CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

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SECTION A. General description of project activity

A.1 Title of the project activity:

Osório Wind Power Plant Project
Version 04
14/08/2006

A.2. Description of the project activity:

The objective of the Osório Wind Power Plant Project. (hereinafter OWPPP) is to generate electricity on a large scale using a clean and renewable energy source, the wind, by means of the installation of 75 Enercon 2 MW wind turbines with hub heights of 98 m for a total installed capacity of 150 MW. OWPPP will sell electricity to Eletrobrás – Centrais Elétricas Brasileiras, thus avoiding fossil-fuelled thermal plants being dispatched. As a consequence, CO_2 emissions are avoided, achieving an estimated emission reduction of 148 325 tCO_2 per year.

The power output will be sold to Eletrobrás on the basis of a 20 years' power purchase agreement (hereinafter PPA), signed on 30 June 2004, within the PROINFA (Mines and Energy Ministry Promotion Program for Electricity Generated from Renewable Sources). The PROINFA is a Brazilian Government sponsored-programme that aims at diversifying the country's energy matrix through the enactment of measures that support renewable energy projects.

The project developer is Ventos do Sul Energia S.A., registered in compliance with Brazilian regulation since May 2005, with the specific purpose of building three wind farms in Osório: Sangradouro, Osório e dos Índios. The company is owned 90,99% by Enerfin Enervento S.A. (controlled by the Spanish Group Elecnor), 9% by Wobben WindPower Enercon, a subsidiary of Enercon GmgH (Germany) in Brazil and 0,01% by CIP Consultores Internacionales. Enerfin Enervento S.A. has been working since 2001 to develop wind farms in Brazil.

The project activity involves the development, design, engineering, procurement, financing, construction, operation, maintenance and monitoring of the Osório plant´s facilities.

The project will be implemented in the South of Brazil. This region is characterised by the existence of moderate winds, if compared to the north and northeast regions. Thus, the successful implementation of the project can lead to the development of other wind farm projects in the same region and contribute to the diversification of the country's energy matrix.

Contribution to sustainable development

CDM projects have, among others, the main objective of assisting the host country in achieving sustainable development. In this content, the municipality of Osório will benefit from the project and will contribute to sustainable development in the following way:

- Improvement of the local infrastructure (roads and electric grid).
- Employment generation and improvement of incomes and working conditions of the population in the area: the project is expected to create jobs during its construction phase, which includes the construction of roads, electric infrastructure, installation of the wind turbines and the control

building, where the equipments and the staff responsible for controlling and operating the wind farm are located. Estimates show the generation of up to 740 direct jobs during this phase in Brazil, of which 160 in Osório, around 460 in Rio Grande do Sul except for Osório and around 120 in other Brazilian regions.

120 news jobs will be created for the manufacture of the towers for the OWPPP in the State of Rio Grande do Sul. Furthermore during the life time of the project, around 25 direct qualified jobs for Brazilian employees are guaranteed in maintenance and operation of the wind farm.

- Vocational training of the employees will be provided through specific training programmes of wind energy generation.
- Value addition in the local recourses through income from land leasing rental for the wind farms construction. The 15 rural owners will have a rental income for 35 years, without leaving their activities. Moreover, a lot of services will be required to the new activity, as equipments rental, hotel and meal services, for example.
- Educational, technical, social and environmental programs will be carried out at the wind farms site during the operation.
- Development of tourism opportunity, as it will be the first big-scale wind farm in South America. It has been estimated that part of the 3,5 million tourists that visits the coast of Rio Grande do Sul during the summer season, will go to Osório to visit OWPPP.
- This type of renewable energy project based on wind is not common in Brazil and therefore supporting the development of this industry will assist building capacities in Brazil, through advanced technology transfer from industrialised countries. The OWPPP will contribute to the technology transfer process and will foster manufacturing of wind turbines and related equipment in Brazil.

The project also contributes to the achievement of the Brazilian Government energy plan: by 2025, 10% of the national energy consumption should come from renewable energy sources.

A.3. Project participants:

Name of Party involved	Private and/or public entity (ies) project participants	Kindly indicate if the Party involved wishes to be considered as project participant
Brazil (host)	Ventos do Sul Energia (private entity)	No
Spain	Enerfin Enervento S.A. (private entity)	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Brazil.

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

Rio Grande do Sul.

A.4.1.3. City/Town/Community etc:

Osório.

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

The OWPPP site is located near the city of Osório, at a distance of approximately 90 km from the city of Porto Alegre and 18 km west of the Atlantic Ocean. The city of Osório is in the southeast part of the state of Rio Grande do Sul, in the south of Brazil. Figure 1 gives an illustration of the location.

The site lies on a flat area, between 10 and 18 m above sea level that runs parallel to the Atlantic Ocean coastline and is immediately adjacent to the shore of the Dos Barros Lake. The wind turbines sites area has an extension of approximately 25 km^2. The location of the wind turbines is shown in Figure 2.

Figure 1: Geographical position of Rio Grande do Sul State and OWPPP

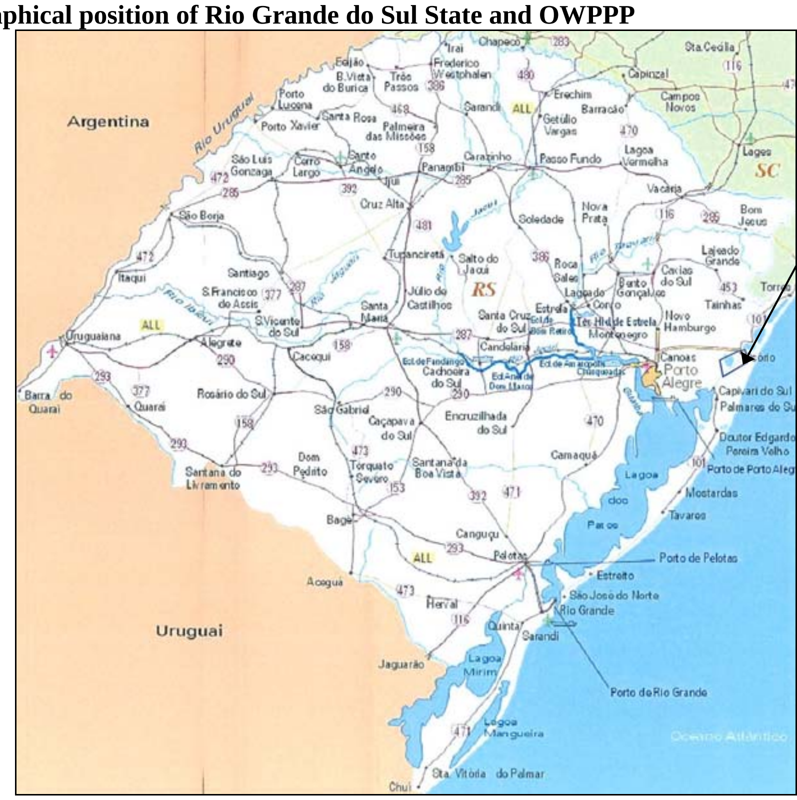

Figure 2: Site drawing for the OWPPP location

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

Sectoral Scope 1: Energy Industries (renewable/non renewable sources).

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

The 75 wind turbines to be installed for the OWPPP project are Enercon E-70, with a nominal power output of 2 MW, achieving a total installed capacity of 150 MW. The project is expected to generate approximately 425 GWh per year.

Enercon GmbH is one of the leading wind-turbine manufacturers in the world, and the E-70 model incorporates the best technologies currently available. Enercon pioneered gearless wind turbine design with a direct drive mechanism and an innovative grid-feeding system leading to a higher energy efficiency and reliability, and meeting the highest standards required for grid connection. The E-70 wind can be connected to most of electric grids.

The E-70 2 MW wind turbine was selected for both technical specifications (yield, sound emission and service life just to name few) and PROINFA requirements. According to the PROINFA, 60% of total project procurement shall be made in the local market. BNDES (National Bank of Social and Economic Development) agrees that E-70 is made in Brazil and 100% of its construction is fully performed by Brazilian companies, so the project complies with PROINFA´s requirement. The purchase contracts were signed on December 2004 and after that, the wind turbine supplier, Enercon GmgH through its subsidiary in Brazil, Wobben WindPower, joined to the project owner company, Ventos do Sul Energia.

Wobben WindPower is the only manufacturer of wind turbines in South America. It manufactures the components and wind turbines both for the export and the domestic market. Wobben has two main factories in Brazil: Sorocaba in the State of Sao Paulo and Pecem in Ceara

Enerfin-Enervento has a long experience in developing and operating wind farms and will be assisted by Elecnor do Brasil in the development of the OWPPP and by Enercon GmbH in the achievement of the transfer of technology during the construction and training of technicians for manufacturing, operation and maintenance of the facilities.

Enerfin-Enervento will transfer the following skills to Ventos do Sul:
- Wind energy measurement and prediction, and electric energy output estimate;
- Wind turbine assessment according to site conditions;
- Wind farm construction and operation, environmental evaluation and monitoring of wind farms.

As for the technology transfer from the German manufacturer Enercon GmbH, vocational training for 60 technicians at different levels will be provided in Germany.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

By dispatching renewable electricity to a grid, electricity that would otherwise be produced using fossil fuel is displaced. This electricity displacement will occur at the system’s margin, i.e. this CDM project will displace electricity that is produced by marginal sources (mainly fossil fueled thermal plants) which have higher electricity dispatching costs than base load sources and are solicited only over the hours that base-load sources (low-cost or must-run sources) cannot supply the grid when the demand exceeds baseload capacity.

The project will create the largest grid connected wind farm in South America. In its absence, energy would be partly produced by non zero emission power plants. The OWPPP is a carbon neutral renewable energy source.

Brazilian legislation recognizes and disciplines independent power producers. The continuously increasing electricity demand opens opportunities for renewable power generation plants in Brazil. Wind power generates electricity during the entire year period and this feature makes it extremely interesting in the Brazilian context. Brazil's most important electricity source is represented by hydroelectric generation system and the system falls under stress during the dry season of the year. Therefore, wind power represents an interesting complementary power source and an attractive solution for many purchasers. It also has to be said that the extra revenues and benefits associated with wind power project developed under the CDM also represent a stimulus and financial incentive for wind power developers and operators.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tonnes of CO_2e
2007	148 325
2008	148 325
2009	148 325
2010	148 325
2011	148 325
2012	148 325
2013	148 325
Total estimated reductions (tonnes of CO_2e)	**1 038 275**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**148 325**

More detailed information about electricity and emission reduction generation is provided in Annex 3 – Baseline Information.

A.4.5. Public funding of the project activity:

No public funding from Parties in Annex I is involved in the proposed OWPPP.

SECTION B. Application of a baseline methodology

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

ACM0002 / Version 6: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

The ACM0002/Version 6 is applicable to the project activity because:

- The OWPPP applies to electricity capacity additions from wind sources;
- The OWPPP does not involve a switch from fossil fuels to renewable energy at the site;
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

B.2. Description of how the methodology is applied in the context of the project activity:

The baseline scenario is determined analyzing data from the electricity grid to which the project is connected. The project will connect to S-SE-CO (South-Southeast-Midwest) subsystem. Brazil system is characterised by two interconnected subsystems: the S-SE-CO and the N-NE (North-Northeast). Annex 3 provides details of the Brazilian grid.

