CLEAN DEVELOPMENT MECHANISM
PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

This form is for the submission of a CDM PoA whose CPAs apply a large scale approved methodology.

At the time of requesting registration this form must be accompanied by a CDM-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-CPA-DD (using a real case).

SECTION A. General description of programme of activities (PoA)

A.1 Title of the programme of activities:

Title of the Programme of Activities: *Omega Wind Power Plants Programme of Activities.*

Version number of the document: 04

Date: (DD/MM/YYYY): 10/04/2012

A.2. Description of the programme of activities:

The primary objective of *Omega Wind Power Plants Programme Activities* is to help meet Brazil's rising demand for energy due to economic growth and to improve the supply of electricity, while contributing to environmental, social and economic sustainability by increasing the share of renewable energy consumption for Brazil (and for the region of Latin America and the Caribbean).

The Latin America and the Caribbean region countries have expressed their commitment towards achieving a target of 10% renewable energy for the total energy use in the region. Through an initiative from the Ministers of the Environment in 2002 (UNEP-LAC, 2002), a preliminary meeting of the World Summit for Sustainable Development (WSSD) was held in Johannesburg in 2002[1]. In the WSSD final Plan of Implementation no specific targets or timeframes were stated, however, their importance was recognized to achieve sustainability in accordance with the Millennium Development Goals[2].

In the late 1990's a strong increase in the energy demand in Brazil contrasted with a less-than-average increase in installed capacity caused the outbreak of the supply crisis/rationing in 2001/2002. One of the solutions the government provided was to review the legislation, favoring independent energy producers. Previously, in 1995, the privatization process had been initiated with the expectation of adequate tariffs and better prices for generators. It drew the attention of investors to possible alternatives not available in the centrally planned electricity market. Furthermore the possible eligibility of renewable energy projects under the Clean Development Mechanism of the Kyoto Protocol drew the attention of investor. .

This Programme of Activities is a voluntary coordinated action by the managing entity *Omega Energia Renovável S.A.*, consisting of the implementation of renewable energy projects in Brazil. The hub of this PoA is the construction of Wind Power Plants (from the Portuguese *Centrais Geradoras Eólicas - CGEs*) connected to the Brazilian Interconnected System (from the Portuguese *Sistema Interligado Nacional – SIN*).

[1] Economic Commission for Latin America and Caribbean (ECLAC) and GTZ. Renewable energy sources in Latin America and the Caribbean. Situation and policy proposals. Available at: <http://www.eclac.cl/cgi-bin/getProd.asp?xml=/publicaciones/xml/1/14981/P14981.xml&xsl=/dmaah/tpl-i/p9f.xsl&base=/dmaah/tpl/top-bottom.xsl>.

[2] WSSD Plan of Implementation, Paragraph 19 (e): "*Diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies, including fossil fuel technologies and renewable energy technologies, hydro included, and their transfer to developing countries on concessional terms as mutually agreed. With a sense of urgency, substantially increase the global share of renewable energy sources with the objective of increasing its contribution to total energy supply, recognizing the role of national and voluntary regional targets as well as initiatives, where they exist, and ensuring that energy policies are supportive to developing countries' efforts to eradicate poverty, and regularly evaluate available data to review progress to this end.*" Available at <http://www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POIChapter3.htm>.

This cleaner source of electricity provides an important contribution to environmental sustainability by reducing carbon dioxide emissions that otherwise would have occurred in the absence of the project. The project activity reduces emissions of greenhouse gas (GHG) by avoiding electricity generation by fossil fuel sources (and CO_2 emissions), which would have been generated (and emitted) in the absence of the project.

Taking into account the different sources of electricity generation in Brazil during 2010, it can be noted that the electricity generated by the operational wind power plants is significantly complementary to that of hydroelectricity. Therefore, despite the size of the Brazilian electric system, based mostly on hydro power plants, this PoA does have a relevant positive impact given electricity generated by wind power is complementary to that generated by hydropower plants. As it can be observed, more wind electricity is generated during the dry season when hydroelectricity generation is lower.

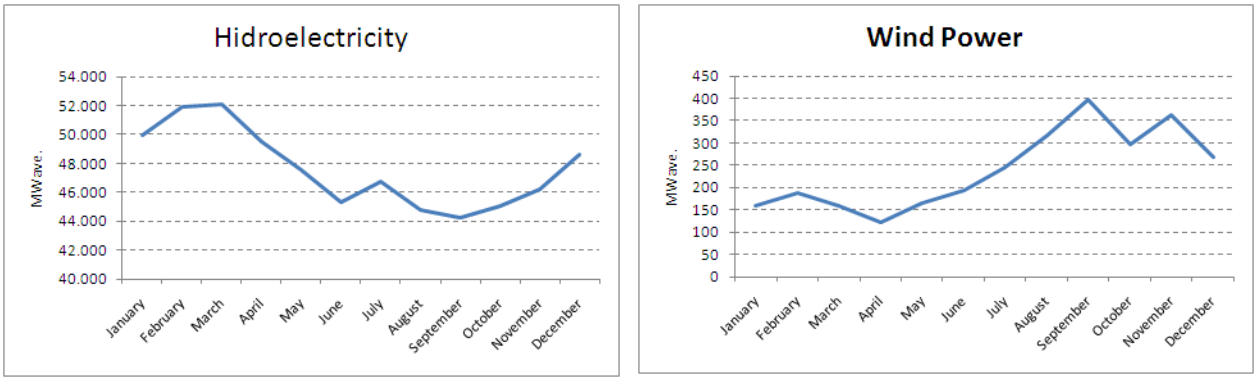


Figure 1: Hydro and wind electricity generation in Brazil during 2010. Source: CCEE[3]

The project contributes to sustainable development since it meets the present needs without compromising the ability of future generations to meet their own needs, as defined by the Brundtland Commission (1987). The Commission was created in order to address the concerns regarding the accelerated deterioration of the human environment and natural resources and their impacts on economic and social development. In other words, the implementation of wind power plants ensures renewable energy generation, complements hydroelectricity generation, avoids negative social and environmental impact caused by the construction and operation of new fossil fuel thermo power plants, and drives regional economies, increasing quality of life in local communities.

In summary, the proposed PoA will contribute to the sustainable development in the following aspects:

- Reducing air pollutants that are emitted from fossil fuel electricity generation from power plants connected to the Brazilian grid;
- Creating job opportunities during the project construction, operation and maintenance, improving capacities related to wind power plants in Brazil through advanced technology transferred from developed countries;
- Efficiently generating electricity, for which there is a growing demand in the country;

[3] CCEE – Câmara de Comercialização de Energia Elétrica. Relatório de Informações ao Público. Available at <http://www.ccee.org.br/StaticFile/Arquivo/biblioteca_virtual/Relatorios_Publico/Anual/Relatorio_anual_2010_REV1.pdf>. Accessed on 18th July, 2011.

– Contributing towards national economic development, adding an Independent Power Producer, leading to energy diversification and creation of additional renewable energy sources;

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

While there are programmes and policies to encourage this kind of project (namely PROINFA and Alternative Sources of Energy Public tenders – please refer to section A.4.3. for details on these programmes), this type of project is a voluntary initiative from the private sector.

A.3. Coordinating/managing entity and participants of POA:

The coordinating and managing entity of PoA, which is the entity responsible for communicating with the CDM Executive Board, is *Omega Energia Renovável S.A.*

Table 1 presented below lists the Project Participants of the PoA. The Project Participants may or may not be involved in one of the CPAs related to the PoA.

Table 1: Party(ies) and private/public entities involved in the project activity

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 whishes to be considered as project participant (Yes/No)
Brazil (host)	Omega Energia Renovável S.A. (Private entity)	No
	Ecopart Assessoria em Negócios Empresariais Ltda. (Private entity)	
(*) 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.		

Detailed contact information on party(ies) and private/public entities involved in the project activity listed in Annex 1.

A.4. Technical description of the programme of activities:

A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

Brazil.

A.4.1.2. Physical/ Geographical boundary:

The physical / geographical boundary is Brazil (Figure 2). Within this geographical boundary, all CDM programme activities (CPAs) included in the PoA will be implemented, taking into account all applicable national and/or sectoral policies and regulations of the host country and its defined boundaries.

Figure 2: Geographical boundary of PoA[4].

A.4.2. Description of a typical CDM programme activity (CPA):

A.4.2.1. Technology or measures to be employed by the CPA:

All CPAs under this PoA consists of the implementation of renewable energy projects - Wind Power Plants – apply the methodology ACM0002 - "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".

The proposed Programme of Activities includes project activities that use wind turbines, a device which extracts kinetic energy from the wind[5] to convert to mechanical useful energy[6]. According to WWEA[7] (2011), wind turbines that generate electricity and feed it directly to the grid usually have two or three rotor blades, a horizontal axis, a nacelle with a rotor hub, gears, and a generator, all of which can be turned into

[4] Source: modified from http://biblioteca.uol.com.br/atlas/index.htm. Accessed on July 13th, 2011.

[5] BURTON, T.; SHARPE, D.; JENKINS, N.; BOSSANYI, E. **Wind Energy Handbook**, Wiley: 2001, 642 p. Partially available at < http://books.google.com.br/books?id=4UYm893y-34C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false>. Accessed on 25 April 2011.

[6] SØRENSEN, B. **Renewable Energy.** Academic Press, 2004 - 3rd edition, 928 p. Partially available at <http://books.google.com.br/books?id=Y17FoN2VUEwC&printsec=frontcover#v=onepage&q&f=false> Accessed on 25 April 2011.

and out of the wind. The rotor is positioned in front of the tower in the direction the wind is blowing (windward as opposed to leeward). The figure below presents the basic components of a modern wind turbine.

1. Foundation: it anchors the turbine to the ground while ensuring its stability. Generally it is made of concrete or steel.
2. Tower: its height varies as a function of the rated power of the turbine as well as its rotor diameter.
3. Nacelle: this component holds the turbine machinery.
4. Rotor blade: the rotor as well as the rotor blades are the equipment which effectively convert the wind energy into rotary mechanical movement
5. Hub: The hub is the center of the rotor to which the rotor blades are attached.
6. Transformer (this is not a part of the Wind Turbine)

Figure 3: Schematic view of the components of a wind turbine. (Source: WWEA, 2006[8]).

A.4.2.2. Eligibility criteria for inclusion of a CPA in the PoA:

The eligibility criteria for the inclusion of a CPA in the proposed PoA follows the recommendations of Annex 3, EB 65, and are listed below.

(a) The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA;

The geographical boundary set in the PoA is Brazil. Therefore, only CPAs corresponding to grid connected wind power plants located within the country are eligible.

