



VALIDATION REPORT

ARIZONA 1 WIND POWER PLANT CDM PROJECT ACTIVITY IN BRAZIL

REPORT No. 2011-3340

REVISION No. 01

DET NORSKE VERITAS



VALIDATION REPORT

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Client: Neoenergia S/A	Client ref.: Flavia Antunes

Summary:

Project Name: Arizona 1 Wind Power Plant CDM Project Activity

Country: Brazil

Methodology: ACM0002

Version: 12.2.0

GHG reducing Measure/Technology: Grid-connected electricity generation from wind power (Sectoral Scope 1)

ER estimate: 43 742 tCO₂e per year (average)

Size

☒ Large Scale

☐ Small Scale

Validation Phases:

☒ Desk Review

☒ Follow up interviews

☒ Resolution of outstanding issues

Validation Status

☐ Corrective Actions Requested

☐ Clarifications Requested

☒ Full Approval and submission for registration

☐ Rejected

In summary, it is DNV's opinion that for project activity "Arizona 1 Wind Power Plant CDM Project Activity" in Brazil, as described in the PDD, version 2 of 24 January 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0002, version 12.2.0. Hence DNV requests the registration of the project as a CDM project activity.

Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

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Report title: Arizona 1 Wind Power Plant CDM Project Activity in Brazil				
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Abbreviations

ABNT	Brazilian Association of Technical Standards
ANEEL	National Electric Energy Agency
BNDES	Brazilian Development Bank
BRL	Brazilian Real; Brazilian currency
CAPEX	Capital Expenses
CAR	Corrective Action Request
CCEE	Electric Energy Commercialization Chamber
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CH ₄	Methane
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
CONAMA	Environmental National Council
CSLL	Social Tax on Assumed Profit
DNA	Designated National Authority
DNV	Det Norske Veritas
EUR	Euro, European currency
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IDEMA	Institute of Environment and Sustainable Development of the state of Rio Grande do Norte
IPCC	Intergovernmental Panel on Climate Change
IPEA	Advanced Economic Research Institute
LI	Installation License
LoA	Letter of approval
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
ONS	National Operator of the System
PDD	Project Design Document
PASEP	Tax for Heritage Program for Public Employees
PIS	Tax for Social Integration Program
PPA	Power Purchase Agreement
PROINFA	Program of Incentive to Alternative Sources of Electric Energy
S&P500	Standard and Poor's
SIN	National Integrated System – Electricity Grid of Brazil
tCO ₂ e	Metric Tonnes of CO ₂ equivalents
TFSEE	Fiscalization Tariff for Electricity Services
TUSD	Electric Distribution System Tariff
UNFCCC	United Nations Framework Convention on Climate Change
WACC	Weighted Average Cost of Capital



1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the project activity “Arizona 1 Wind Power Plant CDM Project Activity” in Brazil. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host Party is Brazil, which fulfils the participation criteria. There is no Annex I Party identified yet.

The project correctly applies the baseline and monitoring methodology ACM0002, version 12.2.0 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

The project activity is a wind power project of 28 MW installed capacity. By generating electricity from wind power and displacing electricity from the grid that is partly generated from fossil fuels, the project results in reductions of CO₂ emissions are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 43 742 tCO₂e per year over the selected 7 years renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the project’s emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV’s opinion that the project participants are able to implement the monitoring plan.

In summary, it is DNV’s opinion that the project activity “Arizona 1 Wind Power Plant CDM Project Activity” in Brazil, as described in the PDD, version 2 dated 24 January 2012, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0002, version 12.2.0. Hence, DNV requests the registration of the project as a CDM project activity.

Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

Rio de Janeiro and Oslo, 28 March 2012

Gabriel Baines
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Michael Lehmann
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2 INTRODUCTION

Neoenergia S/A has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the Arizona 1 Wind Power Plant CDM Project Activity project in Brazil (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0002 (version 12.2.0). The validation was based on the recommendations in the Validation and Verification Manual /28/.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.



3 METHODOLOGY

The validation consisted of the following three phases:

- I a desk review of the project design documents
- II follow-up interviews with project stakeholders
- III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk review of the project design documentation

The following tables list the documentation that was reviewed during the validation.

3.1.1 Documentation provided by the project participants

- /1/ Ecopart Assessoria em Negócios Empresariais Ltda.: *CDM-PDD for project activity "Arizona 1 Wind Power Plant CDM Project Activity" in Brazil*, version 2, dated 24 January 2012 and version 1, dated 9 June 2011.
- /2/ Ecopart Assessoria em Negócios Empresariais Ltda.: *Emission reduction calculation spreadsheet "Arizona1_CERs_2012.01.10_v.2"*, version 2, dated 10 January 2012 and version 1, dated 9 May 2011.
- /3/ Ecopart Assessoria em Negócios Empresariais Ltda.: *Benchmark calculation spreadsheet "WACC ElectricGen_2011 01 v2.xlsx"*, version 2, dated January 2012 and version 1, dated January 2010.
- /4/ Ecopart Assessoria em Negócios Empresariais Ltda.: *Financial analysis calculation spreadsheet "IRR_Iberdrola_Arizona1_v2.xls"*, version 2, dated January 2012 and version 1, dated 9 May 2011.
- /5/ Ecopart Assessoria em Negócios Empresariais Ltda.: *Investment Break Down, "Investimentos.xls"*, dated 3 August 2011.
- /6/ Ecopart Assessoria em Negócios Empresariais Ltda.: *Brazilian DNA grid emission factor for the year 2010*. Available at: <http://www.mct.gov.br/index.php/content/view/327118.html#ancora>
- /7/ Neoenergia S/A: *Notification form*, submitted to UNFCCC Secretariat for Prior Consideration of CDM and confirmed by UNFCCC on 11 November 2011
- /8/ Neoenergia S/A: *Notification form*, submitted to DNA of Brazil for demonstration and assessment of prior consideration of the CDM and confirmed by DNA on 17 November 2011
- /9/ IDEMA: *Environmental license, "Arizona 1 Windfarm Preliminary License"* N° 2010-036397/TEC/LP-0041 issued on 14 May 2010 and valid for 2 years. Available at: http://200.149.240.140/licencas/licencas_emitidas.asp
- /10/ Kohän-Saagoyen Consultoria e Sistemas Ltda.: *Simplified Environmental Report (RAS): "Environmental studies for Wind Complex Area Arizona 1 and Arizona 2"*, version 1, dated February 2010.
- /11/ Neoenergia S/A: *Receipt of Delivery of Mail*, May and June 2011. Receipts filled by postal service when delivering mail (invitation to stakeholder's consultation) to

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recipients.

- /12/ Neoenergia S/A: *Social contract, "Arizona 1_Social Contract.pdf"*, with presence of shareholders Neoenergia S/A, Iberdrola Renovables S/A and Iberdrola Renováveis do Brasil S/A, dated 19 October 2010.
- /13/ ANEEL: *Authorization for independent power producer "ANEEL_prt144 - PIE Arizona 1.pdf"*, stating 28 MW of installed capacity and 12.90 MW as guaranteed power output, dated 3 March 2011.
- /14/ Camargo Schubert: *Certificates of Wind Measurements and of Production of Energy*, certificate C&S/Iberdrola 328/10-D, for "Arizona 1 Wind Power Plant CDM Project Activity" and about the plant load factor of the wind farm, dated 9 April 2010.
- /15/ Kaiser-Wilhelm-Koog GmbH: *Power curve certificate*, N° WT 4887/06 for wind turbine Gamesa G90 DA 2.0 MW, dated 14 February 2006.
- /16/ Gamesa Eólica Brazil Ltda.: *Site suitability of wind turbine model G90 – 2000 kW for Arizona 1 Wind Farm*, dated 7 April 2010.
Technical Specifications available at: <http://www.gamesacorp.com/en/products-and-services/gamesa-g90-20-mw-ii-a-en.html>
- /17/ Iberdrola Renováveis do Brasil S/A: *Arizona1 Technical Summary*, dated 19 April 2010.
- /18/ Gamesa Eólica Brazil Ltda.: *Purchase Contract of Wind Turbogenerators*, signed with Neoenergia S/A on 25 October 2011.
- /19/ Iberdrola Renováveis do Brasil S/A: *Contracts of land rental between Rafael Gregório Trigueiro and Iberdrola Renováveis do Brasil S/A*, dated 1 October 2009.
- /20/ Iberdrola Renováveis do Brasil S/A: *Contracts of real state services between GH Empreendimentos Ltda. and Iberdrola Renováveis do Brasil S/A*, dated 24 October 2009.
- /21/ Neoenergia S/A: *Geographical coordinates of the wind farm "Geo coordinates - decimal format.xlsx"*, dated 2 August 2011.
- /22/ Ecopart Assessoria em Negócios Empresariais Ltda.: *Power Purchase Agreements*, signed on 28 July 2011 between Neoenergia S/A and:
 - Amazonas Distribuidora de Energia S.A., n° 8313/10
 - Caiuá Distribuidora de Energia S.A., n° 8314/10
 - Companhia Energética de Alagoas, n° 8316/10
 - Centrais Elétricas do Pará S.A., n° 8317/10
 - Companhia Energética de Pernambuco, n° 8318/10
 - Companhia de Eletricidade do Estado da Bahia, n° 8319/10
 - Companhia Piratininga de Força e Luz, n° 8320/10
 - Companhia Luz e Força Santa Cruz, n° 8321/10
 - Eletropaulo Metropolitana Eletricidade de São Paulo, n° 8322/10
 - Energisa Borborema – Distribuidora de Energia S.A., n° 8323/10
 - Energisa Paraíba – Distribuidora de Energia S.A., n° 8324/10
 - Energisa Sergipe - Distribuidora de Energia S.A., n° 8325/10
 - Empresa Energética do Mato Grosso do Sul S.A., n° 8326/10
 - Empresa de Distribuição de Energia Vale do Paranapanema S.A., n° 8327/10

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- /23/ Ecopart Assessoria em Negócios Empresariais Ltda.: *Insurance cost*, “ENC Custo seguro eólicas.msg”, dated 28 October 2011.
- /24/ Ecopart Assessoria em Negócios Empresariais Ltda.: *Rio do Fogo Administrative Expenses*, “Taxas Administrativas RiodeFogo.pdf”, dated 28 October 2011.
- /25/ Neoenergia S/A: *Risk Assessment on Electricity Generation*, “Resultados Simulación A-3 Agio 30V1.xls”, dated 28 October 2011.
- /26/ Ecopart Assessoria em Negócios Empresariais Ltda.: *Common Practice Analysis*, “Arizonal_Prática Comum_2012.01.24.xlsx”, dated 24 January 2012.

3.1.2 Letters of approval

- /27/ Interministerial Commission on Global Climate Change (DNA of Brazil): *Letter of approval*: Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

3.1.3 Methodologies, tools and other guidance by the CDM Executive Board

- /28/ CDM Executive Board: *Validation and Verification Manual*, version 1.2, adopted at EB55 Annex 1.
- /29/ CDM Executive Board: *Glossary of CDM terms*, version 5 adopted at EB47, paragraph 71.
- /30/ CDM Executive Board: *Baseline and monitoring methodology ACM0002*, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, version 12.2.0 adopted at EB58.
- /31/ CDM Executive Board: *Tool for the demonstration and assessment of additionality*, version 6.0 adopted at EB65 Annex 21.
- /32/ CDM Executive Board: *Tool to calculate the emission factor for an electricity system*, version 2.2.0 adopted at EB61 Annex 12.
- /33/ CDM Executive Board: *Guidelines on the demonstration and assessment of prior consideration of the CDM*, version 4.0 adopted at EB62 Annex 13.
- /34/ CDM Executive Board: *Guidelines on the Assessment of Investment Analysis*, version 5.0 adopted at EB62 Annex 5.
- /35/ CDM Executive Board: *Guidelines on the Reporting and Validation of Plant Load Factors*, version 1 adopted at EB48 Annex 11.
- /36/ CDM Executive Board: *Clarifications on the consideration of national and/or sectoral policies and circumstances in baseline scenarios*, Annex 3, EB22.

