,427	13,476	21,229	21,918	22,692	22,023	19,679

Build Margin	
Average Emission Factor (tCO_2/MWh) - **ANNUAL**	
2010	0,1404

Average Emission Factor (tCO_2/MWh) - **DAILY**												
2010	MONTH											
Dia	January	February	March	April	May	June	July	August	September	October	November	December
1	0,2270	0,2505	0,2447	0,2068	0,2831	0,3232	0,4227	0,5871	0,6880	0,7227	0,7493	0,6956
2	0,2084	0,2846	0,2496	0,2448	0,3043	0,3468	0,4148	0,5773	0,6952	0,7589	0,7947	0,7111
3	0,2022	0,2877	0,2275	0,2094	0,3500	0,3692	0,4359	0,5937	0,6901	0,7760	0,7448	0,7113
4	0,1821	0,3181	0,1965	0,2206	0,3592	0,3277	0,4906	0,5678	0,7479	0,7552	0,7166	0,7206
5	0,2019	0,2950	0,1873	0,2230	0,3084	0,3849	0,4810	0,5907	0,7721	0,7260	0,7086	0,7539
6	0,2398	0,1675	0,1659	0,2178	0,2942	0,4289	0,4752	0,5781	0,7509	0,6985	0,7404	0,7191
7	0,2370	0,1930	0,1943	0,2489	0,3012	0,3806	0,4518	0,7143	0,7578	0,7055	0,7611	0,7074
8	0,2247	0,2826	0,1909	0,2208	0,2394	0,3819	0,4388	0,7242	0,7495	0,7014	0,7342	0,6870
9	0,2228	0,3162	0,2264	0,2241	0,2806	0,3828	0,4563	0,6808	0,7354	0,7316	0,7407	0,6537
10	0,2253	0,2955	0,2629	0,2179	0,2207	0,4090	0,4175	0,6437	0,7334	0,7508	0,7413	0,6291
11	0,2103	0,3342	0,2882	0,2328	0,2060	0,4340	0,4570	0,7054	0,7356	0,7422	0,7575	0,5778
12	0,2480	0,2957	0,2861	0,2254	0,2102	0,4868	0,4061	0,7290	0,7629	0,7599	0,7544	0,6378
13	0,2357	0,3474	0,1842	0,2278	0,1994	0,5229	0,4591	0,7231	0,7325	0,7380	0,7498	0,7170
14	0,2244	0,4215	0,2053	0,2140	0,2087	0,4768	0,4707	0,7045	0,7347	0,7294	0,7879	0,6971
15	0,2223	0,3565	0,2265	0,1898	0,2625	0,4862	0,4659	0,7303	0,7402	0,7408	0,7654	0,6580
16	0,1870	0,3521	0,2388	0,1946	0,3456	0,4597	0,4631	0,6989	0,7386	0,6877	0,7532	0,6684
17	0,1990	0,2338	0,2312	0,1826	0,3688	0,4636	0,4103	0,7027	0,7322	0,6949	0,7277	0,6335
18	0,1570	0,2353	0,2408	0,2051	0,3861	0,4547	0,4660	0,7056	0,7428	0,7063	0,7326	0,6628
19	0,1710	0,1990	0,2558	0,2032	0,3948	0,5984	0,3979	0,6943	0,7447	0,7417	0,7145	0,6790
20	0,1705	0,1931	0,2163	0,2174	0,4052	0,4661	0,3904	0,6862	0,6964	0,7361	0,7396	0,6329
21	0,2092	0,2201	0,2467	0,2184	0,4031	0,7029	0,4103	0,7432	0,6934	0,7432	0,6628	0,5607
22	0,1914	0,2759	0,3139	0,2107	0,5271	0,7123	0,4087	0,7508	0,7223	0,7323	0,7266	0,5688
23	0,1643	0,3309	0,3657	0,2266	0,5461	0,7352	0,4095	0,7232	0,7046	0,7249	0,7273	0,5623
24	0,2191	0,3535	0,3053	0,2454	0,4643	0,7498	0,3981	0,7203	0,7326	0,7235	0,7229	0,5711
25	0,1892	0,3037	0,3083	0,2696	0,4505	0,6512	0,4237	0,7342	0,7422	0,7467	0,7219	0,5636
26	0,1875	0,2327	0,3182	0,2488	0,4371	0,4657	0,4165	0,7369	0,7745	0,7417	0,7208	0,5489
27	0,2247	0,2229	0,2081	0,3688	0,4150	0,5137	0,4284	0,7347	0,7459	0,7302	0,7368	0,5241
28	0,2419	0,2243	0,2169	0,3211	0,4327	0,4339	0,4289	0,7025	0,7307	0,7240	0,7519	0,5311
29	0,2536		0,2259	0,3664	0,2901	0,4115	0,3747	0,7186	0,7139	0,7233	0,6879	0,5331
30	0,2319		0,2286	0,3132	0,3346	0,4287	0,3737	0,6701	0,7153	0,7354	0,6847	0,5330
31	0,2364		0,2273		0,3290		0,5536	0,6816		0,7836		0,5531

Source: Ministério da Ciência, Tecnologia e Inovação website available at http://www.mct.gov.br/index.php/content/view/327118.html#ancora accessed in 04/01/2012

Annex 4

MONITORING INFORMATION

This section is intentionally left blank. For details please refer to section B.7.2. above.