(b) Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo);

Conditions to avoid double counting are established below in section A.4.4.1. of this CDM-PoA-DD. The unique identification of the wind power plants will be evidenced using any official documentation related to the project being considered in the CPA, such as the authorization issued by the Brazilian Electricity Regulatory Agency (from the Portuguese *Agência Nacional de Energia Elétrica* – ANEEL) or information supplied to environmental agencies.

[8] WWEA – World Wind energy Association. **Wind Energy: Technology and Planning.** 2006. Available at <http://www.wwindea.org/technology/intro/estructura-en.htm>. Accessed on 25 April 2011.

(c) The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications;

In general, wind certifications provide necessary information as to how the wind data was collected, the plant load factor was determined, net electricity to be generated by the plant, among others. In this sense, the technology to be applied as well as the performance of any wind power plant to be considered for a typical CPA must be attested by a wind certification conducted by a third party, which will be provided to the DOE validating the inclusion of the proposed CPA.

(d) Conditions to check the start date of the CPA through documentary evidence;

The starting date of the CPA must be identified following the definitions presented in the *CDM Glossary of terms*. In order to determine the starting date of a CPA the date of the following actions must be presented: construction permit issuance, major equipment order, starting date of construction, date when the Power Purchase Agreement was signed, and the date when the Financing Agreement was signed. In cases where none of these events have happened yet, a forecasted date and the proper justification on when they are expected to happen must be provided.

(e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs;

Each CPA to be included in the PoA must fulfil the requirements of ACM0002 as discussed in section E.2. below (please refer to section E.1. below for the version of the methodology to be considered).

(f) The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality as specified in Section A above;

In accordance with paragraph 10 of section A of Annex 3, EB 65, *PoAs that consist of one or more large scale projects as CPAs shall include eligibility criteria derived from all the relevant requirements contained in the additionality section of the large scale methodologies.* In this sense, a typical CPA to be included in the PoA must pass the additionality test following the requirements of the "*Tool for the demonstration and assessment of additionality"*. The result of each step of the tool must be presented in section B.3. of the CDM-CPA-DD.

(g) The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis;

As discussed in section C.1 of this CDM-PoA-DD, the environmental analysis will be conducted at CPA level considering the peculiarities of each Project. Therefore, the environmental impacts and analysis have to be included in each CPA according to the results of the project's environmental studies.

In the case of the stakeholder consultation, as described in section D.1, the stakeholder consultation has been conducted at PoA level based on the requirements of the Brazilian DNA for the Letter of Approval issuance. Therefore, the local stakeholder consultation does not need to be conducted for the inclusion of CPAs in this PoA.

(h) Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance;

The CPA implementer has to confirm that the proposed CPA does not result in a diversion of Official Development Assistance from an Annex I country.

(i) Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid connected/off-grid) and distribution mechanisms (e.g. direct installation);

As per the requirements of ACM0002, any CPA to be included in the proposed PoA must consist of a grid connected wind power plant.

(j) Where applicable, the conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys;

Not applicable. The monitoring of the emission reductions of each CPA does not foresee the use of sampling methods.

(k) Where applicable, the conditions that ensure that every CPA in aggregate meets the small-scale or microscale threshold criteria and remains within those thresholds throughout the crediting period of the CPA;

Not applicable. The CPAs to be included in the proposed PoA belong to large scale project category.

(l) Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories.

Not applicable. The CPAs to be included in the proposed PoA belong to large scale project category.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

According to the "Programme of Activities Design Document Form (CDM-PoA-DD)", the following criteria should be considered:

(i) The proposed PoA is a voluntary coordinated action;

As mentioned in section A.2, the proposed Programme of Activities is a voluntary coordinated action put into practice by the coordinating and managing entity *Omega Energia Renovável S.A.*

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;

Brazilian experience with wind electricity is recent. By 2007, the country wind power plants installed capacity represented only 0.3% of the total world's installed capacity of wind power (ANEEL, 2008)[9]. Moreover, the implementation of wind energy projects in Brazil has historically relied on governmental incentives.

[9] ANEEL (2008). Atlas de Energia Elétrica do Brazil. 3rd Edition. Brasília: ANEEL, 2008. 236p. Available at <http://www.aneel.gov.br/visualizar_texto.cfm?idtxt=1689>. Accessed on July 20th, 2011.

The first governmental program which was set up specifically to support investments in wind electricity generation was PROEÓLICA, established in 2001. As reported by the International Energy Agency[10], *the goal of PROEÓLICA* "*was to add 1,050 MW of wind capacity to the national grid by December 2003. Under Proeólica, the federal government would guarantee a "beneficial" purchase of wind-generated electricity by state utility Eletrobras for at least 15 years*". However, this program was not implemented by the competent agencies. Therefore, none wind power plant received incentives from this program (FERREIRA, 2008)[11].

Recognizing the importance of favoring the generation of electricity from alternative and renewable sources and increasing their share in the Brazilian electricity market, Brazilian Federal Government created the Program of Incentives for Alternative Electricity Sources (in a free translation from the Portuguese *Programa de Incentivo às Fontes Alternativas de Energia Elétrica – PROINFA*), Federal Law nr. 10,438 dated April 2002.

Brazilian government again designated the federal state-owned power utility Eletrobrás (Centrais Elétricas Brasileiras S/A) to act as the primary off-taker of electric energy generated by alternative energy facilities in Brazil, by entering into long-term Power Purchase Agreements (PPAs) with alternative energy power producers, at a guaranteed price of at least 80% of the average energy supply tariff charged to ultimate consumers.

Both programs were similar in nature, however PROINFA included other sources of renewable electricity such as small hydropower plants and biomass based electricity generation plants. The creation of these programs clearly indicated that, without specific support, projects involving the implementation of plants using renewable sources to generate electricity would hardly be implemented otherwise.

It is worth mentioning that Brazilian Decree nr. 5,025 dated March 30th, 2004, which regulates Law nr. 10,438/2002, states that PROINFA aims for the reduction of greenhouse gases as established by the United Nations Framework Convention on Climate Change (UNFCCC) under Kyoto Protocol, contributing to sustainable development. Therefore, the program is clearly a "Type E-" policy.

The first phase of PROINFA was conducted in 2004, through two public calls for project selection on April 6th and October 5th. There is no indication when the second phase will be carried out.

Another initiative from the Brazilian government for the promotion of renewable energy in the country was the conduction of energy auctions for alternative sources only (from the Portuguese *Leilão para Fontes de Energia Alternativa - LFA*). The first public tender specifically designed for renewable sources (open only small-hydro, wind and biomass), took place in 2007 (June 18th) and resulted in the commercialization of 185 MW-average (electricity) and 638.64 MW installed capacity (power)[12]. Table 2 shows individual results of the auction.

Table 2: Electricity commercialized in the 18 June 2007 auction.

[10] International Energy Agency – IEA. World Energy Outlook. Information available at <http://www.iea.org/textbase/pm/?mode=weo&id=3426&action=detail>. Accessed on July 20th, 2011.
[11] FERREIRA, H.T. Energia eólica: barreiras a sua participação no setor elétrico brasileiro. Dissertação (Mestrado – Programa de Pós-Graduação em Energia) – EP/FEA/IEE/IF da Universidade de São Paulo: São Paulo, 2008. 111p.
[12] Official documents are publicly available at http://www.epe.gov.br/leiloes/Paginas/default.aspx?CategoriaID=43. Summary of the auction results in Portuguese downloaded from the above mentioned web-page is supplied in attached file named "Evidence 3-Alternative sources auction press release.pdf".

Project	Source	Enery (MW-average)	Price (R$/MWh)
Pedra Furada	small hydro	3	134.97
Arvoredo	small hydro	7	135.00
Varginha	small hydro	4	135.00
Santa Luzia Alto	small hydro	14	135.00
Ibirama	small hydro	13	134.98
Pampeana	small hydro	5	135.00
Sub-total		**46**	
Project	**Source**	**Enery (MW-average)**	**Price (R$/MWh)**
Xanxere	biomass	25	138.50
Florida Paulista	biomass	8	139.12
Sao Joao da Boa Vista	biomass	23	138.60
Louis Dreyfus Lagoa da Prata Fase 1	biomass	13	139.12
Louis Dreyfus Lagoa da Prata Fase 2	biomass	6	139.12
Louis Dreyfus Rio Brilhante - Fase 1	biomass	10	139.12
Louis Dreyfus Rio Brilhante - Fase 2	biomass	12	139.12
Pioneiros II	biomass	12	139.12
Santa Cruz AB Fase 1	biomass	6	138.75
Santa Cruz AB Fase 2	biomass	14	138.75
Ester	biomass	7	138.90
Iacanga	biomass	4	138.94
Sub-total		**140**	

Source: CCEE available at www.ccee.org.br

As can be observed in the results presented above, no wind power plant was able to commercialize its electricity under this auction. This unequivocally shows that at that time, wind power generation was the least competitive source of electricity generation, even when more competitive sources, such as large hydro power plants and fossil fuel thermo power plants, were not taking part in the auction.

Given these results, another alternative was to propose auctions which would only be open to biomass based electricity generation project (1st Reserve Energy Auction) and wind power projects (2nd Reserve Energy Auction). Only when the participation of other sources was restricted was it possible to observ wind power projects managing to sell the electricity to the regulated market.

From the experiences mentioned some points need to be further elaborated. First, according to the Electric Power Commercialization Chamber (from the Portuguese *Câmara de Comercialização de Energia Elétrica* – CCEE), *the public tenders are based in the criterion of the least tariff* which *is used to define the winners of a given auction, that is, the winners of the auction shall be those bidders which offer electric power for the least price per Mega-Watt Hour to supply the demand envisaged by the Distributors*. This criteria for buying electricity has continually decreased the prices paid for wind electricity. On average, the tariff obtained by the project developers in the 2nd Reserve Energy Auction, in 2009, for wind farms, was R$148.39/MWh. In the 3rd Reserve Energy Auction which took place in 2010, the tariff obtained by the developers of wind farms was RS122.69/MWh[13].

[13] The result for each auction already conducted by CCEE is publicly available at http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=d3caa5c1de88a010VgnVCM100000aa01a8c0RCRD.

Considering the above, the need for other sources of revenues to make these projects feasible is clear. Amongst the projects which have negotiated electricity under the above mentioned auctions conducted by the CCEE, by September, 2011, 76% had initiated the CDM registration process under UNFCCC by forwarding the prior consideration form or submitting the PDD for GSP.

Secondly, similarly to PROINFA the auctions could also be considered a "Type E-" policy/regulation. As stated above, the tenders were set exclusively for alternative sources which are less emission-intensive and without this incentive the projects could have hardly been implemented. Importantly, from the perspective of the projects' financial feasibility, public auctions are attractive because the Power Purchase Agreements are long term and are signed between the project sponsor and a pool of utilities. This contributes to minimize the risks associated with the development of the projects. Nevertheless, as mentioned above, the price being paid for electricity sold in these auctions has constantly decreased. In this sense, the decreasing price illustrates that other incentives have also to be considered by the project sponsor. In this way, the CDM can effectively contribute to overcoming the barriers since the CDM related revenues increase the attractiveness of the wind power plants projects.