3.1.4 Documentation used by DNV to validate / cross-check the information provided by the project participants

- /37/ Ministry of Environment, *Resolution CONAMA n° 001*, of 23 January 1986 about Environmental Impact Assessment. Available at:
<http://www.mma.gov.br/port/conama/res/res86/res0186.html>
- /38/ BNDES: *Long Term Interest Rate*, 2012 rates, available at:



- http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Custos_Financeiros/Taxa_de_Juros_de_Longo_Prazo_TJLP/index.html
- /39/ National Operator of the System - *Grid Procedures*, available at:
www.ons.org.br/procedimentos/index.aspx
- /40/ ANEEL, *Bank of Information of Generation*, the capacity of electricity generation in Brazil in 2012. Available at:
<http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp>
- /41/ CCEE: *2nd Brazilian Auction of Renewable Energy* - Auction n° 07/2010 dated 26 August 2010 – Results. Available at:
http://www.ccee.org.br/StaticFile/Arquivo/biblioteca_virtual/Leiloes/2_F_A/Resulta_Completo_2_LFA_Resumo_vendedor.pdf
- /42/ IPCC: *Guidelines 2006, Volume 2, Chapter 1, Table 1.4* – “Default CO₂ emission factors for combustion”. Available at:
http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
- /43/ Treasury Department: *Brazilian Assumed Profit regulations*, dated 2011. Available at:
<http://www.receita.fazenda.gov.br/Publico/perguntao/dipj2011/CapituloXIII-IRPJ-LucroPresumido2011.pdf>
- /44/ Damodaran website: *30-year US Treasury Yields*, dated 2011. Available at:
<http://pages.stern.nyu.edu/~adamodar/>
- /45/ Federal Reserve: *Financial and Economics Research Data*, dated 2011. Available at:
<http://www.federalreserve.gov/econresdata/researchdata.htm>
- /46/ IPEA: *Brazilian Macroeconomics Data*, from 2006 to 2010. Available at:
<http://www.ipeadata.gov.br/>
- /47/ BNDES: *Brazilian Long-Term Bond Rates*, from 2006 to 2010. Available at:
http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Custos_Financeiros/Taxa_de_Juros_de_Longo_Prazo_TJLP/index.html
- /48/ BNDES: *Brazilian Funding Conditions*, dated 2011. Available at:
http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Produtos/FINEM/meio_ambiente.html
- /49/ Brazilian Central Bank: *Inflation Targets*, for year 2011. Available at:
<http://www.bcb.gov.br/pec/metas/InflationTargetingTable.pdf>
- /50/ ANEEL: *Fiscalization Tariff for Electricity Services*, dated 22 December 2009
<http://www.aneel.gov.br/cedoc/dsp20094774.pdf>
- /51/ ANEEL: *ONS Fee Calculation and Budget Approval*, from the document “Premissas Regulatorias Leilão A-3.23.08.2010.pdf”, dated 23 August 2010
- /52/ ANEEL: *Electric Distribution System Tariff*, dated 2010. Available at:
http://www.aneel.gov.br/aplicacoes/consulta_publica/documentos/Petrobras1.pdf
- /53/ CCEE: *Contribution Fee*, from the document “Premissas Regulatorias Leilão A-3.23.08.2010.pdf”, dated 23 August 2010
- /54/ Ministry of Environment: *Renewable Sources of Energy in Brazil*, dated 2003.
- /55/ Brazilian National Treasury, *Normative Instruction n° 247*, dated 21 November 2002. About PIS/PASEP and Cofins taxes, available at:



- <http://www.receita.fazenda.gov.br/legislacao/ins/2002/in2472002.htm>
- /56/ Brazilian National Treasury, *Note 517 for information on legislation about presumed profit companies*, dated 2005. Available at:
<http://www.receita.fazenda.gov.br/PessoaJuridica/DIPJ/2005/PergResp2005/pr517a555.htm>
- /57/ Brazilian National Treasury, *Article 22 of Law n° 10684 and Article 3 of Law n° 11727, for social contribution on net profit*, available at:
<http://www.receita.fazenda.gov.br/aliquotas/ContribCsl/Default.htm>
- /58/ ANEEL, *Resolution n° 44 about depreciation rates*, dated 17 March 1999. Available at:
http://www.aneel.gov.br/aplicacoes/leitura_arquivo/arquivos/Tabela_Taxas_Depriacao_RIT.pdf
- /59/ Eduardo Camilo: *Financial Expert Assessments*, approving the choice of benchmark and the investment analysis. Dated 22 July 2011.
- /60/ IBGE: *Official Territorial Area*, dated 2010. Available at:
<http://www.ibge.gov.br/home/geociencias/areaterritorial/principal.shtm>
- /61/ ANEEL: *Brazilian Electricity Book*, 3rd edition, dated 2008. Available at:
http://www.aneel.gov.br/visualizar_texto.cfm?idtxt=1687
- /62/ ANEEL: *Distribution System Tariff for Rio Grande do Norte and Ceará*, “TUSD COSERN_reh20111139.pdf” dated 19 April 2011 and “TUSD CEAL_reh20111193.pdf”, dated 1 February 2012.
- /63/ CCEE: *Electric Energy Commercialization Chamber*. Assessed on 2012 and available at:
<http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=2e09a5c1de88a010VgnVCM100000aa01a8c0RCRD>
- /64/ ABNT: *Brazilian Association of Technical Standards*, *Electricity Meters*, dated 2011. Available at:
<http://www.abntcatalogo.com.br/norma.aspx?ID=89389>
- /65/ UNFCCC: *Prior Consideration of the CDM*, received by UNFCCC on 9 November 2011, available at: http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html
- /66/ ONS: *Daily Operational Data from the National System*, dated 2010, available at:
http://www.ons.org.br/resultados_operacao/boletim_diario/index.htm
- /67/ Portal PCH: *Auction A-5 2011*, dated 22 December 2011 and available at:
http://www.portalpch.com.br/index.php?option=com_content&view=article&id=6826:22122011-leilao-a-5-termina-com-preco-medio-de-r-10218mwh&catid=1:ultimas-noticias&Itemid=98

3.2 Follow-up interviews with project stakeholders

On 26 and 27 of July 2011, DNV auditors Gabriel Baines, Fernando Sasdelli and Luis Filipe Tavares visited the Neoenergia S/A's office at Rio de Janeiro, Brazil, and performed interviews with project stakeholders. The project is a greenfield project and not yet constructed. DNV validated the project description through assessment of Technical Summary /17/ and the study on the site suitability of wind turbine /16/.



	Date	Name	Organization	Topic
/68/	26 and 27 July 2011	Flavia Antunes	Neoenergia S/A	<ul style="list-style-type: none">• Project Design and adopted technology• Determination of baseline scenario• Demonstration of additionality• Emission reduction calculations• Application of monitoring methodology as well as design and application of the monitoring plan• Assessment of environmental impacts, environmental licenses and legal compliance• Stakeholders consultation process• Financial analysis
/69/		Carolina Nunes		
/70/		Thaísa Alcoforado	Iberdrola Renováveis do Brasil S/A	
/71/		Laura Porto		
/72/		Carlos Jobim		
/73/		Ana Paula Veiga	Ecopart Assessoria em Negócios Empresariais Ltda.	
/74/		Renato Oliveira		
/75/		Peter Pehl	Iberdrola Renovables S/A	
/76/		Alejandro Hoz		
/77/		Juan Rivier Abad		

3.3 Resolution of outstanding issues

The objective of this phase of the validation was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "Arizona 1 Wind Power Plant CDM Project Activity" in Brazil is enclosed in Appendix A to this report.

Table 2 of the validation protocol documents the findings of the desk review of the project design documentation and follow-up interviews with project stakeholders. Any findings raised in Table 2 are listed in Table 3 of the protocol, and changes to the description of the project design as a result of these findings will be addressed in Table 3. Table 2 thus may not reflect all aspects of the project as described in the final PDD submitted for registration.

A corrective action request (CAR) is raised if one of the following occurs:



- (a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- (b) The CDM requirements have not been met;
- (c) There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.



Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities				
Requirement	Reference	Conclusion		
The requirements the project must meet.	Gives reference to the legislation or agreement where the requirement is found.	This is either acceptable based on evidence provided (OK) or a corrective action request (CAR) if a requirement is not met.		

Validation Protocol Table 2: Requirement Checklist				
Checklist question	Reference	Means of verification (MoV) of	Assessment by DNV	Draft and/or Final Conclusion
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the CDM-PDD	Gives reference to documents where the answer to the checklist question or item is found.	Means of verification (MoV) are document review (DR) , interview (I) or any other follow-up actions (e.g., on site visit and telephone or email interviews) and cross-checking (CC) with available information relating to projects or technologies similar to the proposed CDM project activity under validation.	The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.	OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A corrective action request (CAR) is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A forward action request (FAR) during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Corrective action and/or clarification requests	Ref. to checklist question in table 2	Response by project participants	Validation conclusion
The CARs and/ or CLs raised in Table 2 are repeated here.	Reference to the checklist question number in Table 2 where the CAR or CL is explained.	The responses given by the project participants to address the CARs and/or CLs .	The validation team's assessment and final conclusions of the CARs and/or CLs .

Validation Protocol Table 4: Forward Action Requests		
Forward action request	Ref. to checklist question in table 2	Response by project participants
The FARs raised in Table 2 are repeated here.	Reference to the checklist question number in Table 2 where the FAR is explained.	Response by project participants on how forward action request will be addressed prior to first verification.

Figure 1: Validation protocol tables



3.4 Internal quality control

The validation report underwent a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

<i>Role</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>						
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.2 competence	Financial expertise
Team leader (Validator)	Baines	Gabriel	Brazil	✓	✓	✓	✓			
Validator	Tavares	Luis Filipe	Brazil	✓	✓	✓			✓	
Assessor under training	Sasdelli	Fernando	Brazil	✓	✓	✓				
Financial Expert	Camilo	Eduardo	Brazil	✓		✓				✓
Technical reviewer	Chattopadhyay	Sasim	India					✓	✓	

The qualification of each individual validation team member is detailed in Appendix B to this report.



4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the PDD, version 2 dated 24 January 2012 /1/.

4.1 Participation requirements

The project participants are Neoenergia S/A, Iberdrola Renováveis do Brasil S/A and Ecopart Assessoria em Negócios Empresariais Ltda. of the host Party of Brazil. The host Party (Brazil) meets all relevant participation requirements. There is no Annex I Party project participant identified yet.

The project does not involve any public funding from an Annex I Party, and the validation did not reveal any information that indicated that the project can be seen as a diversion of official development assistance (ODA) funding towards Brazil.

Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

4.2 Project design

The “Arizona 1 Wind Power Plant CDM Project Activity in Brazil” project is located in the municipality of Rio do Fogo, state of Rio Grande do Norte, Brazil.

The geographical coordinates of the proposed project activity are listed below as presented in the document “Geo coordinates - decimal format.xlsx” /21/ from Neoenergia S/A and the Certificates of Wind Measurements and of Production of Energy /14/.

Aerogenerator	S latitude	W longitude
Control Centre	5.3042	35.3817

The project is a wind power project which involves installation and operation of 14 wind turbines. The installed capacity of each turbine is 2.0 MW thus constituting a total installed capacity of 28 MW /13/.

It has been cross-checked by DNV through the manufacturer’s product specifications /16/ that the project design engineering uses the megawatt-class, three-bladed, variable speed wind turbines, which is deemed to reflect good practices.

The annual electricity delivered to the National Interconnected System (SIN) is expected to be 107 573 MWh, corresponding to an average plant load factor of 43.86%. The guaranteed power as authorized by the ANEEL is 12.9 MW /13/. Based on their own experience and wind certification, project participants negotiated 12.28 MW /41/ under the auction, which is in line with the signed Power Purchase Agreements /22/. Both figures were determined at



50% of probability (P50), which is deemed conservative as financing institutions usually consider P90 for the financing agreement /48/. The lower value (12.28MW) was used in the investment analysis. However, ANEEL's load factor (12.90 MW), establishing the available electricity guaranteed by the Brazilian Regulatory Agency was considered at the sensitivity analysis presented at the revised PDD. The presented sensitivity analysis was assessed by DNV and found to be in accordance with the requirements.

