VALIDATION REPORT

"Caquende and Juliões Small Hydroelectric Power Plants" in Brazil

REPORT NO. 2007-1599

REVISION NO. 01

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VALIDATION REPORT

Date of first issue: 2007-10-01	ConCert Project No.: PRJC-116524-2009-CCS-BRA
Approved by: Michael Lehmann	Organisational unit: DNV Climate Change and Environment Services
Client: Mitsubishi UFJ Morgan Stanley Securities Co. Ltd., former Mitsubishi UFJ Securities Co. Ltd.	Client ref.: Hajime Watanabe

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Project Name: "Caquende and Juliões Small Hydroelectric Power Plants"
Country: Brazil
Methodology: AMS-I.D
Version: 16
GHG reducing Measure/Technology: "*Grid connected renewable electricity generation*"
ER estimate: 6 341 tCO_2eq per year (average) over 7-years (44 387 tCO_2eq in the period)
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 the "Caquende and Juliões Small Hydroelectric Power Plants" project in Brazil, as described in the PDD, version 05.2 of 15 December 2010, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AMS-I.D version 16. DNV thus 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.

Report No.:	Subject Group:
2007-1599	Environment

Report title:
"Caquende and Juliões Small Hydroelectric Power Plants" in Brazil

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VALIDATION REPORT

TABLE OF CONTENTS

Abbreviations

ANA	Brazilian Water Agency (Agencia Nacional de Águas)
ANEEL	Brazilian Electricity Agency (Agencia Nacional de Energia Elétrica)
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEMIG	Centrais Elétricas de Minas Gerais (Minas Gerais State Electric Company) http://www.cemig.com.br/index_ing.asp
CEMIG	Centrais Elétricas de Minas Gerais (Minas Gerais State Electric Company)
CEF	Carbon Emission Factor
CCEE	Câmara de Comercialização de Energia Elétrica (Brazilian Electricity commercialization Chamber)
CER	Certified Emission Reduction
CIE	Companhia Energética Integrada Ltda
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
COPAM	Environmental Commission of Minas Gerais State
CM	Combined Margin
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate Return
MP	Monitoring Plan
NGO	Non-governmental Organisation
NPV	Net Present Value
ODA	Official Development Assistance
OM	Operation Margin
ONS	Brazilian Electric System Operator
PDD	Project Design Document
SHP	Small Hydro Power
UNFCCC	United Nations Framework Convention on Climate Change

VALIDATION REPORT

1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the "Caquende and Juliões Small Hydroelectric Power Plants" project in Brazil. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, 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 project participants are Companhia Energética Integrada Ltda of Brazil and Mitsubishi UFJ Morgan Stanley Securities Co. Ltd. of Japan authorized by Japan as Annex 1 Party. All Parties involved, i.e., Brazil and Japan, meet the requirements to participate in the CDM. Japan has provided written approval of voluntary participation in the project.

The project aims to utilize the hydrological resource of the Macaúbas River in a small scale hydropower facility to generate renewable electricity for the Brazilian national inter-connected electric grid. By generating renewable energy which will displace fossil fuel based grid electricity, the project results in reductions of CO_2 emissions that 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 6 341 tCO_2e per year over the selected 7 year crediting period. The emission reduction forecast has been checked and it is deemed likely that the state 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 "Caquende and Juliões Small Hydroelectric Power Plants" project, as described in the project design document, version 05.2 of 15 December 2010 meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AMS-I.D (version 16). Hence, DNV requests the registration of the "Caquende and Juliões Small Hydroelectric Power Plants" 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, 18 May 2011

Luis Filipe Tavares
CDM Validator
DNV Rio, Brazil

Michael Lehmann
Director of Services and Technologies
DNV Climate Change Services AS

2 INTRODUCTION

Mitsubishi UFJ Morgan Stanley Securities Co. Ltd., former Mitsubishi UFJ Securities Co. Ltd.has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the "Caquende and Juliões Small Hydroelectric Power Plants" CDM project, located in the municipality of Bonfim, Minas Gerais State, Brazil.

This report summarizes the findings of the validation of the project, performed on the basis of UNFCCC criteria for small-scale CDM projects, 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, the simplified modalities and procedures for small-scale CDM project activities 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 and host Party 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 AMS-I.D version 16.

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 table lists the documentation that was reviewed during the validation:

3.1.1 Documentation provided by the project participants

/1/ Mitsubishi UFJ Securities Co. Ltd.: Project Design Document for the "Caquende and Juliões Small Hydroelectric Power Plants". Version 01 of 17 September 2007.

/2/ Mitsubishi UFJ Securities Co. Ltd.: Project Design Document for the "Caquende and Juliões Small Hydroelectric Power Plants". Version 02 of 7 November 2007.

/3/ Mitsubishi UFJ Securities Co. Ltd.: Project Design Document for the "Caquende and Juliões Small Hydroelectric Power Plants". Version 03 of 29 June 2008.

/4/ Mitsubishi UFJ Securities Co. Ltd.: Project Design Document for the "Caquende and Juliões Small Hydroelectric Power Plants". Version 04 of 27 October 2008.

/5/ Mitsubishi UFJ Securities Co. Ltd.: Project Design Document for the "Caquende and Juliões Small Hydroelectric Power Plants". Version 05.2 of 15 December 2010.

/6/ Mitsubishi UFJ Securities Co. Ltd.: Spreadsheet used for the calculation of the feasible and investment analysis (FC-Caquende e Juliões Consolidado version 5.2.xls).

/7/ Mitsubishi UFJ Securities Co. Ltd.: Spreadsheet Investment cost Caquende & Juliões v5.2 (confidential).

/8/ Mitsubishi UFJ Securities Co. Ltd.: Spreadsheet CERs v5.2.

/9/ Caquende SHP 4 MW – Basic project and Preliminary Environmental Assessments (Dec 2007).

/10/ Juliões SHP 3.4 MW – Basic project and Preliminary Environmental Assessments (Dec 2007).

/11/ Caquende SHP 4 MW –Feasibility Study (ANEEL 28 Sep 07).

/12/ Juliões SHP 3.4 MW - Feasibility Study (ANEEL 12 Nov 07).

/13/ Caquende SHP 4MW Basic Project and Feasibility Study Acceptance – ANEEL Dispatch 2101 issued on 30 May 2008.

/14/ Juliões SHP 3.4MW Basic Project and Feasibility Study Acceptance – ANEEL Dispatch 979 issued on 12 March 2008.

/15/ Caquende and Juliões project design CAQ-PBA-C1-001.

/16/ Caquende and Juliões implementation budget issue by ConEnergia on 4 Nov 2007. http://conenergia.com.br/novo/cooperativa.php

/17/ Caquende turbine supply contract HI030, signed between HACKER (manufacturer)

and RECIMAP (Caquende SHP operator) on 12 March 2008. http://www.hacker.ind.br/ (*Evidence for project start date as per EB -41 guidance*).

/18/ Juliões turbine supply contract HI031, signed between HACKER and Machado Ferreira Consultoria e Projetos Administrativos (Juliões SHP operator) on 18 March 2008. (*Evidence for project start date as per EB -41 guidance*).

/19/ Caquende SHP – Construction License Protocol # COPAM 438982/2007 issued on 3 September 2007.

/20/ Juliões SHP – Construction License Protocol # COPAM 630271/2007 issued on 3 December 2007.

/21/ ConEnergy report of Caquende electricity monitoring from 2006 to 2009.

/22/ Electricity receipt issued by Recimap to Fundição Balancins Ltda issued 2 April 2008

/23/ Copy of letters sent to local stakeholders.

