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

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

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Electricity generation from renewable sources - Windfarms Santa Clara I, Santa Clara II, Santa Clara III, Santa Clara IV, Santa Clara V, Santa Clara VI and Eurus VI

Version: 01

Date: 3/11/2010

A.2. Description of the project activity:

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The proposed project activity consists in the implementation and operation of seven new wind electricity generation facilities, Santa Clara I, II, III, IV, V, VI and Eurus VI, located in Parazinho, in the Rio Grande do Norte state, Brazil. The project activity will employ 94 horizontal-axis aerogenerators (model: Enercon E82 E2), each with 2.0 MW (total nominal capacity: 188 MW). Santa Clara I, II, III, IV, V, VI will use 15 aerogenerators each, whereas Eurus VI will use the remaining 4 aerogenerators. By the time of completion of this document, the physical implementation of the project activity had not yet begun.

The project activity will deliver 719,073 MWh/year of renewable electricity to the National Interconnected System (*Sistema Interligado Nacional* - SIN). In the baseline[1], electricity delivered to the grid by the project activity would have been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations. Hence, the project activity will promote GHG emissions reductions by displacing fossil fuel-based electricity generation that would otherwise occur.

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

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

- **Contribution to local environmental sustainability**: The project activity will produce renewable electricity from low environmental impact wind power plants;
- **Contribution to the net workplace generation**: New job posts will be created by the project activity, especially during project implementation;
- **Contribution towards better revenue distribution**: The use of a renewable resource for electricity generation decreases the dependence upon fossil fuels, and its associated pollution and social costs;
- **Contribution towards the diversification of the electric mix and towards energetic security**: The period when there is the greatest abundance of wind resources is coincident with the period of the smallest hydraulic availability, in Brazil. Hence, wind-based electricity generation is complementary to hydroelectricity, which contributes to the security of renewable electricity supply throughout the year and, hence, to the

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

diminishment of the dependence upon fossil fuels during the dry season[2].

- **Contribution to technological learning and technological development**: This type of project can stimulate similar initiatives inside the Brazilian energy sector and encourage the development of modern and more efficient renewable energy units throughout Brazil.

A.3. Project participants:

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Table 1. Project participants.

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

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

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Host Party: Federative Republic of Brazil

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

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State: Rio Grande do Norte

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

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Municipality: Parazinho

[2] Brasil, Agência Nacional de Energia Elétrica, *Atlas de Energia Elétrica do Brasil* (Brasília, DF: ANEEL) <http://www.aneel.gov.br/aplicacoes/Atlas/download.htm>.

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

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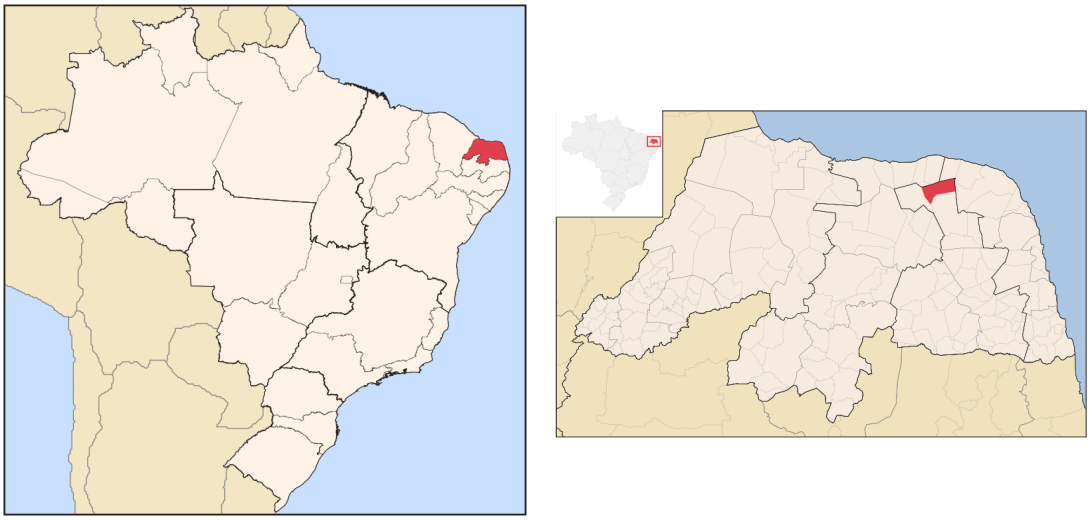

Figure 1. Geographic location of the project activity. Left panel: the localization of the Rio Grande do Norte state within Brazil is depicted in red. Right Panel: the localization of the municipality of Parazinho in the Rio Grande do Norte state is depicted in red.

The reference geographic coordinates of the units of the project activity are depicted in Table 2.

Table 2. Reference geographic coordinates of the project units[3]

Unit Name	Latitude	Longitude
Santa Clara I	- 5.2611	- 35.8982
Santa Clara II	- 5.2529	- 35.9091
Santa Clara III	- 5.2716	- 35.9129
Santa Clara IV	- 5.2393	- 35.9077
Santa Clara V	- 5.2647	- 35.9270
Santa Clara VI	- 5.2374	- 35.9160
Eurus VI	- 5.2352	- 35.9368

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

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Sectoral scopes: 01: Energy Industries (renewable sources).

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

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Wind energy is defined as the kinetic energy contained by moving air masses (wind). Its use for the production of electricity occurs by means of the conversion of translational kinetic energy in

[3] Energetic Research Enterprise (*Empresa de Pesquisa Energética* – EPE). Entrepreneurship Data Sheet (*Ficha de Dados*). Santa Clara I, II, III, IV, V, VI, and Eurus VI. The geographic coordinates have been converted from degrees, minutes, seconds of arc to decimal degrees using a DMS Converter (http://vancouver-webpages.com/META/DMS.html).

rotational kinetic energy and, then, by means of the conversion of the former form of energy into electricity, by means of the employment of wind turbines or aerogenerators[2].

Environmental pros of wind-based electricity generation recognizably include: contribution for atmospheric emissions reduction (including non-GHG gases) by thermoelectric plants, smaller demand for the construction of new large hydropower plants reservoirs, and the reduction of the risk derived from hydrological seasonality, in light of the aforementioned complementary nature of wind-based and hydroelectric electricity generation in Brazil[2].

Amongst the main negative environmental impacts of wind power plants, noise generation impacts can be mentioned. The noise is generated by the movement of the blades and varies according to the equipment specifications. Also, one could mention the possibility of the electromagnetic interference, which may disturb communication and data transmission systems (radio, television, etc.). Such interferences are particularly related to the material used in the manufacture of the blades. Additionally, possible interference upon bird routes should be considered[2].

As previously mentioned, the proposed project activity consists in the implementation and operation of seven new wind electricity generation facilities, Santa Clara I, II, III, IV, V, VI and Eurus VI, located in Parazinho, in the Rio Grande do Norte state, Brazil, at sites where no electricity generation facilities existed prior to the implementation of the project activity. The project activity will employ 94 horizontal-axis aerogenerators (model: Enercon E82 E2), each with 2.0 MW (total nominal capacity: 188 MW). Santa Clara I, II, III, IV, V, VI will use 15 aerogenerators each, whereas Eurus VI will use the remaining 4 aerogenerators.