The electricity generated by the project will be linked to a 34.5 kV onsite transformer substation, and ultimately delivered to the SIN - which has part of its electricity generated by fossil fuel power plants - via a 69 kV transmission line of 55.6 km /13/.

Being a renewable electricity project, the project activity will generate greenhouse gas (GHG) emission reductions by avoiding the CO₂ emissions from the electricity generation by fossil fuel power projects.

The project's system boundaries are clearly defined as the project site and the National Interconnected System (SIN), the grid of Brazil.

The project construction had not been initiated at the commencement of validation. The starting date of the proposed project activity is 28 July 2011, which is the date when the Power Purchase Agreement was signed with the power utilities. DNV assessed the signed PPAs between the project participants Arizona 1 Wind Power Plant CDM Project Activity and the power utilities /22/

The expected operational lifetime of the project activity is 20 years derived from the lifetime of the Wind Turbine Gamesa G90 /16/.

A 7-year renewable crediting period has been chosen for the project, starting on 7 May 2012 or the registration date, whichever is later. The chosen crediting starting date is deemed to be reasonable. The emission reductions are estimated to be 43 742 tCO₂e per year and 306 196 tCO₂e over the first seven years of crediting period.

DNV considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant forms and guidance for completing the PDD.

4.3 Application of selected baseline and monitoring methodology

The project correctly applies the approved baseline and monitoring methodology ACM0002 version 12.2.0 .

The applied baseline methodology is justified as it has been demonstrated that the project activity ensures that:

- The project activity is the installation of a grid-connected and greenfield wind power plant which was verified through ANEEL authorization for independent power producer /13/ about the construction of the wind farm and the results of the 2nd Brazilian Auction of Renewable Energy - Auction n° 07/2010 /41/.
- Being a wind farm project, it does not involve any switching from fossil fuel to renewable energy at the project site, which could be verified by DNV through the follow-up interview /68//69//70//71//72//73//74/ and the ANEEL authorization for independent power producer /13/.
- The project is connected to the National Interconnected System (SIN), the electricity grid of Brazil, for which the geographical and system boundaries are clearly identified and information on the characteristics of this grid is made available by National Electric Energy Agency (ANEEL) /13/.



The assessment of the project's compliance with the applicability criteria of ACM0002 version 12.2.0 are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

4.4 Project boundary

The spatial extent of the project boundary is correctly defined as the site of project activity and the system boundary for the grid electricity system is also correctly defined as all power plants connected physically to the National Interconnected System (SIN), the electricity grid of Brazil, to which the project will be connected. It is DNV's opinion that the project boundary of Arizona 1 Wind Power Plant CDM Project Activity is clearly defined in accordance with applicable guidelines of both ACM0002 /30/ and the "Tool to calculate the emission factor for an electricity system" /32/.

Emission sources and gases included in the project boundary are:

	<i>GHGs involved</i>	<i>Description</i>
Baseline emissions	CO ₂	The baseline emission factor for the project is determined <i>ex-post</i> as a combined margin (CM), consisting of combination of the operating margin (OM) and build margin (BM) of the National Interconnected System (SIN), the electricity grid of Brazil.
Project emissions	N/A	Project emission is regarded as zero as the project is a renewable energy (wind source) project.
Leakage	N/A	There are no leakages that need to be considered in applying this methodology.

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by ACM0002 (Version 12.2.0) /30/.

4.5 Baseline identification

The baseline is in accordance with ACM0002 (version 12.2.0) /30/ that electricity delivered to the grid by project activity would otherwise have been generated by the operation of grid-connected power plants in SIN and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" /32/.

According to ACM0002 (version 12.2.0) /30/ baseline emissions are equal to power generated by the project delivered to the SIN, multiplied by the baseline emission factor. The grid emission factor will be determined *ex-post* as a combined margin, consisting of combination of the operating margin (OM) and build margin (BM) emission coefficient for the project. The



Brazilian grid emission factor has been published by the DNA of Brazil /6/. The calculations are based on electricity generation data provided by the National Operator System (ONS) for the electricity generated in the grid. The weighting of the OM and BM is set to be 75% and 25% respectively, which are the default values stipulated for wind farm projects by “*Tool to calculate the emission factor for an electricity system*” /32/.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

As the project activity is a new grid-connected wind power plant, the baseline scenario is already defined by the methodology and properly stated in section B.4 of PDD.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario are correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

DNV considers the chosen baseline to be applicable and in line with the methodology ACM0002 version 12.2.0 /30/.

4.6 Additionality

As required by ACM0002, the additionality of the proposed project is demonstrated by applying the “*Tool for the demonstration and assessment of additionality*” /31/.

4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status

Project start date:

The starting date of the project activity was defined as 28 July 2011, which is the date when the Power Purchase agreement was signed with the power utilities. DNV assessed the signed PPAs between the project participants Arizona 1 Wind Power Plant CDM Project Activity and the power utilities, was able to confirm that this is the earliest commitment to financial expenditure, as is obliges the PP to sell the amount of electricity accorded in the auction /41/. There were no signed contracts prior to 28 July 2011. The penalty of not providing this electricity to the grid equals the expected revenues of the project.

Serious consideration of CDM and efforts to secure CDM status:

In accordance with the guidance from the CDM Executive Board /33/, the proposed project is a newly built wind farm and the starting date of the project activity (28 July 2011) is after 2 August 2008. The notification letter for the proposed project was sent by the project participant to the Brazilian DNA and confirmed on 17 November 2011 /8/. In parallel to this the project participants sent the prior consideration of the CDM Form to UNFCCC, which was confirmed by UNFCCC by mail on 11 November 2011 /7/. DNV confirm this receipt in the UNFCCC website /64/. Both confirmations are within six months of the project activity starting date i.e. 28 July 2011. CDM was therefore seriously considered in the decision to proceed with the project activity.



The project participants started the global stakeholder consultation on 25 May 2011 /11/. To the consideration of DNV, this shows sufficient actions to secure CDM status in parallel with the physical implementation of the project.

It is DNV's opinion that the proposed CDM project activity complies with the requirements of the latest version of the guidance on prior consideration of CDM.

4.6.2 Identification of alternatives to the project activity

The project activity is the installation of a new grid-connected renewable power plant, thus according to the methodology ACM0002, version 12.2.0 /30/, the baseline scenario for the project activity is defined as follow:

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

In accordance with the paragraph 105 of VVM /28/, the approved methodology ACM0002 version 12.2.0 /30/ that is selected by the proposed project activity has prescribed the baseline scenario as shown above, thus no alternatives to the project activity in order to determine the baseline scenario are identified in the PDD /1/.

4.6.3 Investment analysis

Choice of approach

As the project generates financial and economic benefits other than CDM related income through the sales of electricity, a benchmark analysis was selected for conducting the investment analysis. DNV considers this approach correct, as it is according to *Guidelines on the Assessment of Investment Analysis* /34/. As the start date of the project was defined as 28 July 2011, which is the date when the Power Purchase Agreement was signed with the power utilities /22/, to guarantee availability of all data, the benchmark was based on data until the end of the previous year (i.e.: 31 December 2010). DNV considers this approach correct due to lack of data for 2011, which is consolidated annually, at the time of the investment decision.

Benchmark selection

The selected benchmark is a project benchmark calculated based in bond rates. The benchmark was calculated to be 9.39% by Ecopart Assessoria em Negócios Empresariais Ltda. based on paragraph 12 of the "Guidelines on the Assessment of Investment Analysis" version 5.0 /34/: "weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR". The nominal WACC was calculated based in the Capital Asset Pricing Model (CAPM) as per the option 6 (a) presented in the additionality tool as follows:

$$K_e = R_f + \beta (R_m - R_f)$$

Where:

- R_f (risk free rate): calculated as 4.25%, based on the 30-year US Treasury Yield of year 2010 /44/;
- R_m (equity risk premium): calculated as 6.03%, based on S&P500 historic and 10-year Treasury Bond Yield /45/;



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- R_c (estimated country risk premium): calculated as 2.45%, based on Brazilian Risk Premium from years 2006, 2007, 2008, 2009 and 2010 /46/.
- β (adjusted industry beta): calculated as 2.41, based on the covariance of the daily return of electric industries listed on S&P500 of year 2010 /44/. Beta when re-levered used the conditions of presumed (or assumed) profit regime, which tax rate is zero.

Thus, K_e is calculated to be 19.18%.

The weighted average cost of capital is calculated as follows:

$$WACC = K_e * w_e + K_d * w_d$$

Where:

- K_e (return on equity) is calculated as 19.18% as per indicated above;
- K_d (cost of debt financing) is calculated as 4.71% based on the sum of the financing cost (long term interest rate, 6.53% /47/), BNDES fee (0.9%) /48/, BNDES spread (2.0%) /48/ minus the inflation forecast (4.50%) /49/;
- w_e (weight of equity) and w_d (weight of debt) are 32.3% and 67.7%. 67.7% is the average financing granted by BNDES for wind farms from year 2003 to 2009 /3/.

Thus, WACC is calculated to be: $19.18\% * 32.3\% + 4.71\% * 67.7\% = 9.39\%$.

This benchmark is not specific to the project participants, since it was calculated based on public data considering the risks faced by any wind power project in Brazil. Although CAPM model is generally used to calculate a benchmark on an equity basis, in this case it is accepted to be applied for a benchmark on a project basis, because it was adapted to the project using re-levered beta for condition of a presumed (or assumed) profit regime, for which tax rate is zero in re-levering. DNV confirmed this approach is correct with independent financial expert Eduardo Camilo /59/.

DNV confirmed that the assumptions taken and the values considered for the benchmark calculation are reasonable, according to statement from independent financial expert from Rio de Janeiro Federal University /59/.

Hence, DNV concludes that the benchmark calculated for the proposed project is reasonable.

Input parameters

DNV has validated all input values to the investment analysis based on appropriate evidence, as described below.

Investment costs:

The total investment is estimated to be BRL 110 717 000.00. From this amount:

- BRL 67 183 194 (60.7% of total investment) corresponds to the investment in the wind turbine generators as per spread sheet "Investimentos.xls" /5/.
- BRL 32 075 242 (29.0% of total investment) corresponds to civil works, as per spread sheet "Investimentos.xls" /5/.
- BRL 7 615 479 (6.9% of total investment) corresponds to voltage network, substation of elevation and transmission lines costs as per spread sheet "Investimentos.xls" /5/.
- BRL 2 232 739 (2.0% of total investment) corresponds to development costs as per spread sheet "Investimentos.xls" /5/.



- BRL 1 610 000 (1.5% of total investment) corresponds to the development and know-how costs from Iberdrola Renovables S/A as per spread sheet /4//5/.

The auditor Gabriel Baines visited the Neoenergia S/A office on 30 September 2011 and confirmed the investment costs presented in the document “Investimentos.xls” /5/ are the identical to ones presented in the proposal from the supplier Gamesa Eólica Brasil Ltda. /18/. DNV concludes that the total investments for the proposed project are reasonable for wind power plants.

Operation Expenses:

The operation expenses for the proposed project include:

- TFSEE (Fiscalization Tariff for Electricity Services): fixed to 0.5% of 363.50 BRL/kW and totalling BRL 50 904 per year /50/.
- ONS rate + insurance: 0.55 BRL/kW based on ANEEL ordinance #328/2004 and #2.459/2010. Insurance fees were calculated as 0.13% of the total CAPEX /23/, totalling BRL 143 931.65 for the first year of full operation onwards. Sum of both totals BRL 159 332 per year /51/.
- TUSD: The cost of 3.18 BRL/kW/month was based on ANEEL ordinance #972/2010. No discount was applied to the tariff TUSD /52/ in accordance to Type E- Policy as defined by Annex 3, EB 22 /36/.
- O&M: As per the financial analysis “IRR_Iberdrola_Arizona1_v2.xls” /4/ prices for the operation and maintenance of the wind power plants are variable through the years, starting on BRL 332 397.00 in the first year and reaching BRL 1 787 208.00 in the 4th year, continuing with this value until the end of the contract. According to manufacturer contract /18/ the O&M cost during warrant is 5 000.00 EUR/kW.yr and out-of warrant is 25 000.00 EUR/kW.yr.
- CCEE: The contribution of 0.13 BRL/MWh is annually paid to the CCEE, entity responsible to trade the electricity generated /53/
- Administrative expenses: 1.2% of total revenues, totalling BRL 173 263.00 per year. This cost was based on project participants results from similar project Rio do Fogo /24/.
- Land use is 1.5% of the total revenues, totalling BRL 210 101.00 per year as per contract /19/.
- Land rent is BRL 382 200.00, which includes pre-operational costs and real state services, as per contract /19//20/, for the first year of full operation.