In summary, the implementation of the PoA contributes to overcome the entry barrier existent in the CDM market and secure another source of revenue contributing to increase project's attractiveness from the perspective of the project sponsors. Following the option provided by the CDM Executive Board in its 73rd paragraph of its 47th Meeting Report, the additionality will be assessed and demonstrated at the CPA level.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;

The implementation of the project activities of this PoA is not based on nor has been conducted to ensure a mandatory policy/regulation. Project Participants state that the proposed PoA is a voluntary action by the managing entity.

(iv) If mandatory a policy/regulation are enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

Not applicable. As stated above, the implementation of the project activities to be added to this PoA shall not based on nor have been conducted to ensure a mandatory policy/regulation.

A.4.4. Operational, management and monitoring plan for the programme of activities:

A.4.4.1. Operational and management plan:

The Coordinating and Managing Entity of this PoA is Omega Energia Renovável S.A. The CME will be responsible for all the CDM related matters. However, the CME has commissioned Ecopart Assessoria em Negócios Empresariais Ltda. (a CDM Consultancy also listed as Project Participant of the proposed PoA) to assist the CME in the development, validation, approval, and verification of CPAs related to the proposed PoA. The CPA implementer (project developer) is responsible for the technical aspects of the power plant and its operation (construction, operation, maintenance and monitoring).

The descriptions of the operational and management arrangements established by the CME are detailed below:

(i) A record keeping system for each CPA under the PoA

The CME has commissioned Ecopart Assessoria em Negócios Empresariais (hereinafter referred to as Ecopart) to implement a record keeping system for the inclusion of CPAs in the proposed PoA, which considers the following information: (a) inclusion date in the PoA, (b) name of the CPA, (c) CDM reference number, (d) name of the project activities involved in the CPA, (e) crediting period (starting and ending dates), (f) name of the plant, (g) location (municipality, state and GPS coordinates), (h) technical description of the project, and (i) Reference to ANEEL Ordinances issued in favour of the plant (Figure 4).

eQAO

CPAs added to "Omega Wind Power Plants Programme of Activities"

Inclusion date	Name of the CPA	Ref	Crediting Period		Plant's information				
			Starting date	End date	Name	Location	Geog. Coordinates	Tec. Descrip.	ANEEL Ordinance
Not available yet	Muritiba Wind Power Plant CPA	*Not available yet*	*01/set/2013*	*30/ago/2020*	Muritiba	São Francisco de Itabapoana, RS	LAT: 21.5786 LONG: -41.0911	5 (five) wind turbines with 1.8 MW each, type V100, manufactured by VESTAS	*Not available yet*

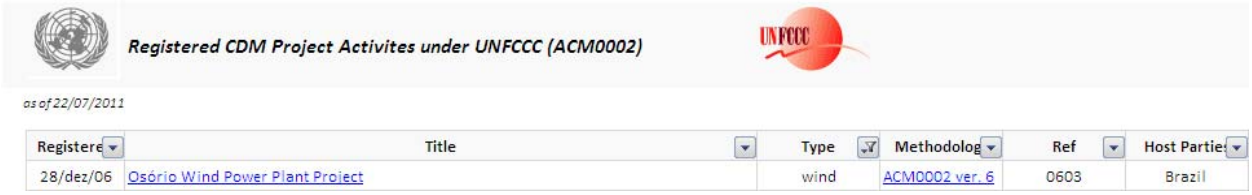
Figure 4 - Record keeping system for the inclusion of CPAs in the proposed PoA.

The record keeping system presented above aims at certifying that all project(s) included in the CPAs considered in this PoA will be uniquely identified, thereby avoiding double counting of the emission reductions.

This record keeping system will be updated by Ecopart every time a CPA is included in the proposed PoA. It is important to mention that during the process of CPA inclusion, improvements in the PoA management system can be proposed.

(ii) A system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA

Besides the record keeping system presented in item (i) above, for the inclusion of CPAs in the proposed PoA, the CME has also commissioned Ecopart to implement a database to avoid double accounting at the time of the inclusion of a new CPA. This database considers the information presented at the UNFCCC's website regarding Brazilian registered CDM Programme Activities as well as Brazilian CDM Project Activities, Since only wind power plants will be included in the proposed PoA, only Brazilian registered CDM projects from scope 1 – energy industries (renewable / non-renewable sources) and which apply ACM0002 "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*" and AMS-I.D "*Grid connected renewable electricity generation*" are considered.



Registered CDM Project Activites under UNFCCC (ACM0002)

as of 22/07/2011

Registere	Title	Type	Methodolog	Ref	Host Partie
28/dez/06	Osório Wind Power Plant Project	wind	ACM0002 ver. 6	0603	Brazil

Figure 5 - CME's database for the registered CDM Project Activities using ACM0002 in Brazil, as of July, 2012

Registered CDM Project Activities under UNFCCC (AMS-I.D.)

as of 22/07/2011

Registere	Title	Type	Methodolog	Ref	Host Partie
28/ago/06	Horizonte Wind Power Generation Project	wind	AMS-I.D. ver. 8	0486	Brazil
30/set/06	Água Doce Wind Power Generation Project	wind	AMS-I.D. ver. 8	0575	Brazil

Figure 6 - CME's database for the registered CDM Project Activities using AMS-I.D in Brazil, as of July, 2012

Registered CDM Programme Activities in Brazil, under UNFCCC

as of 26/01/2012

Registere	Title	Type	Methodolog	Ref	Host Partie
29/out/09	Methane capture and combustion from Animal Waste Management System (AWMS) of th	methane cap.	AMS-III.D. ver. 13	2767	Brazil

Figure 7 - CME's database for Brazilian registered CDM Programme of Activities

The CME's database presented above will be updated by the CME every time a new CPA is submitted for analysis of its inclusion in the PoA according to the information available at the UNFCCC's website. It is important to mention that during this update, improvements in the PoA management system can be proposed.

At the time of the receipt of a proposal to include a CPA under this PoA, the CME will proceed as described below:

(a) The CME will provide Ecopart with the technical documentation of the proposed project activity being considered as an eligible CPA to be included in the PoA;

(b) Ecopart will check if the proposed project activity is already registered as a CPA under this PoA by analyzing its own record keeping system of registered CPAs;

(c) Ecopart will check if the proposed project is already registered under CDM by analyzing the database of registered CDM Project Activities and CDM Programme of Activities in Brazil;

(d) The CME, assisted by Ecopart, will check if the proposed project is in accordance with the eligibility criteria for the inclusion of a CPA in the PoA as established in section A.4.2.2 of this PoA;

(e) The CME will establish a relationship with the CPA implementer (through a letter of intent or contract);

(f) The CME will request the signature of the CPA implementer for two declarations:

- Declaration of voluntary participation: confirmation of awareness and agreement with the implied conditions and responsibilities related to this PoA;
- Declaration of conformity: confirmation that the proposed project does not seek registration as a single CDM project or as part of another Programme of Activities.

Therefore, it is the CME's responsibility to ensure that no double accounting will occur together with confirmation from the CPA implementers. The system/procedure presented above will be conducted by competent personnel and will be peer-reviewed.

The CME's system/procedure for the inclusion of new CPAs in this PoA is summarized in the diagram presented below:

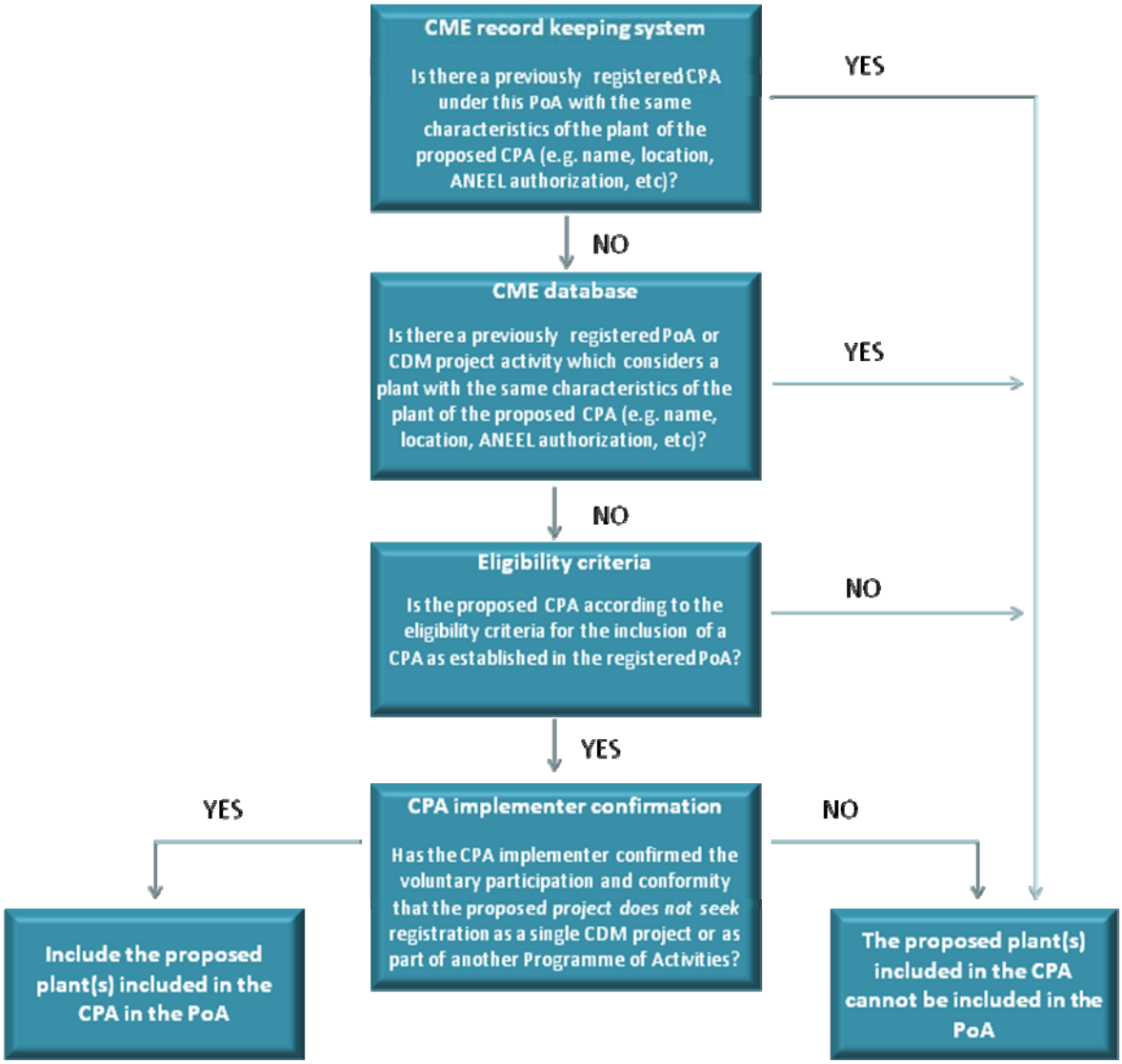


Figure 8 - CME's procedure to avoid double accounting while including new project(s) in the CPA(s) to this PoA

In summary, whenever a new CPA is identified, the information recorded in the CME's recording keeping system regarding its own projects and CME's database related to registered CDM Project Activities and CDM Programme Activities will be consulted. Thus, information of the wind power plant considered in the new CPA must be compared against the CPAs already added to this proposed PoA and already registered CDM Project Activities and CDM Programme of Activities. If it is confirmed that there are no other project(s) previously added to this PoA or registered under CDM similar to the proposed project(s), the CME will proceed following items (c), (d) and (e) described above. The new CPA shall be included only after pass in the system/procedure presented above.