The project activity will deliver 719,073 MWh/year of renewable electricity to the National Interconnected System (Sistema Interligado Nacional - SIN). In the baseline[1], electricity delivered to the grid by the project activity would have been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations. Hence, the project activity will promote GHG emissions reductions by displacing fossil fuel-based electricity generation that would otherwise occur.

Wobben, the aerogenerator supplier to the project activity, belongs to the Enercon GmbH group, which is one of the world's largest manufacturers of wind turbines[4]. Wobben/Enercon was the first manufacturer of large-scale (800 – 3,000 kW) wind turbines in South America[5], being installed in Brazil since 1995[6]. Its manufacturing facilities are located in Germany, Sweden, Brazil, Turkey and Portugal. By March 2010, Enercon was responsible for over 16,000 installed wind turbines and 20 GW across the world[7].

The aerogenerator "E82 E2" is designed for medium wind speed[8] regime and for a lifetime of 20 years[9]. It is a wind turbine with a three-blade rotor, active blade adjustment (adjustment of

[4] Wobben Windpower. Enterprise (*Empresa*) - http://www.wobben.com.br/empresa1.htm - Accessed in 13/07/2010.

[5] Wobben Windpower. http://www.wobben.com.br/. Accessed in 11/06/2010.

[6] Wobben Windpower. Common questions about windpower and Wobben (*Perguntas comuns sobre energia eólica e a Wobben*) - http://www.wobben.com.br/TireSuasduvidas.htm - Accessed in 13/07/2010.

[7] ENERCON at a glance - http://www.enercon.de/en/_home.htm - Accessed in 13/07/2010.

[8] Wobben Windpower. Products and Services (Produtos e Serviços). Aerogenerator E-82 (Aerogerador E-82). http://www.wobben.com.br/produtos_Servicos_e82.htm. Accessed in 02/09/2010.

[9] ENERCON GmbH – Lifetime of the Wind Turbine ENERCON E-82

pitch) and variable speed operation with a nominal power of 2000 kW. Its diameter of 82 m and hub height of 78-108 m allows E82 E2 to effectively use the existing wind conditions for electricity generation[10].

The rotating component of the generator and the rotor consist in a single unit. These two parts are connected directly to the hub so they can spin at the same low speed. Once the gearbox and other rotating parts do not exist, the energy losses between the rotor and generator, noise emissions, the use of oil in the gearbox and mechanical wear are reduced drastically[10].

The first plant to be installed by Wobben is in operation since December 1998 (*Taíba*, Ceará, 5 MW)[11], hence wind-power electricity generation technologies developed by Wobben are all well known in the wind power industry and have proven themselves over the time.

The overview of the technical characteristics of the E82 E2 aerogenerator is provided in Table 3.

Table 3. ENERCON E82 E2 technical overview.

Operational data	
Rated power	2.0 MW
Cut-in wind speed	2.5 m/s
Cut-out wind speed	28-34 m/s
50 years gust wind speed	59.5 m/s
Wind class*	IEC IIA
Rotational speed	6 to18 rpm
Rotor	
Power Control	Pitch
Diameter	82 m
Swept area	5,281 m^2
Blade material type	Epoxy-bounded fibreglass
Generator	
Type	ENERCON direct-drive synchronous annular generator
Rated power	2000 kW
Protection	IP 23
Braking system	
Aerodynamical brake	- 3 independent systems with blade pitching mechanism - Rotor Brake - Rotor Lock
Certification*	Compliance with IEC 61400-1: Wind turbines – Part 1: Design requirements, 3rd Edition 2005-08 – Wind Turbine Class II A

[10] ENERCON E-82 E2 2 MW – Technical Description (*Descrição Técnica*)

[11] Wobben Windpower. Installed wind plants (*Plantas Eólicas Instaladas*) http://www.wobben.com.br/usinas.htm. Accessed in 13/07/2010.

Source: ENERCON E-82 E2 2MW – Aerogenerator Characteristics (*Características do Aerogerador)*. *Type Certificate TC 100201, Rev. 0

It is noteworthy that there are no environmental restrictions in the area, such as permanent conservation areas (*Áreas de Preservação Permanente* – APP). Moreover, possible interference with environment will be also minimized through the adoption of mitigation and environmental control measures.

The environmental aspects of the project activity are discussed in the Environmental Impact Assessment on the project activity, summarized in Section E.

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

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

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Table 4. Estimated amount of emission reductions over the chosen crediting period.

Years	Annual estimation of emission reductions in tonnes of CO_2e
From July 2012	98,446
2013	196,891
2014	196,891
2015	196,891
2016	196,891
2017	196,891
2018	196,891
2019	196,891
2020	196,891
2021	196,891
Till June 2022	98,446
Total estimated reductions (tonnes of CO_2e)	**1,968,913**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	196,891

A.4.5. Public funding of the project activity:

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There is no public funding involved on this project activity.

SECTION B. Application of a baseline and monitoring methodology

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

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Approved consolidated baseline and monitoring methodology ACM0002 – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", Version 12.0.0.

This methodology also refers to the latest approved versions of the following tools:

- "Tool to calculate the emission factor for an electricity system". Latest approved version at the time of conclusion of the PDD: **2**;
- "Tool for the demonstration and assessment of additionality". Latest approved version at the time of conclusion of the PDD: **5.2**;
- "Combined tool to identify the baseline scenario and demonstrate additionality". Latest approved version at the time of conclusion of the PDD: **2.2**;
- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". Latest approved version at the time of conclusion of the PDD: **2**.

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

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The proposed project activity consist in the installation of a grid-connected renewable power generation facility at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant). This is in accordance with the applicability conditions of ACM0002/Version 12.0.0. Therefore, this methodology was applied to the project activity.

Furthermore, the project activity fulfils the remaining applicability conditions of ACM0002/Version 12.0.0 in the following ways:

- "The project activity is the installation (…) of a wind power plant (…)".
- The project activity does *not* involve:
    - Switching from fossil fuels to renewable energy sources at the site of the project activity;
    - Biomass fired power plants;
    - 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

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

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The spatial extent of the project boundary includes the project power plants (i.e. Santa Clara I, II, III, IV, V, VI and Eurus VI) and all power plants connected physically to the electricity system that the CDM project power plant is connected to, i.e., SIN. Emission sources and gases included in the project boundary are depicted in **Table 5**.

Table 5. Emissions sources included in the project boundary, as per ACM0002/Version 12.0.0

Source		Gas	Included?	Justification/Explanation
Baseline	Power plants supplying energy to SIN	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project Activity	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam.	CO_2	No	Not applicable.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants.	CO_2	No	Not applicable.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.
	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	Not applicable.
		CH_4	No	Not applicable.
		N_2O	No	Not applicable.