Information from the national dispatch centre (hereinafter ONS, Operador Nacional do Sistema*)* is available to obtain the build and operating margins, in accordance with the ACM0002, for the determination of the electricity emission factor and the baseline emissions. For this project activity, ONS´s data from years 2002 to 2004 were used.

The project activity follows the steps provided by ACM0002. For the calculation of the operating margin emission factor in the STEP 1, the calculation method chosen was: (b) *Simple Adjusted OM*, since data are not available for the application of the preferred method – (c) *Dispatch Data Analysis OM*. For the calculation of the build margin emission factor in the STEP 2, the Option 1 was chosen. The following table presents the key information and data used to determine the baseline scenario.

Table 1: Summary of the data used to determine the baseline scenario

ID number	Data type	Value	Unit	Data Source
1. EG_y	Electricity supplied to the grid by the Project	Obtained throughout project activity lifetime	MWh	Obtained from Ventos do Sul Energia, the project developer
2. EF_y	CO_2 emission factor of the Grid	0,3490	tCO_2e/MWh	Calculated

3. $EF_{OM,y}$	CO_2 Operating Margin emission factor of the grid	0,4332	tCO_2e/MWh	This value was calculated using ONS data
4. $EF_{BM,y}$	CO_2 Build Margin emission factor of the grid	0,0962	tCO_2e/MWh	This value was calculated using ONS data
10. λ_y	Fraction of time during which low-cost/ must-run sources are on the margin	$\lambda_{2002} = 0,5053$ $\lambda_{2003} = 0,5312$ $\lambda_{2004} = 0,5041$	-	This value was calculated using ONS data

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity:

Additionality was determined using the "Tool for the demonstration and assessment of additionality (version 2)", approved by the Executive Board (Annex 1, EB 16). The CDM consolidated tool to determine additionality, includes the following steps:

Step 0. Preliminary screening based on the starting date of the project activity

The crediting period of the OWPPP will start after the date of registration. So Step 0 does not apply to this project activity.

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

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

The following alternatives have been considered:

Alternative 1: The proposed OWPPP, construction of a new wind energy development with an installed capacity of 150 MW connected to the regional grid and with an expected annual energy output of 425 GWh, not undertaken as a CDM project.

Alternative 2: Continuation of current situation in Brazil, and therefore no project activity is undertaken.

Sub-step 1b. Enforcement of applicable laws and regulations

Both alternatives comply with Brazilian electricity generation laws and regulations.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

The project activity generates other financial or economic benefits than CDM related income. As a consequence, a simple cost analysis (Option I) cannot be applied. Therefore, project participants are opting for the benchmark analysis (Option III).

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

The most appropriate financial indicator for this project type is the Internal Rate of Return (IRR). For the investment benchmark analysis the IRR is the main indicator for comparing all the scenarios under the analysis. The project IRR will be used, because there is more than one potential project developer.

The most plausible benchmark to compare the project IRR has been derived from government bond rates (NTN-C)[1]. These bonds are indexed to the IGPM (index of market prices) as well as the Project revenues and had a return of 8,6% + IGPM. For a foreigner investor it is common to consider an increase in the expected return due to the country risk and the illiquidity of the assets (estimated in 4%) compared to the case of the government bond rates.

<u>Sub-step 2c. Calculation and comparison of financial indicators (only applicable to options II and III):</u>

Ventos do Sul developed a cash flow analysis for the OWPPP (150 MW), with and without considering the expected CDM revenues of the project. This analysis is based on confidential information and its details have only been made available to the Designated Operational Entity.

The assumptions made for the analysis include:
- The OWPPP will generate 425 GWh per year (energy output validated by the wind energy consultancies, the German Wind Energy Institute – DEWI - and Garrad Hassan and Partners Ltd from the United Kingdom).
- Construction and O&M costs.
- CDM consulting fees. Validation and verification have not been included as costs in the cash flow analysis.

According to Annex 3 of the Executive Board 22 "Clarifications on the consideration of national and/or sectoral policies and circumstances in baseline scenarios – Version 2", the baseline scenario should refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place, since these policies or regulations 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) and have been implemented since the adoption of the Kyoto Protocol. Then, fixed electricity prices of PROINFA should not be considered in the baseline scenario. For clarification purposes, only, paragraphs 6(b) and 7(b) of the aforementioned document follow:

> "6(b) National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs).(…)
>
> 7(b) National and/or sectoral policies or regulations under paragraph 6 (b) that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account in developing a baseline scenario (i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place)."

The Cash flow for OWPPP is presented in Table 2 and the IRR analysis outcome is presented in Table 3.

Table 2: Cash flow for OWPPP

[1] http://www.tesouro.fazenda.gov.br/tesouro_direto/consulta_titulos/consultatitulos.asp

DESCRIPTION	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
EBIT - Operational Profit	**0**	**6.927**	**26.230**	**26.230**	**25.275**	**22.387**	**25.624**	**39.504**	**39.504**	**39.504**	**39.504**	**39.504**	**39.504**	**39.504**	**39.504**
(-) Income Tax (IT) and Social Contribuition (SC) on EBIT	0	(2.355)	(8.918)	(8.918)	(8.594)	(7.612)	(8.712)	(12.884)	(8.664)	(6.475)	(5.157)	(4.283)	(6.942)	(5.712)	(3.886)
(-) Variations of the Differ IT	0	(1.972)	(10.380)	(6.013)	(5.263)	(5.129)	(2.914)	908	1.350	1.806	2.268	2.731	2.903	2.903	2.903
NOPLAT - Net Operational Profit of the adjusted IT/SC	**0**	**2.600**	**6.932**	**11.299**	**11.419**	**9.646**	**13.998**	**27.528**	**32.190**	**34.835**	**36.615**	**37.952**	**35.465**	**36.695**	**38.521**
(+) Depreciation and Amortization	0	10.603	42.557	42.557	42.557	42.557	39.320	29.608	29.608	29.608	29.608	29.608	29.608	29.608	29.608
Gross Cash flow	**0**	**13.203**	**49.489**	**53.856**	**53.976**	**52.203**	**53.318**	**57.136**	**61.798**	**64.443**	**66.223**	**67.560**	**65.073**	**66.302**	**68.129**
Operational Investments	**(285.632)**	**(418.173)**	**7.999**	**7.999**	**7.902**	**7.608**	**7.608**	**3.440**	**3.440**	**3.440**	**3.440**	**3.440**	**1.958**	**0**	**0**
Fixed Assets	(220.317)	(324.766)	0	0	0	0	0	0	0	0	0	0	0	0	0
Differ	(40.504)	(59.945)	0	0	0	0	0	0	0	0	0	0	0	0	0
Credits of PIS/COFINS	(24.810)	(33.463)	7.999	7.999	7.902	7.608	7.608	3.440	3.440	3.440	3.440	3.440	1.958	0	0
Operational Cash Flow of the Project	**(285.632)**	**(404.971)**	**57.488**	**61.855**	**61.878**	**59.811**	**60.925**	**60.576**	**65.238**	**67.883**	**69.663**	**71.000**	**67.031**	**66.302**	**68.129**
Project IRR (real in 30 years)	**7,3%**														

miles R$

DESCRIPTION	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
EBIT - Operational Profit	**39.504**	**39.779**	**41.738**	**41.858**	**41.858**	**41.858**	**48.671**	**47.855**	**26.599**	**26.599**	**26.599**	**26.599**	**26.599**	**26.599**	**26.599**
(-) Income Tax (IT) and Social Contribuition (SC) on EBIT	(2.903)	(2.903)	(2.903)	(2.903)	(2.903)	(2.903)	(2.903)	(2.272)	(1.545)	(1.515)	(1.514)	(1.514)	(1.514)	(1.514)	(1.514)
(-) Variations of the Differ IT	2.903	2.903	2.903	2.903	2.289	0	0	0	0	0	0	0	0	0	0
NOPLAT - Net Operational Profit of the adjusted IT/SC	**39.504**	**39.779**	**41.738**	**41.858**	**41.244**	**38.955**	**45.769**	**45.584**	**25.054**	**25.084**	**25.085**	**25.085**	**25.085**	**25.085**	**25.085**
(+) Depreciation and Amortization	29.608	29.333	27.374	27.254	27.254	27.254	20.441	0	0	0	0	0	0	0	0
Gross Cash flow	**69.112**	**69.112**	**69.112**	**69.112**	**68.498**	**66.209**	**66.209**	**45.584**	**25.054**	**25.084**	**25.085**	**25.085**	**25.085**	**25.085**	**25.085**
Operational Investments	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Fixed Assets	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Differ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Credits of PIS/COFINS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operational Cash Flow of the Project	**69.112**	**69.112**	**69.112**	**69.112**	**68.498**	**66.209**	**66.209**	**45.584**	**25.054**	**25.084**	**25.085**	**25.085**	**25.085**	**25.085**	**25.085**

Table 3: IRR analysis outcome

Description	Project IRR
The OWPPP without CDM revenue stream at electricity price sold through PROINFA	**7,31%**
The OWPPP without CDM revenue stream at market electricity price*	**-0,32%**
The OWPPP with CDM revenue stream (considering 15 US$/t$CO_2$) at electricity price sold through PROINFA	**7,76%**
The OWPPP with CDM revenue stream (considering 15 US$/t$CO_2$) at electricity price sold under market price*	**0,44%**
Benchmark Government bond rate for Brazil NTN-C (20 years) + country risk and illiquidity of the asset	**8,60%** **+ 4%**

* Maximun Market Price of the last governmental auction of energy (16/12/2005) for public Bid ANEEL 2005: 116 R$/MWh.[2]

The investment analysis shows that the CDM project activity has a less favourable indicator (IRR=0,44%) than the benchmark (IRR=8,6%+IGPM+4%). As a result, the CDM project activity cannot be considered as financially attractive.

Sub-step 2d. Sensitivity analysis (only applicable to options II and III):

In order to account for private investment, the risk related to this kind of technology must be taken into account when considering the IRR.

Wind energy involves relatively high risks as compared to thermal or hydro energy power plants currently operating in the Rio Grande do Sul State. One of the main risks related to wind power is directly linked to the difficulties of correctly predicting the energy production of a wind farm. Several energy output prediction methodologies exist but all of them are approximate approaches by means of modelling tool. The main input for all modelling tools is represented by the wind behaviour estimate based on limited data measurements.

Besides, other uncertainties are to be added, as losses that may occur due to the following: turbine availability; electric transmission efficiency; blade degradation; substations maintenance; utility down time; power curve adjustment.

A sensitivity analysis was conducted modifying the following parameters:

- Energy output (plus and minus 11%):
  A procedure of DEWI calculation to assess the uncertainty of the long term energy yield output (“Mean annual energy output”) estimates it in 11%. Deviations in the real energy output during the operation of the wind farms could involve important variations in the IRR of the project. On the other hand, if the wind resource during the two first years of operation is lower than the long term wind resource (20 years), a negative impact in the IRR and in the debt service coverage ratio would occur.