The system/procedure presented above will ensure that all project(s) included in the CPAs considered in this PoA will be uniquely defined, thereby avoiding double counting of the emission reductions in this PoA.

(iii) The provisions to ensure that those operating the CPA are aware and have agreed that their activity is being subscribed to the PoA

To ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the proposed PoA, the CPA operator/implementer has to sign a declaration of voluntary participation, stating that it has agreed with the implied conditions and responsibilities.

A.4.4.2. Monitoring plan:

The monitoring plan will be implemented per CPA following the description provided in section E.7.2 and considering the parameters described in section E.7.1. The monitoring plan defines that the project implementer of each CPA should periodically submit the monitoring data to the coordinating entity (Omega Energia Renovável S.A.).

The verification will be conducted by the Coordinating and Managing Entity and it will be carried out per CPA or in groups without applying sampling methods. As described in the PoA monitoring plan (Section E.7.2.), the monitoring of electricity generation by wind power plants follows the procedures established by the National Electric System Operator (from the Portuguese *Operador Nacional do Sistema Elétrico – ONS*), *ANEEL* and *CCEE*. Each wind power plant is individually identified in the system of those entities. This procedure ensures that no double accounting occurs and that the status of verification can be determined anytime for each CPA.

Once the monitoring data will be crosschecked with information from CCEE, no double counting is expected. Also, since no sampling methods are used and the CPAs are individually monitored, the status of verification can be determined anytime for each CPA.

A.4.5. Public funding of the programme of activities:

This Programme of Activities does not receive any public funding.

SECTION B. Duration of the programme of activities

B.1. Starting date of the programme of activities:

27/10/2011

NOTE: This date represents the one in which the proposed PoA became publicly available in the UNFCCC website (GSP commencement).

B.2. Length of the programme of activities:

28y – 0m.

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at CPA level ☑

In Brazil, the sponsoring of any project that involves construction, installation, expansion or operation of any polluting or potentially polluting activity or any other activity capable of causing environmental degradation is obliged to secure several permits from the relevant environmental agency (federal and/or at the state level, depending on the technical aspects of the project).

The environmental impact of the Projects to be included in the future in this PoA (*i.e.* wind power plants) is considered small given that of other sources of electricity generation. As per Resolution #279[14], dated June 27th, 2001, issued by the National Environmental Council – CONAMA (from the Portuguese *Conselho Nacional do Meio Ambiente*) wind power plants must do a simplified environmental impact assessment in order to obtain the necessary permits to the project. Therefore, the CPA level was chosen as the one in which the environmental analysis will be performed.

Permits required by this resolution are:

The Preliminary Permit (*Licença Prévia* or *LP*);

The Construction Permit (*Licença de Instalação* or *LI*); and

The Operation Permit (*Licenca de Operação* or *LO*).

The process starts with a previous analysis (preliminary studies) conducted by the project sponsor which is submitted to the environmental agency. Once the environmental local agency has a positive understanding about the environmental project concept, the Preliminary Permit (LP) is issued.

[14] Available at <http://www.mma.gov.br/port/conama/res/res01/res27901.html>. Accessed on 14th July, 2011.

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

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

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Given the particularities that may occur depending on the location of the CPAs, the environmental analysis as well as the documentation mentioned above will be discussed individually for each one of the projects as the CPA level.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

According to Brazilian environmental regulations, an environmental impact assessment is required for every CPA to be added to the proposed PoA.

As mentioned above, the environmental impact of the project considered in this PoA is considered small given other sources of electricity generation. However, they must do the environmental impact assessment and respective environmental impact report in order to obtain the necessary permits for the project as per the National Environmental Council Resolution 237/97 (from the Portuguese *Conselho Nacional do Meio Ambiente – CONAMA nº 237/97*)

In this sense, an environmental impact assessment will be done individually for each power plant, corresponding then to a typical CPA.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

1. Local stakeholder consultation is done at PoA level ☑
2. Local stakeholder consultation is done at CPA level ☐

The local stakeholder was conducted at PoA level based on the requirements of the Brazilian Designated National Authority "*Comissão Interministerial de Mudanças Globais do Clima*" for requesting the Letter of Approval.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

According to Resolution nr. 9, issued on March 20th, 2009[15], the Brazilian Designated National Authority (*Comissão Interministerial de Mudanças Globais do Clima – CIMGC)* states that the coordinating and managing entity shall invite for comments at least the following entities in order to obtain the Letter of Approval for the programme of activities:

- *Comissão Interministerial de Mudança Global do Clima – CIMGC* (*the Executive Secretariat of the Interministerial Commission on Global Climate Change*);
- *Fórum Brasileiro de ONGs e Movimentos Sociais para o Meio Ambiente e Desenvolvimento – FBOMS (Brazilian NGO Forum and Social Movements for the Environment and Development)*;
- Associação Brasileira de Energia Eólica – ABEEólica (Brazilian Wind Energy Association) representing the relevant national institutions whose work is directly or indirectly related to the proposed Programme of Activities;
- *Ministério Público Federal* (Federal Attorney General).

Additionally, Resolution #9 also established that all requirements related to the approval process for CDM Project Activities shall also be applied while seeking approval for Programme of Activities. In this sense, some of the procedures established by Resolution #7, issued on March 5th 2008[16], are also going to be followed.

In addition to the procedures established in Resolution #9, Resolution #7 also requires that at the time the letters are sent, a version of the PDD in the local language and a declaration stating how the project contributes to the sustainable development of the country must be made available to these stakeholders at least 15 days previous to the starting of the Global Stakeholder Process (GSP).

The Portuguese versions of the CDM-PoA-DD, CDM-CPA-DD (both the generic and the one developed considering a real case) were published at the internet website <http://sites.google.com/site/consultadcp/> on 03/10/2011 which is also the date when the invitation letters were sent to the agents mentioned above.

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.

D.3. Summary of the comments received:

No comments have been received yet.

D.4. Report on how due account was taken of any comments received:

No comments have been received yet.

[15] Available at: <http://www.mct.gov.br/upd_blob/0201/201258.pdf >. Accessed on July 18th, 2011.
[16] Available at: <http://www.mct.gov.br/>.

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved baseline and monitoring methodology applied to each CPA included in the PoA:

ACM0002 - "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*" (Version 12.3.0).

- Tool to calculate the emission factor for an electricity system (version 2.2.1);
- Tool for the demonstration and assessment of additionality (version 6.0.0);
- Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (version 2);
- Combined tool to identify the baseline scenario and demonstrate additionality (version 3.0.1).

The *Combined tool to identify the baseline scenario and demonstrate additionality* and the *Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion* are not applicable to the project activity, and therefore are not used.

E.2. Justification of the choice of the methodology and why it is applicable to each CPA:

The justification of the choice of the methodology ACM0002 and why is applicable to each of the CPAs to be added to the proposed PoA is further detailed below.

ACM0002 methodology *is applicable to grid-connected renewable power generation project activities that (a) 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); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).*

The plants to be considered in each CPA are all grid connected renewable power generation (*i.e.* wind power plants), corresponding to option (a) provided in the above paragraph.

The methodology also provides the following conditions:

- *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 CPAs to be added to the PoA shall correspond to the installation of a new wind power plant.

- *In the case of capacity additions, retrofits or replacements (except for capacity addition projects for which the electricity generation of the existing power plant(s) or unit(s) is not affected): 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 addition or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;

Not applicable. The CPA shall consist of the implementation of a new wind power plant.

– *In case of hydro power plants*

- *At least one of the following conditions must apply:*
  - *The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or*
  - *The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoirs, as per definitions given in the Project Emissions section, is greater than 4 W/m^2 after the implementation of the project activity; or*
  - *The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2 after the implementation of the project activity.*

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

- *The power density calculated for the entire project activity using equation 5 is greater than 4W/m^2;*
- *All reservoirs and hydro power plants are located at the same river and were designed together to function as an integrated project that collectively constitutes the generation capacity of the combined power plant;*
- *The water flow between the multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity;*
- *The total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4W/m^2, is lower than 15MW;*
- *The total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4W/m^2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.*

Not applicable. The CPAs to be added in the PoA do not correspond to a hydropower plant.

Finally, the methodology has the following restrictions – *i.e.* project activities may not be applicable in the following cases:

– *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;*

– *Biomass fired power plants;*

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

The CPA is eligible for the use of ACM0002 since it does not correspond to any of the restrictions listed above. In addition to the applicability conditions of the ACM0002 methodology, the applicability conditions of the tools used must also be assessed.

In order to estimate the baseline emissions occurring after the implementation of the CPA the "*Tool to calculate the emission factor for an electricity system*" is used. This tool provides the steps required to estimate the CO_2 emission factor, which consists of a "*combined margin*", for the displacement of electricity generated by plants connected to an electric grid.

As further described below in section B.6.1, off-grid power plants are not considered. Hence, the requirements of Annex 2 of the tool, referring to the applicability conditions that shall be met when these kind of plants are considered, are not applicable. Further, the Brazilian Electric System is neither partially nor totally located in any Annex-I country.

In this sense, it can be concluded that there are no applicability conditions preventing the use of this tool to estimate the CO_2 emission factor of the Brazilian Electricity System in the context of the proposed CPA project activity.

E.3. Description of the sources and gases included in the CPA boundary

According to ACM0002, *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*.

On May 26th, 2008, the Brazilian Designated Authority published Resolution #8 defining the Brazilian Interconnected System as a single system covering all five geographical regions of the country (North, Northeast, South, Southeast and Midwest) [17]. The figure below is a graphic representation of the project boundary.