Total estimate operational expenses represents 2.2% of the total investment.

Comparing with simulations presented in the book from the Ministry of Environment “Renewable Sources of Energy in Brazil” /54/, which considered values of operational expenses ranging from 1% to 4%, the costs of the project is reasonable.

DNV concludes that the operational expenses are reasonable for wind power plants.

*Annual power generation:*

According to the PDD /1/ and Certificates of Wind Measurements and of Production of Energy /14/, it is expected that the proposed project will supply to SIN approximately 107 573 MWh at a plant load factor (PFL) of 43.86%. Annex 11 of EB48 /35/ gives “*Guidelines on the Reporting and Validation of Plant Load Factors*“. One option is to use a plant load factor provided to the government while applying the project activity for implementation approval. This value of plant load factor was calculated based on the guaranteed energy sold in the auction (12.28 MW) /41/ and the installed capacity of the wind farm.

The other plant load factor (12.90 MW) /13/, establishing the available electricity guaranteed by the Brazilian Regulatory Agency was considered at the sensitivity analysis presented at the revised PDD.

Power tariff:

In Brazil, the auctions for reserve energy follow the inverted auctions model, in which the smallest price charged by the producer in the bid wins the slot. In the 2nd Brazilian Auction of Renewable Energy - Auction n° 07/2010 /41/, Neoenergia S/A offered the best prices for wind farm Arizona 1 Wind Power Plant CDM Project Activity, thus winning these slots. The price offered was BRL 134.59/MWh. The power tariff is above the tariff applicable to other power generation sources, such as hydro power plants. For example auction A-5 from December 2011 resulted in an average price of BRL 102.18/MWh /67/.

A discount of 3.26% was applied to the PPA price, resulting in BRL 130.21/MWh because according to the PPA contract /22/ the amount of electricity generated has decreasing tolerance bands every quadrennial. When generating above those bands the extra electricity may be sold in the spot market, which has a lower price than the PPA. When generating below those bands the revenue will suffer a proportional discount by the price agreed in the auction. The discount of 3.26% reflects the most probable variation after a statistical analysis of 5 000 wind generation scenarios over 20 years.

DNV assessed those scenarios at “Resultados Simulación A-3 Agio 30V1.xls” /25/ and confirmed that the discount is taking in consideration the risks associated with climate conditions the inevitable uncertainty of electricity generation by wind farms.

These prices will not change until the end of the PPA period, of 20 years, only varying according to the inflation.

Taxes and depreciation:

DNV could also confirm that the special purpose societies formed for the project are eligible for the presumed (or assumed) profit regime, in accordance to the national fiscal legislation. Values of 8% /56/ for the income rate basis and income tax of 25%, 0.65% for the PIS/PASEP tax /55/, 3% for the Cofins tax /55/, 12% of revenues basis and a 9% rate is applied as social contribution on net income (CSLL) /57/ were established accordingly to the Brazilian legal requirements. In the presumed profit regime, depreciation has no impact in the project’s internal rate of return. In this case, tax rates are calculated over revenues and not over gross profits.



Calculation and conclusion

The IRR calculations were provided in spreadsheet /4/ and verified by DNV. The assumptions and calculations were verified and found to be correct by DNV. The IRR is after tax and the assessment period of 20 years is equivalent to the lifetime of the project /16/, in which the nominal IRR without CDM revenues is 5.71%. This confirms that the project in the absence of CDM benefits and compared to the benchmark of 9.39% is not financially attractive /4/.

Sensitivity analysis

Two sensitivity analyses have been carried out. For the plant load factor of 43.86% or 12.28 MW of guaranteed power effectively sold during the energy auction /41/ and for the plant load factor of 46.07% or 12.90 MW of guaranteed power informed by ANEEL /13/. Parameters contributing to more than 20% of the revenues or costs were simulated in order to check the robustness of the financial analysis. Reasonable variations of the electricity price, electricity generation, capital expenditures and operation and maintenance costs were checked by varying the parameters in 10%. Also, for parameters electricity price, electricity generation, capital expenditures were calculated the variation necessary to reach the benchmark and then discussing the likelihood for that to happen. Operation and maintenance costs were not included in the sensibility analysis as they represent a small variation in the IRR and even if disregarded from the costs the project would not reach the benchmark./4//34/. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation. DNV was able to verify that the project IRR will reach the benchmark only if the above mentioned parameters change by values as mentioned below:

Table 1 – Scenario 1: 12.28 MW of guaranteed power

Key Indicators	Variation of the parameter indicator needed to reach the benchmark
Electricity price	+ 24.55%
Electricity generation	+ 24.55%
CAPEX	- 24.05%

Table 2 – Scenario 2: 12.90 MW of guaranteed power

Key Indicators	Variation of the parameter indicator needed to reach the benchmark
Electricity price	+ 18.60%
Electricity generation	+ 18.60%
CAPEX	- 19.10%

- Electricity price:** To reach the 9.39% benchmark, electricity price must increase by 24.55% above inflation to BRL 162.17/MWh in the first scenario and 18.60% (BRL 154.43/MWh) in the second scenario. This is not likely to happen. In Brazil, the prices are strictly set by ANEEL in the time of the auction and cannot be changed during the period of the PPA, determined as 20 years in the rules of the auction.



2. **Electricity generation:** According to the PDD and study from Camargo Schubert /14/, the annual output is based on the long term (from 1989 to 2008) weather statistic data and wind resources measurement provided by NCAR/NCEP Global Reanalysis Project (NOAA-USA) and the gross plant load factor was defined as 47.1%, what would result in an electricity generation of 115 527 MWh/year. After this study, the guaranteed plant load factor was fixed at 43.86%, which is the guaranteed power for the project activity defined in the energy auction /41/. Therefore even the electricity generation calculated using the higher gross plant load factor (115 527 MWh/year) is 13.77% below scenario 1 which would reach the benchmark at 133 982 MWh/year or a PLF of 54.6% and 13.80% below scenario 2 which would reach the benchmark at 134 023 MWh/year and a PLF of 54.64%). According to “Renewable Sources of Energy in Brazil” /53/, the average plant load factor of a wind park in Brazil is 40%. Considering that the annual output calculations for the proposed project were carried out using professional software designed for wind energy and that the output was maximized by considering air density corrections, turbine efficiency, planned maintenance, contaminated rotors, and auxiliary power use, it is unlikely that the electricity delivered to the grid will suffer the additional increase necessary to reach benchmark.
3. **Investment costs:** DNV was able to confirm that a decrease of 24.05% or 19.10% in investment costs is unlikely to happen, as 96.5% of the total investment of the proposed project goes towards civil works and purchase and installation of electric equipment (including wind turbines, towers and transformers) as indicated in the PDD and signed contracts /18/. Therefore the total investment is not likely to decrease by more than 19.10%.

The sensitive analysis above shows that very unrealistic favorable circumstances would be needed for the IRR to reach the benchmark. In conclusion, the investment analysis and sensitivity assessment have shown that the proposed project is not financially attractive.

4.6.4 Barrier analysis

Barrier analysis was not applied for the proposed project.

4.6.5 Common practice analysis

According to the EB “Tool for the demonstration and assessment of additionality” /31/ the common practice analysis is carried out on similar projects which are considered to be in the same region, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. The applicable output range was calculated considering the installed capacity of 28 MW. Therefore only projects wind projects between 14 MW and 42 MW of installed capacity were taken into consideration.

Considering the Brazilian territorial extension /60/, variability of wind conditions /61/ and the tariffs applied by ANEEL in different states /62/, the geographical scope for common practice analysis was determined to be the Rio Grande do Norte state.



Following the steps of the “Tool for the demonstration and assessment of additionality” /31/, “N_{all}” and “N_{diff}” were calculated. No wind power plants that became operational before 28 July 2011, within the output range and non-CDM were found in the Rio Grande do Norte state. DNV assessed document “Arizona1_Prática Comum_2012.01.24.xlsx” /26/, ANEEL Bank of Information of Generation /40/ and UNFCCC website to confirm this information.

DNV was able to confirm that despite of the available high technical potential for wind energy utilization in Brazil, only around 1.2% of electricity in Brazil is generated from wind farms /40/.

Finally, it is DNV opinion that as “N_{all}” and “N_{diff}” are equal to zero, the development of wind farm Arizona 1 Wind Power Plant CDM Project Activity does not represent a common practice in Brazil.

In conclusion, it is DNV’s opinion that the project is not a likely baseline scenario and that emission reductions from the project are thus additional.

4.7 Monitoring

The project applies the approved monitoring methodology ACM0002 “*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*”, version 12.2.0 /30/. The selected monitoring methodology is applicable for the project activity as it involves grid-connected renewable power generation using wind energy.

Monitoring of sustainable development indicators is not required by the DNA of Brazil. The monitoring plan will give opportunity for real measurements of achieved emission reductions. The environmental impacts are considered minor and will be monitored by the local environmental authority during the project lifetime.

The project monitoring plan is in compliance with the monitoring methodology ACM0002 version 12.2.0.

It is DNV’s opinion, that the project participants are able to implement the monitoring plan.

4.7.1 Parameters determined ex-ante

There is no parameter determined *ex-ante*.

4.7.2 Parameters monitored ex-post

The parameters monitored *ex-post* are the net electricity generation from the proposed project activity, the operating margin and the build margin emission factors.

According to the “*Tool to calculate the emission factor for an electricity system*” /32/, the dispatch data analysis OM method was considered for the determination of the operating margin (OM). Thus, the combined margin CO₂ emission factor (EF_{grid,CM,y}) will be monitored ex-post. The Brazilian grid emission factors, OM and BM are published regularly by the Brazilian DNA /6/. Those emission factors are calculated by the Ministry of Science and Technology /6/. Although there are no further details on how this values are calculated, DNV confirms that the database is an official publication of the Brazilian Government for the purpose of CDM baselines and as stated in the Brazilian DNA website it is in line with the “*Tool to calculate the emission factor for an electricity system*” /32/.

The net electricity dispatched will be measured through the metering equipment at the point of connection of Arizona 1 Wind Power Plant CDM Project Activity in Brazil to the Brazilian grid at the substation of Extremoz /13/.



The net electricity generated by project activity and fed into the grid will be monitored continuously by two meters (main and back-up) at the project substation named Extremoz, in accordance to the Electric Energy Commercialization Chamber (CCEE) procedures /63/.

Both meters (main and back-up) have a level of uncertainty, 0.2 precision class, as determined in the standards of the ABNT - Brazilian Association of Technical Standards /64/. The main and backup meters will be installed at the substation of the wind farm.

All meters will be calibrated every two years by a qualified third party according to the national and industrial regulations from ABNT /64/.

Data will be archived for 2 years following the end of the last crediting period or 2 years after the last issuance of CER for this project activity, whichever occurs later. The project owner will be responsible for the overall monitoring and reporting and will keep all the data archived.

4.7.3 Management system and quality assurance

Detailed procedures have been elaborated in the PDD section B.7.2. The responsibility of monitoring parameters is clearly described, as well as frequency of reporting and calibration. Data quality control and the training programme were presented.

These will be maintained and implemented to enable subsequent verification of emission reductions. The application of the monitoring methodology is transparent and DNV considers that the project participants are able to implement the monitoring plan.

4.8 Algorithms and/or formulae used to determine emission reductions

The emission reductions (ER_y) by the project activity during the crediting period are calculated as the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

- 1) Baseline emissions: baseline emissions (BE_y in tCO_2) are the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh).
- 2) Project emissions: there are no emissions from the project activity which is a renewable wind energy project.
- 3) Leakage: no leakage has to be considered for the proposed project activity.

The baseline emission factor for the project will be determined *ex-post* as a combined margin (CM), consisting of combination of the operating margin (OM) and build margin (BM) according to “Tool to calculate the emission factor for an electricity system” /32/ for the 7-years crediting period.