/24/ Agreement for consulting services signed between Companhia Energética Integrada Ltda and Mitsubishi UFJ Morgan Stanley Securities Co. Ltd., former Mitsubishi UFJ Securities Co. Ltd. on 6 October 2006 (Evidence for CDM consideration in accordance with EB-49 Annex 22 guidance).

3.1.2 Letters of approval

/25/ Liaison Committee for the Utilization of the Kyoto Mechanisms (DNA of Japan): *Letter of Approval*.30 July 2010

/26/ 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

/27/ CDM Executive Board: *Validation and Verification Manual*. Version 01.2.

/28/ CDM Executive Board: Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities": Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities. AMS-I.D – "Grid connected renewable electricity generation" for Type I – Renewable Energy Project. Version 16.

/29/ CDM Executive Board: Attachment A to the Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities": Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities. Version 06 of 30 September 2005.

/30/ CDM Executive Board: "Tool to calculate the emission factor for an electricity system" version 02.

/31/ "Caquende and Juliões Small Hydroelectric Power Plants". UNFCCC webhost.
http://www.dnv.com/focus/climate_change/Projects/ProjectDetails.asp?ProjectId=1950
http://www.dnv.com/focus/climate_change/Projects/ProjectDetails.asp?ProjectId=1476

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

/32/ *U.S. Department of Energy DOE/GO-102001-1173 Small Hydropower Systems July 2001.* www.PDHengineer.com

/33/ ANEEL resolution 52 issued on 30 October 2006 with Caquende old facility capacity. http://www.aneel.gov.br/cedoc/prt2006052spde.pdf

/34/ ANEEL resolution 2101 issued on 30 May 2008 for new Caquende facility capacity. http://www.aneel.gov.br/cedoc/dsp20082101.pdf

/35/ ANEEL resolution 1687 issued on 30 May 2007 for new Juliões SHP facility capacity http://www.aneel.gov.br/cedoc/dsp20071687.pdf

/36/ Brazilian DNA grid emission factor for 2007. http://www.mct.gov.br/index.php/content/view/303077.html#ancora

/37/ SHP lifetime CEMIG study. http://clientes.agestado.com.br/cpfl/Especial:viabilidade%20econ%F4mica%20limita%20projetos%20de%20repotencia%E7%E3o%20a%20PCH.html

/38/ Brazilian Electricity Market regulations. http://www.aneel.gov.br/cedoc/lei200410848.pdf http://www.aneel.gov.br/cedoc/lel2006004.pdf

/39/ ANEEL electricity auctions 04/2006 and 03/2008. http://www.aneel.gov.br/aplicacoes/editais_geracao/documentos_editais.cfm?IdProgramaEdital=54# http://www.aneel.gov.br/aplicacoes/editais_geracao/documentos_editais.cfm?IdProgramaEdital=67#

/40/ Brazilian government active interest rates (SELIC- Special System for Settlement and Custody). http://www.bcb.gov.br

/41/ Brazilian Electric Energy Commercialization Chamber http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=1259a5c1de88a010VgnVCM100000aa01a8c0RCRD

/42/ Electricity average price on spot market by CCEE http://www.ccee.org.br/cceeinterdsm/v/index.jsp?vgnextoid=a39ca5c1de88a010VgnVCM100000aa01a8c0RCRD

/43/ ANEEL – Brazilian PCH potential http://www.zonaeletrica.com.br/downloads/ctee/forumce20080325/Ricardo_Pigato_APMPE.pdf

/44/ ANEEL Hydro power on Macaúbas river database http://www3.aneel.gov.br/netacgi/cobaia.exe?s4=rio+maca%FAbas&s5=LEGISLA%C7%C3O&l=20&SECT1=IMAGE&SECT4=e&SECT6=HITOFF&SECT3=PLURON&SECT2=THESON&SECT5=BIBL01&d=BIBL&p=1&u=http%3A%2F%2Fwww3.aneel.gov.br%2Fbiblioteca%5Cpesquisafa.htm&r=0&f=S

/45/ ANEEL Electricity Services Regulation - Article 79 of the Federal Decree number 41.019 of February 26th, 1957 http://www.aneel.gov.br/cedoc/dec195741019.pdf

/46/ Con Energia http://www.conenergia.com.br/

/47/ Brazilian Central Bank – Brazilian Inflation.

http://www.bcb.gov.br/Pec/metas/TabelaMetaseResultados.pdf

/48/ ONS Electric Grid Procedures.
http://www.ons.org.br/procedimentos/modulo_12.aspx

/49/ CIMGC: "Note of Explanation by the CIMGC regarding CO_2 emission factors". Publication issued by the Brazilian DNA (CIMGC – Comissão Interministerial de Mudança Global do Clima / Interministerial Commission on Global Climate Change).
"The CIMGC, in its 43rd meeting on 29 April 2008, after considering the findings of the working group, decided to adopt a SINGLE SYSTEM as the pattern for CDM projects using the tool for calculating emission factors associated with the ACM0002 methodology to estimate their greenhouse gas reductions."
This information is public available through the following link:
http://www.mct.gov.br/upd_blob/0024/24834.pdf

/50/ ANA – Flow river database
http://hidroweb.ana.gov.br/

/51/ INMETRO – Calibration eletricity measure gauge.
http://www.inmetro.gov.br/laboratorios/servicos/calibDiele.asp

3.2 Follow-up interviews with project stakeholders

On 7 December 2007, DNV performed a site visit to the Macaúbas River facilities and interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Mitsubishi UFJ Morgan Stanley Securities Co. Ltd., former Mitsubishi UFJ Securities Co. Ltd. /52//53/ and representatives of Recimap Geração de Energia Elétrica Ltda /54//55/ were interviewed. The main topics of the interviews are summarized in the table below.

	Date	Name	Organization	Topic
/52/	7 December 2007	Mara Regina Mendes	Mitsubishi UFJ Morgan Stanley Securities Co. Ltd. (MUMSS), former Mitsubishi UFJ Securities Co., Ltd. (MUS)	Baseline scenario Credit period starting date Additionality Monitoring plan Emission reduction ex-ante estimation
/53/	7December 2007	Patricia Toledo Merola		
/54/	7 December 2007	Guilherme Machado Ferreira	Recimap Geração de Energia Elétrica Ltda	Environmental Licenses and legal compliance Stakeholders consultation process
/55/	6 December 2007	Romero Ferreira		

The main differences between the PDD published and the revised PDD version 05.2 dated 15 December 2010 submitted for registration are:

- Revised to comply with AMS-I.D version 16;
- Revised the additionality and sensitivity analysis as per EB 49 requirements;
- Revised the description of CDM consideration and project's starting date;
- Updated the starting date of project as per EB 49 requirements and the start date of the first crediting period;
- Revised benchmark to be the benchmark valid at the time of the investment decision;
- Revised the calculation take into consideration of EGexisting, y of old hydro power production;
- Revised the monitoring plan considering *ex post* the calculation of emission factor of CO_2 from electricity generation of Brazilian National Interconnected Grid, issued by Brazilian DNA.

After reviewing the revised PDD version 05.2 of 15 December 2010, DNV issued this final validation report and opinion.

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 three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the "Caquende and Juliões Small Hydroelectric Power Plants" project is enclosed in Appendix A to this report.

The validation protocol in Appendix A is based on the project design as documented and described in the PDD, version 05.2 of 15 December 2010.

The findings of the validation of the project design as documented and described in earlier version(s) of the PDD are described in the initial validation protocol included in Appendix B to this report.