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

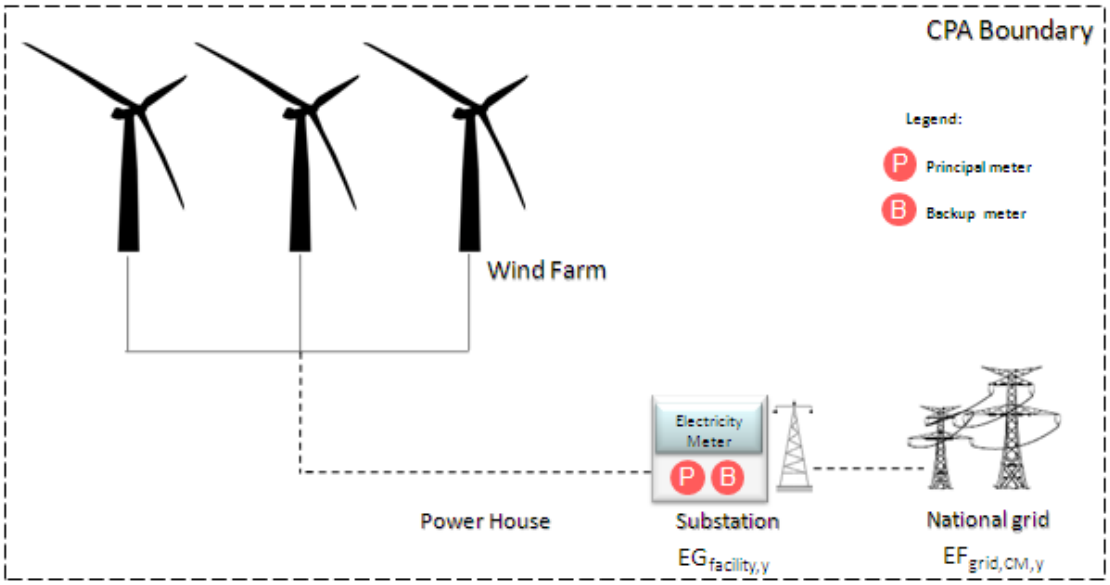


Figure 9: CPA boundary.

The greenhouse gases and emission sources included in or excluded from the CPA boundary are shown in the table below.

Table 3: Emissions sources included or excluded in the CPA 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 noncondensable gases contained in geothermal steam.	Not applicable.		
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	Not applicable.		
	For hydro power plants, emissions of CH_4 from the reservoir.	Not applicable.		

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

The CPAs to be included in the proposed Programme of Activities shall correspond to the installation of a new grid-connected wind power plant. Therefore, in accordance with the methodology ACM0002, 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 as described in the "Tool to calculate the emission factor for an electricity system".*

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the CPA being included as registered PoA (assessment and demonstration of additionality of CPA):

E.5.1. Assessment and demonstration of additionality for a typical CPA:

In accordance with the procedures provided in the baseline and monitoring methodology ACM0002, the additionality of a typical CPA must be assessed and demonstrated trough the application of "*Tool for the demonstration and assessment of additionality*". This tool provides 4 steps to determine whether the project activity is additional or not, which are further detailed below.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulation

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

Scenario 1: Continuation of the current (previous) situation of electricity supplied by the Brazilian Interconnected System.

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

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

Both alternative scenarios identified above are in compliance with all regulations, and in accordance with the following entities: ONS; ANEEL and relevant environmental agencies (at both federal and state level, when applicable).

SATISFIED/PASS – Proceed to Step 2

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method:

The additionality of a typical CPA will be demonstrated through an investment benchmark analysis (option III). Options I and II are not considered applicable to a typical CPAs considering that:

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

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

In addition, in accordance with paragraph 19, Annex 5, EB62, the benchmark analysis was identified as the most appropriate method to demonstrate the additionality of the proposed CDM Project Activity since the alternative to the implementation of the wind power plant is the supply of electricity from the grid.

Sub-step 2b - Option III - benchmark analysis

The financial indicator identified for a typical CPA is either the Project Internal Rate of Return (P-IRR) or the Equity Internal Rate of Return (E-IRR) calculated in the project cash-flow. The financial indicator to be presented in the CPA is going to be compared to the appropriate benchmark of the electric sector (in accordance with paragraph 12, Annex 5, EB 62) which is the *Weighted Average Cost of Capital (WACC)* for project IRR and Return Equity (Ke) for equity IRR. Preferably, both the indicator and the benchmark are going to be calculated in real terms.

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

Each assumption made and all data used to estimate the benchmark has to be presented to the DOE. The spreadsheet used for calculation of the WACC is going to be available with the Coordinating and Managing Entity and will also be provided to the DOE. Parameters used in the calculation will be presented and discussed individually in each CPA.

The WACC has to be calculated using parameters that are standard in the market (e.g. not linked to the expected profitability of the project sponsor) considering information from the year in which the decision to build the plant was/is/will be made. The rationale of the calculation is presented below.

Benchmark - Weighted Average Cost of Capital (WACC)[18]

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

The WACC calculation is based on parameters that are standard in the market, considers the specific characteristics of the project type, and is not linked to the subjective profitability expectation or risk profile

[18] To be determined when the proposed CPA uses the Project IRR as the financial indicator to demonstrate the additionality.

of this particular project developer. Once a wind power potential is discovered, any corporate entity is able to obtain the authorization from the government to build a wind power plant. In addition, even after the project proponent obtains such authorization, it can be negotiated afterwards. Therefore, the use of a sectorial benchmark is applicable as per the guidance provided in paragraph 13, Annex 5, EB62.

The WACC shall be valid and applicable at the time of the investment decision calculated through the formula below:

$$WACC = Wd \times Kd + We \times Ke, \text{ where:}$$

We and **Wd** are, respectively, the weights of equity and debt typically observed in the sector. The weights shall be derived from the Guidelines on the assessment of investment analysis[19], which considers a default value for CDM projects. **Kd** and **Ke** are, respectively, the cost of debt and cost of equity. Detailed explanations related to both calculations are presented below.

Cost of Debt (Kd)[18]

Kd is the cost of debt, which is observed in the market related to the project activity, and which already accounts for the tax benefits of contracting debts. **Kd** is also derived from long term loans applied to the sector in Brazil, and therefore is based on three variables, including the interest rates of the Brazilian Development Bank - BNDES (from the Portuguese *Banco Nacional de Desenvolvimento Econômico e Social*) financing endeavour credit line. Kd is calculated considering the sum of:

- Long Term Interest Rate (TJLP from the Portuguese *Taxa de Juros a Longo Prazo*) (**a**);
- BNDES remuneration (**b**);
- Credit risk rate (**c**).

TJLP (**a**) is a variable market figure which assesses the rate of debt to be applied to the average party borrowing from BNDES. This figure is the underlying majority found in the debt portion of borrowers from the BNDES. The TJLP is based on factors pertaining to market rates and spread of corporate rates over government risk.

The BNDES remuneration (**b**) and the credit risk rate (**c**) are two other factors that constitute the rate of debt companies in Brazil encounter via BNDES. The BNDES remuneration is the fee attached by BNDES for its administrative and operational costs, and for its remuneration. This rate varies according to BNDES policies, is non-negotiable and the least arguable rate in the equation. Regarding the credit risk rate, each year BNDES provides lower and upper limits to define its margin of variation. It respects its perception of risks, and banking policies. For the purposes of our calculation and due to the fact that the industry as a whole is being considered, we estimate that rate by averaging the upper limit of the margin with the rate

[19] Paragraph 18, EB 62, Annex 5. <http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf>

established for loans to direct public administration of States and Cities, which is the lowest rate that could be provided to a private investor.

Two other components for the **Kd** calculation are the marginal tax rate (**t**) and inflation forecast (**π**). In the **Kd** calculation, the marginal tax rate (**t**) is multiplied by the Cost of debt and then by the debt to total cost of capital ratio to ascertain the debt portion of the WACC formula. In the case of Brazil, and specifically to energy projects, this tax factor could either be 34% (actual profit) or 0% (presumed profit). This is decided by the specific type of project and tax regime under which it sits.

For the Presumed Profit eligibility, corporate entities revenues must be under Forty eight million Reais per year (Article #13, Law #9.718/1998)[20].

For the Presumed Profit system, 8% of gross sales in addition to financial revenues/earnings are used as basis for the income tax calculation. To this figure a 25% rate is applied resulting in the final income tax value. For the social contribution calculation 12% of gross sales in addition to financial revenues/earnings are used as a basis for the calculation. To this figure a 9% rate is applied resulting in the final social contribution value (As per Article #518 of the Federal Decree #3000, dated 26 March 1999) (please see Table 4 as an example).

Table 4: Income Tax and Social Contribution (illustrative calculation):

Income Tax	**$**
Gross Sales	1.000
Presumed Profit for income tax (8%)	80
Financial revenue	500
Total Presumed for income tax	580
Income tax due (app. 25%)	145

Social contribution	**$**
Gross Sales	1.000
Presumed Profit for social contribution (12%)	120
Financial revenue	500
Total Presumed Profit for social contribution	620
Social contribution due (9%)	55.80

Source: KPMG. "Investment in Brazil: tax." (2008)[21].

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

The nominal rate achieved for debt is used to calculate nominal WACC, which is used to discount nominal cash flow projections. In order to achieve the real cash flow rate, the inflation targeting figure (**π**) for Brazil is reduced from the nominal figure achieved. The π is obtained from the Brazilian Central Bank (www.bcb.gov.br) and has experienced very little variance in the past 5 years.

[20] Publicly available in Portuguese at http://www.receita.fazenda.gov.br/legislacao/leis/Ant2001/lei971898.htm.
[21] KPMG. Investment in Brazil: tax. São Paulo: Escrituras Editora, 2008. Publicly available in English at http://www.kpmg.com.br/publicacoes/livros_tecnicos/Investment_in_Brazil10_out08.pdf

Considering explanations above, **Kd** is calculated through the following equation:

$$\mathbf{Kd = [1 + (a + b + c) \times (1 - t)] / [(1 + \pi) - 1]}$$

Cost of Equity (Ke)[22]

Ke is the cost of equity. As per option b) provided in the paragraph 15 of Annex5, EB62, it was estimated using the best financial practices through the Capital Asset Pricing Model - CAPM (mentioned as an appropriate method to determine benchmarks in guidance 14, Annex 5, EB62). This method considers the risk associated in investing in the Brazilian electricity market, which has become increasingly competitive in the last years mainly due the electricity auctions conducted by the government.