The Brazilian grid emission factor has been published by the Brazilian DNA.

The system boundary for the grid electricity system affected by the project is defined as the system of the Brazilian grid (SIN).

It has been calculated as the weighted average ($w_{OM} = 0.75$; $w_{BM} = 0.25$) of the operating margin and the build margin emission factors.

Dispatch data analysis OM is used by the Brazilian DNA. The OM is calculated to be 0.4787 tCO_2/MWh for 2010.

The BM is calculated as 0.1404 tCO_2e/MWh for 2010, resulting in a combined margin emission factor of 0.3941 tCO_2e/MWh for the year 2010.



The annual electricity delivered to the SIN is expected to be 107 573 MWh /1/. This value was crosschecked by DNV through assessment of the Technical Summary presented /17/.

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 43 742 tCO₂e per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

4.9 Environmental impacts

According to Brazilian environmental law (Federal Resolution CONAMA 001/86 /37/) a Simplified Environmental Report (RAS) is required to grant the installation license of electricity generation projects with more than 10 MW of installed capacity. As stated in the PDD, a Simplified Environmental Report (RAS) /10/ has been conducted according to Brazilian law and regulation /37/. The potential significant environmental impacts of the project have been sufficiently identified. No significant environmental impacts are expected from the project activity.

DNV was able to verify that all wind farms were granted the Preliminary License issued by the Institute of Environment and Sustainable Development of the state of Rio Grande do Norte (IDEMA) which are valid for 2 years /9/.

4.10 Comments by local stakeholders

Local stakeholders, such as the Municipal governments and City Councils, Federal and State Attorney, the environmental state and local agencies, the Brazilian forum of NGOs and local communities associations, were invited on 25 May 2011 to comment on the project - in accordance with the requirements of Resolution 7 (5 March 2008) of the Brazilian DNA - to visit the website <http://sites.google.com/site/consultadcp/> in order to access the project documentation which includes the CDM-PDD and a correspondent version in Portuguese.

DNV has checked all the invitation letters and the mail receipts /11/. No comments were received.

DNV considers the local stakeholder consultation carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 1 dated 9 June 2011 /1/, was made publicly available on the CDM website and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period, from 18 June 2011 to 17 July 2011.

Two comments were received for the proposed project, and are available on the PDD publication page. Those comments are related to generic issues and are replicating the CDM VVM requirements /28/. DNV has verified that the same comments have been posted to many proposed CDM project, and finds that the comments are not related specifically to the project



in question, but represents general issues which shall be validated for proposed CDM projects. Some issues are also clearly not applicable to the project in question, such as issue 13 about the “Baseline definition” which is clearly defined by the applied methodology ACM0002 version 12.2.0 and not a case proposed by the project participants.

The issues raised have been sufficiently covered in the validation process.

For example, issue “DOE to ensure that the PDD values are consistent and ensure that the CDM project is a genuine project”. The values in the PDD and the project itself were validated by DNV as described in section 4 of this report.

Information regarding for example issue “If applicable only: Is these machines, equipment was a part of any bundle of CDM activity envisaged and developed earlier”. As validated in section 4.6.3 of this report, there is no use of second hand or remanufactured equipment; the project participants are purchasing new equipment for the wind farm from Gamesa /18/.

Hence, it is DNV's opinion that all issues raised have been sufficiently covered in the validation process, as illustrated by the examples above, and were addressed during the validation process as reflected in this validation report and validation protocol..

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APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory requirements for Clean Development Mechanism (CDM) project activities

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	No participating Annex I Party is yet identified.
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

Requirement	Reference	Conclusion
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	The Brazilian designated national authority for the CDM is the Comissão Interministerial de Mudança Global do Clima.
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	Brazil has ratified the Kyoto Protocol on 23 August 2002.
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	No participating Annex I Party is yet identified.
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	No participating Annex I Party is yet identified.
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK

Requirement	Reference	Conclusion
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	A preliminary environmental licence, as required by the Brazilian regulation /37/, was presented by the project participants /9/.
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements checklist

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity					
A.1 Title of the project activity (VVM para 55-57)					
A.1.1 Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	<input checked="" type="checkbox"/> Clearly identifiable title of the project activity <input checked="" type="checkbox"/> Version number of the PDD is included <input checked="" type="checkbox"/> Date of the PDD is included.		OK
A.1.2 Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	<input checked="" type="checkbox"/> Yes <i>If no, list where the PDD is not in accordance:</i>		OK
A.2 Description of the project activity (VVM para 58-64)					
A.2.1 How was the design of the project assessed?	/1/ /2/ /3/ /4/ /6/ /7/ /8/ /9/ /10/ /11/ /12/	DR	<i>What type is the project?</i> <input type="checkbox"/> Project in existing facility or utilizing existing equipment(s) <input type="checkbox"/> Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO ₂ e per year. In this case, a site visit must be performed. <input type="checkbox"/> Project is a bundled small scale project, with each project in the bundle with emission reductions not exceeding 15,000 tCO ₂ e per year. In such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis. <input type="checkbox"/> The project is an individual small scale project activity with emission reductions		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>not exceeding 15 000 tCO₂e per year. In this case, DOE may not conduct a physical site visit as appropriate.</p> <p><input checked="" type="checkbox"/> Greenfield project</p> <p><i>How was the design of the project assessed?</i></p> <p><input type="checkbox"/> Physical site inspection</p> <p><input checked="" type="checkbox"/> Reviewing available designs and feasibility studies</p> <p><i>If a physical site inspection is not undertaken, justify why no site visit was undertaken:</i></p> <p>The project is a newly built wind farm project; through the documents which the project participant provided, DNV can confirm the project design, construction, operation and monitoring plan and all baseline scenario information.</p> <p>The representatives of the project participants Neoenergia S/A, Iberdrola Renováveis do Brasil S/A and Ecopart Assessoria em Negócios Empresariais Ltda. were interviewed on 26 and 27 July 2011 at Neoenergia S/A office in Rio de Janeiro by DNV auditors Gabriel Baines, Fernando Sasdelli and Luis Filipe Tavares, to resolve the issues identified during the desk review.</p> <p>During the desk review, the relevant documents including PDD, ER calculation spreadsheet, benchmark calculation, IRR spreadsheet, Brazilian grid emission factor calculation, notification to UNFCCC and its confirmation, notification to Brazilian DNA and its</p>		