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**), a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements or a request for **Clarification (CL)** where further clarifications are needed.*

Validation Protocol Table 2: Requirement checklist				
Checklist Question	***Reference***	***Means of verification (MoV)***	***Comment***	***Draft and/or Final Conclusion***
The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.	*Gives reference to documents where the answer to the checklist question or item is found.*	*Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.*	*This is either acceptable based on evidence provided (**OK**), or a **corrective action request (CAR)** due to non-compliance with the checklist question (See below). A request for clarification (CL) is used when the validation team has identified a need for further clarification.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	***Ref. to checklist question in table 2***	***Summary of project owner response***	***Validation conclusion***
If the conclusions from the draft Validation are either a CAR or a CL, these should be listed in this section.	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants during the communications with the validation team should be summarised in this section.*	*This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".*

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

				Type of involvement					
Role	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.2 competence
Team leader (Validator)	Tavares	Luis Filipe	Brazil	✓	✓	✓	✓		✓
GHG auditor	Leiroz	Andrea	Brazil	✓					✓
GHG auditor	Baines	Gabriel	Brazil			✓			
Expert	Francisco	Chavez	Oslo	✓		✓			✓
Technical reviewer (Draft)	Ramachandran	Ramesh	India					✓	✓
Technical reviewer (Final)	Sharma	Anjana	India					✓	
Technical reviewer (Final)	Lehmann	Michael	Norway					✓	✓

The qualification of each individual validation team member is detailed in Appendix C 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 revised and resubmitted PDD, version 05.2 of 15 December 2010.

4.1 Participation Requirements

The project participants are Companhia Energética Integrada Ltda (CEI) of Brazil and Mitsubishi UFJ Morgan Stanley Securities Co. Ltd., former Mitsubishi UFJ Securities Co. Ltd. of Japan. The host Party Brazil and the Annex I Party Japan meet all relevant participation requirements.

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.

The DNA of Japan issued the LoA on 30 July 2010 /25/ and authorized the Companhia Energética Integrada Ltda and Mitsubishi UFJ Morgan Stanley Securities Co. Ltd. as project participants.

The mentioned letter of approval was received from the project participants. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM 01.2.

The project does not involve public funding, 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.

4.2 Project Design

The “Caquende and Juliões Small Hydroelectric Power Plants” project involves the construction and operation of two small hydroelectric power plants located in the municipality of Bonfim, Minas Gerais State, Brazil. Total installed capacity of the project (including both small scale hydropower plants) will be 7.4 MW (4 MW + 3.4 MW) /34//35/, with a predicted power supply to the grid of 34 426 MWh per year. Both SHPs are a run of river type that will be constructed on the Macaúbas River. The expected load factor for the Caquende and Juliões power plants is 53%. The plant is connected to the Brazilian interconnected grid.

The Caquende power plant will involve the construction of a new powerhouse that will be installed 900 meters far from the existing dam and the construction of a new adduction tunnel for the Caquende SHP. For Juliões SHP, a new dam, a powerhouse, a penstock and transmissions lines will be constructed. According the feasibility study approved by ANEEL, the average river flow rate is 6.87 m^3/s on Caquende and 7.36 m^3/s on Juliões and represents average measurements from January 1939 to December 2005.

The project activity will construct a new dam with 2.5 meters and 4 meters height for Caquende and Juliões with the reservoir area of 13000 m^2 and 5700 m^2, respectively, which includes the channel area /11//12/, and result in a power density of 308 W/m^2 for Caquende and 596 W/m^2 for Juliões.

The existing dam is part of old Caquende SHP operating from 1994 to 2000 when operation was abandoned. On 2006 CEI bought the facility and restarted the operation with the power capacity of 0.8 MW /33/. This operation of the power plant will be decommissioned to implement the new facilities.

The project design engineering reflects good practice. Caquende SHP utilizes two Francis turbines with an installed capacity of 1.625 MW each and one Francis turbine with an installed capacity of 0.75 MW /11//12/. The Caquende project is expected to deliver 18 728.88 MWh to the grid per year. Juliões SHP utilizes two Francis turbines with an installed capacity of 1.4 MW each, and one Francis turbine with an installed capacity of 0.6 MW. Juliões project is expected to deliver 15 697.92 MWh to the grid per year

The project is not a de-bundled component of a larger project activity as it can be confirmed because this is the first CDM project of project participant, as verified on UNFCCC-CDM database and no other hydro power on river Macaúbas were implemented /44/.

A 7-year renewable crediting period is selected (with the potential of being renewed twice), starting on 01 May 2013 with respect the SHPs operation starting or on the date of registration of the CDM project activity, whichever is later. In line with paragraph 47 of EB 49 report, the project starting date is 12 March 2008 which is the date when the contract for the supply of the turbine was signed between the SHP operators and the manufacturer /17//18/.

The operational lifetime of the proposed project activity is expected to be 30 years, according the Federal Decree 41.019 article 79 /45/ which establish all types of electricity services in Brazil to be granted with 30 years of concession period. The concession will not be renewed.

Evidence that the project proponent seriously considered the CDM in the decision to proceed with the project was presented as the agreement for consulting services on issues relating to the creation and acquisition of Certified Emission Reductions that Mitsubishi UFJ Securities Co. Ltd. sent to Companhia Energética Integrada Ltda on 6 October 2006. /24/

The project is expected to bring social, environmental, economic, resources management and technological and infrastructure benefits, thus contributing to sustainable development objectives of the Brazilian Government.

No public funding is involved, and the validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.

DNV considers the project description of the project contained in the PDD version 05.2 of 15 December 2010 to be complete and accurate.

The PDD version 05.2 of 15 December 2010 complies with the relevant forms and guidance for completing the PDD.

4.3 Application of selected baseline and monitoring methodology

The project applies the simplified baseline methodology for selected small-scale CDM project activity AMS-I.D version16 – "Grid connected renewable electricity generation" for Type I – Renewable Energy Project as outlined in the Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities": Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities.

The applicability of this methodology is justified since:

i) The "Caquende and Juliões Small Hydroelectric Power Plants" project involves the construction and operation of two small hydroelectric power plants located in the municipality of Bonfim, Minas Gerais State, Brazil. Total installed capacity of the project (including both small scale hydropower plants) will be 7.4 MW (4 MW + 3.4 MW) /11//12/, with a predicted power supply to the grid of 34 426 MWh per year. Both SHPs are a run of river type that will be constructed on the Macaúbas River. The expected load factor for the Caquende and Juliões power plants is 53%. The plant is connected to the Brazilian interconnected grid /33/ which comply with the para 1 of AMS-I.D version 16;

ii) The project activity complies with class (d) as it will construct two new dams with 2.5 m and 4 meters high for Caquende /34/ and Juliões /35/ respectively replacing the existing dam is part of old Caquende SHP operating from 1994 to 2000 when operation was abandoned. On 2006 CEI bought the facility and restarted the operation with the power capacity of 0.8 MW /33/. This old dam/power plant will be decommissioned to implement the new facilities which comply with the para 2 of AMS-I.D version 16;

iii) Considering the reservoir area, that includes the channel area, they are respectively of 13000 m^2 and 5700 m^2 as demonstrated in the Basic Project and the Feasibility Study;/9//10//11//12/ which result in a power density of 308 W/m^2 for Caquende and 596 W/m^2 for Juliões, which comply with the para 3 of AMS-I.D version16;

iv) The project consists of only hydro power plants /11//12/ and there is no biomass, non-renewable components or cogeneration, /34//35/ and para 4-6 of AMS-I.D version16 are thus not applicable;

v) The project does not involve the addition of renewable energy generation units at an existing renewable power generation facility (as it replaces the existing capacity) and para 7 of AMS-I.D version16 is thus not applicable;

vi) The project consists only on replacement of old hydro power plant by new two with total electricity generation capacity is 7.4 MW /11//12/ which comply with the para 8 of AMS-I.D version16;

The assessment of the project's compliance with the applicability criteria of AMS-I.D version16 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 project boundary is defined as the physical, geographical site of the renewable generation source. In accordance with AMS-I.D version16, the project boundary includes the Brazilian interconnected grid system to which the project plants will be connected by transmission line. The selected sources and gases are justified for the project activity.