Ke is a summation of the following parameters:

- Risk-free rate (**Rf**);
- Equity risk premium (**Rm**);
- Estimated country risk premium (**Rc**);
- Sectorial Risk (**β**)

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

In order to adjust the risk-free rate (**Rf**) to the inflation adjusted rate, the expected inflation rate (for the United States) (**π'**) is reduced. The 10 Year Treasury Note (^TNX), and the TIPS (Treasury Inflation Protected Securities) are considered for the purpose of calculation, and are readily quoted in the US market. The ^TNX index carries inflation on their value while the TIPS is an index without inflation. Subtraction from the chosen period average values from the ^TNX and the TIPS results in the estimated inflation. There is no need to adjust for Brazil's expected inflation when dealing with a hurdle rate in real terms.

Sectorial Risk stands for the average sensitivity of comparable companies in that industry to movements in the underlying market. The parameter considered for Sectorial Risk is the beta **"β",** derived from the correlation between returns of US companies from the sector and the performance of the returns of the US market. **β** has been adjusted to the leverage of Brazilian companies in the sector, reflecting both structural and financial risks. **β** adjusts the market premium to the sector.

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

[22] To be determined when the proposed CPA uses either the Project IRR or Equity IRR as the financial indicator to demonstrate the additionality.

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

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

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

As mentioned in the **Kd** calculation, in order to achieve the real cash flow rate, the inflation targeting figure (**π**) for Brazil is reduced from the nominal figure achieved from the Brazilian Central Bank shall be used.

Considering explanation above, Ke is calculated through the following equation:

$$\mathbf{Ke = [(1 + Rf) / (1 + \pi') - 1] + (\beta \times Rm) + Rc}$$

Financial Indicator – Project or Equity Internal rate of return

As mentioned above, the financial indicator identified is the Internal Rate of Return (IRR), which can be the Project IRR or the Equity IRR. The Project IRR can be compared with the WACC and the Equity IRR with the Return on Equity (Ke)[23]. The cash flow of each project is going to be calculated considering an expected lifetime of 20 years[24].

The table presented below provides a list of the main input values as well as a brief justification for their use. Values used are going to be presented in the CPA. Moreover, documents evidencing all input values mentioned used to estimate the IRR have to be supplied to the DOE and the IRR calculation spreadsheet has to be attached to the CPA.

Table 5: Parameters and justification of data used in the investment analysis.

Parameter	Justification/source of information used
Installed Capacity (MW)	Preferably based on the project design of the wind farm and supported by the wind certification.
Plant Load Factor†	Value estimated by the wind certification company at 50% of probability (P50). The use of the wind certification report is in compliance with paragraph 3(b) of Annex11, EB 48. This range of probability represents 50:50 of chance of higher or lower generation of electricity by the plant and can be

[23] Guidance 12 , Annex 5, EB 62 link: http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf
[24] *M*aximum assessment period as recommended by *the guidance 3, Annex 5, EB 62.* link: http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

	deemed conservative. As an example, the financing institutions usually consider P90 for the financing agreement.
PPA price (BRL/MWh)	The price considered in the investment analysis is derived from the PPA when available or; based on the Settlement Price for the Differences (from the Portuguese *Preço de Liquidação das Diferenças – PLD*).
100% TUST/TUSD fee	In Brazil, electricity producers using renewable sources receive a 50% discount in the Tariff for the Use of the Transmission System - TUST fee (from the Portuguese *Tarifa de Uso do Sistema de Transmissão*) or in the Tariff for the Use of the Distribution System - TUSD fee (from the Portuguese *Tarifa de Uso do Sistema de Distribuição*). This discount aims at boosting investments in renewable energy projects and shall be considered as a Type E- policy as defined by Annex 3, EB 22. Additionally, according to this clarification, type E- policies[25] do not need to be considered in the development of the baseline scenario if implemented after 11 November 2001. The reduction in the TUST/TUSD fee was established by ANEEL Resolution nr. 77 dated 18/08/2004[26]. Therefore, the discount is not going to be taken into account.
Industrialized Products Tax (IPI)	Industrialized Products Tax (from the Portuguese *Imposto sobre produtos Industrializados – IPI)* stands for a tax over industrialized products. Since 2009 the federal government agreed to exempt wind turbines from paying this tax. Considering that this policy is specific for wind turbines, or rather, the policy creates incentives for less GHG emission intensive technology (Type E- policy), the exemption was not considered.
Investment (1,000BRL)	Preferably based on quotations from the manufacturers as well as from the EPC services providers.
P/E-IRR%	***Project/Equity Internal Rate of Return of the Wind Power Plant***

† Depending on the connection point of the plant (distribution or transmission system) this value may consider the transmission losses of the system. The transmission losses are determined in relation to the the Gravity Point of the Brazilian Interconnected System and can be confirmed using the Report Published by the Chamber for the Commercialization of Electric Power available at www.ccee.org.br

Sub-step 2d: Sensitivity analysis

A sensitivity analysis will be conducted by altering the following parameters:

• Increase in electricity generation, which may increase the project revenues;

[25] From paragraph 6.b) of Annex 3, EB 22 Type E- policies are *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).*

[26] Available in Portuguese at <http://www.aneel.gov.br/cedoc/ren2004077.pdf>. Accessed on 02/09/2011.

• Increase in electricity tariff, which may also influence project revenues;

• Reduction in expected investments.

Those parameters are selected as being the most likely to fluctuate over time. In addition, these variables constitute more than 20% of either total project costs or total project revenues (paragraph 20 of Annex 5, EB62). First, the sensitivity analysis is performed altering each of these parameters by 10%, and assessing what was the impact on financial indicator (paragraph 21 of Annex 5, EB62).

A simulation will be conducted by altering the parameters mentioned above in order to verify possible scenarios where the financial indicator would equal the benchmark. Regardless of the result, an assessment on the probability of occurrence of the scenario will be presented.

SATISFIED/PASS – Proceed to Step 3

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 was applied in order to determine project's 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 was used to determine project's additionality.

SATISFIED/PASS – Proceed to Step 4

Step 4. Common practice analysis

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

Not applicable since the proposed project activity is listed as one of the measures described in paragraph 6 of the tool, as further discussed below.

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

Not applicable since the proposed project activity is listed as one of the measures described in paragraph 6 of the tool, as further discussed below.

In accordance with paragraph 47 of the additionality tool, a stepwise approach is to be applied while conducting the common practice analysis. In addition, the tool lists the measures for which the method is applicable.

A typical CPA to be included in the proposed PoA matches option (b) - *Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies)* - since it consists of a switch from grid electricity to electricity generation from wind power plants[27]. Therefore, only wind power plants were considered in this common practice analysis.

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

Taking into account the design output or capacity of the proposed CPA, the applicable range of the design output or installed capacity to be considered while conducting the common practice analysis as established above is determined under this step.

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

As per the guidance of step 2, the plants to be considered in the analysis are selected following the definitions for output and geographical area as presented in the additionality tool.

(i) Output

The additionality tool defines output as "*goods or services with comparable quality, properties, and application areas (e.g. clinker, lighting, residential cooking)*". Therefore, in the case of the CPAs, the output considered is the renewable electricity generated by grid-connected wind power plants.

(ii) Applicable geographical area

The additionality tool states:

> *"Applicable geographical area covers the entire Host Country as a default; if the technology applied in the project is not country specific, then the applicable geographical area should be extended to other countries".*

The technology to be applied in the project is not country specific. Nevertheless, Brazil has an extension of 8,514,876.599 square kilometres[28] (with over 4,000 km distance in the north-south as well as in the east-west axis) and 6 distinct climate regions: sub-tropical, semi-arid, equatorial, tropical, highland-tropical and Atlantic-tropical (humid tropical).

These climatic variations obviously have a strong influence in the technical aspects related to the implementation of wind farms since meteorological events have strong influence in the wind regime. As

[27] Analogously to the example provided in the Annex 8 of the EB 62.
[28] Available at: http://www.ibge.gov.br/home/geociencias/areaterritorial/principal.shtm.

cited by VESELKA[29], the *climate affects all major aspects of the electric power sector from electricity generation, transmission and distribution system to consume demand for power*. Therefore, it is reasonable to assume that the technology may vary considerably from location to location within the country.

According to the Brazilian Electricity Regulatory Agency all regions of the country have some potential to generate electricity using wind, however the highest wind power potential is located in the northeast region of the country, where the majority of operational projects are located (Figure 10).

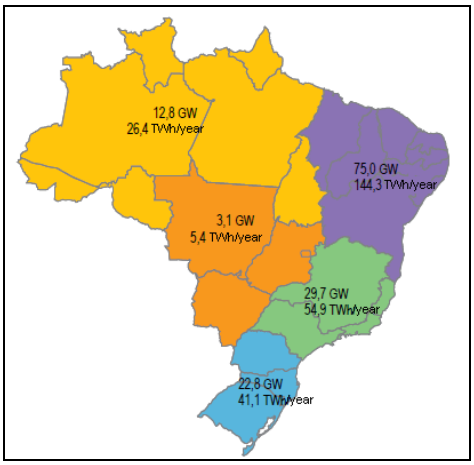


Figure 10: Brazilian wind resource potential[30].

Nevertheless, the climate conditions are not the only distinguishing feature among the several regions of the country. In Brazil, project developers connecting to the transmission or distribution network are charged a fee called Tariff for the Use of the Transmission/Distribution System. This tariff varies depending on the state where the power plant is connected to. TUST/TUSD is established by specific ANEEL regulation and has strong impact in the financial analysis of a project.

Just for reference, between 2011 and 2012, TUSD in Minas Gerais state (located in the same region of Rio de Janeiro) was BRL 2.94/kW and in Rio de Janeiro state BRL 1.66/kW (less than half that of Minas Gerais). Both states are located in the southeast region of the country[31].

In addition, it is worth mentioning that each state has a specific environmental agency responsible for determining the technical standards required to obtain all environmental licenses, with regional regulations and distinct administrative process established by each state region.

Therefore, when evaluating the different climate conditions of each region, the specific environmental regulatory framework of each state, the energy price subdivision per markets and different values of TUSD/TUST applied at each Brazilian state, it's clear that the national territory does not consist of the same

[29] VESELKA, T. D. Balance power: A warming climate could affect electricity. Geotimes. Earth, energy and environment news. American Geological Institute: August, 2008. Available at: < http://www.agiweb.org/geotimes/aug08/article.html?id=feature_electricity.html>.

[30] ANEEL - Agência Nacional de Energia Elétrica. **Atlas de energia elétrica do Brasil**. 3ed. – Brasília: Aneel, 2008. Available at <http://www.aneel.gov.br/biblioteca/EdicaoLivros2009atlas.cfm>.

[31] The TUSD applicable for Minas Gerais (ANEEL Ordinance #1127, dated 05/04/2011) is available at http://www.aneel.gov.br/cedoc/reh20111127.pdf. The TUSD tariff applicable to Rio de Janeiro state (ANEEL Ordinance #1232, dated 01/11/2011) is available at http://www.aneel.gov.br/cedoc/reh20111232.pdf.