- Project operation costs (plus and minus 10%):
  Insurance, maintenance, replacement of parts, repair, management, land rental, dismantling, etc. are included in the operations and maintenance cost. Since the OWPPP will be the first project of this kind in the region, foreign experts will have to train local maintenance personnel. This operation might result in cost variations, especially during the first years of the project life time.

Financial analysis was performed considering the aforementioned variables. The impact on the IRR would be as described in Table 4.

[2] http://www.ccee.org.br/leiloes/index.jsp

Table 4: IRR analysis outcome for the sensitivity analysis

Scenario	Variables	Project IRR % (without CDM revenues) at PROINFA electricity price	Project IRR % (without CDM revenues) at market electricity price	Project IRR % (with CDM revenues) at PROINFA electricity price	Project IRR % (with CDM revenues) at market electricity price
Base case	--	7,31%	-0,32%	7,76%	0,44%
Energy output	-11%	5,86%	-1,97%	6,30%	-1,39%
Energy output	11%	8,07%	1,33%	8,57%	1,05%
Project operation costs	-10%	7,66%	0,68%	8,09%	1,77%
Project operation costs	10%	6,94%	-0,23%	7,39%	0,47%

At last, the increment of the IRR of the OWPPP, taking into account the CDM revenues, for different prices of tCO_2, would be as described in Table 5:

Table 5: IRR analysis for different prices of tCO_2

	Price of tCO_2 (US$/ tCO_2)					
	5	6	7	10	15	20
Project's IRR at PROINFA electricity price	7,46%	7,49%	7,52%	7,59%	7,76%	7,91%
Project's IRR at market electricity price	-0,10%	-0,05%	0,00%	0,15%	0,44%	0,82%

All the scenarios generate a project IRR lower than the selected benchmark (8,6% + IGPM). So this emphasizes the project activity is unlikely to be the most financially attractive.

Step 3. Barrier analysis

The proposal project activity faces barriers that prevent the implementation of this type of project activity and do not prevent the implementation of at least one of the alternatives.

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:

Investment barriers:

Wind farms require an intensive capital investment and a long-term financing, proportional to the risks associated with this kind of investment.

Several issues have led to higher capital requirements per MW installed for the OWPPP as compared to average wind farms worldwide (circa US$ 0,7 to 0,8 million higher), i.e.: technical specific difficulties for construction at the site of the project, the lack of significant experience in wind power generation in Brazil, the requisites of local manufacture of the turbines to obtain local financing. The total investment is expected to reach 670,14 million R$. That is 4,46 million R$ per installed MW.

It has been proven to be very difficult to find partners and potential investors to develop the project due to the risks associated with wind energy in a region where no wind farms are commercially operated. As a consequence, the only relevant partner at the present moment is the wind turbines manufacturer Enercon.

Several potential investors decided not to be partners because their expected IRR on investments is higher that the one the project can give (7,31%) without considering the CDM revenues.

Financial entities have demanded additional guarantees to Ventos do Sul to offset this factor and the CDM revenues will alleviate the need of those additional guarantees.

Technological barriers:

- Only 10 very small wind farms totalling 28 MW have been developed in Brazil to date. Therefore, there is little expertise and limited availability of specialized staff for design, implementation, operation and development of wind energy projects [3].

- There is only one wind turbine manufacturer in Brazil[4], and the PROINFA requires 60% of total procurement be made in the domestic market. Furthermore, the use of high technology is necessary to guarantee the stipulated energy output committed in the PPA agreement. Therefore Ventos do Sul had to select a sophisticated and high-cost wind turbine, which means both a technological and financial barrier.

- In Latin America, a similar high technology (E-70) has never been used before. Two wind turbines technologies exist on the market and depend on the drive system, whether there is a direct-drive between the rotor and the generator (Enercon´s type) or there is a gear coupling instead (conventional wind turbines). Enercon´s wind turbine is more expensive but offers the benefits of higher reliance and availability.

  The aforementioned benefits need highly qualified technicians for the manufacturing, assembling and maintenance of the equipment. However, these professionals are not currently available in Brazil and a long-training period will be needed for local staff.

- Taking into account the measured wind resources and aiming at maximising the energy production as to make the wind farm feasible, it is necessary that the wind turbines be installed on concrete towers of 98 meters height, increasing significantly the price comparing to standard steel towers of 64 meters height with the same rated power installed.

- The wind turbines are to be installed on soft ground, even flooded for some periods, that demand higher construction costs: larger foundations, with many big piles, access roads and mounting platforms of 1,20 meter above the ground; larger mounting platforms, sized to hold on them some materials that otherwise would rest on the ground; wider access roads to lay the medium voltage cables.

- The absence of detailed information on wind resource in the South of Brazil led to long measurement periods. Studies have also been carried out on geological, topographic and hydrologic issues.

[3] http://www.aneel.gov.br/15.htm
[4] http://www.wobben.com.br/wobben.htm

Barriers due to prevailing practice:
The OWPPP is the "first of its kind": No project activity of this type is currently operational in the host country or region.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

In case of Alternative 2 (continuation of current situation), there will be no effect of the identified barriers, as this represents a continuation of current practices or development of hydroelectric and thermal power stations, both well-established technology in Brazil.

Step 4. Common practice analysis

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

The most important wind farms in Brazil are small plants located in the states of Ceará, Paraná, Rio Grande do Norte, Pernambuco, Santa Catarina and Minas Gerais, for a total of 10 farms with an installed capacity of 28 MW in 2005. Most of the total wind power capacity installed in Brazil comes from the state of Ceará, with 17,4 MW[5]. This capacity represents roughly 0,03% of the electricity generation installed in the country in 2005. Moreover there is no wind farms installed in the State of Rio Grande do Sul.

The 150 MW capacity of the OWPPP project represents by itself more than 5 times the overall wind capacity installed in the whole country. It can be stated that wind power generation is not a business as usual scenario in Brazil.

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

As shown in *Sub-step 4a*, no similar activities are widely observed and commonly carried out in the host country.

It has to be mentioned that, at the end of March 2004, the long expected Brazilian wind energy programme PROINFA (Promotion Program for Electricity Generated from Renewable Sources) started. The first phase of the PROINFA envisaged the installation of approximately 1.100 MW of wind energy: 1.099 MW in projects were contracted by Eletrobrás in the first public call, and 323 MW in the second phase, totalling 1422 MW[6]. Notwithstanding the sectoral polices and circumstances should not be considered as alternative scenario, as mentioned in Step 2c, even though the several wind farms from PROINFA could in fact be installed this would represent only circa 1,5% of the total installed capacity of Brazil[7].

5 http://www.aneel.gov.br/15.htm
6 http://www.eletrobras.gov.br/EM_Programas_Proinfa/default.asp
7 http://www.aneel.gov.br/15.htm

Step 5. Impact of CDM registration

As explained in Step 2, the OWPPP is not a financially attractive project.

However, with the approval and registration of this project activity as a CDM activity, the additional CERs revenue will make the project more attractive for the financial entities, particularly because the additional CDM revenues will mitigate the investors concerns about the project feasibility.

The financial analysis indicated that the IRR can be increased from 7,31% to 7,76% if the credits will be sold at a price of 15 US$/t$CO_2$e, alleviating both economic and financial hurdles related to the project activity.

Moreover, Enerfin Enervento and Ventos do Sul will benefit from the promotion of its image as a clean energy technologies developer and producer, supportive of the Kyoto objectives.

Additionally, the benefits associated with the project registrations are:

- Anthropogenic greenhouse gas emission reductions of GHGs by displacing thermal power plants dispatched at the margin of the South-Southeast and Midwest (S-SE-CO) subsystem grid. In the absence of the project, energy would be partly produced by non zero emission power plants;
- The situation regarding technology availability, implementation, operations and maintenance of this sort of initiative is likely to be greatly improved. This, in turn, can create incentives for the implementation of other similar renewable energy projects to the Brazilian grid;
- Better position to obtain project financing;
- Financial benefits from the revenue of sales of CERs;
- Attracting new players who are not exposed to the same barriers, or can accept a lower IRR (for instance because they have access to cheaper capital).

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

The project boundary in this case is determined as:

- The project activity site, where the electricity is being produced;
- The Brazilian South-Southeast-Midwest electricity subsystem of the Brazilian grid.

These project boundary definitions are therefore in line with the definitions found in the baseline methodology ACM0002 version 6. Please refer to Annex 3 for more information on the Brazilian electricity system.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

1. Date of completing the final draft of this baseline section: 14/08/2006.

2. Name of person/entity determining the baseline:
   Econergy Brasil Ltda is responsible for the technical services related to GHG emission reductions, and is therefore, on behalf of Ventos do Sul Energia, the developer of the baseline.
   Contact Person: Mr. Marcelo Schunn Diniz Junqueira; telephone: +55 (11) 3555-5700.

SECTION C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

30/05/2006.[8]

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

25y-0m

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

C.2.1. Renewable crediting period

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

01/01/2007

C.2.1.2. Length of the first crediting period:

7y-0m

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Left blank on purpose

C.2.2.2. Length:

Left blank on purpose

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

The approved consolidated monitoring methodology is ACM0002, “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources – Version 6”.

[8] The project start date is 30/05/2006 and it corresponds to the expected beginning of the operation of the facility, according to the chronogram established through the wind power generation contract signed between Enerfin Enervento and Wobben WindPower.

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

The approved consolidated monitoring methodology "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources" is justified as:

- This methodology applies to electricity capacity additions from wind sources;
- This project activity does not involve switching from fossil fuels to renewable energy at the site of the project activity;
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

This monitoring methodology is used in conjunction with the adopted approved consolidated baseline methodology ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources – Version 6".

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Left blank on purpose

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Left blank on purpose

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1. EG_y	Electricity supplied to the grid by the Project	Readings of the energy metering connected to the grid and Receipt of Sales	MWh	*M*	Monthly	*100%*	Electronic and paper	Double check by receipt of sales. Will be archived according to internal procedures, until 2 years after the end of the crediting period.