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

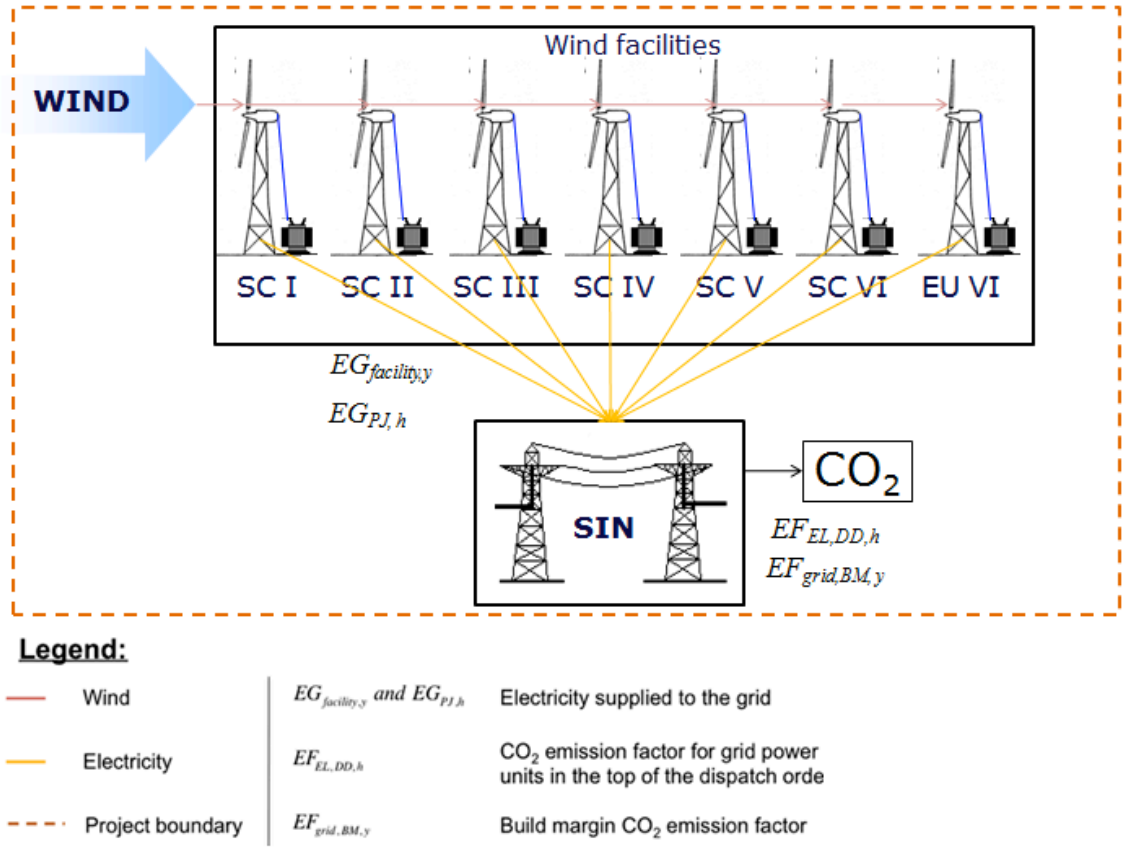

Figure 2. Project boundary. Monitored variables are depicted. Baseline emissions consist of CO_2 emissions from fossil fuel combustion for the generation of electricity by the plants connected to SIN as reflected in its combined margin.

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

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As per ACM0002/Version 12.0.0, since the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

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

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

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As per ACM0002/Version 12.0.0, the additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality".

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

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

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

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

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

All identified alternatives are in accordance with laws and regulations.

Step 2: Investment analysis

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

The investment analysis was conducted according to the "Tool for the demonstration and assessment of additionality" *version 5.2*, therefore the following sub-steps shall be undertaken:

Sub-step 2a. Determine appropriate analysis method:

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

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

Identification of the financial indicator

The method of the Project Internal Rate of Return (Project IRR) was considered as the most appropriate, once it is the most suitable for the project type and decision context.

Identification of the benchmark

The weighted average cost of capital (WACC) was defined as the benchmark in accordance to the "Guidelines on the Assessment of Investment Analysis" vs. 3.1, paragraph 12: "weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR".

The weighted average cost of capital (WACC) is calculated considering the percentage of debt/equity financing and the average cost of debt/equity financing. The average cost of equity financing was calculated using the Capital Asset Pricing Model (CAPM), a widely used pricing model in finance, using publicly available data. The average cost of debt financing refers to the

expected cost of financing that the decision makers of the company expected at the moment of the investment decision. Assumptions, sources and calculation steps used in benchmark development are described in detail in documents made available during validation.

Result: WACC = 16.36%

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

The detailed financial analysis is provided in the annex electronic spreadsheet "CPFL-Financial_Analysis.xls", where a full description of all the variables and assumptions is available. The "Guidelines on the Assessment of investment analysis (version 3.1)" (EB51 Annex 58) was thoroughly observed in the elaboration of the financial analysis whose results are reported below.

Result:

After applying the assumptions enumerated above and others described in the financial analysis spreadsheet, the Project IRR is 11.33%.

Comparison of the Project IRR and the Benchmark rate:

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

Thus, without the CDM revenues, the proposed CDM project is not financially feasible, that is, the Project IRR of 11.33% is lower than the reference of 16.36%.

Project IRR of 11.33% < Benchmark rate of 16.36%

Sub-step 2d. Sensitivity analysis:

Sensitivity analysis was carried out to demonstrate that the conclusion regarding financial/economic (un)attractiveness is robust to reasonable variations in the critical assumptions. Variables that constitute more than 20% of either total project costs or total revenues were subject to a 10% variation:

- Energy Generation
- Capital Expenditures (CAPEX)
- Operational Expenditures (OPEX).

Sensitivity analysis (described in detail in documents made available during validation) shows that the investment analysis provided a valid argument in favour of the additionality of the proposed project activity, since it consistently supports, for a realistic range of assumptions, the

conclusion that **the project activity without CERs revenues is unlikely to be financially/economically attractive**.

Step 3: Barrier analysis

This step was not applied.

Step 4: Common practice analysis

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

There are 45 operating wind power plants in Brazil, summing 794.3 MW of installed capacity, which represents 0.73% of the total installed capacity in the country (Table 6). Moreover, there are two wind power units being constructed in Brazil, summing 70.0 MW of installed capacity, which corresponds to 0.40% of the total electricity production capacity being added in the country (Table 7).

Table 6. Electricity production entrepreneurships in operation in Brazil*

Type	Number of units	Verified installed capacity (kW)	Verified installed capacity (%)
Mini and Micro Hydroelectric Plants (≤ 1 MW)	315	179,700	0.16%
Wind power plants	45	794,334	0.73%
Small hydroelectric plants (1 MW – 30 MW)	369	3,140,827	2.88%
Solar plants	1	20	0.00%
Large hydroelectric plants	168	75,861,799	69.51%
Thermoelectric plants	1,340	27,149,050	24.88%
Nuclear plants	2	2,007,000	1.84%
Total	1,925	109,132,730	100.00%

*Source: National Electric Energy Agency (*Agência Nacional de Energia Elétrica* - ANEEL)/Generation Database (*Banco de Informação de Geração* - BIG). Available at: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp. Accession date: 11/06/2010.