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				confirmation, preliminary environmental license, environmental studies for the wind farm, receipts of delivery of mail to stakeholders, social contract among shareholders have been assessed. The construction of the project had not been initiated at the time of validation, as was confirmed through the photographic report and satellite images. Hence, DNV can justify that a physical site visit for this project was not required during the validation stage.		
A.2.2	If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR	At the time of commencing of validation, the physical implementation of the project had not been started yet.		OK
A.2.3	If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO ₂ e per year), justify the sampling through a statistical analysis:	/1/	DR	It is not applicable for the proposed project since it is not a bundled small scale project.		OK
A.2.4	Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/ /13/	DR	The “Arizona 1 Wind Power Plant CDM Project Activity in Brazil” project is located in the municipality of Rio do Fogo, state of Rio Grande do Norte, Brazil. The geographical coordinates of the control centre of the proposed project activity are 5.3042 S and 35.3817 W. The project is a wind power project which involves installation and operation of 14 wind turbines. The installed capacity of each turbine is 2.0 MW thus, constituting a total installed capacity of 28 MW.		OK
A.2.5	Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/ /41/	DR	No, it is a greenfield project that will utilize new equipment. The project activity is the installation of a greenfield wind power plant that is connected to the national grid, as confirmed in		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				the 2 nd Brazilian Auction of Renewable Energy - Auction n° 07/2010.		
A.2.6	Does the project design engineering reflect current good practices?	/1/ /16/	DR	It has been cross-checked by DNV through the manufacturer's product specifications that the project design engineering uses the megawatt-class, three-bladed, variable speed wind turbines, which is deemed to reflect good practices.		OK
A.2.7	Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/ /40/	DR	DNV has confirmed that both the installed capacity and generation of wind power plants was only 1.2% of the total capacity and power generation of Brazil according to the ANEEL's Bank of Information of Generation. DNV has confirmed that by the time of the project investment decision phase, there were 73 wind farms operating in Brazil.		OK
A.3 Participation requirements (VVM para 51-54, 125-127)						
A.3.1	Do all participating Parties fulfil the participation requirements as follows:	/1/	DR	The involved party is Brazil as the host Party. There is no Annex I Party identified yet. The project participants are Neoenergia S/A, Iberdrola Renováveis do Brasil S/A and Ecopart Assessoria em Negócios Empresariais Ltda.. The project participants are listed in Section A.3 of the PDD and the information is consistent with the contact details provided in Annex 1 of the PDD.		OK
		Brazil (host)				
a) Party has ratified the Kyoto Protocol		<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	
b) Party has designated a Designated National Authority		<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	
c) The assigned amount has been determined		<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No	
A.3.2	Do the letters of approval meet the following requirements?	/1/	DR	Prior to the submission of the final validation report to the CDM Executive Board, DNV will		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	/27/		have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.		
		Brazil (host)			
a) LoA confirms that Party has ratified the Kyoto Protocol	<input type="checkbox"/> Yes <input type="checkbox"/> No				
b) LoA confirms that participation is voluntary	<input type="checkbox"/> Yes <input type="checkbox"/> No				
c) The LoA confirms that the project contributes to the sustainable development of the host country?	<input type="checkbox"/> Yes <input type="checkbox"/> No				
d) The LoA refers to the precise project activity title in the PDD	<input type="checkbox"/> Yes <input type="checkbox"/> No				
e) The LoA is unconditional with respect to (a) to (d) above	<input type="checkbox"/> Yes <input type="checkbox"/> No				
f) The LoA is issued by the respective Party's DNA	<input type="checkbox"/> Yes <input type="checkbox"/> No				
g) The LoA was received directly by the DNA or the PP	<input type="checkbox"/> DNA <input type="checkbox"/> PP				
h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic					
A.3.3 Have all private/public project participants been authorized by an involved Party?	/1/	DR	Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.		
A.4 Technical description of the project activity (VVM para 58-64)					
A.4.1 Is the project's location clearly defined?	/1/ /13/ /21/	DR	Yes, the location of the project is clearly defined. The geographical coordinates of the control centre are 5.3042 S and 35.3817 W. Also the coordinates of each wind turbine was presented at		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				the document “Geo coordinates - decimal format.xlsx”		
A.5 Public funding of the project activity						
A.5.1	In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/1/	DR	The project does not involve public funding from Parties included in Annex I, and the validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards Brazil. The project is using BNDES (Brazilian Development Bank) funding.		OK
B Application of a baseline and monitoring methodology						
B.1 Methodology applied (VVM para 65-76)						
B.1.1	Does the project apply an approved methodology and the correct and valid version thereof?	/1/ /30/	DR	The project correctly applies the approved baseline and monitoring methodology ACM0002 “Consolidated <i>baseline methodology for grid-connected electricity generation from renewable sources</i> ” version 12.2.0.		OK
B.1.2	If applicable, has any specific guidance provided by the CDM EB in respect to the applied methodology been considered?	/1/ /31/ /32/	DR	Yes, the “ <i>Tool to calculate the emission factor for an electricity system</i> ” (version 2.2.0) and the “ <i>Tool for the demonstration and assessment of additionality</i> ” are also applicable.		OK
B.2 Applicability of methodology (and tools) (VVM para 65-76) <i>Insert a row for each applicability criteria of the applied methodology (and tools)</i>						
B.2.1	How was it validated that project complies with the following applicability criteria: The project activity is the installation, capacity addition, retrofit or replacement of a	/1/ /41/	DR	The project activity is the installation of a greenfield wind power plant that is connected to the national grid, as confirmed in the 2 nd Brazilian		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	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?			Auction of Renewable Energy - Auction n° 07/2010.		
B.2.2	How was it validated that project complies with the following applicability criteria: 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?	/1/ /41/	DR	The project does not involve switching from fossil fuel to renewable energy at the project site, as confirmed in the 2 nd Brazilian Auction of Renewable Energy - Auction n° 07/2010.		OK
B.2.3	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/ /30/	DR	Yes. The selected baseline of the project is based on the baseline described in ACM0002 (version 12.2.0). Therefore, it is deemed that the approved methodology ACM0002 version 12.2.0 is applicable to the project activity.		OK
B.3 Project boundary (VVM para 78-80)						
B.3.1	What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?	/1/ /32/	DR	The spatial extent of the project boundary is correctly defined as the site of project activity and the system boundary for the grid electricity system is also correctly defined as all power plants connected physically to the National Interconnected System (SIN), the electricity grid of Brazil, to which the project will be connected. Project and system boundaries are defined in accordance with applicable guidelines of both ACM0002 and the <i>"Tool to calculate the emission factor for an electricity system"</i> .		OK
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/	DR	The only GHG source applied is the CO ₂ generated by fossil fuel power plants connected to the National Interconnected System (SIN), the electricity grid of Brazil.		OK
B.3.3	Does the project involve other emissions sources not	/1/	DR	No other emission sources may question the		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/17/		applicability of the methodology. As stated in the <i>Arizona 1 Technical Summary</i> there is a continuous current system to supply the emergency lighting demand. This is deemed below 1% of the estimated emissions.		
B.4 Baseline scenario determination (VVM para 81-88, 105-107) <i>Ensure that the evaluation of all alternatives provided in the PDD and required by the methodology and also possible alternatives/offshoots of alternatives are discussed. Check that all alternatives required to be considered by the methodology are included in the final PDD. If baseline alternatives required to be considered by the methodology are considered not applicable, please assess the justification for this.</i>					
B.4.1 Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/ /30/ /32/	DR	The baseline is in accordance with ACM0002 version 12.2.0 that electricity delivered to the grid by project activity would otherwise have been generated by the operation of grid-connected power plants in SIN and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “ <i>Tool to calculate the emission factor for an electricity system</i> ”.		OK
B.4.2 How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/ /30/	DR	Not applicable, as ACM0002 version 12.2.0 prescribes the baseline scenario.		OK
B.4.3 What is the baseline scenario?	/1/	DR	Refer to B.4.1.		OK
B.4.4 Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/ /30/	DR	The baseline determination is in line with ACM0002, version 12.2.0.		OK
B.4.5 Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	This is not applicable as the baseline is directly determined as per ACM0002, version 12.2.0.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
		/30/				
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /30/	DR	This is not applicable as the baseline is directly determined as per ACM0002, version 12.2.0.		OK
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /30/	DR	This is not applicable as the baseline is directly determined as per ACM0002, version 12.2.0		OK
B.4.8	Is the baseline determination adequately documented in the PDD? <ul style="list-style-type: none"> • All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity 	/1/	DR	The baseline determination has been adequately documented in the PDD: <ul style="list-style-type: none"> • Not applicable. • Not applicable. • Not applicable. • Not applicable. • The methodology has been correctly applied to identify what would occur in the absence of the proposed CDM project activity 		OK
B.5 Additionality determination (VVM para 94-121)						
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/ /30/ /31/	DR	As required by ACM0002, 12.2.0, the additionality of the project has been established using the “ <i>Tool for the demonstration and assessment of additionality</i> ” (version 5.2).		OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR	Yes, the baseline alternative complies with regulatory requirements.		OK
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	Yes, as described below in the following items.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	The additionality is based in investment analysis.		OK
Prior consideration of CDM (VVM para 98-103)						
B.5.5	What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/ /7/ /8/	DR	Notification on the CDM activity was submitted to both UNFCCC and the DNA and confirmed on 14 September 2010. Since the validation started on 26 May 2011 by global stakeholder consultation, which is less than one year after that, sufficient efforts to secure CDM in parallel with the implementation have been demonstrated		OK
B.5.6	If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/ /7/ /8/	DR	Notification on the CDM activity was submitted to both UNFCCC and the DNA and confirmed on 14 September 2010. Since the validation started on 26 May 2011 by global stakeholder consultation, which is less than one year after that, sufficient efforts to secure CDM in parallel with the implementation have been demonstrated.		OK
Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)						
B.5.7	What initiatives were taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/1/	DR	It is not applicable to the proposed project activity as its starting date is after 2 August 2008.		OK
B.5.8	When did the construction of the project activity start?	/1/	DR	It is not applicable to the proposed project activity as its starting date is after 2 August 2008.		OK
B.5.9	When was the project commissioned?	/1/	DR	It is not applicable to the proposed project activity as its starting date is after 2 August 2008.		OK
B.5.10	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	It is not applicable to the proposed project activity as its starting date is after 2 August 2008.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Investment analysis (VVM para 108-114) <i>The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.</i>						
B.5.11	Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/	DR	Yes, the proposed project activity generates financial and economic benefits through the sales of electricity other than CDM-related income		OK
B.5.12	Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	No, the other alternatives listed in the investment analysis do not involve investments.		OK
B.5.13	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	Since the proposed project generates financial and economic benefits through the sales of electricity other than CDM-related income, a benchmark analysis is correctly selected as the analysis method.		OK
B.5.14	Is the benchmark/discount rate the latest available at the time of decision?	/1/	DR	The benchmark is defined as the weighted average cost of capital (WACC), it was estimated using an Adjusted-Beta based in the Capital Asset Pricing Model (CAPM) as per the option 6 (a) presented in the additionality tool.. In an Investment Analysis, the financial indicator must be compared to an appropriate benchmark. The Brazilian Development Bank (BNDES) has a typical debt/equity finance structure for wind projects and that was not applied to the benchmark calculation.	CAR8	OK
B.5.15	What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/	DR	The financial indicator is project IRR calculated after tax, and therefore in correspondence with the benchmark chosen.		OK
B.5.16	Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/	DR	See B.5.14.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.17 Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/ /43/	DR	Yes, depreciation is being taken into account. However the income taxes are based on the <i>Assumed Profit</i> and consequently depreciation will not impact in internal rate of return. As per <i>Assumed Profit</i> regulations taxes are calculated over the gross revenues and not gross profits of each year. The <i>Assumed Profit</i> is applicable to companies that have gross revenues below 48 million BRL per year.		OK
B.5.18 Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/ /4/	DR	According to paragraph 3 of the “Guidelines on the Assessment of Investment Analysis” the indicator shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or if a shorter period is chosen include the fair value of the project activity assets at the end of the assessment period. Project participants did not correctly apply the Guideline. Depreciation is 5% per year therefore the salvage value will be zero at the end of the project activity.	CAR1	OK
B.5.19 When a feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?	/1/	DR	Not applicable		OK
B.5.20 How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /35/	DR	<input type="checkbox"/> The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval <input type="checkbox"/> The plant load factor determined by a third	CAR2	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			party contracted by the project participants (e.g. an engineering company) <input type="checkbox"/> Other approach. <i>Provide details on how the load factor was validated:</i> The plant load factor, according to “Guideline for the Reporting and Validation of Plant Load Factors” shall be determined by a third party. Project participants did not explain why Camargo Schubert’s plant load factor was not used.		
B.5.21 How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /35/	DR	<input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants <i>Provide details on how the output price was validated:</i> According to paragraph 6 of “Guidelines on the Assessment of Investment Analysis” all input values must be valid and applicable at the time of decision for the investment analysis. Project participants did not present the references of the costs related to the equipments, insurance, project installation and operation/maintenance, prices, taxes, resolutions, estimates.	CAR3	OK
B.5.22 How were the investment costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /35/	DR	<input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input type="checkbox"/> Review of feasibility reports, public announcements, contracts and annual financial reports related to the project and the project participants <i>Provide details on how the investment costs were</i>	CAR3	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<i>validated:</i> According to paragraph 6 of “Guidelines on the Assessment of Investment Analysis” all input values must be valid and applicable at the time of decision for the investment analysis. Project participants did not present the references of the costs related to the equipments, insurance, project installation and operation/maintenance, prices, taxes, resolutions, estimates.		
B.5.23 How were the O&M costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /35/	DR	<input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants <i>Provide details on how the O&M costs were validated:</i> According to paragraph 6 of “Guidelines on the Assessment of Investment Analysis” all input values must be valid and applicable at the time of decision for the investment analysis. Project participants did not present the references of the costs related to the equipments, insurance, project installation and operation/maintenance, prices, taxes, resolutions, estimates.	CAR3	OK
B.5.24 Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /35/	DR	<input type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants <i>Provide details on how other input parameters were validated:</i> According to paragraph 6 of “Guidelines on the	CAR3	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				Assessment of Investment Analysis” all input values must be valid and applicable at the time of decision for the investment analysis. Project participants did not present the references of the costs related to the equipments, insurance, project installation and operation/maintenance, prices, taxes, resolutions, estimates.		
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/ /35/	DR	According to paragraph 6 of “Guidelines on the Assessment of Investment Analysis” all input values must be valid and applicable at the time of decision for the investment analysis. Project participants did not present the references of the costs related to the equipments, insurance, project installation and operation/maintenance, prices, taxes, resolutions, estimates.	CAR3	OK
B.5.26	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/	DR	Yes, the key parameters: electricity price, total investment and amount of electricity generated were increased and decreased in 10% in order to do a sensitivity analysis of the project activity.		OK
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	The range of 10% of variation is reasonable to the project context.		OK
B.5.28	Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/	DR	The parameters electricity price, total investment and amount of electricity generated were varied to reach the benchmark. However the electricity price that was set at a public auction will remain fixed throughout the years as it and will only be adjusted accordingly to the Consumers Price Index (official Brazilian inflation). Also the amount of electricity generated is not expected to vary as it was based on the plant load factor of a third party estimative, carried out using professional software designed for wind energy		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			and that the output was maximised by considering air density corrections, turbine efficiency, planned maintenance, contaminated rotors, and auxiliary power use. Therefore it is unlikely that the electricity delivered to the grid will suffer increase.		
Barrier analysis (VVM para 115-118)					
B.5.29 Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.30 How were the <u>investment barriers</u> assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.31 How does CDM alleviate the investment barriers?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.32 Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.33 How were the <u>technological barriers</u> assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.34 How does CDM alleviate the technological barriers?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.35 Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.36 How were the <u>barriers due to prevailing practise</u> assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	participants?					
B.5.37	How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.38	Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.39	How were the <u>other barriers</u> assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.40	How does CDM alleviate the other barriers?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
B.5.41	Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable as barrier analysis was not applied for the proposed project.		OK
Common practice analysis (VVM para 119-121)						
B.5.42	What is the geographical scope of the common practice analysis? Is this justified?	/1/ /61/ /62/	DR	The common practice analysis is made for the state of Rio Grande do Norte. This is reasonable since the wind conditions and tariffs applied by ANEEL are different from state to state.		OK
B.5.43	What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/ /31/	DR	According to <i>Tool for the demonstration and assessment of additionality</i> ” only projects wind projects between 14 MW and 42 MW of installed capacity were taken into consideration.		OK
B.5.44	What is the data source(s) used for the common practice analysis?	/1/ /40/	DR	ANEEL data from the Bank of Information of Generation in Brazil is used to analyze other wind power plants.		OK
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/ /40/	DR	No wind power plants that became operational before 28 July 2011, within the output range and non-CDM were found in the Rio Grande do Norte state.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.46	How were possible essential distinctions between the project activity and similar activities assessed?	/1/ /40/	DR	No wind power plants that became operational before 28 July 2011, within the output range and non-CDM were found in the Rio Grande do Norte state.		OK
B.5.47	What is the conclusion of the common practice analysis?	/1/	DR	The project activity cannot be considered a common practice once the similar projects existents in the region have all received some type of financial incentive, either PROINFA or CDM. Project participants did not explain which are the items i to iv <i>presented</i> in Sub-Step 4b of the PDD	CL1	OK
Conclusion						
B.5.48	What is the conclusion with regard to the additionality of the project activity?	/1/	DR	It is DNV's opinion that the project is additional.		OK
B.6 Calculations of GHG emission reductions						
Data and parameters that are available at validation and that are not monitored (VVM para 199-203)						
B.6.1	How was the EF _{grid,BM} parameter available at validation verified?	/1/	DR	Project participants did not determine which emission factor will be used to calculate the GHG emission reductions. Consequently parameters monitored ex-ante and ex-post should be properly addressed in the PDD at section B.6	CAR7	OK
B.6.2	How was the EF _{grid,OM} parameter available at validation verified?	/1/	DR	Project participants did not determine which emission factor will be used to calculate the GHG emission reductions. Consequently parameters monitored ex-ante and ex-post should be properly addressed in the PDD at section B.6	CAR7	OK
B.6.3	How was the EF _{grid,CM} parameter available at validation verified?	/1/	DR	Project participants did not determine which emission factor will be used to calculate the GHG emission reductions. Consequently parameters monitored ex-ante and ex-post should be properly	CAR7	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				addressed in the PDD at section B.6		
Baseline emissions (VVM para 89-93)						
B.6.4	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Project participants did not determine which emission factor will be used to calculate the GHG emission reductions. Consequently parameters monitored ex-ante and ex-post should be properly addressed in the PDD at section B.6	CAR7	OK
B.6.5	Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	See B.6.2	CAR7	OK
B.6.6	Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	See B.6.2	CAR7	OK
Project emissions (VVM para 89-93)						
B.6.7	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	There are no emissions resulted from the operation of project activity which is a renewable energy project based in wind generation.		OK
B.6.8	Have conservative assumptions been used when calculating the project emissions?	/1/	DR	Not applicable.		OK
B.6.9	Are uncertainties in the project emission estimates properly addressed?	/1/	DR	Not applicable.		OK
Leakage (VVM para 89-93)						
B.6.10	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /30/	DR	As per ACM0002, version 12.2.0 no leakage has to be considered for the proposed project activity.		OK
B.6.11	Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	Not applicable.		OK
B.6.12	Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	Not applicable.		OK
Emission Reductions (VVM para 89-93)						
B.6.13	Algorithms and/or formulae used to determine emission reductions:	/1/	DR	Project participants did not determine which emission factor will be used to calculate the GHG	CAR7	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<ul style="list-style-type: none"> All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced All documentation is correctly quoted and interpreted. All values used can be deemed reasonable in the context of the project activity The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration. 				emission reductions. Consequently parameters monitored ex-ante and ex-post should be properly addressed in the PDD at section B.6		
B.7 Monitoring plan (VVM para 122-124)						
Data and parameters monitored						
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/ /30/	DR	Yes. The means of monitoring described in the plan complies with ACM0002 version 12.2.0.		OK
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	<p>The parameter monitored <i>ex-post</i> is the net electricity generation from the proposed project activity. The net electricity dispatched will be measured through the metering equipment at the point of connection of electricity generation from the “Arizona 1 Wind Power Plant CDM Project Activity” to the Brazilian grid.</p> <p>The power exported to and imported from the SIN will be monitored continuously and recorded on a monthly basis. In addition, the electricity sales receipts will be provided for data quality control and cross check. Data will be archived for 2 years following the end of the last crediting period.</p> <p>The PDD describes in a general way the equipment to be used for monitoring purposes. Additional relevant technical details about the</p>	CAR4	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				type of electricity meter and accuracy were not included in appropriate sections of the PDD and the monitoring plan did not detail the information about the requirements for maintenance and calibration of the measurement equipment.		
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	See B.7.2	CAR4	OK
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	See B.7.2	CAR4	OK
B.7.5	In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/	DR	See B.7.2	CAR4	OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	See B.7.2	CAR4	OK
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	See B.7.2	CAR4	OK
Ability of project participants to implement monitoring plan						
B.7.8	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR	Authorities and responsibilities for project management, monitoring and reporting activities are clearly defined. However, the project's monitoring plan did not include detailed information regarding data and parameters to be monitored, compilation of the monitored data and dealing with errors, QA/QC procedures, training plan, calibration and record keeping	CAR5	OK
B.7.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	/1/	DR	See B.7.8	CAR5	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.7.10	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR	See B.7.8	CAR5	OK
B.7.11	Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	See B.7.8	CAR5	OK
Monitoring of sustainable development indicators/ environmental impacts						
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	Neither ACM0002, version 12.2.0 nor the Brazilian DNA requires collection and archiving of relevant data concerning environmental, social and economic impacts.		OK
B.7.13	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	See B.7.12		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	See B.7.12		OK
C Duration of the project activity / crediting period						
C.1.1 Start date of project activity (VVM para 99-100, 104)						
C.1.2	How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/	DR	The start date of the project activity must be in accordance to the Glossary of CDM terms. Project participants did not clearly describe in section C.1.1 the start date of the project activity	CAR6	OK
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR	The expected operational lifetime of the project activity is 20 years and it is deemed reasonable		OK
C.1.4	Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	A 7-year renewable crediting period has been chosen for the project. The chosen crediting		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				period starting date, on 7 May 2012 or the registration date, is deemed to be reasonable.		
D Environmental Impacts (VVM para 131-133)						
D.1.1	Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?	/1/ /10/ /37/	DR	According to Brazilian environmental law a Simplified Environmental Report (RAS) is required to grant the installation license of electricity generation projects with more than 10 MW of installed capacity. As stated in the PDD, a Simplified Environmental Report (RAS) has been conducted according to Brazilian law and regulation.		OK
D.1.2	Does the project comply with environmental legislation in the host country?	/1/ /9/	DR	Yes, the project complies with Brazilian environmental legislation. DNV was able to verify that all wind farms were granted the Preliminary License issued by the Institute of Environment and Sustainable Development of the state of Rio Grande do Norte (IDEMA) which were valid for 2 years.		OK
D.1.3	Will the project create any adverse environmental effects?	/1/	DR	No significant environmental impacts are expected from the project activity. The wind farm was granted the Preliminary Licences, which is part of the environmental regulatory process.		OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/	DR	See D.1.3		OK
D.1.5	Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	See D.1.3		OK
D.1.6	Are transboundary environmental impacts considered in the analysis?			See D.1.3		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
E Stakeholder Comments (VVM para 128-130)					
E.1.1 Have relevant stakeholders been consulted?	/1/	DR	Local stakeholders, such as the Municipal governments and City Councils, Federal and State Attorney, the environmental state and local agencies, the Brazilian forum of NGOs and local communities associations, were invited on 2 August 2010 to comment on the project - in accordance with the requirements of Resolution 7 (5 March 2008) of the Brazilian DNA.		OK
E.1.2 Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	Yes, DNV has checked all the invitation letters and the postal service mail receipts.		OK
E.1.3 If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	Refer to E.1.1.		OK
E.1.4 Is a summary of the stakeholder comments received provided?	/1/	DR	Two comments were received for the proposed project, and are available on the PDD publication page. DNV has verified that the same comments have been posted to many proposed CDM project, and finds that the comments are not related specifically to the project in question. It is DNV's opinion that these general comments have been sufficiently covered in the validation process and reflected in the validation protocol.		OK
E.1.5 Has due account been taken of any stakeholder comments received?	/1/	DR	See E.1.4		OK