2. EF_y	CO_2 emission factor of the Grid	Calculated	tCO_2e/MWh	*C*	At the validation and baseline renewal	*0%*	Electronic and paper	Will be archived according to internal procedures, until 2 years after the end of the crediting period.
3. $EF_{OM,y}$	CO_2 Operating Margin emission factor of the grid	Factor calculated from ONS, the Brazilian electricity system manager	tCO_2e/MWh	*C*	At the validation and baseline renewal	*0%*	Electronic and paper	Will be archived according to internal procedures, until 2 years after the end of the crediting period.
4. $EF_{BM,y}$	CO_2 Build Margin emission factor of the grid	Factor calculated from ONS, the Brazilian electricity system manager	tCO_2e/MWh	*C*	At the validation and baseline renewal	*0%*	Electronic and paper	Will be archived according to internal procedures, until 2 years after the end of the crediting period.
10. λ_y	Fraction of time during which low-cost/ must-run sources are on the margin	Factor calculated from ONS, the Brazilian electricity system manager	index	*C*	At the validation and baseline renewal	*0%*	Electronic and paper	Will be archived according to internal procedures, until 2 years after the end of the crediting period.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

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$$EF_{OM,simple\_adjusted,y} = (1-\lambda_y)\frac{\sum_{i,j} F_{i,j,y}.COEF_{i,j}}{\sum_j GEN_{j,y}} + \lambda_y \frac{\sum_{i,k} F_{i,k,y}.COEF_{i,k}}{\sum_k GEN_{k,y}} \quad (tCO_2e/GWh)$$

$F_{i,j(or\ m),y}$ Is the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in year(s) *y*

j,m Refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports4 from the grid

$COEF_{i,j(or\ m)\ y}$ Is the CO2 emission coefficient of fuel *i* (tCO2 / mass or volume unit of the fuel), taking intoaccount the carbon content of the fuels used by relevant power sources j (or m) and the percent oxidation of the fuel in year(s) y, a

$GEN_{j(or\ m),y}$ Is the electricity (MWh) delivered to the grid by source *j (or m)*

$BE_{electricity,y}$ Are the baseline emissions due to displacement of electricity during the year y in tons of CO_2

$EF_{electricity} = \frac{EF_{OM} + EF_{BM}}{2}$ (tCO$_2$e/GWh) $BE_{electricity,y} = EF_{electricity} \cdot EG_y$	w_{OM}, w_{BM} Are the weights given to the operating margin (OM) and the build margin (BM) in the emission factor calculation. EG_y Is the net quantity of electricity generated in the bagasse-based cogeneration plant due to the project activity during the year y in MWh, and $EF_{electricity,y}$ Is the CO_2 baseline emission factor for the electricity.

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Left blank on purpose

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

Left blank on purpose

D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Left blank on purpose

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Left blank on purpose

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

$ER_y = BE_{thermal,\,y} + BE_{electricity,\,y} - PE_y - L_y$ $BE_{thermal,\,y} = 0$ $PE_y = 0$ $L_y = 0$ $BE_{electricity,\,y} = EF_{electricity} \,.\, EG_y$	ER_y: are the emissions reductions of the project activity during the year y in tons of CO_2 $BE_{electricity,y}$: Are the baseline emissions due to displacement of electricity during the year y in tons of CO_2 $BE_{thermal,y}$: Are the baseline emissions due to displacement of thermal energy during the year y in tons of CO_2 PE_y: Are the project emissions during the year y in tons of CO_2. L_y: Are the leakage emissions during the year y in tons of CO_2.

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1	*Low*	These data will be directly used for calculation of emission reductions. Sales record and other records are used to ensure the consistency.
2	*Low*	Data does not need to be monitored
3	*Low*	Data does not need to be monitored
4	*Low*	Data does not need to be monitored
10	*Low*	Data does not need to be monitored

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

The structure for monitoring this project activity will basically consist of registering the amount of energy sold to the grid (EG_y). There are two operations that the project operators must perform in order to ensure data consistency, despite the fact that this will actually consist on monitoring one single variable.

1. The monthly readings of the gauged meter equipment must be recorded in an electronic spreadsheet;
2. Sales receipt must be archived for double checking the data. In case of inconsistency, the sales receipts are the data to be used.

Moreover, and in compliance with legislative requirements, metering equipment shall be periodically gauged to comply with the regulations for independent power producers connected to the regional grid.

D.5 Name of person/entity determining the monitoring methodology:

Econergy Brasil Ltda is responsible for the technical services related to GHG emission reductions and for determining the monitoring methodology, on behalf of Ventos do Sul. Contact Person: Mr. Marcelo Schunn Diniz Junqueira; telephone: +55 (11) 3555-5700.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

The project boundary is defined to include those emissions that are related to the direct on-site activities. There are no emissions associated with the production of electricity using wind energy.

The total project emissions are also zero, because all other emissions related to the project activity are excluded from the project boundary and thus not further accounted for.

Therefore, the variable PE_y, presented in the methodology, does not need to be monitored.
Thus, $PE_y = 0$.

E.2. Estimated leakage:

No potential emission sources of leakage were identified for this project.
Thus, $L_y = 0$

E.3. The sum of E.1 and E.2 representing the project activity emissions:

The result of the sum of E.1 and E.2 is zero, taking into account that the project emissions are zero and no leakage has been identified.
Thus, $L_y + PE_y = 0$

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

The baseline methodology considers the determination of the emissions factor for the grid to which the project activity is connected as the core data to be determined in the baseline scenario. In Brazil, there are two main grids, South-Southeast-Midwest and North-Northeast, therefore the South-Southeast-Midwest Grid is the relevant one for this project.

The method that will be chosen to calculate the Operating Margin (OM) for the electricity baseline emission factor is the option (b) *Simple Adjusted OM,* since the preferable choice (c) *Dispatch Data Analysis OM* would face the barrier of data availability in Brazil.

In order to calculate the Operating Margin, daily dispatch data from the Brazilian electricity system manager (ONS) needed to be gathered. ONS does not regularly provide such information, which implied in getting it through communicating directly with the entity.

The provided information covers years 2002, 2003 and 2004, and it is the most recent information available at this stage.

Simple Adjusted Operating Margin Emission Factor Calculation

According to the methodology, the project is to determine the Simple Adjusted OM Emission Factor ($EF_{OM, simple adjusted, y}$). Therefore, the following equation is to be solved:

$$EF_{OM,simple\_adjusted,y} = (1-\lambda_y)\frac{\sum_{i,j} F_{i,j,y}.COEF_{i,j}}{\sum_j GEN_{j,y}} + \lambda_y \frac{\sum_{i,k} F_{i,k,y}.COEF_{i,k}}{\sum_k GEN_{k,y}} \text{ (tCO}_2\text{e/GWh)}$$

It is assumed here that all the low-cost/must-run plants produce zero net emissions.

$$\frac{\sum_{i,k} F_{i,k,y}.COEF_{i,k}}{\sum_k GEN_{k,y}} = 0 \text{ (tCO}_2\text{e/GWh)}$$

Please refer to the methodology text or the explanations on the variables mentioned above.

The ONS data, as well as the spreadsheet data with the calculation of emission factors, have been provided to the validator (DOE). In the spreadsheet, the dispatch data is treated as to allow calculation of the emission factor for the most three recent years with available information, which are 2002, 2003 and 2004.

The Lambda factors were calculated in accordance with methodology requests. More detailed information is provided in Annex 3. The table below presents such factors.

Year	Lambda
2002	0,5053
2003	0,5312
2004	0,5041

Electricity generation for each year needs also to be taken into account. This information is provided in the table below.

Year	Electricity Load (MWh)
2002	275.402.896
2003	288.493.929
2004	297.879.874

Using therefore appropriate information for $F_{i,j,y}$ and $COEF_{i,j}$, OM emission factors for each year can be determined, as follows.

$$EF_{OM,simple\_adjusted,2002} = (1-\lambda_{2002})\frac{\sum_{i,j} F_{i,j,2002}.COEF_{i,j}}{\sum_j GEN_{j,2002}} \therefore EF_{OM,simple\_adjusted,2002} = 0{,}4229 \text{ tCO}_2\text{/MWh}$$

$$EF_{OM,simple\_adjusted,2003} = (1-\lambda_{2003})\frac{\sum_{i,j} F_{i,j,2003}.COEF_{i,j}}{\sum_j GEN_{j,2003}} \therefore EF_{OM,simple\_adjusted,2003} = 0{,}4417 \text{ tCO}_2\text{/MWh}$$

$$EF_{OM,simple\_adjusted,2004} = (1-\lambda_{2004}) \frac{\sum_{i,j} F_{i,j,2004}.COEF_{i,j}}{\sum_{j} GEN_{j,2004}} \therefore EF_{OM,simple\_adjusted,2004} = 0{,}4346 \text{ tCO}_2\text{/MWh}$$

Finally, to determine the baseline *ex-ante*, the mean average among the three years is calculated, finally determining the $EF_{OM,simple\_adjusted}$.

$$EF_{OM,simple\_adjusted\ 2002\_2004} = \frac{EF_{OM,simple\_adjusted,2002} * \sum_{j} GEN_{j,2002} + EF_{OM,simple\_adjusted,2003} * \sum_{j} GEN_{j,2003} + EF_{OM,simple\_adjusted,2004} * \sum_{j} GEN_{j,2004}}{\sum_{j} GEN_{j,2002} + \sum_{j} GEN_{j,2003} \sum_{j} GEN_{j,2004}} = 0{,}4332$$

According to the methodology used, a Build Margin emission factor also needs to be determined.

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y}.COEF_{i,m}}{\sum_{m} GEN_{m,y}}$$

Electricity generation in this case means 20% of total generation in the most recent year (2004), as the 5 most recent plants built generate less than such 20%. Calculating such factor one reaches:

$$EF_{BM,2004} = 0{,}0962 \text{ tCO}_2\text{/MWh}$$

Finally, the electricity baseline emission factor is calculated through a weighted-average formula, considering the weights 75% for OM and 25% for BM, applied for wind projects. That gives:

$$EF_{electricity,2002-2004} = 0{,}75 * 0{,}4332 + 0{,}25 * 0{,}0962 = 0{,}3490 \text{ tCO}_2\text{/MWh}$$

The baseline emissions would then be proportional to the electricity delivered to the grid throughout the project's lifetime. Baseline emissions due to displacement of electricity are calculated by multiplying the electricity baseline emissions factor ($EF_{electricity,2002\text{-}2004}$) with the electricity generation of the project activity.

$BE_{electricity,y} = EF_{electricity,2002\text{-}2004} \ . \ EG_y$

Therefore, for the first crediting period, the baseline emissions will be calculated as follows:

$BE_{electricity,y}$ = 0,3490 tCO_2/MWh . EG_y (in tCO_2e)

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

The emissions reduction of this project activity is:

ER = $BE_{electricity,y}$ – (L_y + PE_y) = 0, 3490 tCO_2/MWh . EG_y – 0 → **ER = 0,3490 tCO_2/MWh . EG_y**

E.6. Table providing values obtained when applying formulae above:

Year	Estimation of project activity emission reductions (tonnes of CO_2e)	Estimation of the baseline emission reductions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of emission reductions (tonnes of CO_2e)
2007	148 325	0	0	148 325
2008	148 325	0	0	148 325
2009	148 325	0	0	148 325
2010	148 325	0	0	148 325
2011	148 325	0	0	148 325
2012	148 325	0	0	148 325
2013	148 325	0	0	148 325
Total (tonnes of CO_2e)	1 038 275	0	0	1 038 275

SECTION F. Environmental impacts

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

The possible environmental impacts of the OWPPP were reviewed by the State Foundation for Environmental Protection (FEPAM) through a report called Simplified Environment Impact Assessment (EIA), including the construction and operation of the OWPPP. This Assessment was prepared by Intercon, a consulting company, and delivered to FEPAM in November 2002, in order to comply with the 279/2001 Ministerial Arrangement of the Environmental National Board (CONAMA)[9].