Table 7. Electricity production entrepreneurships under construction in Brazil*

Type	Number of units	Authorized installed capacity (kW)	Authorized installed capacity (%)
Mini and Micro Hydroelectric Plants (≤ 1 MW)	1	848	0.00%
Wind power plants	2	70,050	0.40%
Small hydroelectric plants (1 MW - 30 MW)	63	866,391	4.96%
Large hydroelectric plants	16	10,128,500	58.03%
Thermoelectric plants	49	5,037,271	28.86%
Nuclear plants	1	1,350,000	7.74%
Total	132	17,453,060	100.00%

*Source: National Electric Energy Agency (*Agência Nacional de Energia Elétrica* -

ANEEL)/Generation Database (*Banco de Informação de Geração* - BIG). Available at: http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp. Accession date: 11/06/2010.

The data depicted in Table 6 and Table 7 show that the participation of wind-based electricity is still not significant in the electric matrix in Brazil. Moreover, it should be noted that most wind-based electricity generation entrepreneurships in Brazil accrue from one of the following incentive mechanisms: CDM and PROINFA[12].

PROINFA (*Programa de Incentivo às Fontes Alternativas de Energia Elétrica*/Program of Incentive to Alternative Sources of Electric Energy) was launched in 2002 with the objective of increasing the participation of electricity produced from wind and biomass sources and from small hydroelectric plants in the National Interconnected System (SIN). PROINFA is based on feed in tariffs and was designed to have 2 phases. The first phase initially set a quota of 3.3 GW of new generation capacity equally distributed among wind, biomass and small hydro. After the program was launched, part of the quota of biomass was transferred to wind projects[12].

The program foresees the implementation of 144 plants, totaling 3,299.40 MW of installed capacity, being 1,191.24 MW from 63 small hydroelectric plants (1 MW - 30 MW), 1,422.92 MW from 54 wind plants and 685.24 MW from 27 biomass plants. It is estimated that till the end of 2010, 68 (1,591.77 MW) entrepreneurships will start operation, being 23 small hydroelectric plants (414.30 MW), 2 biomass plants (66.50MW) and 43 wind plants (1,110.97 MW)[12].

Projects developed under PROINFA have a 20-year Power Purchase Agreement signed with the state-owned electricity utility ELETROBRÁS[12]. PROINFA presets the price of the electricity paid to generators as a technology specific economic value, which is defined as the value that guarantee, for a defined timeframe and efficiency level, the economic feasibility of a typical project based on alternative sources of energy. It is worthy mentioning that the prices paid by PROINFA are higher than those practiced by the market[13].

Besides, electricity generation companies that had Electricity Purchase and Sale Contracts signed with ELETROBRÁS in the ambit of PROINFA could take up a loan from the National Development Bank (*Banco Nacional do Desenvolvimento* - BNDES). Under the so-called Program of Financial Support to Investments in Alternative Sources of Electric Energy in the Ambit of PROINFA (*Programa de Apoio Financeiro a Investimentos em Fontes Alternativas de Energia Elétrica no Âmbito do PROINFA*), borrowers could finance up to 70% of financeable items, where the first installment could be paid up to third month after the operation start date with up to 10-year amortization periods[14].

[12] Programa de Incentivo às Fontes Alternativas de Energia Elétrica/ *Program of Incentive to Alternative Sources of Electric Energy*. Available at: http://www.mme.gov.br/programas/proinfa. Accession date: 11/06/2010.

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

[14] Program of Financial Support to Investments in Alternative Sources of Electric Energy in the Ambit of PROINFA/*Programa de Apoio Financeiro a Investimentos em Fontes Alternativas de Energia Elétrica no Âmbito do PROINFA*. Available at: http://www.mme.gov.br/programas/proinfa/galerias/arquivos/programa/resolproinfa.pdf. Accessed in 14/06/2010.

It is worthy mentioning that "PROINFA also aims at the reduction of GEE, in the terms of UNFCCC, contributing to sustainable development" and "it's the attribution of ELETROBRÁS the direct or indirect development of the processes of preparation and validation of PDDs, registration, monitoring, and certification of the emissions reductions, and the commercialization of carbon credits obtained by PROINFA". "The resources originated from the activities related to the CDM or other carbon markets will be destined to the reduction of the costs of PROINFA"[15]. In that sense 12 PROINFA wind projects in Brazil are being/were developed as CDM projects (Table 8).

Both wind plants under construction, and 36 out of 45 operating wind plants in Brazil accrue from PROINFA incentives (Table 8). Importantly, 2 out 9 non-PROINFA operating plants are being developed as CDM projects (Table 8). Moreover, within the group of the 7 non-CDM and non-PROINFA wind plants, *Fernando de Noronha* plant is located in the Fernando de Noronha Archipelago, which is served by a hybrid wind-diesel isolated electric complex. *Morro do Camelinho* is a 1 MW experimental power plant owned by the state-owned power utility CEMIG (*Companhia Energética de Minas Gerais*/Energy Company of Minas Gerais), which was implemented in 1994 with support from the German Government[2]. Similarly, *Olinda* is an experimental power plant operated by the Brazilian Wind-Power Center (*Centro Brasileiro de Energia Eólica*)[16], which is a research institute whose objectives are "to produce and publish scientific knowledge in the areas aerodinamics, aeroeleasticity, control, quality of energy, energy hybrid systems, and assessment of wind-power potential and other topics related to the technology of wind turbines"[17]. *Prainha*, *Taíba* and *Mucuripe* belong to the company Wobben Wind Power Industria e Comércio Ltda[16]. Wobben projects, constructs, assembles, operates and maintains wind power plants, and was the first Brazilian company to manufacture large scale aerogenerators (800 – 3,000 kW)[5]. Hence, they posses an intrinsically higher competitiveness in regards to the acquisition of the aerogenerators in comparison to other project proponents, which do not manufacture the wind turbines themselves, such as the proponents of the current project activity. *Palmas* is currently owned and operated by *Centrais Eólicas do Paraná Ltda.*[16], which, in turn, is owned by the State-owned power utility *Companhia Paranaense de Energia* (COPEL)[18]. However, *Palmas* was formerly co-owned by Wobben (70%) and COPEL (30%)[19]. Hence, one may affirm that *Palmas* had an environment comparable to that of *Prainha*, *Taíba* and *Mucuripe* at time of its implementation.

In light of the facts above, it is possible to conclude that, at the moment of the conclusion of this document, there were no operating entrepreneurships comparable to the project activity, in regards to investment climate.

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[15] Federal Decree 5025 of March 30th of 2004. Available at: http://www.planalto.gov.br/ccivil/_Ato2004-2006/2004/Decreto/D5025.htm. Accessed in 14/06/2010.

[16] ANEEL: Operating wind entrepreneurships. http://www.aneel.gov.br/aplicacoes/capacidadebrasil/GeracaoTipoFase.asp?tipo=7&fase=3. Accessed in 11/06/2010.

[17] Brazilian Wind-Power Center (*Centro Brasileiro de Energia Eólica*). http://www.eolica.org.br. Accessed in 14/06/2010.

[18] COPEL. Entrepreneurhips in operation. http://www.copel.com/hpcopel/root/nivel2.jsp?endereco=/hpcopel/root/pagcopel2.nsf/docs/950F73FF30B18CD2032574020061FAB7. Accessed in 11/06/2010.