Table 3 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>CAR1</p> <p>According to paragraph 3 of the “Guidelines on the Assessment of Investment Analysis” the indicator shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or if a shorter period is chosen include the fair value of the project activity assets at the end of the assessment period. Project participants did not correctly apply the Guideline.</p>	B.5.18	<p>The investment analysis (cash flow) spreadsheet was revised as requested. In line with Guidance 3 of Annex 5, EB62, the total assessment period is 20 year, which reflects the technical lifetime of the wind power plant. Please refer to the revised versions of the spreadsheet and PDD.</p>	<p>Ok, the investment analysis was assessed by DNV and the period of 20 years of operation was considered in the cash flow, according to the Guidelines on the Assessment of Investment Analysis.</p> <p>Therefore this CAR is closed.</p>
<p>CAR2</p> <p>The plant load factor, according to “Guideline for the Reporting and Validation of Plant Load Factors” shall be determined by a third party. Project participants did not explain why Camargo Schubert’s plant load factor was not used.</p>	B.5.20	<p>The Camargo Schubert Wind Certification presents the gross load factor. From the plant load factor reported by Camargo Shubert, it has to be deducted the forced and programmed unavailability effects as well as the transmission losses. These deductions are based on project sponsors experience. Nevertheless, the “<i>Guidelines for the reporting and validation of plant load factors</i>” (Annex 11, EB48) provides another option to define the plant load factor which is:</p> <p><i>(a) The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval;</i></p> <p>On July 25th, 2011 Iberdrola made a formal presentation to BNDES (Brazilian Development Bank) with the purpose of obtaining the project financing in which</p>	<p>OK. Neither the load factor from ANEEL nor from the third party Camargo Schubert were used in the investment analysis. However, ANEEL’s load factor, establishing the available electricity guaranteed by the Brazilian Regulatory Agency, was considered at the sensitivity analysis presented at the revised PDD.</p> <p>The presented sensitivity analysis was assessed by DNV and found to be in accordance with the requirements.</p> <p>Therefore this CAR is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		declares the plant load factor. The number presented is consistent with the plant load factor approved by the Brazilian Electricity Regulatory Agency (ANEEL Ordinance #144, dated March 3 rd , 2011) and is going to be used. For details please refer to section B.6.3. of the revised version of the PDD.	
<p>CAR3</p> <p>According to paragraph 6 of “Guidelines on the Assessment of Investment Analysis” all input values must be valid and applicable at the time of decision for the investment analysis.</p> <p>Project participants did not present the references of the costs related to the equipments, insurance, project installation and operation/maintenance, prices, taxes, resolutions, estimates.</p>	<p>B.5.21</p> <p>B.5.22</p> <p>B.5.23</p> <p>B.5.24</p> <p>B.5.25</p>	<p>Wind industry in Brazil has become very competitive in the latest years. In this sense, some items of the total costs of the project (e.g. equipment cost) are considered confidential. Therefore, PPs have opted to include the requested information in the IRR calculation spreadsheet, instead of making it publicly available in the PDD. Following guidance 8 of the Annex 5, EB 62, a different version of the spreadsheet will be made available to the DOE for publication in the UNFCCC website.</p> <p>Moreover, information regarding TUSD and payment for the Land Use were adapted in order the values considered in the IRR calculation are consistent with the evidences that were available when the investment decision was made. The TUSD fee considered was taken from an ANEEL ordinance which is mentioned in the spreadsheet. The payment for the Land Use was revised to be consistent with the rental contract.</p> <p>PPs also clarify that the total investment mentioned in the PDD includes the</p>	<p>OK. DNV assessed the references presented in the investment analysis spreadsheet, including costs of equipment, insurance, project installation and operation/maintenance, prices, taxes, resolutions and estimates were found to be sufficient.</p> <p>A second site visit was held on 30 September 2011 at Neoenergia offices and DNV crosschecked the values presented with the original documents and contracts.</p> <p>DNV assessed the revised PDD and confirmed that sufficient evidences were presented. According to the PPA the amount of electricity generated has decreasing tolerance bands every quadrennial. When generating above those bands the extra electricity may be sold in the free market. When generating below those bands the revenue will suffer a proportional discount by the price agreed in the auction.</p> <p>The discount of 3.26% reflects the most probable variation after a statistical analysis of 5 000 wind generation scenarios over 20</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>development cost, as it can be seen in the IRR calculation spreadsheet. In the other hand, the total cost of the project used to calculate the warranties does not consider the development costs.</p> <p>In addition, Section B.5. of the PDD was revised in order to present a detailed explanation as to how the price correction factor was calculated and why it is important to consider this correction while conducting the investment analysis of the project.</p>	<p>years.</p> <p>Therefore this CAR is closed.</p>
<p>CAR4</p> <p>The PDD describes in a general way the equipment to be used for monitoring purposes. Additional relevant technical details about the type of electricity meter and accuracy were not included in appropriate sections of the PDD and the monitoring plan did not detail the information about the requirements for maintenance and calibration of the measurement equipment.</p>	B.7.2	<p>No contract for equipment supply has been signed. Therefore, the type of electricity meter to be used is not defined yet. Nevertheless, independently of the type used, it shall meet the requirements established by ONS. The relevant procedures set by the regulatory agencies were mentioned in the revised version of the PDD.</p>	<p>OK. Considering that no contract for monitoring equipment has been signed yet, this will be classified as a FAR and shall be verified during the first verification.</p> <p>Therefore this CAR is closed.</p>
<p>CAR5</p> <p>Authorities and responsibilities for project management, monitoring and reporting activities are clearly defined. However, the project's monitoring plan did not include detailed information regarding data and parameters to be monitored, compilation of the monitored data and dealing with errors, QA/QC procedures, training plan, calibration and record keeping</p>	B.7.8	<p>The only parameter to be monitored is electricity dispatched to the grid. PPs understand that the procedures established by the regulatory agencies already conforms the CDM requirements regarding monitoring of electricity. Nevertheless, the monitoring plan was further elaborated to present information regarding the QA/QC procedures such as cross check of information supplied by Project Participants with official data provided by CCEE.</p>	<p>OK. DNV assessed the revised PDD and confirmed that additions made to the monitoring plan are satisfactory under requirements of ACM0002 version 12.2.0.</p> <p>Therefore this CAR is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>CAR6</p> <p>The start date of the project activity must be in accordance to the Glossary of CDM terms.</p> <p>Project participants did not clearly describe in section C.1.1 the start date of the project activity</p>	C.1.2	<p>The starting date of the proposed project activity was updated. The date mentioned in the revised version of the PDD represents the one which it is forecasted the PPA was signed. Considering there are relevant penalties in the case the plant is not built, it is assumed that this event characterize a strong commitment towards the implementation of the project.</p> <p>The signed versions of the PPA and the equipment supplier contract are also attached as evidence of the information provided in the PDD. Please note that the date of the documents is different than the one stated previously. In this sense, sections B.5 and C.1.1. of the PDD were revised.</p> <p>Besides, differently than what was stated in the first version of the PDD, the GSP started after the identified starting date of the project activity. Therefore, evidences confirming that both UNFCCC and the Brazilian DNA were notified of the Project Participants' intention to seek CDM certification are attached.</p>	<p>OK. DNV assessed the signed PPAs between the PP, Arizona 1 Energia Renovável S.A. and nine power utilities. All PPA were signed in 28 July 2011, in accordance to the start date presented in the PDD.</p> <p>Therefore this CAR is closed.</p>
<p>CAR7</p> <p>Project participants did not determine which emission factor will be used to calculate the GHG emission reductions. Consequently parameters monitored ex-ante and ex-post should be properly addressed in the PDD at section B.6</p>	B.6.1	<p>Instead of the ex-ante option previously adopted to determine the grid emission factor, PPs have chosen to apply the ex-post vintage. The data used to determine the combined margin was taken from the Brazilian DNA, i.e. official source. The information is made available revised versions of the PDD and CERs calculation spreadsheet.</p>	<p>OK. The revised PDD and CER spreadsheet were assessed by DNV and the emission factor was correctly presented.</p> <p>The dispatch data operating margin was correctly applied for the calculation of the emission grid.</p> <p>DNV crosschecked the information provided by the project participants with</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			<p>the data from the ONS (Brazilian National System Operator). Calculations and emission factors BM and OM were found to be in order.</p> <p>Therefore this CAR is closed.</p>
<p>CAR8</p> <p>In an Investment Analysis, the financial indicator must be compared to an appropriate benchmark. The Brazilian Development Bank (BNDES) has a typical debt/equity finance structure for wind projects and that was not applied to the benchmark calculation.</p>	<p>B.5.14</p>	<p>The investment decision took place on May 11th, 2011. The benchmark was updated in order to reflect the available information at that time, as requested.</p> <p>It is PPs understanding that the publicly available information regarding BNDES' typical debt/equity finance structure applies for items eligible for financing and is only valid for the first year of the cash flow.</p> <p>Usually, for alternative energy generating project, BNDES finances up to 80% of the items eligible for financing. Considering the total investment necessary to build a plant, it can be assumed that approximately 70% of the project is financed. Therefore, this percentage corresponds to the Initial Debt/Equity ratio for the energy generation companies, which is the portion disbursed by the bank to the investor and paid on the beginning of the project.</p> <p>Nevertheless, for the WACC calculation it should be considered the Long-term Debt/Equity structure, which considers not only the debt/equity ratio in the beginning of the project but also how this structure is expected to vary during the project. As a consequence of using the long term debt/equity structure, the 70% proportion</p>	<p>OK. DNV understands that the debt/equity financial structure is the ratio between the total amounts of capital funded by a third party (loan) divided by the project participant private capital invested at the time of decision of the project.</p> <p>The project participants presented in the file "WACC ElectricGen_2011 01 v4.xlsx", tab "Target Debt" a BNDES presentation relating the approved projects from 2003 to 2009 and their debt/equity ratio. This presentation is also available at: http://www.canalenergia.com.br/zpublisher/secoes/Especial/Biblioteca.asp?IDE=14.</p> <p>DNV assessed this document and could confirm a typical debt/equity ratio for wind projects in line with the expected.</p> <p>Therefore this CAR is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>decreases with the duration of the project.</p> <p>In general, the investor has a grace period before starting to pay the amortization and, at the same time, receives all the financing from BNDES on the beginning of the project. For the remaining time, the investor does not receive additional financing (debt proportion decreases), while investor starts to pay the amortization from the financing with his equity capital (equity proportion increases), increasing the ratio between Equity/Debt until there is no Debt in the 16th year of the BNDES funding period. This rationale is illustrated using a hypothetical example presented in the attached Excel file named “50_50_table”.</p> <p>Despite of the explanation provided above, this information is not readily available for similar project being developed in Brazil. Then, the typical debt/equity finance structure as reported by the BNDES and mentioned by the DOE was considered, which is 70/30. The WACC and IRR calculation spreadsheets as well as the PDD were revised accordingly.</p>	
<p>CL1</p> <p>Project participants did not explain which are the items <i>i</i> to <i>iv</i> presented in Sub-Step 4b of the PDD</p>	B.5.47	<p>This section of the PDD was revised following the stepwise approach proposed in the latest version of the “<i>Tool for the demonstration and assessment of additionality</i>” (Annex 21, EB 65). Please refer to the revised version of the PDD.</p>	<p>OK. The “Tool for the demonstration and assessment of additionality”, Annex 21, EB65 was accessed and DNV confirmed that all the steps were correctly followed by the project participants.</p> <p>Therefore this CL is closed.</p>
CL2	-	All data, rationales, assumptions,	OK. DNV assessed the presented evidences