The application of the baseline methodology is transparent and conservative.

Emission sources and gases included in the project boundary are:

	GHGs involved	*Description*
Baseline emissions	*CO_2*	*Brazilian National Interconnected Grid*
Project emissions	*N/A*	*Project emission is regarded as zero as the project is a renewable energy (small hydro power) 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 AMS-I.D version16.

4.5 Baseline Determination

Caquende SHP was identified in Macaúbas River as an old hydropower built in the 1940s, which was operated until 2000. From 2000 to 2006, this plant was abandoned (i.e. not operating). In 2006, when CEI bought RECIMAP, which was the original owner of the plant, it was re-started as a pilot plant to test it, to obtain hydrological information of the river, and to obtain experience in running a small hydropower plant. This facility will be completely decommissioned in order to construct a new tunnel with 550 m way and install new turbine using 45 m of difference level on river, higher 12 meters from the old equipment. Hence, only two alternatives to the project have been identified and discussed:

a) The construction of new renewable power plants, such as those SHPs of the project activity, as a source of electricity with low carbon emissions not undertaken as a CDM project activity

b) The continuation of the current practice is electricity generation with the existing power plant at the same location with 0.8 MW capacity while the remaining electricity generated by the project activity would be generated by large hydropower plants and fossil fuel-fired thermal plants in the grid;

DNV considers the list of realistic and credible alternatives to be complete.

As per the investment analysis, prevailing practice and other barrier like hydrologic risk discussions presented in section 4.4 below, alternative a) is not a realistic and credible alternative since it is not financially attractive.

Hence, the baseline scenario is that an equivalent of electricity at the margin would, in the absence of the project activity, have been generated by the operation of grid-connected thermal power plants.

As stipulated in AMS-I.D version16, the baseline emission coefficient is determined in accordance with the '*Tool to calculate the emission factor for an electricity system*" as a combined margin (CM) which is the weighted average of operating margin (OM) and build margin (BM). The operating margin (OM) and build margin (BM) emission coefficient for the project will be determined annually *ex-post* from the dispatch data obtained from the National Dispatch Center (ONS) or Brazilian DNA. The project developer has selected the default values of 0.5 for operating margin and build margin.

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.

All the assumption and data used by the project participants are listed in the PDD version 05.2 of 15 December 2010 and/or supporting documents. All documentation relevant for establishing the baseline scenario were correctly quoted and interpreted in the PDD version 05.2 of 15 December 2010. 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 version 05.2 of 15 December 2010.

4.6 Additionality

The additionality of the project is demonstrated by applying Attachment A to the Appendix B of the simplified modalities and procedures for CDM small-scale project activities.

4.6.1 Evidence for prior CDM consideration and continued action to secure CDM status

The project start date is after the commencement of the validation. The serious consideration of CDM prior to project start has been demonstrated through an agreement for consulting services signed between Companhia Energética Integrada Ltda and Mitsubishi UFJ Securities Co. Ltd. on 6 October 2006 for the development of proposed project as a CDM project.

In addition, the subsequent real actions to secure CDM registration were evidenced:

- PDD version 1 of 17 September 2007 published for global stakeholder consultation as a step of the validation process in 28 September 2007;
- Submission of documents to the local Environmental Agency for obtaining Environmental Licenses in 3 December 2007;
- Feasibility studies approval by ANEEL on March and May 2008 for Juliões and Caquende respectively;
- Contract with turbine supplier in 12 March 2008

The starting date of the project activity is 12 March 2008 with respect to the date of contract with turbine supplier /17//18/.

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 alternative scenarios were identified as below:

- Scenario 1: The continuation of current practice: The continuation of the current practice is electricity generation with significant participation of large hydropower plants and fossil fuel-fired thermal plants in the grid and no implementation of the project activity.
- Scenario 2: The construction of new renewable power plants: The construction of SHP, such as those of the project activity, is part of this scenario and is considered a source of electricity with low carbon emissions.

DNV considers the listed alternatives to be credible and complete.

4.6.3 Investment analysis

Choice of approach

Since the proposed project generates financial and economic benefits through the sales of electricity other than CDM-related income and the alternative does not involve any investment, a benchmark analysis is applicable.

Benchmark selection

Since the proposed project is submitted the electricity market in Brazil and the financing of large magnitude depend of official development banks (BNDES), the IRR analysis was applicable, considering as benchmark, the Brazilian government active interest rates SELIC /40/. The updated financial analysis had considered the average of previous three years of the SELIC rate at the time of first significant expenditure (January 2005 to December 2007) is 15.47%/y.

Input parameters

The input values used in the financial analysis have been verified by DNV from the following sources:

- The investment involved by the project (i.e. the project cost of both power plants in the bundle) was verified from the implementation proposal issued by ConEnergia /16/.
- Furthermore, since the power purchase agreement of the proposed project has not been signed yet, the project developer has considered the electric price based on ANEEL's auction results /39/. DNV considered the electric price from the ANEEL's auction reasonable for the financial analysis of the proposed project.
- The amount of electricity generated (for each power plant considered in the bundle) was considered as assured capacity established by Feasible Study reports (of both power plants considered in the bundle) approved by ANEEL /13//14/.
- The O&M is around 3% of investment. The same includes costs a) labour (man power), (b) facility operation and maintenance cost, and (c) contingency expenses. The IRR analysis was established for 30 years usually applied for hydro power projects **/7/**.
- The project financing is foreseen use 80% of BNDES and 20% equity.

Calculation and conclusion

The IRR considering 30 years reach 12.15%, which is below the selected benchmark (SELIC) of 15.47% mentioned above.

DNV compared the input parameters for the financial analysis included in the PDD version 05.2 of 15 December 2010 with the parameters stated in the Feasible Study reports /11//12/, electricity auctions /39/ as well as other relevant document, and was able to confirm that the values applied are consistent with the values stated in the mentioned before.

The Feasible Study reports for Caquende /11/ and Juliões /12/ and approved by ANEEL Dispatches /13//14/ were issued less than one year prior to the decision to proceed with the project activity (i.e. the turbine supply contract) /17//18/. Given this relatively short period of time between approval of the Feasible Study reports and the decision to proceed with the project activity, it justifies that the input values were valid at the time of the project start. It is

thus reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project.

Sensitivity analysis

The project developer has also carried out the sensitivity analysis by varying the parameters investment, O&M cost and electricity price. The same has been carried out to check the robustness of the financial analysis presented.

a) Initial Investment: The investment for project activity implementation of 25,837,822 BRL was considered according the investment cost /16/ carried out by ConEnergia /46/ in 2007 based on the specification defined in the *Projeto Básico* (Feasibility study approved by ANEEL) /13//14/ and the confirmed by the turbine supply contract /17//18/. The benchmark of 15.47% on IRR would be reached only if the investment was 20% lower. Considering the inflation on Brazilian market as average from 2006 to 2010 as 4.74%/y /47/, it is unlikely the reduction of budget of project.

b) Operation and Maintenance Costs (O&M): The O&M costs /7/ for hydro electricity generation means mainly man power and operational costs. The project calculates the O&M as 3% of investment. As the salary and operational costs are highly linked with inflation rate which reach around 4.74%/y for 2006 to 2010 /47/, it could be considered that a sensibility analyses with excluding 100% of O&M cost in order to reach the benchmark of 15.47% on IRR is an unlikely scenario.

c) Electricity price: For the financial analysis of the proposed project, the project developer has considered the electric price based on ANEEL 's auction results /39/. Considering the uncertainty in the electricity price for the proposed project, the project developer has considered this parameter for sensitivity analysis. DNV, based on its local expertise, was able to verify that in Brazil, the electricity market is regulated by the public auctions according law 10.848/2004 /38/, in order to offer the electricity with the lower price as the electricity producers can offer. The follow auctions demonstrate that the actual price is lower than the one considered by the project:

- Auction 04/2006 /39/ the hydro electricity was sold on average R$ 125/MWh.
- Auction A-5/2007 the hydro electricity was sold at R$128/MWh
- Auction A-3 Oct/2008 the price reaches R$ 128/MWh.