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

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

Activities similar to the project activity are not widely observed nor commonly carried out, and hence the **project activity is not common practice in the relevant sector in the country**. Corroborating with that conclusion, one may mention the fact that there are three other non-PROINFA wind projects in Brazil, which still have not started construction, but are being developed as CDM projects (currently at validation stage)[20,21,22].

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

[20] Jaguarão wind farm, CDM Project: http://cdm.unfccc.int/Projects/Validation/DB/6CXYWGRBO0SOOGH34RVRSCN1K46OQ5/view.html. Accessed in: 11/06/2010.

[21] Serra dos Antunes wind farm, CDM Project: http://cdm.unfccc.int/Projects/Validation/DB/3I96I5K6CL7810JG5G1OEZIZKS7S04/view.html. Accessed in: 11/06/2010.

[22] Livramento wind farm, CDM Project: http://cdm.unfccc.int/Projects/Validation/DB/WLLN3C8AW52MUD1B7XX1CKRW4ZOXBS/view.html . Accessed in: 11/06/2010.

Table 8. Operating and under construction wind electricity generation entrepreneurships in Brazil.

Plant	Authorized installed capacity (kW)[1,2]	State[1,2]	Status[1,2]	PROINFA?[3]	CDM?	CDM Status
Albatroz	4.50	PB	Operating	Yes	No	N.A.
Atlântica	4.50	PB	Operating	Yes	No	N.A.
Bons Ventos	50.00	CE	Operating	Yes	No	N.A.
Camurim	4.50	PB	Operating	Yes	No	N.A.
Canoa Quebrada	57.00	CE	Operating	Yes	Yes[4]	Validation[4]
Caravela	4.50	PB	Operating	Yes	No	N.A.
Coelhos I	4.50	PB	Operating	Yes	No	N.A.
Coelhos II	4.50	PB	Operating	Yes	No	N.A.
Coelhos III	4.50	PB	Operating	Yes	No	N.A.
Coelhos IV	4.50	PB	Operating	Yes	No	N.A.
Eólica Água Doce	9.00	SC	Operating	Yes	Yes[9]	Registered[9]
Eólica Canoa Quebrada	10.50	CE	Operating	Yes	No	N.A.
Eólica de Bom Jardim	0.60	SC	Operating	Yes	No	N.A.
Eólica de Fernando de Noronha	0.23	PE	Operating	No	No	N.A.
Eólica de Prainha	10.00	CE	Operating	No	No	N.A.
Eólica de Taíba	5.00	CE	Operating	No	No	N.A.
Eólica Icaraizinho	54.60	CE	Operating	Yes	Yes[5]	Validation[5]
Eólica Olinda	0.23	PE	Operating	No	No	N.A.
Eólica Paracuru	23.40	CE	Operating	Yes	Yes[5]	Validation[5]
Eólica Praias de Parajuru	28.80	CE	Operating	Yes	No	N.A.
Eólica-Elétrica Experimental do Morro do Camelinho	1.00	MG	Operating	No	No	N.A.
Eólio - Elétrica de Palmas	2.50	PR	Operating	No	No	N.A.
Foz do Rio Choró	25.20	CE	Operating	Yes	Yes[5]	Validation[5]
Gargaú	28.05	RJ	Constructing	Yes	Yes[7]	Validation[7]
Gravatá Fruitrade	4.95	PE	Operating	Yes	No	N.A.
Lagoa do Mato	3.23	CE	Operating	Yes	Yes[4]	Validation[4]

Macau	1.80	RN	Operating	No	Yes[10]	Registered[10]
Mandacaru	4.95	PE	Operating	Yes	No	N.A.
Mataraca	4.50	PB	Operating	Yes	No	N.A.
Millennium	10.20	PB	Operating	Yes	No	N.A.
Mucuripe	2.40	CE	Operating	No	No	N.A.
Parque Eólico de Beberibe	25.60	CE	Operating	Yes	No	N.A.
Parque Eólico de Osório	50.00	RS	Operating	Yes	Yes[8]	Registered[8]
Parque Eólico do Horizonte	4.80	SC	Operating	No	Yes[11]	Registered[11]
Parque Eólico dos Índios	50.00	RS	Operating	Yes	Yes[8]	Registered[8]
Parque Eólico Enacel	31.50	CE	Operating	Yes	No	N.A.
Parque Eólico Sangradouro	50.00	RS	Operating	Yes	Yes[8]	Registered[8]
Pedra do Sal	18.00	PI	Operating	Yes	No	N.A.
Pirauá	4.95	PE	Operating	Yes	No	N.A.
Praia do Morgado	28.80	CE	Operating	Yes	No	N.A.
Praia Formosa	104.40	CE	Operating	Yes	Yes[5]	Validation[5]
Presidente	4.50	PB	Operating	Yes	No	N.A.
RN 15 - Rio do Fogo	49.30	RN	Operating	Yes	Yes[6]	Validation[6]
Santa Maria	4.95	PE	Operating	Yes	No	N.A.
Taíba Albatroz	16.50	CE	Operating	Yes	No	N.A.
Volta do Rio	42.00	CE	Constructing	Yes	No	N.A.
Avante	4.95	PE	Operating	Yes	No	N.A.

1 - ANEEL: Operating wind entrepreneurships. http://www.aneel.gov.br/aplicacoes/capacidadebrasil/GeracaoTipoFase.asp?tipo=7&fase=3. Accessed in 11/06/2010.

2 - ANEEL: Wind entrepreneurships under construction. http://www.aneel.gov.br/aplicacoes/capacidadebrasil/GeracaoTipoFase.asp?tipo=7&fase=2. Accessed in 11/06/2010.

3 - PROINFA: Contrated entreprenerships. http://www.eletrobras.com/elb/Proinfa/services/eletrobras/ContentManagementPlus/FileDownload.ThrSvc.asp?DocumentID={5EE94F36-806D-4A91-956B-326204F743B3}&ServiceInstUID={9C2100BF-1555-4A9D-B454-2265750C76E1}&InterfaceInstUID={18F15ED9-1E73-4990-8CC6-F385CE19FF17}&InterfaceUID={72215A93-CAA7-4232-A6A1-2550B7CBEE2F}&ChannelUID={B38770E4-2FE3-41A2-9F75-DFF25AF92DED}&PageUID={ABB61D26-1076-42AC-8C5F-64EB5476030E}&BrowserType=IE&BrowserVersion=6. Accessed in 11/06/2010.

4 - http://cdm.unfccc.int/Projects/Validation/DB/HMOI5ZUNC27YH7DVBYBCFCRPUZWQ09/view.html. Accessed in 11/06/2010.
5 - http://cdm.unfccc.int/Projects/Validation/DB/HSLJUUZ9G0RMHT1A6S1F14IMVIZ45B/view.html. Accessed in 11/06/2010.
6 - http://cdm.unfccc.int/Projects/Validation/DB/BQQ32CCBBQ2342SUQ84SKA1T3NLEC0/view.html. Accessed in 11/06/2010.
7 - http://cdm.unfccc.int/Projects/Validation/DB/J6EQPTU2VOQJKGG6LHWEERQVH5Z72F/view.html. Accessed in 11/06/2010.
8 - http://cdm.unfccc.int/Projects/DB/DNV-CUK1158843861.54/view. Accessed in 11/06/2010.
9 - http://cdm.unfccc.int/Projects/DB/SGS-UKL1156244716.38/view. Accessed in 11/06/2010.
10 - http://cdm.unfccc.int/Projects/DB/DNV-CUK1167973931.45/view. Accessed in 11/06/2010.
11 - http://cdm.unfccc.int/Projects/DB/SGS-UKL1151534607.76/view. Accessed in 11/06/2010.