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>Project participants are presenting evidences in accordance to VVM, version 1.2, paragraph 95. However when the financial indicator is compared to the benchmark, even with the addition of the estimate CER revenues, the project is not financially attractive.</p> <p>Project participants did not clearly explain why the final financial decision was to implement the project.</p>		<p>justification and documentation provided to support the demonstration of additionality are reliable and credible. As “motivation” the PPs call the attention to the pioneering aspect of the joint venture created by the project owners, Iberdrola and Neoenergia, which are strongly committed to renewable energy based power generation and with reducing GHG emissions. Neoenergia is one of the largest groups in the Brazilian electricity sector and has been developing several activities related to energy efficiency and special projects such as solar panel installation in isolated areas (http://www.neoenergia.com/section/projeto-social_en.asp). Likewise, Iberdrola has also oriented its business activities related to climate change, by implementing several renewable energy project both in developed countries and developing ones (http://www.iberdrola.es/webibd/gc/prod/en/doc/responsabilidad_cambioclimatico.pdf http://www.iberdrola.es/webibd/gc/prod/en/doc/EnergiaSostenible10.pdf). It is also important to mention that Iberdrola is also involved in the European Carbon Markets, is strongly involved with wind project (over 10,000MW of installed capacity), and possess an important portfolio to be implemented in developing countries. Iberdrola has made a major commitment to the use of cleaner technologies, becoming a world leader in wind energy and one of the</p>	<p>and concluded that the motivation on implementing the project activity is related to the main goals, of the joint venture between Neoenergia S/A and Iberdrola Renováveis do Brasil S/A, that are renewable energy generation and reduction of GHG emissions. DNV considers that the project motivation is well justified. Therefore this CL is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>companies with the lowest CO₂ emission levels in the electricity sector. The Company's environmental strategy and management have been recognized in different international environmental indices. Among the most prestigious is the Dow Jones Sustainability Index, where Iberdrola has been distinguished as a world leader among utilities, or the Climate Leadership Index, where we are considered Best in Class: the best electric company in the world due to its strategy to fight climate change.</p> <p>In other words, one can clearly states that key "motivations" of the project owners in developing the project as presented to the DOE are related both to their strong commitment towards the implementation of renewable projects and to greenhouse emission reductions.</p> <p>Another relevant point is the barrier imposed to new entrants competing for wind power projects in energy auctions. The joint venture had to overcome this barrier in terms of qualification, rules for trading in the regulated energy market and competition from other large national and international wind power companies.</p>	

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
<p>FAR1</p> <p>The PDD describes in a general way the equipment to be used for monitoring purposes. Additional relevant technical about the type of electricity meter and accuracy details shall be presented during the first verification, as well as, the information about the requirements for maintenance and calibration of the measurement equipment.</p>	-	<p>The information requested by the DOE is going to be reported in the project's Monitoring Report to be issued during its periodic verifications.</p>

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Gabriel Baines

Gabriel Baines holds a Bachelor's Degree in Environmental Engineering. He has an overall work experience of 6 years. Prior to joining DNV, has had two and a half years experience in the aluminium industry covering the areas of production and environment. His experience also covers the fields of environmental management and management systems such as ISO 14001.

He has experience of around 2 years in validation and verification of numerous CDM projects in DNV, both in Brazil and abroad.

His qualification and experience in CDM demonstrate his sufficient sectoral competence Renewable Energies and Swine Manure.

Fernando Sasdelli

Fernando Sasdelli holds a Bachelor's Degree in Mechanical Engineering from University of São Paulo and has a Specialization in Business Administration from Fundação Getúlio Vargas.

Prior to joining DNV Fernando has four years of experience in cogeneration projects, including project design and development for biomass and natural gas power plants. Fernando has worked in middle and large size cogeneration projects, from hotels and commercial buildings to chemical industries and large sugar cane mills.

His qualification and industrial experience demonstrate his sufficient sectoral competence in thermal energy generation from fossil fuels and biomass.

Luis Filipe Aboim Tavares

Mr. Luis Filipe Tavares holds a Technician's Degree in Chemistry and Bachelor's Degree in Metallurgical Engineering. Having an overall experience of thirty three years. Prior to joining DNV having around twenty tree years experience in steel production industry covering utilities (water, steam, wastewater treatment), environment control (atmosphere emissions, water emission and waste dumping).

His experience also covers the development of nitrification biological wastewater station as well as other activities as head of Utilities and Environmental Laboratory control. He has also been actively involved in implementation of Management Systems such as ISO 9001 standard on coke oven department of steel industry as well as the ISO 140001 standard in all steel plant (the second steel company certified in the world) for more than three years.

He has experience of around 8 years in validation and verification of numerous CDM projects in DNV, both in Brazil & South America.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in Iron and Steel; Metal production; Oil and Gas industry, CMM

recovery and use; Generation from renewable energy sources; Waste handling and disposal and Animal waste management.

Eduardo Camilo da Silva

Eduardo holds a Doctor Degree in Business Administration and is Adjunct Professor at Federal University of Rio de Janeiro, where he develops researches in the areas of Microstructure of Market and Behavioural Finances.

He holds a Bachelor's Degree in Electronic Engineering from the Army Institute of Engineering.

Has working experience of over 20 years in corporations in the area of Finances, Retail and Information Technology.

Sasim Chattopadhyay

Sasim Chattopadhyay holds a Master Degree (M. Sc.) in Physics and a Master Degree (M. Tech.) in "Energy Science and Technology". Having an overall experience of around seventeen years. Prior to joining DNV having five years experience in Energy Auditing in various industries like Engineering, Jute & Textile, Cement, Iron & Steel, Chemical, Automotive etc. covering Analysis of Energy Consumption pattern, Measurement of energy/fuel consumption & environmental emission parameters and Analysis for identifying Energy Conservation Opportunities.

He has experience of around three years in validation and verification of CDM projects and around six years in Management System Certification (QMS/EMS/OHSAS/SA) services. His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in “(1) 1.2 - Energy generation from renewable energy sources and (2) 3.1 - Energy Demand.”