Keeping in view, the current prevailing practice in Brazilian electricity market supported by the evidences (as mentioned above), DNV is of the opinion that variation in the electricity prices up to an extent of 10% is highly unlikely

In addition, DNV verified that the plant load factor of both power plants considered in the project has been established based on the Feasibility Studies /11//12/ approved by ANEEL /13/.

The investment analysis and sensitivity analysis have shown that the project activity is unlikely to be the most financially attractive option. The financial calculations and assumptions have been assessed by DNV and are considered correct and conservative.

4.6.4 Prevailing business practice barrier:

DNV had confirmed that projects such as "Caquende and Juliões Small Hydroelectric Power Plants" are not widely observed and commonly carried out in Brazil. As verified on Brazilian

Electricity Market (ANEEL Generation Database 2007 only 1.75% of the Brazil's installed capacity comes from small-hydro projects, what corresponds to 1.99 GW. According the ANEEL, Brazil has 25.9 GW potential capacity from SHP not yet installed /43/.

In addition, DNV had confirmed that for projects with only a small regulating reservoir, the power generation is directly dependent on the natural variation of the river flow, since there is no reservoir to control the water flow to be delivered to the turbines for the electricity generation /32/.

The feasible studies of Caquende and Juliões /9//10/ show that the Macaúbas River has restriction on flow during dry season and the load factor could reach only 53 %. According to the hydrologic data of Macaúbas River /50/, the years 1999, 2001 and 2003, characterized with low rain density, the flow was reduced of 30% from the 1939-2005 flow average.

The above risks can explain the low interest of investors in SHP and can be considered when explaining why only 7.1% of the potential capacity from SHP is installed (1.99 GW out of 27.89 GW) /43/.

Given the above investment analysis and prevailing practice barrier, it is sufficiently demonstrated that the project is not a likely baseline scenario for the 7-year renewable credit period and that emission reductions thus are additional to what would otherwise have occurred.

4.7 Monitoring

The project applies the approved monitoring methodology AMS-I.D version16 – "Grid connected renewable electricity generation" for Type I – Renewable Energy Project, according to the Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities": Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities.

The emission factor will be calculated and validated *ex-post* according to the Tool to calculate the emission factor for an electricity system" and the available through the Brazilian DNA website /36/.

The monitoring plan is in accordance with the monitoring methodology. The monitoring plan will give opportunity for real measurements of achieved emission reductions.

The project is a run-of-river hydropower project with minimum reservoir area (including river channel) of 13000 m^2 on Caquende and 5700 m^2 on Juliões according the ANEEL feasibility study /11//12/; hence no indicators have been defined for project emissions from water reservoirs of hydro power plants.

Leakage accounting has not been considered for the project since the renewable energy technology equipment is new /17//**18/** and not transferred from another activity or to another activity according to AMS-I.D version 16.

Monitoring of sustainable development indicators is not required by the Brazilian DNA.

The project monitoring plan is in compliance with the monitoring methodology AMS-I.D version16.

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

4.7.1 Parameters determined ex-ante

According the AMS-I.D version16 and considering the operation of the old facilities of Caquende until the present date, the existing electricity generation was calculated as follows:

$$EG_{existing,y} = MAX(EG_{actual,y}, EG_{estimated,y})$$

Where:
The actual, measured net electrical energy production of the existing unit was assessed from the Caquende electricity report /21/, and electricity receipt sold by Caquende/Recimap to Fundição Banlancins Ltda /22/ was 668 kW on average of period from 15 August 2006 to 30 September 2009. The estimated net electrical energy that would have been produced by the existing units under the observed availability of the renewable resource was assessed from the ANEEL regulation # 52 /33/ considering 800 kW hydro power capacity. This second figure was considered as the maximum attainable.

4.7.2 Parameters monitored ex-post

Details of data to be collected, data recording frequency and its format are described in the PDD version 05.2 of 15 December 2010. The data will be archived in electronic form and be kept for two years after the end of the last crediting period.

The electricity generated by the hydropower plant and supplied to the grid will be monitored with calibrated meters according Brazilian standard /48/ /51/. The generated energy by power plant will be multiplied by the combined margin emission coefficient for the grid.

The emission factor of integrated Brazilian grid will be calculated and validated *ex-post* according the "*Tool to calculate the emission factor for an electricity system*" considering the dispatch approach and should be considered to calculated the CERs as verified on Brazilian DNA website /36/.

The baseline estimation had considered the emission factor for the year 2007, value used in the PDD, version 3, published for public comments on 19 July 2008.

4.7.3 Management system and quality assurance

Authorities and responsibilities for project management, monitoring and reporting activities as well as for organizing and training of the staff in the appropriate monitoring, measurement and reporting techniques are clearly defined.

No specific procedures beyond the already established QA/QC procedures will be necessary. The established procedures reflect good monitoring and reporting practices.

4.8 Algorithms and/or formulae used to determine emission reductions

The methodologies for calculating emissions reductions are transparently documented through spreadsheet CERs v 5.2**/8/** .

Regarding leakage, no sources of emission were identified.

Project emissions are considered zero for this project, as the net electricity delivered to the grid has been used for the calculation of emissions reduction.

Baseline emissions have been estimated based on the expected electricity generation from the proposed project activity and the ex ante calculated grid emission factor sourced from the Brazilian DNA. The grid emission factor published by the Brazilian DNA is based on the most recent information available at the time of publication of version 3 of the PDD **/3/**. Based on the expected electricity generation of 34 426 MWh per year and the grid emission factor for 2007 of 0.1842 tCO_2e/MWh.

Considering the energy produced by the old Caquende unit, the expected electricity generation should be calculated as:

$$EG_{add,\,y} = EG_{PJ,\,y} - EG_{\grave{e}xisting,\,y}$$

Where:

$EG_{add,\,y}$ =Net increase in electrical energy generation at existing plant in year *y*; kWh/y

$EG_{PJ,\,y}$ =The total net actual electrical energy produced in year *y* by the new project units; kWh/y

$EG_{existing,\,y}$ =The estimated net electrical energy that would have been produced by existing units (installed before the project activity) in year *y* in the absence of the project activity, kWh/y considered as 0.8 MW of installed capacity /33/ as the produced electricity had reach only 0.78 MW **/21/**:

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 6 341 tCO2e per year for the selected crediting period and an estimated amount of 44 387 tCO_2e during the first crediting period (7 years.

All assumptions and data used by the project participants are listed in the PDD version 05.2 of 15 December 2010 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 version 05.2 of 15 December 2010. All values used in the PDD version 05.2 of 15 December 2010 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 version 05.2 of 15 December 2010.

4.9 Environmental Impacts

According to Brazilian environmental law a preliminary environmental assessment is required to grant the construction license. The application process was done under protocol numbers 438982/2007 and 630271/2007 for Caquende and Juliões SHPs respectively, with the LI granted on February 2009 valid until 2013.

A copy of the construction license protocols were sent and assessed.

4.10 Comments by Local Stakeholders

Local stakeholders, such as the Municipal governments and City Councils, State Attorney, State and Municipal Environmental Agencies, the Brazilian forum of NGOs and communities associations, were invited to comment on the project, in accordance with the requirements of Resolution 7 of the Brazilian DNA. No comments were received.