Demonstration and assessment of prior consideration of the CDM

As per the "Guidelines on the demonstration and assessment of prior consideration of the CDM" (Version 3 - Annex 22/EB49), "for project activities with a starting date on or after 02 August 2008, the project participant must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status".

Accordingly, project participants informed the Brazilian DNA and the UNFCCC Secretariat of the commencement of the project activity and of their intention in seeking the CDM status. Such notification was made within six months of the start date of project activity and contained a brief description of the project activity and the precise geographical location of the project plant. Such notifications, using the standardized form F-CDM- Prior Consideration, were sent for Brazilian DNA and UNFCCC Secretariat in 03/05/2010 and the receipt of such documents has been subsequently confirmed. Documental evidences of these notifications were made available to DOE during validation.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Project emissions

As per ACM0002/Version 12.0.0, since the project activity is neither a geothermal, solar nor a hydropower plant, $PE_y = 0$.

Baseline emissions

The baseline emissions are to be calculated as follows:

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

Where:

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

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

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

Calculation of $EG_{PJ,y}$

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

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

Where:

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

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

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

The project plants will serve Brazilian Interconnected System (SIN). The Brazilian DNA has published the delineation of SIN to be adopted for the purposes of CDM projects. As per Resolution Nº8 of the Brazilian DNA, the electric grid considered in this project activity is considered as a single system consisted by the sub-markets of SIN as the definition of the electric system of the project. Off-grid plants will not be included in the calculation of $EF_{grid,CM,y}$.

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

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

Where:

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

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh);

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh);

w_{OM} = Weighting of operating margin emissions factor (75%);

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

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

The $EF_{grid,OM,y}$ will be calculated according to the *dispatch data analysis*. As per this method OM emission factor is determined based on the grid power units that are actually dispatched at the margin during each hour h where the project is producing electricity and $EF_{grid,OM-DD,y}$ is calculated as follows:

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

Where:

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

$EG_{PJ,h}$ = Electricity generation by the project activity in hour h of year y (MWh);

$EF_{EL,DD,h}$ = CO_2 emission factor for grid power units in the top of the dispatch order in hour h in year y (tCO_2/MWh);

$EG_{PJ,y}$ = Total electricity displaced by the project activity in year y (MWh);

h = Hours in year y in which the project activity is generating electricity;

y = Year in which the project activity is displacing grid electricity.

For the crediting period, the build margin emission factor will be updated annually, *ex-post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available.

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

Leakage

According to ACM0002, version 12.0.0, *"no leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected."*

Emission reductions

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

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

Where,

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

BE_y = Baseline emissions during the year y (tCO_2e)

PE_y = Project emissions during the year y (tCO_2e)

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

Data / Parameter:	w_{OM}
Data unit:	Fraction
Description:	Weighting of operating margin emissions factor
Source of data used:	"Tool do calculate the emission factor for an electricity system", Version 2
Value applied:	75%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value for wind power plants.
Any comment:	--

Data / Parameter:	w_{BM}
Data unit:	Fraction
Description:	Weighting of build margin emissions factor
Source of data used:	"Tool do calculate the emission factor for an electricity system", Version 2
Value applied:	25%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value for wind power plants.
Any comment:	--

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

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

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

Where:

BE_y = Baseline emissions in year y (196,891 tCO_2/yr);

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (719,073 MWh/yr);

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (0.2738 tCO_2/MWh).

Despite the fact that $EF_{grid,CM,y}$ will be monitored *ex-post*, for the purposes of the *ex-ante* emission reduction calculations it has been assumed that this parameter would remain constant throughout the crediting period as a simplicity measure. This assumption is supported by data from the Operation Plan (2008) of the National Electric System from National Electric System Operator (ONS). According to this plan, for the years 2008 – 2012, 45% of new electricity offers would come from renewable sources (42% from hydro resources and 3% from wind) and the remaining 55% would come from thermoelectric sources. These fairly symmetric capacity additions render a low impact in the grid emission factor.

As per ACM0002/Version 12.0.0 for this project activity, project emissions are zero ($PE_y = 0$) and leakage emissions are not considered.

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

Where:

ER_y = Emissions reductions of the project activity during the year y (196,891 tCO_2e)

BE_y = Baseline emissions during the year y (196,891 tCO_2e)

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

See detailed ex-ante calculation in the annex spreadsheet “ex_ante_CPFL.xls”.

The parameters used for *ex-ante* calculations are compiled in **Table 9**.

Table 9. Parameters used for ex-ante calculations

Parameter	Unit	Value	Description	Comment
ER_y	tCO_2/yr	196,891	Emissions reductions in the year y	Calculated
BE_y	tCO_2/yr	196,891	Baseline emissions in year y	Calculated
PE_y	tCO_2/yr	-	Project emissions in the year y	For this project activity (wind-based electricity generation project), emissions are null, as per ACM0002/Version 12.0.0
$EG_{PJ,y}$	MWh/yr	719,073	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y	Estimated as the average total yearly net electricity generation by the project activity, as per Camargo Schubert Reports, Ref. C&S-CEG-271/10 (rev-02), C&S-CEG-272/10 (rev-02), C&S-CEG-273/10 (rev-02), C&S-CEG-274/10 (rev-02), C&S-CEG-275/10 (rev-02), C&S-CEG-276/10 (rev-02) and C&S-CEG-277/10 (rev-02).
$EG_{facility,y}$	MWh/yr	719,073	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	Estimated as the average total yearly net electricity generation by the project activity, as per Camargo Schubert Reports, Ref. C&S-CEG-271/10 (rev-02), C&S-CEG-272/10 (rev-02), C&S-CEG-273/10 (rev-02), C&S-CEG-274/10 (rev-02), C&S-CEG-275/10 (rev-02), C&S-CEG-276/10 (rev-02) and C&S-CEG-277/10 (rev-02).
$EG_{PJ,h}$	MWh	82.09	Electricity generation by the project activity in hour h of year y	Estimated as the average total yearly net electricity generation by the project activity, as per Camargo Schubert Reports, Ref. C&S-CEG-271/10 (rev-02), C&S-CEG-272/10 (rev-02), C&S-CEG-273/10 (rev-02), C&S-CEG-274/10 (rev-02), C&S-CEG-275/10 (rev-02), C&S-CEG-276/10 (rev-02) and C&S-CEG-277/10 (rev-02). This estimated annual value was divided by 8,760 (number of hours in a year).