"comparable environments" as required by the methodological tool "*Tool for the demonstration and assessment of additionality*". Undoubtedly, these differences among the Brazilian states (climate, energy price, transmission/distribution costs and environmental legislation) have technical, financial and regulatory impacts for the implementation of wind power plants.

In summary, taking into account the definitions presented above, only grid-connected wind power plants; with an installed capacity between the range established in *Step 1* above and located in the same state as the one where the plant considered in a typical CPA is going to be implemented will be taken into consideration while conducting the common practice analysis.

Other CDM Project Activities, defined by the tool as the ones *registered (...)* and that *have been published on the UNFCCC website for global stakeholder consultation as part of the validation process* do not have to be considered. In addition, the common practice analysis will only comprehend plants that became operational before the starting date identified for the CPA under consideration.

The result of N_{all} for the range identified above in *Step* 1 is determined by the set of plants considered identified as per the criteria discussed above. A list containing the resultant set of plants is going to be supplied to the DOE.

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}.

According to the methodological tool *"Tool for the demonstration and assessment of additionality"*, different technologies are ones that deliver the same output and differ by at least one of the following (as appropriate in the context of the applicable geographical area and measure applied in the proposed CPAs):

(a) Energy source/fuel

Only electricity generation from wind source (wind power plants) has to be considered in this analysis.

(b) Feed stock

Not applicable.

(c) Size of installation (power capacity):

(i) Micro (as defined in paragraph 24 of Decision 2/CMP.5 and paragraph 39 of Decision 3/CMP.6);

(ii) Small (as defined in paragraph 28 of Decision 1/CMP.2);

(iii) Large.

Not applicable.

(d) Investment climate in the date of the investment decision, inter alia:

(i) Access to technology

Wind power plants can differ significantly from each other considering the region to be implemented, climate, topography, availability of transmissions lines, direction and wind speed, etc. Therefore, depending on the project location, differences related to the technical aspects of wind power plant projects have influence in their implementation, even where wind power projects are located in the same region. Considering that these technical differences obviously have influence in the investment/financing of a project and project sponsors have different investment capacities, financial information has to be considered when projects are analyzed. If financial information or incentives for similar projects is accessible or publicly available, this information has to be used in the analysis following the additionality tool; otherwise, this criterion can be excluded from the common practice analysis.

(ii) Subsidies or other financial flows

If subsidies of other financial flows were identified for other projects (although this information is not always publicly available), they have to be considered as different technologies to the proposed project(s) to be included in the CPA.

(iii) Promotional policies

As mentioned in section A.4.3, PROINFA is a Program of Incentives to Alternative Energy Sources launched by the Brazilian government in 2002. This program provides better tariffs through long-term PPAs. Therefore, projects which have been participating in PROINFA cannot be compared with projects which do not receive this type of incentive. Since the project(s) to be included in the CPA do(es) not receive PROINFA incentive, PROINFA projects have to be considered as having different technology to the proposed project(s) to be included in the CPA.

(iv) Legal regulations

Until the beginning of the 1990's, the energy sector was composed almost exclusively of state-owned companies. From 1995 onwards, due to the increase in international interest rates and the lack of state investment capacity, the government initiated the privatization process. However, by the end of 2000 results were still modest. Although further initiatives, aiming to improve electric generation in the country, were taken between the 1990's and 2003, they did not attract new investment to the sector. In 2003, the recently elected government decided to fully review the electricity market institutional framework in order to boost investments in the electric energy sector. Market rules were changed and new institutions were created such as Energetic Research Company (in a free translation from the Portuguese *Empresa de Pesquisa Energética – EPE*) – an institution responsible for the long term planning of the electricity sector with the role of evaluating, on a perennial basis, the safety of the supply of electric power – and Chamber for the Commercialization of Electric Power (CCEE) – an institution responsible for the management of electric power commercialization within the interconnected system. This new structure was approved by the House of Representatives and published in March of 2004[32]. Given the new regulatory framework, the Project Participants have to consider only projects which started operation from April of 2004 onwards. Projects that started operations before the new electricity framework have to be considered as having different technology to the proposed project(s) to be included in the CPA.

[32] http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/lei/l10.848.htm

(e) Other features, inter alia:

(i) Unit cost of output (unit costs are considered different if they differ by at least 20 %);

As mentioned in "access to technology" item, the Project Participants have to do their up most to make a reasonable comparison although information related to the unit cost of output is not always available.

Outcome: Considering the criteria mentioned above in conjunction with the results from *Steps 1* and *2* above, N_{diff} will mainly consist of projects that are starting operations from April 2004 onwards, without access to PROINFA incentives.

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. The proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and* $N_{all}-N_{diff}$ *is greater than 3.*

The factor F *and the result of* $N_{all}-N_{diff}$ *will be calculated from the results presented above. If the factor* F *is lower than 0.2 and* $N_{all}-N_{diff}$ *is lower than 3, then the proposed project(s) to be included in the CPA is* ***not*** *considered as "*common practice*". Therefore, the CPA is additional*.

If the final result shows that no comparable activities occur without incentives, the project cannot be considered common practice and therefore is not a business as usual type scenario. In this sense, it is clear that, in the absence of the incentive created by the CDM this project would not be the most attractive scenario.

E.5.2. Key criteria and data for assessing additionality of a CPA:

The key criteria for assessing additionality of a CPA when proposed to be included in the proposed PoA are detailed below:

Step 1 – It has to be confirmed that the alternative scenarios presented in section E.5.1 in the CDM-PoA-DD are the credible and are in compliance with mandatory laws and regulations at the time of the CPA validation.

Step 2 – the investment analysis of a typical CPA must be conducted as described in section E.5.1. in the CDM-PoA-DD. The result shall demonstrate that the IRR of a project is lower than the WACC, thus unequivocally show that the project activity is not the most economically or financially attractive alternative.

Step 3 – Not applicable

Step 4 – The common practice analysis of a typical CPA shall be conducted analysing wind power plants implemented within the PoA's boundary, by applying the stepwise approach presented in section E.5.1. in the CDM-PoA-DD to official and publicly available database (e.g. ANEEL database). If any similar option is identified, why the existence of a similar project does not contradict the outcome of step2 and/or 3 of the additionality test shall be discussed.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical CPA:

Baseline emissions (BE_y)

Baseline emissions are calculated for each CPA as established by the ACM0002 methodology. From the methodology "*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 calculation of the combined margin CO_2 emission factor for grid connected power generation ($EF_{grid,CM,y}$) follows, as recommended by ACM0002, the procedures established in the methodological tool "*Tool to calculate the emission factor for an electricity system*". According to this tool Project Participants shall apply six steps in order to calculate the baseline emission factor as further detailed below.

- **STEP 1** - Identify the relevant electricity system

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 such delineations are 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*".

Brazilian DNA published Resolution #8, issued on 26th May, 2008, defines the Brazilian Interconnected System as a single system that covers all the five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest). Hence this figure will be used to calculate the baseline emission factor of the grid.

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

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

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

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

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM.

The Brazilian DNA made available the operating margin emission factor calculated using option *(c) Dispatch data analysis OM*. Detailed information on the methods and data applied can be obtained in the DNA's website (http://www.mct.gov.br/index.php/content/view/74689.html).

In accordance with the tool, for the dispatch data analysis, the emission factor shall be up-dated annually, i.e. the *ex-post* data vintage is chosen.

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

The dispatch data analysis OM emission factor ($EF_{grid,OM-DD,y}$) is determined based on the grid power units that are actually dispatched at the margin during each hour *h* where the project is displacing grid electricity. It shall be calculated according to the formulae below:

$$EF_{grid,OM-DD,y} = \frac{\sum_{h} EG_{PJ,h} \times EF_{EL,DD,h}}{EG_{PJ,y}} \qquad \textbf{Equation 1}$$

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 displaced by the project activity in hour *h* of the year *y* (MWh);

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

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

h = Hours in year *y* in which the project activity is displacing grid electricity;

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

Calculation of hourly CO_2 emission factor for grid power units ($EF_{EL,DD,h}$)

The Brazilian DNA made available the calculation of the operating margin emission factor based on option (c) dispatch data analysis. Therefore, the project participants used this figure for the proposed project activity.

However, the project participants neither have access to the decisions that the Brazilian DNA took in order to calculate the hourly CO_2 emission factor nor to the spreadsheet used. Only final values are available for public consultation. Hence, the project participants are not able to describe which method has been used to calculate the hourly emission factor.

Calculation to determine the set of grid power units n in top of the dispatch

The Brazilian DNA made available the calculation of the operating margin emission factor based on option (c) dispatch data analysis. Therefore, the project participants used this figure for proposed project activity.

However, the project participants neither have access to the decisions that the Brazilian DNA took in order to determine the set of power units *n* nor to the spreadsheet used. Only final values for the hourly emission factor ($EF_{EL,DD,h}$) are available for public consultation. Hence, the project participants are not able to describe which method has been used to determine the set of power units *n*

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

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \textbf{Equation 2}$$

Where:

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

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year *y* (MWh);

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year *y* (tCO_2/MWh);

m = Power units included in the build margin;

y = Most recent historical year for which electricity generation data is available.

Calculation to determine the set of power units m included in the build margin

The Brazilian DNA made available the calculation of the build margin emission. Therefore, the project participants used this figure for proposed project activity.

However, the project participants neither have access to the decisions that the Brazilian DNA took in order to determine the set of power units *m* nor to the spreadsheet used. Only final values are available for public consultation. Hence, the project participants are not able to describe which method has been used to determine the set of power units *m*.

Calculation of the CO_2 emission factor for each power unit m ($EF_{EL,m,y}$)

The Brazilian DNA made available the calculation of the build margin emission. Therefore, the project participants used this figure for proposed project activity.

However, the project participants neither have access to the decisions that the Brazilian DNA took in order to calculate the CO_2 emission factor for each power unit *m* nor to the spreadsheet used. Only final values are available for public consultation. Hence, the project participants are not able to describe which method has been used to calculate the CO_2 emission factor for each power unit *m*.

- **STEP 6** – Calculate the combined margin (CM) emissions factor $EF_{y.}$

The combined margin calculation is based on method ***a)*** provided by the tool, as follows:

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

Where,

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

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

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

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

According to the tool, for wind power generation project activities, as is the case of a typical CPA to be added to the proposed PoA, weights are $w_{OM} = 0.75$ and $w_{BM} = 0.25$.

Project emissions (PE_y)

According to ACM0002, *for most renewable power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:*

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad \textbf{Equation 4}$$

Where,

PE_y = Project emissions in year *y* (tCO_2e);

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year *y* (tCO_2);

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e);

$PE_{HP,y}$ = Project emissions from 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 for emissions from the consumption of fossil fuels. Therefore, in the case of the proposed CPA, $PE_{FF,y} = 0$ tCO_2e.