The letters sent to the local stakeholders were assessed.

DNV considers the local stakeholder consultation carried out adequately.

4.11 Comments by Parties, Stakeholders and NGOs

The PDD version 03 of 29 June 2008 applying version 13 of AMS.I.D was made publicly available on DNV's climate change website /31/ and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 19 July 2008 to17 August 2008. No comments were received

Prior to this, the PDD version 01 of 17 September 2007 applying version 12 of AMS.I.D was made publicly available on DNV's climate change website /31/ and Parties, stake-holders and NGOs were through the CDM website invited to provide comments during a 30 days period from 28 September 2007 to 27 October 2007. No comments were received.

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	Table 2, Section E.4.1 The PDD identifies Mitsubishi UFJ Morgan Stanley Securities Co. Ltd., former Mitsubishi UFJ Securities Co. Ltd. (Japan) as Annex I project participants. 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.
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	Ok. Table 2, Section E.4.1.
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	Kyoto Protocol Art. 12.2, CDM Modalities and	Table 2, Section A.3

Requirement	Reference	Conclusion
and shall have obtained confirmation by the host country thereof.	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.
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. Japan: Liaisons committee for the Utilization of the Kyoto Mechanisms.
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	Brazil ratified the protocol on 23 August 2002, and Japan ratified the protocol on 4 June 2002.
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	The assigned amount of Japan is 94% of the emissions in 1990.
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	Japan has in place a national registry and reported in May 2005 the latest inventory for the years 1990-2003.
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the	Kyoto Protocol Art. 12.5c,	Table 2, Section B.3.1

Requirement	Reference	Conclusion
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.	CDM Modalities and Procedures §43	It is sufficiently demonstrated that the project is not a likely baseline scenario for the 7-year renewable credit period and that emission reductions thus are additional to what would otherwise have occurred
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	Yes. The PDD version 05.2 of 15 December 2010 estimated amount of GHG emission reductions from the project is 44 387 tCO_2e during the first crediting period (7 years), resulting in estimated average annual emission reductions of 6 341 tCO_2e Table 2, Section B.4 to B.7
About small-scale project activities (if applicable)		
12. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakech Accords and shall not be a debundled component of a larger project activity.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	Table 2, Section A.5.
13. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and use the simplified baseline and monitoring methodology for that project category.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	Table 2, Section A.5.

Requirement	Reference	Conclusion
14. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	The project complies with environmental legislation and granted the applicable environment licences. Table 2, Section D.
About stakeholder involvement		
15. 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	Table 2, Section E.
16. 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	The PDD version 03 of 29 June 2008 applying version 13 of AMS.I.D was made publicly available on DNV's climate change website /31/ and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 19 July 2008 to 17 August 2008. No comments were received Prior to this, the PDD version 01 of 17 September 2007 applying version 12 of AMS.I.D was made publicly available on DNV's climate change website /31/ and Parties, stake-holders and NGOs were through the CDM website invited to provide comments during a 30 days period from 28

Requirement	Reference	Conclusion
		September 2007 to 27 October 2007. No comments were received.
Other		
17. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	Table 2, Section B.1.1 and D.1.1
18. 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	Table 2, Section B.2
19. 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	Table 2, Section B.2
20. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	The project design document conforms to version 03 of the CDM-SSC-PDD.
21. 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	Table 2, Section D

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	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ 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	☒ Yes *If no, list where the PDD is not in accordance:*		OK
A.2 Description of the project activity (VVM para 58-64)					
A.2.1 How was the design of the project assessed**?**	/1/	DR	*What type is the project?* ☒ Project in existing facility or utilizing existing equipment(s) ☐ Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO_2e per year. In this case, a site visit must be performed. ☐ Project is a bundled small scale project, with each project in the bundle with emission reductions not exceeding 15,000 tCO_2e 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. ☒ The project is an individual small scale project activity with emission reductions not exceeding 15 000 tCO_2e		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			per year. In this case, DOE may not conduct a physical site visit as appropriate. ☐ Greenfield project *How was the design of the project assessed?* ☒ Physical site inspection ☒ Reviewing available designs and feasibility studies.		
A.2.2 If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR	NA – project is not Greenfield.		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 tCO2e per year), justify the sampling through a statistical analysis:	/1/	DR	NA – visit was not based on sampling.		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/	DR	Yes, requirements are fulfilled.		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/ /33/	DR	Yes: "The "Caquende and Juliões Small Hydroelectric Power Plants" project involves the construction and operation of two small hydroelectric power plants located in the municipality of Bonfim, Minas Gerais State, Brazil. Total installed capacity of the project (including both small scale hydropower		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			plants) will be 7.4 MW (4 MW + 3.4 MW), with a predicted power supply to the grid of 34 426 MWh per year. Both SHPs are a run of river type that will be constructed on the Macaúbas River. The expected load factor for the Caquende and Juliões power plants is 53%. The plant is connected to the Brazilian interconnected grid. The Caquende power plant will involve the construction of a new powerhouse that will be installed 900 meters far from the existing dam and the construction of a new adduction tunnel for the Caquende SHP. For Juliões SHP, a new dam, a powerhouse, a penstock and transmissions lines will be constructed. The dams are 2.5 m and 4 meters high for Caquende and Juliões respectively. The existing dam is part of old Caquende SHP operating from 1994 to 2000 when operation was abandoned. On 2006 CEI bought the facility and restarted the operation with the power capacity of 0.8 MW /33/. This operation of the power plant will be decommissioned to implement the new facilities."		
A.2.6 Does the project design engineering reflect current good practices?	/1//2/ /5//6/	DR	The project design engineering reflects good practice. Caquende SHP utilizes two Francis turbines with an installed capacity of 1.625 MW each, and one Francis turbine with an installed		OK