FEPAM[10] issued the Environmental Installation License LI Nº702/2005-DL on 14 September, 2005. The license will expire on 2 January, 2009. This License allows for the installation of Osório´s Wind Power Plant to generate 150 MW. This license includes many conditions and restrictions, such as:

- Monthly underground water monitoring until the end of the installation phase;
- The maximum height of the equipments admitted is 140 m;
- Recovery of the areas modified by the project;
- Superficial draining of the land during the operation and installation phases;
- Erosion control of the land in the impacted areas;
- Management of the residuals produced during the installation phase;
- Access building to the wind farm;
- Transmission lines between the substation and aero-generators;
- Lay out of the wind farm;
- Participation with the municipal administration in environmental improvements activities;
- Environmental Monitoring Plan of the installation phase;
- Present the activities plan of the project.

In order to renew the Environmental Installation License, or to obtain the Operation License, Ventos do Sul presented:

- Monitoring Plan for the operation phase;
- Monitoring Plan for the deactivation phase;

[9] www.mma.gov.br/port/conama/res/res01/res27901.html
[10] http://www.fepam.rs.gov.br/spogweb/e016/licenciamento.asp

- Proposal of land use for the OWPPP´s neighbourhood;
- Assessment of the landscape impact caused by the OWPPP;
- Evidence of the fulfilment of the Installation License requirements
- Evidence of the development of environmental monitoring activities.

As Ventos do Sul applied all the requirements of the Installation License, FEPAM issued the Operational License LO N.º 5128/2006-DL on 21/06/2006 for the OWPPP operation and the LO N.º 5142/2006-DL on 23/06/2006 for the transmission lines.

There will be no transboundary impacts resulting from the OWPPP. All the relevant impacts occur within Brazilian borders and have been mitigated to comply with the environmental requirements for project's implementation. Therefore this project will not affect by any mean Brazil´s neighbouring countries, except for the reduction of global pollution by GHG avoided by the implementation of the project activity.

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

The EIA analysed the possible environmental impacts that can be generated by the OWPPP in the following natural resources: landscape, fauna, flora, noise, soil, hydro resources, historical resources, taking into consideration the quality parameters.

Beyond all the possible environmental impacts caused during the installation of the OWPPP (land movement, dust and noise that can disturb the local fauna), the OWPPP brings important benefits, for example: diversification of the electric matrix of the country, generation of clean and renewable energy, technology transfer, employment generation and tourism development.

Thorough plans for the prevention, correction, monitoring and compensatory measures were already undertaken during the phases previous to construction, and will be continued in the subsequent construction and operation phases.

During the project construction, monitoring plans will be implemented with reference to the following: Fauna, underground water, landscape, recovery of degraded areas, soil erosion, solid residuals, archeological and Environmental Supervision of the entire site area.

These plans will contribute to the prevention, control, minimization, recovery, and compensation for the impacts identified in the EIA.

Among other plans, the following are worth mentioning:

- Fauna Monitoring Program: this action began 12 months before the construction phase, and will be continued throughout the construction and operation phases. It will contribute to the prevention, control, minimization and restoration of the negative impacts over the fauna and also they will be useful as a complete study of fauna in Rio Grande do Sul State. These programs include detailed monitoring on small, medium and large mammals, birds, amphibians and underground water level.
- Visitors reception center: located at the wind farm's control building, in order to bring nearer the visitors to the world of renewable energies and to inform about the natural environment of wind

farms in Osório. There will be an exposition area (models, graphic panels, murals) and audio-visual room for informative video projections.

- Complementary actions: in the framework of an agreement with the administration of Osório, an environmental project will be implemented with the following objectives: investments in environmental sanitation, recovery of the Marcelino and Peixoto lagoons through diagnostic, environmental zoning and landscape project, environmental education projects, development of tourist and environmental information center in the environmental protection area "Morro da Borússia".

It has been concluded that the project is feasible in legal, techno-environmental and economic terms and the OWPPP has been in compliance with the current environmental legislation and the proposed corrective measures of the environmental programs suggested by FEPAM.

SECTION G. Stakeholder's comments

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

Invitations letters including an executive summary of the project were sent for comments by the proponents to the following stakeholders involved and affected by the project activities[11], according to the Resolution Number 1 of the Interministerial Commission on Global Climate Change:

- Prefeitura municipal de Osório / *Municipal Administration of Osório;*
- Câmara dos vereadores de Osório / *Legislation Chamber of Osório;*
- Secretaria do Meio Ambiente de Osório / *Environmental Secretary of Osório;*
- Secretaria Estadual do Meio Ambiente do Estado do Rio Grande do Sul / *Secretary of Environment of Rio Grande do Sul State;*
- Ministério Público do Estado do Rio Grande do Sul / *District Attorney of Rio Grande do Sul State;*
- Lyons Clube de Osório / *Osório Lyons Club;*
- Fórum Brasileiro das Organizações Não Governamentais e Movimentos Sociais para o Meio Ambiente e o Desenvolvimento - FBOMS / *Brazilian Non-Governamental Organizations and Social Movements for Environment and Development Forum.*

Ventos do Sul waited for comments for a period of 30 days after sending the invitation's letters.

On December 9th 2005, the Legislative Chamber of Osório invited local stakeholders to participate in a two hours public audience where the OWPPP is located. Ventos do Sul general manager presented numerous key points of the OWPPP such as design, engineering, construction, operation, environmental monitoring programs and sustainable development contributions. It was shortly explained the global warming impact, the Kyoto Protocol and the Clean Development Mechanism. It was explained that the anthropogenic GHG emission reduction would occur by the implementation of the Project activity by displacing thermal power plants dispatched at the margin of the grid. Several assistance questions were answered until the end of the session. The public audience saw the participation of more than 30

[11] The copies of these invitations are available from the Project participants.

stakeholders: politicians, NGOs activists, students, press and other private groups[12]. The stakeholders presented asked questions about the total job planning in building and operation phases, details of the wind tower's design, financial investments and complementary actions like environmental recovery of the Marcelino and Peixoto lagoons. Some people expressed satisfaction with the prospect of an increased tourism business and technological improvements that might arise in association with OWPPP.

G.2. Summary of the comments received:

One written commentary was received from FBOMS.

The Forum's letter expresses gratitude for the correspondence dispatched by Ventos do Sul and recognizes the importance of its comments. The letter mentions the importance of consulting local stakeholders for comments in order to improve sustainability and the project's quality. The Forum affirms it is waiting for a manifestation from the Brazilian Federal Government, by means of the CIMGC (the Brazilian DNA), on about how the comments and analysis made are considered into the final decision for this type of projects.

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

Since no requests for additional information were received, Ventos do Sul Energia proceeded with the project as initially planned.

[12] The public audience register is available at the Legislation Chamber of Osório.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from Parties in Annex I is involved in the proposed OWPPP.

Annex 3

BASELINE INFORMATION

The Brazilian electricity system has been historically divided into two subsystems: the North-Northeast (N-NE) and the South-Southeast-Midwest (S-SE-CO). This is due mainly to the historical evolution of the physical system, which was naturally developed nearby the biggest consuming centers of the country.

The natural evolution of both systems continues to demonstrate that integration will happen in the future. In 1998, the Brazilian government announced the first leg of the interconnection line between S-SE-CO and N-NE. With investments of around US$700 million, the connection had the main purpose, in the government's view, at least, to help solve energy imbalances in the country: the S-SE-CO region could supply the N-NE in case it was necessary and vice-versa.

Nevertheless, even after the interconnection was established, technical papers continue to divide the Brazilian system in two (Bosi, 2000)[13]:

"… where the Brazilian Electricity System is divided into three separate subsystems:
(i) The South/Southeast/Midwest Interconnected System;
(ii) The North/Northeast Interconnected System; and
(iii) The Isolated Systems (which represent 300 locations that are electrically isolated from the interconnected systems)"

Moreover, Bosi (2000) gives a strong argumentation in favor of having so-called *multi-project baselines*:

> *"For large countries with different circumstances within their borders and different power grids based in these different regions, multi-project baselines in the electricity sector may need to be disaggregated below the country-level in order to provide a credible representation of 'what would have happened otherwise."*

Finally, one has to take into account that even though the systems today are connected, the energy flow between N-NE and S-SE-CO is heavily limited by the transmission lines capacity. Therefore, only a fraction of the total energy generated in both subsystems is sent one way or another. It is natural that this fraction may change its direction and magnitude (up to the transmission line's capacity) depending on the hydrological patterns, climate and other uncontrolled factors. But it is not supposed to represent a significant amount of each subsystem's electricity demand. It should also be noted that only in 2004 the interconnection between SE and NE was concluded, i.e., if project proponents are to be coherent with the generation database they have available as of the time of the PDD submission for validation, a situation where the electricity flow between the subsystems was even more restricted is to be considered.

[13] Bosi, M. *An Initial View on Methodologies for Emission Baselines: Electricity Generation Case Study.* International Energy Agency. Paris, 2000.

The Brazilian electricity system nowadays comprises of around 101,3 GW of installed capacity, in a total of 1.482 electricity generation enterprises. From those, nearly 70% are hydropower plants, around 10% are natural gas-fired power plants, 4,5% are diesel and fuel oil plants, 3,2% are biomass sources (sugarcane bagasse, black liquor, wood, rice straw and biogas), 2% are nuclear plants, 1,4% are coal plants, and there are also 8,17 GW of installed capacity in neighboring countries (Argentina, Uruguay, Venezuela and Paraguay) that may dispatch electricity to the Brazilian grid[14]. This latter capacity is in fact comprised by mainly 5,65 GW of the Paraguayan part of *Itaipu Bi-national*, a hydropower plant operated by both Brazil and Paraguay, but whose energy almost entirely is sent to the Brazilian grid.

The approved methodology ACM0002 asks project proponents to account for "all generating sources serving the system". In that way, project proponents in Brazil should search for, and research, all power plants serving the Brazilian system.

However, information on such generating sources is not publicly available in Brazil. The national dispatch center, ONS – National System Operator – argues that dispatching information is strategic to the power agents and therefore cannot be made available. On the other hand, ANEEL, the electricity agency, provides information on power capacity and other legal matters on the electricity sector, but no dispatch information can be got through this entity.

In that regard, project proponents looked for a plausible solution in order to be able to calculate the emission factor in Brazil in the most accurate way. Since real dispatch data is necessary after all, the ONS was specifically contacted and the reason for data collection was explained. After several months of talks, plants' daily dispatch information was made available for years 2002, 2003 and 2004 by ONS.

Project proponents, discussing the feasibility of using such data, concluded it was the most proper information to be considered when determining the emission factor for the Brazilian grid. According to ANEEL, in fact, ONS centralized dispatched plants accounted for 75.547 MW of installed capacity by 31/12/2004, out of the total 98.848,5 MW installed in Brazil by the same date[15], which includes capacity available in neighboring countries to export to Brazil and emergency plants, that are dispatched only during times of electricity constraints in the system. Such capacity in fact is constituted by plants with 30 MW installed capacity or above, connected to the system through 138kV power lines, or at higher voltages. Therefore, even though the emission factor calculation is carried out without considering all generating sources serving the system, about 76,4% of the installed capacity serving Brazil is taken into account, which is a fair amount if one looks at the difficulty in getting dispatch information in Brazil. Moreover, the remaining 23,6% are plants that do not have their dispatch coordinated by ONS, since: either they operate based on power purchase agreements which are not under control of the dispatch authority; or they are located in non-interconnected systems to which ONS has no access. In that way, this portion is not likely to be affected by the CDM projects, and this is another reason for not taking them into account when determining the emission factor.