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

Considering that the CPA to be considered in the context of the proposed PoA consists of 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_2e.

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 a typical CPA shall consists of the construction of a new wind power plant, there are no emissions from water reservoirs. Therefore, $PE_{HP,y} = 0$ tCO_2e.

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.

Emission Reductions (ER_y)

As per the explanations provided above project and leakage emissions for the type of project being considered in the context of the proposed PoA are zero. Emission reductions by the project are equal to baseline emissions. For detailed calculation procedures to be applied in each CPA, please refer to section E.6.2. below.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a CPA:

Baseline emissions (BE_y)

Baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \qquad \textbf{Equation 5}$$

Where,

BE_y = Baseline emissions in year y (tCO_2);

$EG_{PJ,y}$ = 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);

$EF_{grid,CM,y}$ = 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).

CPAs to be added to this PoA in the future shall consist of new wind power plants. Therefore, $EG_{PJ,y}$ is determined as follows.

$$EG_{PJ,y} = EG_{facility,y} \quad \textbf{Equation 6}$$

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);

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

The quantity of net electricity generation supplied by the project's plant to the grid in year *y* ($EG_{faciclity,y}$, in MWh/yr) is determined, for the purpose of ex-ante estimative as being equal to the installed capacity of each plant multiplied by the capacity factor - as determined by the Wind Certification (option b, Annex 11, EB 48) specially conducted for the site considered in the CPA – and by the number of hours in which the plant is forecasted to be operational during year *y*.

The calculation of the combined margin CO_2 emission factor for grid connected power generation ($EF_{grid,CM,y}$) follows the steps established in the "*Tool to calculate the emission factor for an electricity system*". As described above in section E.6.1., data published by the Brazilian DNA will be used to calculate the combined margin CO_2 emission factor of the grid.

The Brazilian DNA applies the *Dispatch Data Analysis OM* method. In accordance with the tool, the emission factor has to be monitored. In addition, the tool requires that the combined margin shall be determined for the year in which the plant dispatched electricity to the grid. Therefore, the combined margin CO_2 emission factor will be determined for each CPA during the verification.

Project Emissions (PE_y)

As explained above in section E.6.1., there are no sources of project emissions associated with the implementation of a typical CPA considered in the context of the proposed PoA.

Therefore, $\boldsymbol{PE_y = 0}$.

Leakage emissions (LE_y)

As explained above, there are no sources of leakage emissions associated with the implementation of a typical CPA considered in the context of the proposed PoA.

Therefore, $LE_y = 0$.

Emission reductions (ER_y)

According to ACM0002 emission reductions by a typical CPA are calculated as follows.

$$ER_y = BE_y - PE_y \qquad \textbf{Equation 7}$$

Where,

ER_y = Emission reductions in year y (t CO_2e);

BE_y = Baseline emissions in year y (t CO_2);

PE_y = Project emissions in year y (t CO_2e).

E.6.3. Data and parameters that are to be reported in CDM-CPA-DD form:

All parameters used for the determination of the emission reductions by the proposed PoA are monitored by each CPA. For details please refer to section E.7.1. below.

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

E.7.1. Data and parameters to be monitored by each CPA:

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project plant/unit 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 section B.5	To be presented in the CPA
Description of measurement methods and procedures to be applied:	This parameter will be quantified through the energy meter to be located at the substation which continuously measures the electricity delivered by the plant to grid. The equipment to be used has, by legal requirements, an extremely low level of uncertainty – 0.2 precision class. In addition, there should be another meter functioning as the backup meter which will ensure that electricity will be properly measured.The monitoring of this parameter will be conducted separately for each plant and will be, at least, monthly recorded.
QA/QC procedures to be applied:	Energy metering QA/QC procedures are explained in section E.7.2 (the equipments used have by legal requirements extremely low level of uncertainty – 0.2 precision class). In addition, there will be another meter at the substation (backup) to ensure that electricity will be properly measured. The monitored data will be crosschecked with documents issued by the local power utility or CCEE.

Any comment:	-

Data / Parameter:	$EG_{PJ,h}$
Data unit:	MWh
Description:	Electricity displaced by the project activity in hour *h* of the year *y*
Source of data to be used:	Local measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Not used for ex-ante estimative
Description of measurement methods and procedures to be applied:	The electricity delivered to the grid by the project activity is monitored by the project owner. Hourly aggregated information will be used to determine the operating margin CO_2 emission factor following the steps provided in the "*Tool to calculate the emission factor for an electricity system*".
QA/QC procedures to be applied:	Energy metering QA/QC procedures are explained in section B.7.2 (the equipments used have by legal requirements extremely low level of uncertainty). Hourly information provided by project participants can be weekly aggregated and crosschecked with the Reports issued by CCEE.
Any comment:	-

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 DNA website (http://www.mct.gov.br/index.php/content/view/74689.html)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Large amount of data.
Description of measurement methods and procedures to be applied:	The selected option to calculate the operating margin is the dispatch analysis which does not permit the vintage of *ex-ante* calculation of the emission factor. Hence, this value will be calculated annually applying the numbers published by the Brazilian DNA and following the steps provided in the "*Tool to calculate the emission factor for an electricity system*".
QA/QC procedures to be applied:	Official source of information (*i.e.* Brazilian DNA) will be used.
Any comment:	-

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 DNA website (http://www.mct.gov.br/index.php/content/view/74689.html)
Value of data applied	0.1404

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The selected option to calculate the operating margin was the dispatch analysis which does not permit the vintage of *ex-ante* calculation of the emission factor. Hence, this value will be calculated annually applying the numbers published by the Brazilian DNA and following the steps provided in the "*Tool to calculate the emission factor for an electricity system*".
QA/QC procedures to be applied:	Official source of information (*i.e.* Brazilian DNA) will be used.
Any comment:	-

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "*Tool to calculate the emission factor for an electricity system*"
Source of data to be used:	Brazilian DNA website (http://www.mct.gov.br/index.php/content/view/74689.html)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA.
Description of measurement methods and procedures to be applied:	The selected option to calculate the operating margin was the dispatch analysis which does not permit the vintage of *ex-ante* calculation of the emission factor. Hence, this value will be calculated annually applying the numbers published by the Brazilian DNA and following the steps provided in the "*Tool to calculate the emission factor for an electricity system*".
QA/QC procedures to be applied:	Official source of information (*i.e.* Brazilian DNA) will be used.
Any comment:	-

E.7.2. Description of the monitoring plan for a CPA:

The project sponsor of each CPA will proceed with the necessary monitoring measures as established in the procedures from ONS; ANEEL and CCEE. All data collected as part of the monitoring will be archived electronically and kept for 2 years after the end of the last crediting period.

ONS is the entity responsible for coordinating and controlling the operation of generation and transmission facilities in the Brazilian Interconnected System (SIN) under supervision and regulation of ANEEL[33] which is the regulatory agency providing favourable conditions for the electric power market to develop a balance between the agents and the benefit of society[34]. CCEE is a not-for-profit, private, civil organization company that is in charge of carrying out the wholesale transactions and commercialization of

[33] Information available at <http://www.ons.org.br/institucional/modelo_setorial.aspx?lang=en>.
[34] Information available at <http://www.aneel.gov.br/>.

electric power within the SIN, for both Regulated and Free Contracting Environments and for the spot market[35].

The total electricity exported to the grid will be monitored following the procedures and requirements established by ONS which defines the technical characteristics and precision class (0.2% of maximum permissible error) of the electricity meters to be used[36]. In addition, ONS also determines the electricity meter calibration requirements (every two years)[37].

Electricity generated by each wind power plant will be measured by two energy meters (principal and backup) located at the respective substation, as specified by CCEE[38]. Before operation start-up, CCEE demands that these meters are individually registered within their system and calibrated by an entity accredited by the Brazilian Calibration Network (from the Portuguese *Rede Brasileira de Calibração* - RBC) credential. Further, energy information will be controlled in real time by CCEE. Once the measurement points are physically defined and the invoice measurement system and the communication infrastructure are installed, the measurement points will be registered in the SCDE (System of Energy Data collection) managed by CCEE.

As mentioned before, CCEE makes feasible and regulates the electricity energy commercialization in Brazil. In a process called Accounting Commensuration Aggregation (from the Portuguese, *Agregação Contábil da Medição*) CCEE compares the energy generation reported by every seller connected to the national grid with the consumption registered during the month under consideration. After the adjustments due to energy losses occurring in the transmission system are made, CCEE issues several official reports certifying the amount of energy generated by each seller.

Moreover, to confirm CCEE's information, every month the company auditing CCEE's reports randomly selects a sample of sellers that have to provide detailed information of their Power Purchase Agreement(s) and energy generation during the month being analyzed. Then the auditors analyse the information, check whether CCEE's calculation is correct and issue an opinion. The independent auditors' statements confirming CCEE's information are available at CCEE's website.

The final results of electricity generation are published at CCEE's website and are publicly available. Hence, CCEE's information - which is an official and publicly available source – is going to be used to cross-check information monitored by the project participant.

The company that owns the wind farm will be responsible for data collection and archiving as well as the calibration and maintenance of the monitoring equipment, for dealing with possible monitoring data adjustments and uncertainties, reviewing of reported results/data, internal auditing of GHG project

[35] Information available at <http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=25afa5c1de88a010VgnVCM100000aa01a8c0RCRD>.
[36] ONS – Operador Nacional do Sistema. **Procedimentos de Rede – Módulo 12: medição para faturamento / Submódulo 12.2: Instalação do sistema de medição para faturamento.** Available at http://www.ons.org.br/procedimentos/modulo_12.aspx.
[37] ONS – Operador Nacional do Sistema. **Procedimentos de Rede – Módulo 12: medição para faturamento / Submódulo 12.3: Manutenção do sistema de medição para faturamento.** Available at http://www.ons.org.br/procedimentos/modulo_12.aspx.
[38] Meters requirements are available at ONS' website: <http://www.ons.org.br/download/procedimentos/modulos/Modulo_12/Submodulo%2012.2_Rev_1.0.pdf>.
Models of meters that have the technical characteristics as required by ONS, available at CCEE's website: <http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=ca4da5c1de88a010VgnVCM100000aa01a8c0RCRD>.

compliance with operational requirements and corrective actions. Additionally, it is responsible for the project management, and for organising and training of the staff in the appropriate monitoring, measurement and reporting techniques.

It is important to mention that ANEEL can visit the plant to inspect the operation and maintenance of the facilities at any time.

E.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 study and monitoring methodology (DD/MM/YYYY): 27/07/2011

Name of person/entity determining the baseline:

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Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this CDM Programme of Activities.

Annex 3

BASELINE INFORMATION

This section is intentionally left blank. For details please refer to section E.6.1. and E.6.3. above.

Annex 4

MONITORING INFORMATION

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

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