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			capacity of 0.75 MW with the total of 4.0 MW. Juliões SHP utilizes two Francis turbines with an installed capacity of 1.4 MW each, and one Francis turbine with an installed capacity of 0.6 MW with the total of 3.4MW.		
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//2/ /5//6/	DR	There was no transfer of technology, as the one used in the project activity is Brazilian.		OK
A.2.8 Does the project qualify as a small scale CDM project activity as defined in paragraph 6(c) of decision 17/CP.7 on the modalities and procedures for the CDM?	/1//2// 5//6/		The project applies the simplified baseline methodology for selected small-scale CDM project activity AMS-I.D version16 – "Grid connected renewable electricity generation" for Type I – Renewable Energy Project as outlined in the Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities": Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities. This category is applicable as the project is a run of river hydroelectric power plant with total installed capacity below the 15 MW thresholds, and it supplies electricity to a Brazilian electricity grid. The electricity generation capacity is 7.4 MW.		OK
A.2.9 Is the small scale project activity a debundled component of a larger project activity?	/1//2/ /5//6/		The project has been confirmed not to be a de-bundled component of a larger project		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			activity.		
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			
			Brazil (host) / Japan		
a) Party has ratified the Kyoto Protocol			☐ Yes ☐ No / ☒ Yes ☐ No		
b) Party has designated a Designated National Authority			☐ Yes ☐ No / ☒ Yes ☐ No		
c) The assigned amount has been determined			☐ Yes ☐ No / ☒ Yes ☐ 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 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) / Japan		
a) LoA confirms that Party has ratified the Kyoto Protocol			☐ Yes ☐ No / ☒ Yes ☐ No		
b) LoA confirms that participation is voluntary			☐ Yes ☐ No / ☒ Yes ☐ No		
c) The LoA confirms that the project contributes to the sustainable development of the host country?			☐ Yes ☐ No / NA		
d) The LoA refers to the precise project activity title in the PDD			☐ Yes ☐ No / ☒ Yes ☐ No		
e) The LoA is unconditional with respect to (a) to (d) above			☐ Yes ☐ No / ☒ Yes ☐ No		
f) The LoA is issued by the respective Party's DNA			☐ Yes ☐ No / ☒ Yes ☐ No		
g) The LoA was received directly by the DNA or the PP			☐ DNA ☐ PP / ☐ DNA ☐ PP		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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//2/ /5//6/	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//2/ /5//6/	DR	The project is located in the municipality of Bonfim, Minas Gerais State, Brazil at Macaúbas River. Caquende SHP is located at geographical coordinates of 20°23'22" S and 44°11'21"W, and Juliões SHP is located at geographical coordinates of 20°22'05" S and 44°11'45"W.		OK
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//2/ /5//6/	DR	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.		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	/1//2/	DR	The project applies the simplified baseline		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
and the correct and valid version thereof?	/5//6/		methodology for selected small-scale CDM project activity AMS-I.D version16 – "Grid connected renewable electricity generation" for Type I – Renewable Energy Project		
B.1.2 If applicable, has any specific guidance provided by the CDM EB in respect to the applied methodology been considered?	/1//2/ /5//6/	DR	It was considered the Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities": Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities		OK
B.2 Applicability of methodology (and tools) (VVM para 65-76) *Insert a row for each applicability criteria of the applied methodology (and tools)*					
B.2.1 How was it validated that project complies with the following applicability criteria: "This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass that supply electricity to a national or a regional grid. Project activities that displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit shall apply AMS-I.F."?	/1/ /2/ /5/ /6/ /11/ /12/ /33/ /34/ /35/	DR	The "Caquende and Juliões Small Hydroelectric Power Plants" project involves the construction and operation of two small hydroelectric power plants located in the municipality of Bonfim, Minas Gerais State, Brazil. Total installed capacity of the project (including both small scale hydropower plants) will be 7.4 MW (4 MW + 3.4 MW) /11//12/, with a predicted power supply to the grid of 34 426 MWh per year. Both SHPs are a run of river type that will be constructed on the Macaúbas River. The expected load factor for the Caquende and Juliões power plants is 53%. The plant is connected to the Brazilian interconnected grid as authorized by ANEEL /33/ which comply with the para 1 of AMS-I.D version16		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2.2 How was it validated that project complies with the following applicability criteria: "This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s)."?	/1/ /2/ /5/ /6/ /33/ /34/ /35/	DR	The project activity complies with class (d) as it will construct two new dams with 2.5 m and 4 meters high for Caquende /34/ and Juliões /35/ respectively replacing the existing dam is part of old Caquende SHP operating from 1994 to 2000 when operation was abandoned. On 2006 CEI bought the facility and restarted the operation with the power capacity of 0.8 MW /33/. This old dam/power plant will be decommissioned to implement the new facilities which comply with the para 2 of AMS-I.D version16.		OK
B.2.3 How was it validated that project complies with the following applicability criteria: "Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • *The project activity is implemented in an existing reservoir with no change in the volume of reservoir;* • *The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2;* • *The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2".*	/1/ /2/ /5/ /6/ /11/ /12/ /33/ /34/ /35/	DR	The project activity will construct a new dam with 2.5 m and 4 meters high for Caquende and Juliões with the reservoir area of 13000 m^2 and 5700 m^2 respectively, which includes the channel area, and result in a power density of 308 W/m^2 for Caquende and 596 W/m^2 for Juliões /11//12/, which comply with the para 3 of AMS-I.D version16.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2.4 How was it validated that project complies with the following applicability criteria: "In the case of biomass power plants, no other biomass types than renewable biomass are to be used in the project plant."?	/1/ /2/ /5/ /6/ /11//12/ /33/ /34/ /35/	DR	The project consists only of hydro power plants /11//12/ and no renewable biomass components will be included /34//35/. Hence, para 4 of AMS-I.D version 16 is not applicable.		OK
B.2.5 How was it validated that project complies with the following applicability criteria: "If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW"?	/1/ /2/ /5/ /6/ /11//12/ /33/ /34/ /35/	DR	The project consists only of hydro power plants /11//12/ and no non-renewable components will be included /34//35/. Hence, para 5 of AMS-I.D version 16 is not applicable.		OK
B.2.6 How was it validated that project complies with the following applicability criteria: "Combined heat and power (co-generation) systems are not eligible under this category"?	/1/ /2/ /5/ /6/ /11//12/ /33/ /34/ /35/	DR	The project consists of only hydro power plants /11//12/ and there is no cogeneration. Hence, the para 6 of AMS-I.D version 16 is not applicable.		OK
B.2.7 How was it validated that project complies with the following applicability criteria: "In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units"?	/1/ /2/ /5/ /6/ /11//12/ /33/ /34/ /35/	DR	The project does not consist of a capacity addition /11//12/. Hence, para 7 of AMS-I.D version 16 are not applicable.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2.8 How was it validated that project complies with the following applicability criteria: In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW	/1/ /2/ /5/ /6/ /11/ /12/	DR	The project consists only on replacement of old hydro power plant by new two with total electricity generation capacity is 7.4 MW. /11//12/. Hence, the project complies with para 8 of AMS-I.D version 16.		OK
B.2.9 How was it validated that project complies with the following applicability criteria: "The project boundary encompasses the physical, geographical site of the renewable generation source"	/1//2/ /5//6/ /48/ /49/	DR	The baseline scenario is defined as the electricity being generated by the grid, dominated by large hydropower and fossil fuel-based power plants /48//49/ which comply with the para 9 of AMS-I.D version16.		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//2/ /5//6/	DR	The project boundary is defined as the physical, geographical site of the renewable generation source. So, in accordance with AMS-I.D version 16, the project boundary includes the Brazilian interconnected grid system to which the project plants will be connected by transmission line.		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//2/ /5//6/	DR	*GHGs involved* / *Description* *Baseline emissions*: CO_2 — *Brazilian Interconnected Grid* *Project emissions*: *N/A* — *Project emission is regarded as zero as the project is a renewable energy (small hydro power) project.*		OK

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			Leakage	*N/A*	*There are no leakages that need to be considered in applying this methodology.*		
B.3.3 Does the project involve other emissions sources not 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?	/1//2/ /5//6/	DR	No, all sources are covered by the methodology.				OK
B.4 Baseline scenario determination (VVM para 81-88, 105-107) *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.*							
B.4.1 Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1//2/ /5//6/	DR	Electricity being generated by the grid, dominated by large hydropower and fossil fuel-based power plants, and construction of new renewable power plants, such as those SHPs of the project activity, as a source of electricity with low carbon emissions not undertaken as a CDM project activity. Yes, the list is complete.				OK
B.4.2 How have the other baseline scenarios been eliminated in order to determine the baseline?	/1//2/ /5//6/	DR	Through an analysis of investment, prevailing practice and other barrier like hydrologic risk				OK
B.4.3 What is the baseline scenario?	/1//2// 5//6/	DR	The baseline scenario is defined as the electricity being generated by the grid,				OK