In an attempt to include all generating sources, project developers considered the option to research for available, but non-official data, to supply the existing gap. The solution found was the International Energy Agency database built when carrying out the study "Road-Testing Baselines For Greenhouse Gas Mitigation Projects in the Electric Power Sector", published in October 2002. Merging ONS data with the IEA data in a spreadsheet, project proponents have been able to consider all generating sources connected to the relevant grids in order to determine the emission factor. The emission factor calculated was found

[14] www.aneel.gov.br
[15] www.aneel.gov.br/arquivos/PDF/Resumo_Gráficos_mai_2005.pdf

more conservative when considering ONS data only, as the table below shows the build margin in both cases.

IEA/ONS Merged Data Build Margin (tCO_2/MWh)	ONS Data Build Margin (tCO_2/MWh)
0,205	0,0962

Therefore, considering all the rationale explained, the project developers selected to use ONS information only, as it was capable of properly addressing the issue of determining the emission factor and doing it in the most conservative way.

The fossil fueled plants efficiencies were also taken from the IEA paper. This was done considering the lack of more detailed information on such efficiencies from public, reliable and credible sources.

From the mentioned reference:

> *"The fossil fuel conversion efficiency (%) for the thermal power plants was calculated based on the installed capacity of each plant and the electricity actually produced. For most of the fossil fuel power plants under construction, a constant value of 30% was used as an estimate for their fossil fuel conversion efficiencies. This assumption was based on data available in the literature and based on the observation of the actual situation of those kinds of plants currently in operation in Brazil. The only 2 natural gas plants in combined cycle (totaling 648 MW) were assumed to have a higher efficiency rate, i.e. 45%."*.

Therefore only data for plants under construction in 2002 (with operation start in 2002, 2003 and 2004) was estimated. All others efficiencies were calculated. To the best of our knowledge there was no retrofit/modernization of the older fossil-fuelled power plants in the analyzed period (2002 to 2004). For that reason project participants find the application of such numbers to be not only reasonable but the best available option.

The aggregated hourly dispatch data received from ONS was used to determine the lambda factor for each of the years with available data (2002, 2003 and 2004). The Low-cost/Must-run generation was determined as the total generation minus the generation from fossil-fuelled thermal plants generation, this one determined through daily dispatch data provided by ONS. All this information has been provided to the validators, and extensively discussed with them, in order to make all points crystal clear.

On the following pages, a summary of the analysis is provided. First, the Tables 6 and 7 with the 126 plants dispatched by ONS are provided. Then, the Table 8 with the summarized conclusions of the analysis of the emission factor calculation and the load duration curves for the S-SE-CO sub system are presented.

Table 6: ONS Dispatched Plants -1/2

	Subsystem*	Fuel source**	Power plant	Operation start [2, 4, 5]	Installed capacity (MW) [1]	Fuel conversion efficiency (%) [2]	Carbon emission factor (tC/TJ) [3]	Fraction carbon oxidized [3]	Emission factor (tCO2/MWh)
1	S-SE-CO	G	Termo Rio	Nov-2004	423,3	0,30	15,3	99,5%	0,670
2	S-SE-CO	H	Candonga	Sep-2004	140,0	1,00	0,0	0,0%	0,000
3	S-SE-CO	H	Queimado	May-2004	105,0	1,00	0,0	0,0%	0,000
4	S-SE-CO	G	Norte Fluminense	Feb-2004	860,2	0,30	15,3	99,5%	0,670
5	S-SE-CO	H	Jauru	Sep-2003	121,5	1,00	0,0	0,0%	0,000
6	S-SE-CO	H	Gauporé	Sep-2003	120,0	1,00	0,0	0,0%	0,000
7	S-SE-CO	G	Três Lagoas	Aug-2003	306,0	0,30	15,3	99,5%	0,670
8	S-SE-CO	H	Funil (MG)	Jan-2003	180,0	1,00	0,0	0,0%	0,000
9	S-SE-CO	H	Itiquira I	Sep-2002	156,1	1,00	0,0	0,0%	0,000
10	S-SE-CO	G	Araucária	Sep-2002	484,5	0,30	15,3	99,5%	0,670
11	S-SE-CO	G	Canoas	Sep-2002	160,6	0,30	15,3	99,5%	0,670
12	S-SE-CO	H	Piraju	Sep-2002	81,0	1,00	0,0	0,0%	0,000
13	S-SE-CO	G	Nova Piratininga	Jun-2002	384,9	0,30	15,3	99,5%	0,670
14	S-SE-CO	O	PCT CGTEE	Jun-2002	5,0	0,30	20,7	99,0%	0,902
15	S-SE-CO	H	Rosal	Jun-2002	55,0	1,00	0,0	0,0%	0,000
16	S-SE-CO	G	Ibirité	May-2002	226,0	0,30	15,3	99,5%	0,670
17	S-SE-CO	H	Cana Brava	May-2002	465,9	1,00	0,0	0,0%	0,000
18	S-SE-CO	H	Sta. Clara	Jan-2002	60,0	1,00	0,0	0,0%	0,000
19	S-SE-CO	H	Machadinho	Jan-2002	1.140,0	1,00	0,0	0,0%	0,000
20	S-SE-CO	G	Juiz de Fora	Nov-2001	87,0	0,28	15,3	99,5%	0,718
21	S-SE-CO	G	Macaé Merchant	Nov-2001	922,6	0,24	15,3	99,5%	0,837
22	S-SE-CO	H	Lajeado (ANEEL res. 402/2001)	Nov-2001	902,5	1,00	0,0	0,0%	0,000
23	S-SE-CO	G	Eletrobolt	Oct-2001	379,0	0,24	15,3	99,5%	0,837
24	S-SE-CO	H	Porto Estrela	Sep-2001	112,0	1,00	0,0	0,0%	0,000
25	S-SE-CO	G	Cuiaba (Mario Covas)	Aug-2001	529,2	0,30	15,3	99,5%	0,670
26	S-SE-CO	G	W. Arjona	Jan-2001	194,0	0,25	15,3	99,5%	0,804
27	S-SE-CO	G	Uruguaiana	Jan-2000	639,9	0,45	15,3	99,5%	0,447
28	S-SE-CO	H	S. Caxias	Jan-1999	1.240,0	1,00	0,0	0,0%	0,000
29	S-SE-CO	H	Canoas I	Jan-1999	82,5	1,00	0,0	0,0%	0,000
30	S-SE-CO	H	Canoas II	Jan-1999	72,0	1,00	0,0	0,0%	0,000
31	S-SE-CO	H	Igarapava	Jan-1999	210,0	1,00	0,0	0,0%	0,000
32	S-SE-CO	H	Porto Primavera	Jan-1999	1.540,0	1,00	0,0	0,0%	0,000
33	S-SE-CO	D	Cuiaba (Mario Covas)	Oct-1998	529,2	0,27	20,2	99,0%	0,978
34	S-SE-CO	H	Sobragi	Sep-1998	60,0	1,00	0,0	0,0%	0,000
35	S-SE-CO	H	PCH EMAE	Jan-1998	26,0	1,00	0,0	0,0%	0,000
36	S-SE-CO	H	PCH CEEE	Jan-1998	25,0	1,00	0,0	0,0%	0,000
37	S-SE-CO	H	PCH ENERSUL	Jan-1998	43,0	1,00	0,0	0,0%	0,000
38	S-SE-CO	H	PCH CEB	Jan-1998	15,0	1,00	0,0	0,0%	0,000
39	S-SE-CO	H	PCH ESCELSA	Jan-1998	62,0	1,00	0,0	0,0%	0,000
40	S-SE-CO	H	PCH CELESC	Jan-1998	50,0	1,00	0,0	0,0%	0,000
41	S-SE-CO	H	PCH CEMAT	Jan-1998	145,0	1,00	0,0	0,0%	0,000
42	S-SE-CO	H	PCH CELG	Jan-1998	15,0	1,00	0,0	0,0%	0,000
43	S-SE-CO	H	PCH CERJ	Jan-1998	59,0	1,00	0,0	0,0%	0,000
44	S-SE-CO	H	PCH COPEL	Jan-1998	70,0	1,00	0,0	0,0%	0,000
45	S-SE-CO	H	PCH CEMIG	Jan-1998	84,0	1,00	0,0	0,0%	0,000
46	S-SE-CO	H	PCH CPFL	Jan-1998	55,0	1,00	0,0	0,0%	0,000
47	S-SE-CO	H	S. Mesa	Jan-1998	1.275,0	1,00	0,0	0,0%	0,000
48	S-SE-CO	H	PCH EPAULO	Jan-1998	26,0	1,00	0,0	0,0%	0,000
49	S-SE-CO	H	Guilmam Amorim	Jan-1997	140,0	1,00	0,0	0,0%	0,000
50	S-SE-CO	H	Corumbá	Jan-1997	375,0	1,00	0,0	0,0%	0,000
51	S-SE-CO	H	Miranda	Jan-1997	408,0	1,00	0,0	0,0%	0,000
52	S-SE-CO	H	Noav Ponte	Jan-1994	510,0	1,00	0,0	0,0%	0,000
53	S-SE-CO	H	Segredo (Gov. Ney Braga)	Jan-1992	1.260,0	1,00	0,0	0,0%	0,000
54	S-SE-CO	H	Taquaruçu	Jan-1989	554,0	1,00	0,0	0,0%	0,000
55	S-SE-CO	H	Manso	Jan-1988	210,0	1,00	0,0	0,0%	0,000
56	S-SE-CO	H	D. Francisca	Jan-1987	125,0	1,00	0,0	0,0%	0,000
57	S-SE-CO	H	Itá	Jan-1987	1.450,0	1,00	0,0	0,0%	0,000
58	S-SE-CO	H	Rosana	Jan-1987	369,2	1,00	0,0	0,0%	0,000
59	S-SE-CO	N	Angra	Jan-1985	1.874,0	1,00	0,0	0,0%	0,000
60	S-SE-CO	H	T. Irmãos	Jan-1985	807,5	1,00	0,0	0,0%	0,000
61	S-SE-CO	H	Itaipu 60 Hz	Jan-1983	6.300,0	1,00	0,0	0,0%	0,000
62	S-SE-CO	H	Itaipu 50 Hz	Jan-1983	5.375,0	1,00	0,0	0,0%	0,000
63	S-SE-CO	H	Emborcação	Jan-1982	1.192,0	1,00	0,0	0,0%	0,000
64	S-SE-CO	H	Nova Avanhandava	Jan-1982	347,4	1,00	0,0	0,0%	0,000
65	S-SE-CO	H	Gov. Bento Munhoz - GBM	Jan-1980	1.676,0	1,00	0,0	0,0%	0,000

* Subsystem: S - south, SE-CO - Southeast-Midwest

** Fuel source (C, bituminous coal; D, diesel oil; G, natural gas; H, hydro; N, nuclear; O, residual fuel oil).

[1] Agência Nacional de Energia Elétrica. *Banco de Informações da Geração* (http://www.aneel.gov.br/, data collected in november 2004).