$EF_{grid,CM,y}$	tCO_2/MWh	0.2738	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"	Calculated
$EF_{grid,OM,y}$	tCO_2/MWh	0.3331	Operating margin CO_2 emission factor in year y	Calculated as the average hourly emission factor, weighted by the hourly net electricity generation
$EF_{grid,OM-DD,y}$	tCO_2/MWh	0.3331	Dispatch data analysis operating margin CO_2 emission factor in year y	Calculated as the average hourly emission factor, weighted by the hourly net electricity generation
$EF_{EL,DD,h}$	tCO_2/MWh	0.3331	CO_2 emission factor for grid power units in the top of the dispatch order in hour h in year y	Estimated as the average hourly operating margin emission factor of the National Interconnected System (2006 - 2009), from January to December, as published by the Brazilian DNA (http://www.mct.gov.br/index.php/content/view/74689.html, accession date 12/07/2010)
$EF_{grid,BM,y}$	tCO_2/MWh	0.0960	Build margin CO_2 emission factor in year y	Estimated as the average build margin emission factor of the National Interconnected System (2006 - 2009), as published by the Brazilian DNA (http://www.mct.gov.br/index.php/content/view/74689.html, accession date 12/07/2010)
w_{OM}	Fraction	0.75	Weighting of operating margin emissions factor	Default value for wind-based electricity generation projects, as per "Tool to calculate the emission factor for an electricity system", Version 2
w_{BM}	Fraction	0.25	Weighting of build margin emissions factor	Default value for wind-based electricity generation projects, as per "Tool to calculate the emission factor for an electricity system", Version 2

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

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Table 10. Summary of the ex-ante estimation of emission reductions

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
From July 2012	-	98,446	-	98,446
2013	-	196,891	-	196,891
2014	-	196,891	-	196,891
2015	-	196,891	-	196,891
2016	-	196,891	-	196,891
2017	-	196,891	-	196,891
2018	-	196,891	-	196,891
2019	-	196,891	-	196,891
2020	-	196,891	-	196,891
2021	-	196,891	-	196,891
Till June 2022	-	98,446	-	98,446
Total (tonnes of CO_2e)	-	**1,968,913**	-	**1,968,913**

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

B.7.1 Data and parameters monitored:	
Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project plant to the grid in year y
Source of data to be used:	Measurements at project activity site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	719,073
Description of measurement methods	This parameter will be continuously analyzed and monitored values will be averaged monthly and yearly. Corresponds to the sum of the

and procedures to be applied:	electricity generation by the seven units of the project activity.
QA/QC procedures to be applied:	Measurement results will be cross-checked with records for sold electricity.
Any comment:	Corresponds to the yearly consolidation of $EG_{PJ,h}$. Ex-ante estimated as the predicted average total yearly net electricity generation by the project activity , as per Camargo Schubert Reports, Ref. C&S-CEG-271/10 (rev-02), C&S-CEG-272/10 (rev-02), C&S-CEG-273/10 (rev-02), C&S-CEG-274/10 (rev-02), C&S-CEG-275/10 (rev-02), C&S-CEG-276/10 (rev-02) and C&S-CEG-277/10 (rev-02).

Data / Parameter:	$EG_{PJ,h}$
Data unit:	MWh
Description:	Electricity generation by the project activity in hour h of year y
Source of data to be used:	Measurements at project activity site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	82.09
Description of measurement methods and procedures to be applied:	This parameter will be continuously analyzed and monitored values will be averaged monthly and yearly. Corresponds to the sum of the electricity generation by the seven wind electricity generation facilities of the project activity.
QA/QC procedures to be applied:	Measurement results will be cross-checked with records for sold electricity.
Any comment:	Ex-ante estimated as the predicted average total yearly net electricity generation by the project activity, as per Camargo Schubert Reports, Ref. C&S-CEG-271/10 (rev-02), C&S-CEG-272/10 (rev-02), C&S-CEG-273/10 (rev-02), C&S-CEG-274/10 (rev-02), C&S-CEG-275/10 (rev-02), C&S-CEG-276/10 (rev-02) and C&S-CEG-277/10 (rev-02). This estimated annual value was divided by 8,760 (number of hours in a year).

Data / Parameter:	$EF_{EL,DD,h}$
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor for power units in the top of the dispatch order in hour h in year y
Source of data to be used:	Brazilian Interministerial Commission on Global Climate Change
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.3331
Description of measurement methods and procedures to be	Hourly values will be used. As per the most recent version of the "Tool to calculate the emission factor for an electricity system".

applied:	
QA/QC procedures to be applied:	As per the most recent version of the "Tool to calculate the emission factor for an electricity system".
Any comment:	Estimated as the average hourly operating margin emission factor of the National Interconnected System (2006 - 2009), from January to December, as published by the Brazilian DNA (http://www.mct.gov.br/index.php/content/view/74689.html, accession date 12/07/2010).

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/MWh
Description:	Build margin CO_2 emission factor in year y
Source of data to be used:	Brazilian Interministerial Commission on Global Climate Change
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0960
Description of measurement methods and procedures to be applied:	As per the most recent version "Tool to calculate the emission factor for an electricity system".
QA/QC procedures to be applied:	As per the most recent version of the "Tool to calculate the emission factor for an electricity system".
Any comment:	For the crediting period, the build margin emission factor will be updated annually, *ex-post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. Ex-ante estimated as the average build margin emission factor of the National Interconnected System (2006 - 2009), as published by the Brazilian DNA (http://www.mct.gov.br/index.php/content/view/74689.html, accession date 12/07/2010).

B.7.2. Description of the monitoring plan:

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General Considerations

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emissions reductions achieved by the project activity during the whole crediting period. The project operator (CPFL Geração de Energia S/A) will be responsible for the implementation of the monitoring plan.

Monitoring consists of metering the net electricity generated by the project activity. Measurement results will be crosschecked with records for sold electricity. Data will be measured continuously and will be consolidated hourly and monthly. Monthly values will be

used for crosschecking electricity sales records. Records pertaining to the meters used in the project activity (type, model and calibration reports) will be kept accordingly.

The Operator of National Electric System (*Operador do Sistema Elétrico Nacional* - ONS) regulates, by means of its Grid Procedures[23] (*Procedimentos de Rede*), *inter alia*, the measurements of electricity production for invoicing (12nd module).

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

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

Monitoring Structure

The operational and management structure that the project operator will implement in order to monitor emission reductions achieved by the project activity is given in the flowchart below:

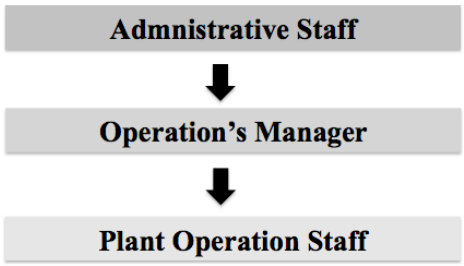

Figure 3. Operational and management structure that the project operator will implement in order to monitor emission reductions achieved by the project activity.

The roles and responsibilities within the structure outlined in Figure 3 are described in detail in the paragraphs below.

Administrative Staff: Responsible for the record keeping and indexing of the data pertaining to the net electricity supply to the grid. Monitored data will be collected in a monthly basis and will be kept in a specific folder in electronic media, which will be backed up, at least, weekly. The Administrative Staff will also be responsible for the record keeping and indexing of copies of electricity sales/billing invoices or other applicable registers, of information pertaining to the

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

model and calibration reports of the meters used as part of the present monitoring plan, and of any other relevant paper-based documentation such as maps, plant diagrams, etc. The Administrative Staff will forward all electronic media-based information to the CDM Consultancy Company at a minimum bimonthly frequency.