[2] Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A.F. Simoes, H. Winkler and J.M. Lukamba. *Road testing baselines for GHG mitigation projects in the electric power sector.* OECD/IEA information paper, October 2002.

[3] Intergovernamental Panel on Climate Change. *Revised 1996 Guidelines for National Greenhouse Gas Inventories.*

[4] Operador Nacional do Sistema Elétrico. Centro Nacional de Operação do Sistema. *Acompanhamento Diário da Operação do SIN* (daily reports from Jan. 1, 2001 to Dec. 31, 2003).

[5] Agência Nacional de Energia Elétrica. Superintendência de Fiscalização dos Serviços de Geração. *Resumo Geral dos Novos Empreendimentos de Geração* (http://www.aneel.gov.br/, data collected in november 2004).

Table 7: ONS Dispatched Plants -2/2

	Subsystem*	Fuel source**	Power plant	Operation start [2, 4, 5]	Installed capacity (MW) [1]	Fuel conversion efficiency (%) [2]	Carbon emission factor (tC/TJ) [3]	Fraction carbon oxidized [3]	Emission factor (tCO2/MWh)
66	S-SE-CO	H	S.Santiago	Jan-1980	1.420,0	1,00	0,0	0,0%	0,000
67	S-SE-CO	H	Itumbiara	Jan-1980	2.280,0	1,00	0,0	0,0%	0,000
68	S-SE-CO	O	Igarapé	Jan-1978	131,0	0,30	20,7	99,0%	0,902
69	S-SE-CO	H	Itauba	Jan-1978	512,4	1,00	0,0	0,0%	0,000
70	S-SE-CO	H	A. Vermelha (Jose E. Moraes)	Jan-1978	1.396,2	1,00	0,0	0,0%	0,000
71	S-SE-CO	H	S.Simão	Jan-1978	1.710,0	1,00	0,0	0,0%	0,000
72	S-SE-CO	H	Capivara	Jan-1977	640,0	1,00	0,0	0,0%	0,000
73	S-SE-CO	H	S.Osório	Jan-1975	1.078,0	1,00	0,0	0,0%	0,000
74	S-SE-CO	H	Marimbondo	Jan-1975	1.440,0	1,00	0,0	0,0%	0,000
75	S-SE-CO	H	Promissão	Jan-1975	264,0	1,00	0,0	0,0%	0,000
76	S-SE-CO	C	Pres. Medici	Jan-1974	446,0	0,26	26,0	98,0%	1,294
77	S-SE-CO	H	Volta Grande	Jan-1974	380,0	1,00	0,0	0,0%	0,000
78	S-SE-CO	H	Porto Colombia	Jun-1973	320,0	1,00	0,0	0,0%	0,000
79	S-SE-CO	H	Passo Fundo	Jan-1973	220,0	1,00	0,0	0,0%	0,000
80	S-SE-CO	H	Passo Real	Jan-1973	158,0	1,00	0,0	0,0%	0,000
81	S-SE-CO	H	Ilha Solteira	Jan-1973	3.444,0	1,00	0,0	0,0%	0,000
82	S-SE-CO	H	Mascarenhas	Jan-1973	131,0	1,00	0,0	0,0%	0,000
83	S-SE-CO	H	Gov. Parigot de Souza - GPS	Jan-1971	252,0	1,00	0,0	0,0%	0,000
84	S-SE-CO	H	Chavantes	Jan-1971	414,0	1,00	0,0	0,0%	0,000
85	S-SE-CO	H	Jaguara	Jan-1971	424,0	1,00	0,0	0,0%	0,000
86	S-SE-CO	H	Sá Carvalho	Apr-1970	78,0	1,00	0,0	0,0%	0,000
87	S-SE-CO	H	Estreito (Luiz Carlos Barreto)	Jan-1969	1.050,0	1,00	0,0	0,0%	0,000
88	S-SE-CO	H	Ibitinga	Jan-1969	131,5	1,00	0,0	0,0%	0,000
89	S-SE-CO	H	Jupiá	Jan-1969	1.551,2	1,00	0,0	0,0%	0,000
90	S-SE-CO	O	Alegrete	Jan-1968	66,0	0,26	20,7	99,0%	1,040
91	S-SE-CO	G	Campos (Roberto Silveira)	Jan-1968	30,0	0,24	15,3	99,5%	0,837
92	S-SE-CO	G	Santa Cruz (RJ)	Jan-1968	766,0	0,31	15,3	99,5%	0,648
93	S-SE-CO	H	Paraibuna	Jan-1968	85,0	1,00	0,0	0,0%	0,000
94	S-SE-CO	H	Limoeiro (Armando Salles de Olivie	Jan-1967	32,0	1,00	0,0	0,0%	0,000
95	S-SE-CO	H	Caconde	Jan-1966	80,4	1,00	0,0	0,0%	0,000
96	S-SE-CO	C	J.Lacerda C	Jan-1965	363,0	0,25	26,0	98,0%	1,345
97	S-SE-CO	C	J.Lacerda B	Jan-1965	262,0	0,21	26,0	98,0%	1,602
98	S-SE-CO	C	J.Lacerda A	Jan-1965	232,0	0,18	26,0	98,0%	1,869
99	S-SE-CO	H	Bariri (Alvaro de Souza Lima)	Jan-1965	143,1	1,00	0,0	0,0%	0,000
100	S-SE-CO	H	Funil (RJ)	Jan-1965	216,0	1,00	0,0	0,0%	0,000
101	S-SE-CO	C	Figueira	Jan-1963	20,0	0,30	26,0	98,0%	1,121
102	S-SE-CO	H	Furnas	Jan-1963	1.216,0	1,00	0,0	0,0%	0,000
103	S-SE-CO	H	Barra Bonita	Jan-1963	140,8	1,00	0,0	0,0%	0,000
104	S-SE-CO	C	Charqueadas	Jan-1962	72,0	0,23	26,0	98,0%	1,462
105	S-SE-CO	H	Jurumirim (Armando A. Laydner)	Jan-1962	97,7	1,00	0,0	0,0%	0,000
106	S-SE-CO	H	Jacui	Jan-1962	180,0	1,00	0,0	0,0%	0,000
107	S-SE-CO	H	Pereira Passos	Jan-1962	99,1	1,00	0,0	0,0%	0,000
108	S-SE-CO	H	Tres Marias	Jan-1962	396,0	1,00	0,0	0,0%	0,000
109	S-SE-CO	H	Euclides da Cunha	Jan-1960	108,8	1,00	0,0	0,0%	0,000
110	S-SE-CO	H	Camargos	Jan-1960	46,0	1,00	0,0	0,0%	0,000
111	S-SE-CO	H	Santa Branca	Jan-1960	56,1	1,00	0,0	0,0%	0,000
112	S-SE-CO	H	Cachoeira Dourada	Jan-1959	658,0	1,00	0,0	0,0%	0,000
113	S-SE-CO	H	Salto Grande (Lucas N. Garcez)	Jan-1958	70,0	1,00	0,0	0,0%	0,000
114	S-SE-CO	H	Salto Grande (MG)	Jan-1956	102,0	1,00	0,0	0,0%	0,000
115	S-SE-CO	H	Mascarenhas de Moraes (Peixoto)	Jan-1956	478,0	1,00	0,0	0,0%	0,000
116	S-SE-CO	H	Itutinga	Jan-1955	52,0	1,00	0,0	0,0%	0,000
117	S-SE-CO	C	S. Jerônimo	Jan-1954	20,0	0,26	26,0	98,0%	1,294
118	S-SE-CO	O	Carioba	Jan-1954	36,2	0,30	20,7	99,0%	0,902
119	S-SE-CO	O	Piratininga	Jan-1954	472,0	0,30	20,7	99,0%	0,902
120	S-SE-CO	H	Canastra	Jan-1953	42,5	1,00	0,0	0,0%	0,000
121	S-SE-CO	H	Nilo Peçanha	Jan-1953	378,4	1,00	0,0	0,0%	0,000
122	S-SE-CO	H	Fontes Nova	Jan-1940	130,3	1,00	0,0	0,0%	0,000
123	S-SE-CO	H	Henry Borden Sub.	Jan-1926	420,0	1,00	0,0	0,0%	0,000
124	S-SE-CO	H	Henry Borden Ext.	Jan-1926	469,0	1,00	0,0	0,0%	0,000
125	S-SE-CO	H	I. Pombos	Jan-1924	189,7	1,00	0,0	0,0%	0,000
126	S-SE-CO	H	Jaguari	Jan-1917	11,8	1,00	0,0	0,0%	0,000
				Total (MW) =	66.007,1				

* Subsystem: S - south, SE-CO - Southeast-Midwest

** Fuel source (C, bituminous coal; D, diesel oil; G, natural gas; H, hydro; N, nuclear; O, residual fuel oil).

[1] Agência Nacional de Energia Elétrica. *Banco de Informações da Geração* (http://www.aneel.gov.br/, data collected in november 2004).

[2] Bosi, M., A. Laurence, P. Maldonado, R. Schaeffer, A.F. Simoes, H. Winkler and J.M. Lukamba. *Road testing baselines for GHG mitigation projects in the electric power sector.* OECD/IEA information paper, October 2002.

[3] Intergovernamental Panel on Climate Change. *Revised 1996 Guidelines for National Greenhouse Gas Inventories.*

[4] Operador Nacional do Sistema Elétrico. Centro Nacional de Operação do Sistema. *Acompanhamento Diário da Operação do SIN* (daily reports from Jan. 1, 2001 to Dec. 31, 2003).

[5] Agência Nacional de Energia Elétrica. Superintendência de Fiscalização dos Serviços de Geração. *Resumo Geral dos Novos Empreendimentos de Geração* (http://www.aneel.gov.br/, data collected in november 2004).

Table 8: Emission factors for the Brazilian South-Southeast-Midwest Sub system

Emission factors for the Brazilian South-Southeast-Midwest interconnected grid				
Baseline (including imports)	**EF_{OM} [tCO2/MWh]**	**Load [MWh]**	**LCMR [GWh]**	**Imports [MWh]**
2002	0,8548	275.402.896	258.720	1.607.395
2003	0,9421	288.493.929	274.649	459.586
2004	0,8763	297.879.874	284.748	1.468.275
	Total (2002-2004) =	**861.776.699**	**818.118**	**3.535.256**
	$EF_{OM, simple-adjusted}$ [tCO2/MWh]	**$EF_{BM,2004}$**	**Lambda**	
	0,4332	0,0962	λ_{2002}	
	Alternative weights	**Default weights**	0,5053	
	w_{OM} = 0,75	w_{OM} = 0,5	λ_{2003}	
	w_{BM} = 0,25	w_{BM} = 0,5	0,5312	
	Alternative EF_{OM} [tCO2/MWh]	**Default EF_{OM} [tCO2/MWh]**	λ_{2004}	
	0,3490	**0,2647**	0,5041	

Figure 3. Load duration curve for the S-SE-CO sub system, 2002

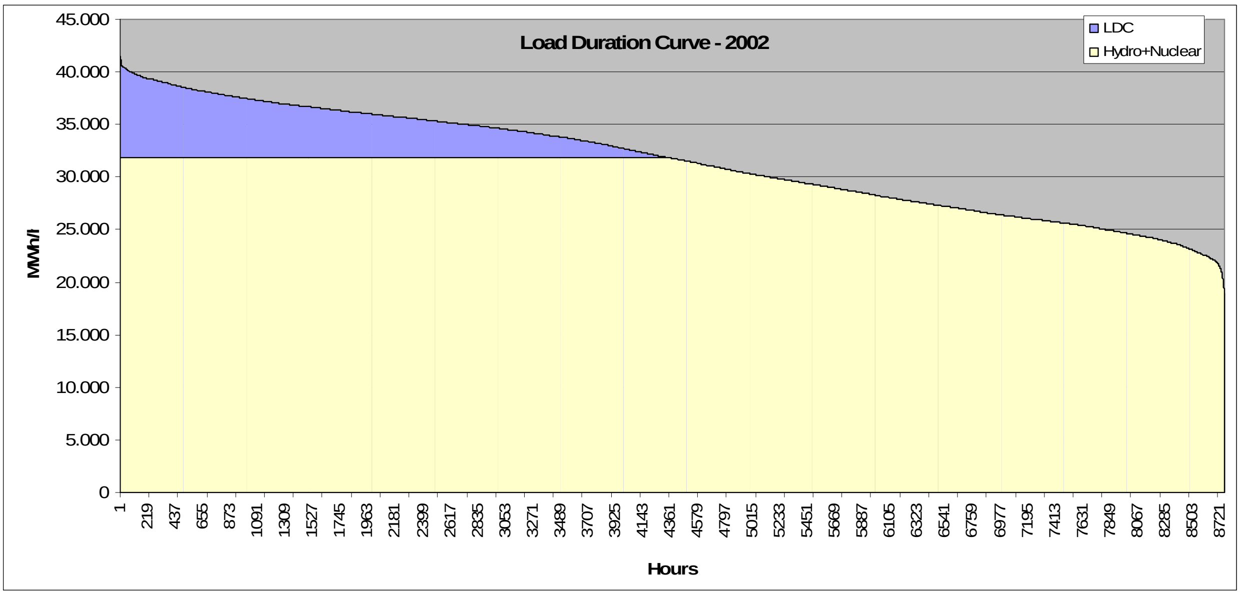


Figure 4. Load duration curve for the S-SE-CO sub system, 2003

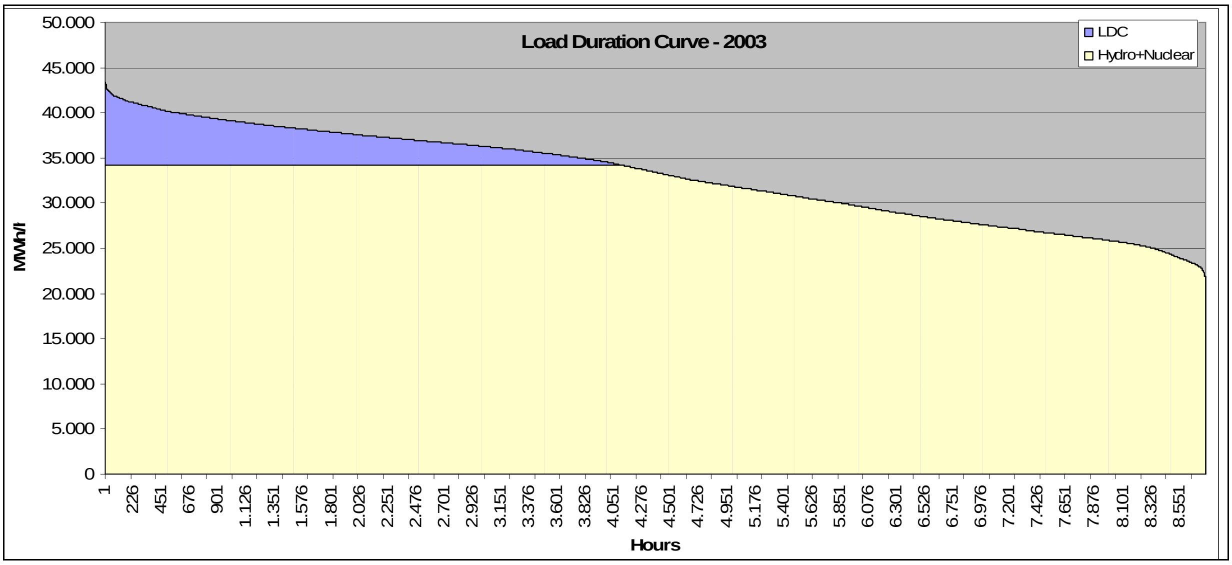


Figure 5. Load duration curve for the S-SE-CO sub system, 2004

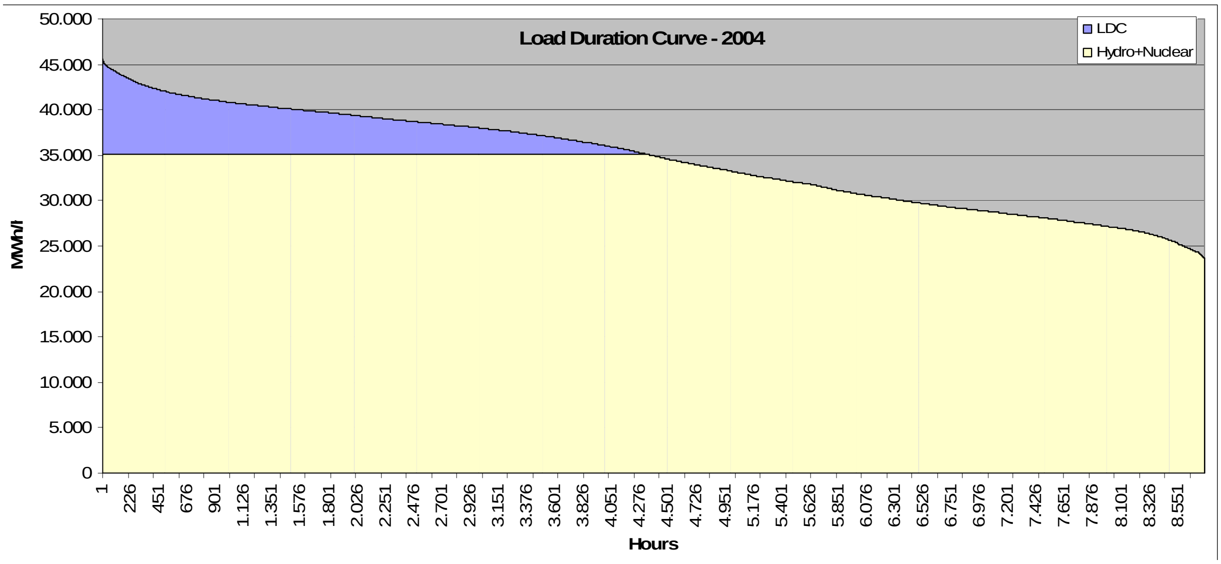


Table 9: Emission reductions calculation data for the first crediting period

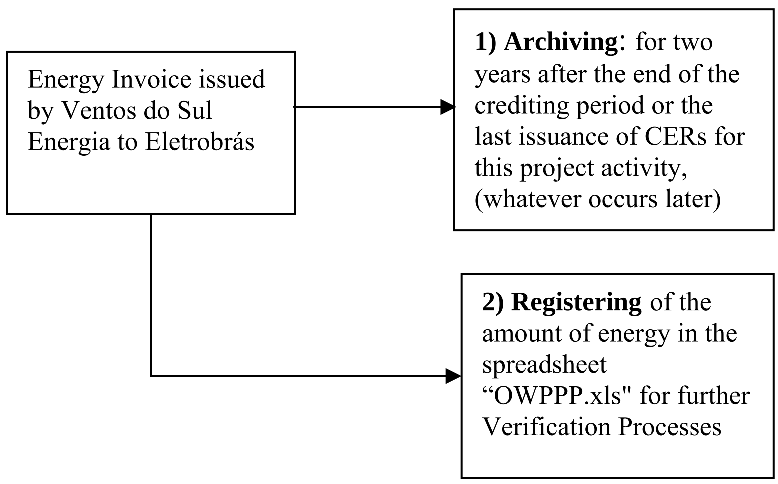
Osório Wind Power Plant Project									
Grid-Connected Emission Reductions	Item	2007	2008	2009	2010	2011	2012	2013	Total CERs
	Installed Capacity, MW	150	150	150	150	150	150	150	
	Estimated generation, MWh/year	425.000	425.000	425.000	425.000	425.000	425.000	425.000	
	Baseline emission factor tCO2e/MWh	0,3490	0,3490	0,3490	0,3490	0,3490	0,3490	0,3490	
	Total CO_2 emissions reductions, tCO2e/year	148.325	148.325	148.325	148.325	148.325	148.325	148.325	**1.038.275**

Annex 4

MONITORING PLAN

According to section D of this document, the only variable that will be monitored in this project activity is the quantity of energy exported to the grid, from year 2007 through end of the last crediting period. Since no leakage nor any off-grid emissions change were identified in this project activity, there will be no need to monitor the variables for these latter cases. The monitoring will occur as follows:

Figure 6: Monitoring procedures for the OWPPP



The operational conditions of the dispatch of energy related to the Power Purchase Agreement will respect the Grid Procedures and/or Distribution Procedures, or in the absence of the latter, will adopt the criteria of Eletrobrás. The dispatch of energy must be associated with the quality index established by ANEEL (National Agency of Electric Energy).

According to Resolution nº 127 of December 6, 2004 of ANEEL, the commercialization of energy under PROINFA will happen through the Modelling of the participating plants in the scope of CCEE (Chamber of Commercialization of Electric Energy), in order to dispatch to Eletrobrás the energy produced by each power plant.

Ventos do Sul is responsible for the monitoring of the energy generated and purchased, under the procedures indicated above. However, all the information referring to the measures will be available, to CCEE and Eletrobrás in real time, through serial interface connected to a communication unit - UTR, UCR or Modem.

The measuring equipments for invoicing will be installed at "Osório 2 Substation", which belongs to CEEE (Eletric Energy State Company – the connected agent) and which is the point of connection of the OWPPP to the Electric Grid.

According to the ONS Grid Procedures, the Measurement System will always have two identical measuring equipments. So, in case one of them fails, the second one will keep measuring. . The measuring equipment will have a conformity certificate issued by INMETRO (National Institute of Measurement, Norm and Industrial Quality).

Once the measurement points are physically defined and the measurement system of invoice and the communication infrastructure are installed, the measurement points will be registered in the SCDE (System of Energy Data collection) managed by CCEE.

The Financial Payment of the energy will be performed by Eletrobrás. The difference between the contracted energy and the verified generation will be eliminated monthly according to CCEE Procedures.

Although the monitoring procedures are responsibility of Ventos do Sul, all the steps of the process have to be approved by all parties involved: CCEE, ONS and CEEE. The approval of all parties will guarantee transparency and reliability of the values measured.