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

Plant Operation Staff**:** Responsible for the operation of the wind plant and for reporting the monitored data to the Operations Manager and to the Administrative Staff. Its attributions also include ensuring that the monitored data pertaining to the net electricity generation is continuously sent (online) to the Electric Energy Commercialization Chamber (CCEE – *Câmara de Comercialização de Energia Elétrica*).

Compilation of Monitoring Reports

As previously mentioned, monitored data will be forwarded to the CDM Consultancy Company (**Key Consultoria e Treinamento Ltda.**) at a minimum bimonthly basis. Besides being responsible for collecting the information pertaining to the calculation of the grid emission factor ($EF_{EL,DD,h}$ and $EF_{grid,BM,y}$), the CDM Consultancy Company will compile monitoring reports and will be responsible for the calculation of the emission reductions achieved by the project activity.

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

>>

Date of completion of the application of the baseline and monitoring methodology: 03/11/2010.

Responsible person:
Mr. Breno Rates;
Mr Carlos Henrique Delpupo;
Mr. Carlos Shiguematsu Junior;
Miss. Laura Araujo Alves;
Miss. Luísa Guimarães Krettli;
Mr. Matheus Alves de Brito;
Mr. Rui Pereira.

Key Consultoria e Treinamento Ltda. (Project Participant)
Av. Av. Paulista, 37
10º andar – Bela Vista
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URL: http://www.keyassociados.com.br

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:

>>
14/12/2009

The date indicated above corresponds to that of the 2nd Brazilian Auction of Reserve Energy (*2º Leilão de Energia de Reserva - Leilão nº 003/2009 - LER-2009*[24]), in which the seven electricity generation facilities, Santa Clara I, II, III, IV, V, VI, and Eurus VI have been contracted. For the present project activity this is the earliest of the date(s) on which the implementation or construction or real action has begun.

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

>>
20 years and zero months[9].

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

C.2.1. Renewable crediting period:

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

>>
Not Applicable

C.2.1.2. Length of the first crediting period:

>>
Not Applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/07/2012 or the registry date of the project activity at the CDM-UNFCCC, whichever is later.

C.2.2.2. Length:

>>
10 years and zero months.

[24] 2nd Brazilian Auction of Reserve Energy (*2º Leilão de Energia de Reserva - Leilão nº 003/2009 - LER-2009*) - http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=ec41d74d98114210VgnVCM1000005e01010aRCRD - Accessed in 13/07/2010

SECTION D. Environmental impacts

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

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The main objective of Environmental Licensing in Brazil is to standardize environmental impacts assessments and establish control plans for polluting enterprises. The state level environmental agencies are the authority in charge to issue Environmental Permits. In Rio Grande do Norte, the Institute of Sustainable Development and Environment of Rio Grande do Norte (*Instituto de Desenvolvimento Sustentável e Meio Ambiente do Rio Grande do Norte* - IDEMA) is responsible for environmental licensing.

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

Therefore the project activity Simplified Environmental Report (*Relatório Ambiental Simplificado* – RAS) [25], that describes environmental impacts caused by project implementation and operation, was submitted to IDEMA, in order to obtain its Previous License (*Licença Prévia* - LP). IDEMA emitted the Previous Licenses for the seven electricity generation facilities establishing the basic requirements to the next phases of licensing. By the meeting of requirements set out in the Previous License, IDEMA has already emitted the Installation Licenses (*Licença de Instalação* - LI) for six electricity generation facilities (Santa Clara I, II, IV, V, and VI) and a Simplified License (*Licença Simplificada* – LS) for wind farm Eurus VI, identified as:

- Santa Clara I – Installation License Nº 2010-038080/TEC/LI-0043, issued in 15/07/2010 and valid until 15/07/2014.
- Santa Clara II – Installation License Nº 2010-038078/TEC/LI-0041, issued in 15/07/2010 and valid until 15/07/2014.
- Santa Clara III – Installation License Nº 2010-038081/TEC/LI-0044, issued in 15/07/2010 and valid until 15/07/2014.
- Santa Clara IV – Installation License Nº 2010-038076/TEC/LI-0040, issued in 15/07/2010 and valid until 16/07/2014.
- Santa Clara V – Installation License Nº 2010-038074/TEC/LI-0039, issued in 15/07/2010 and valid until 15/07/2014.
- Santa Clara VI – Installation License Nº 2010-038079/TEC/LI-0042, issued in 15/07/2010 and valid until 15/07/2014.
- Eurus VI - Simplified License Nº 2010-038090/TEC/LS-0234, issued in 13/08/2010 and valid until 15/07/2012.

[25] **Simplified Environmental Report** (*Relatório Ambiental Simplificado* – RAS): assesses the environmental impacts of project activity and is required by IDEMA for the Previous License (LP) granting. Available for DOE during validation.

The Installations Licenses and Simplified License enumerated above are available for DOE during validation.

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

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The interventions on the physical environment by the project activity in its planning, implementation and operation phases were categorized and their associated environmental impacts were identified in the RAS; actions to prevent, mitigate or compensate them were proposed in these documents. In the Previous License - LP (*Licença Prévia*), IDEMA imposed some requirements to minimize or eliminate the impacts. By the meeting of requirements set out in the Previous License, IDEMA has emitted the Installation Licenses (*Licença de Instalação* - LI) for six electricity generation facilities (Santa Clara I, II, IV, V, and VI) and a Simplified License (*Licença Simplificada* – LS) for wind farm Eurus VI, also imposing some requirements for the subsequent Operating License (*Licença de Operação* – LO) granting.

The project developer is working in order to meet all requirements set out in Installation License and Simplified License.

SECTION E. Stakeholders' comments

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

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Stakeholders' comments were invited in 28/07/2010 following the Designated National Authority procedures for such purpose, defined by Resolution number 07 of the Interministerial Comission for Global Climate Change (CIMGC).

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

The following stakeholders received letters communicating the CDM project activity:

- Mayor from project activity Municipality;
- Representatives of the Legislative Chambers from project activity Municipality;
- Local Environmental NGOs;
- State and local environmental agencies;
- Brazilian Forum of NGOs and Social Movements for the Environment and Development (FBOMS);

- National NGOs which objectives are related to the project activity;
- National and international environmental NGOs;
- State and Federal Prosecutors.

E.2. Summary of the comments received:

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So far, amongst the consulted parties only the Federal Prosecution has manifested itself. According to this entity, despite of the project relevance, the Federal Prosecution is forbidden to play consultancy activities, i.e. the entity can not analyses the project.

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

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The Federal Prosecution communication does not include any comment related to the project activity. Thus, it did not imply in any PDD modification.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Direct tel.:	55 11 3372 9595
Personal E-Mail:	cdelpupo@keyassociados.com.br

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

All pertinent information is provided throughout the text.

Annex 4

MONITORING INFORMATION

All pertinent information is provided throughout the text.

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