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			dominated by large hydropower and fossil fuel-based power plants,		
B.4.4 Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1//2/ /5//6/	DR	Yes, an analysis of investment, prevailing practice and other barrier like hydrologic risk was carried out according to the methodology.		OK
B.4.5 Has the baseline scenario been determined using conservative assumptions where possible?	/1//2/ /5//6/	DR	Yes, the baseline scenario is defined as the electricity being generated by the grid, dominated by large hydropower and fossil fuel-based power plants,		OK
B.4.6 Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1//2/ /5//6/	DR	Yes, the baseline scenario is defined as the electricity being generated by the grid, dominated by large hydropower and fossil fuel-based power plants,		OK
B.4.7 Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1//2/ /5//6/	DR	Yes, the baseline scenario is defined as the electricity being generated by the grid, dominated by large hydropower and fossil fuel-based power plants,		OK
B.4.8 Is the baseline determination adequately documented in the PDD**?** • 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	/1//2/ /5//6/	DR	Yes, the baseline scenario is defined as the electricity being generated by the grid, dominated by large hydropower and fossil fuel-based power plants,		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
CDM project activity					
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//2/ /5//6/	DR	The additionality of the project is demonstrated by applying the Attachment A to the Appendix B of the simplified modalities and procedures for CDM small-scale project activities.		OK
B.5.2 Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1//2/ /5//6/	DR	The additionality of the project is demonstrated by applying the Attachment A to the Appendix B of the simplified modalities and procedures for CDM small-scale project activities.		OK
B.5.3 Is sufficient evidence provided to support the relevance of the arguments made?	/1//2/ /5//6/	DR	The additionality of the project is demonstrated by applying the Attachment A to the Appendix B of the simplified modalities and procedures for CDM small-scale project activities.		OK
B.5.4 What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1//2/ /5//6/	DR	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//2/ /5//6/	DR	The project participants published the PDD version 01 of 17 September 2007 for global stakeholder consultation on 28 September 2007.		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//2/ /5//6/	DR	NA – it is before 2 August 2008.		OK
Continuous efforts to secure CDM status (only to be	/1//2/				

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completed if starting date is before 2 August 2008)	/5//6/				
B.5.7 What initiatives where 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//2/ /5//6/	DR	The project participants submitted documents to the local Environmental Agency for licensing on 3 December 2007, obtained approval from ANEEL on March and May 2008 for Juliões and Caquende respectively.		OK
B.5.8 When did the construction of the project activity start?	/1//2/ /5//6/	DR	Initially planned to April 2008 and actual date is April 2012.		OK
B.5.9 When was the project commissioned?	/1//2/ /5//6/	DR	Not yet.		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//2/ /5//6/	DR	Yes, as described in vii above.		OK
Investment analysis (VVM para 108-114) *The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.*					
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//2/ /5//6/	DR	Yes, and it is reflected in the PDD version 05.2 of 15 December 2010.		OK
B.5.12 Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1//2/ /5//6/	DR	No, and it is reflected in the PDD version 05.2 of 15 December 2010.		OK
B.5.13 Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1//2/ /5//6/	DR	Since the proposed project generates financial and economic benefits through the sales of electricity other than CDM-related income and the alternative does not involve any investment, a benchmark analysis is applicable.		OK
B.5.14 Is the benchmark/discount rate the latest	/1//2/	DR	Yes, the benchmark chosen was SELIC for		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
available at the time of decision?	/5//6/		the three years before the decision to invest into the project March 2008.		
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//2/ /5//6/	DR	It is the IRR, on equity basis, after taxes and in correspondence with the benchmark.		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//2/ /5//6/	DR	Yes, they are appropriate.		OK
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//2/ /5//6/	DR	Not applicable		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//2/ /5//6/	DR	The operational lifetime of the proposed project activity is expected to be 30 years, according the Federal Decree 41.019 article 79 /45/ which establish all types of electricity services in Brazil to be granted with 30 years of concession period. The concession will not be renewed.		OK
B.5.19 When 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//2/ /5//6/	DR	Yes, it is confirmed that data from PDD and FSR are consistent.		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//2/ /5//6/	DR	☒ 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		OK

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			☐ The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) ☐ Other approach. *Provide details on how the load factor was validated::* • - Technical application for ANEEL was 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//2//5//6//39/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the output price was validated:* • Electric price as the auctions carried out by ANEEL.		OK
B.5.22 How was 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//2//5//6//13//14//16/.	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements, contracts and annual financial reports related to the project and the project participants *Provide details on how the investment costs were validated:* • The investment involved by the project (i.e. the project cost of both power plants		OK

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			in the bundle) was verified from the implementation proposal issued by ConEnergia;		
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//2/ /5//6/	DR	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the O&M costs were validated:* • O&M according CCEE regulations		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//2/ /5//6/ /13/ /14/	DR	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how other input parameters were validated:* • Amount of electricity generated (for each power plant as assured capacity established by Feasible Study reports approved by ANEEL.		OK
B.5.25 Was the financial calculation spreadsheet verified and found to be correct?	/1//2/ /5//6/	DR	Yes, was verified and found to be correct.		OK
B.5.26 Sensitivity analysis: Have the key parameters contributing to more than 20% of the	/1//2/ /5//6/	DR	Yes, sensitivity analysis by varying the parameters likes initial investment, O&M		OK

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revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?			cost and electricity price. The same has been carried out to check the robustness of the financial analysis presented.		
B.5.27 Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1//2/ /5//6/	DR	Yes, all parameter considered were changed until reach the benchmark and assess the likelihood of it be happen.		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//2/ /5//6/	DR	Yes • The investment would be low 20% (cost based on contract) • The O&M would be low 100% • Electricity price would be higher 17.4% (electricity auctions of ANEEL show tendency to be lower)		OK
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/ /43/	DR	It was discussed that projects such as "Caquende and Juliões Small Hydroelectric Power Plants" are not widely observed and commonly carried out in Brazil. As verified on Brazilian Electricity Market (ANEEL Generation Database 2007 only 1.75% of the Brazil's installed capacity comes from small-hydro projects, what corresponds to 1.99 GW. According the ANEEL, Brazil has 25.9 GW potential capacity from SHP not yet installed. /43/. The power generation is directly dependent on the natural variation of the river flow. The feasible studies of Caquende and Juliões /9//10/ show that the Macaúbas River has restriction on flow during dry season.		OK

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			The above risks can explain the low interest of investors in SHP and can be considered when explaining why only 7.1% of the potential capacity from SHP is installed (1.99 GW out of 27.89 GW). Given the above barriers, it is sufficiently demonstrated that the project is not a likely baseline scenario for the 7-year renewable credit period and that emission reductions thus are additional to what would otherwise have occurred.		
B.5.30 **How were the investment barriers assessed to be real? Are the investment** barriers **substantiated by a source independent of the project participants?**	/1//2/ /5//6/	DR	See B.5.29.		OK
B.5.31 How does CDM alleviate the investment barriers?	/1//2/ /5//6/	DR	The IRR on 30 years reach 12.15%, which is below the selected benchmark (SELIC) of 15.47% mentioned on benchmark selection		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//2/ /5//6/	DR	Yes. Other alternative proposed is the continuation of the current conditions.		OK
B.5.33 How were the technological barriers assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1//2/ /5//6/	DR	NA -Technological barriers were not considered by Project participants.		OK
B.5.34 How does CDM alleviate the technological barriers?	/1//2/ /5//6/	DR	NA -Technological barriers were not considered by Project participants.		OK
B.5.35 Is the project activity prevented by the technological barriers and at least one of the possible	/1//2/ /5//6/	DR	NA -Technological barriers were not considered by Project participants.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
alternatives to the project activity is feasible under the same circumstances?					
B.5.36 How were the barriers due to prevailing practise assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/ /43/	DR	It was discussed that projects such as "Caquende and Juliões Small Hydroelectric Power Plants" are not widely observed and commonly carried out in Brazil. As verified on Brazilian Electricity Market (ANEEL Generation Database 2007 only 1.75% of the Brazil's installed capacity comes from small-hydro projects, what corresponds to 1.99 GW. According the ANEEL, Brazil has 25.9 GW potential capacity from SHP not yet installed. /43/.		OK
B.5.37 How does CDM alleviate the barriers due to prevailing practise?	/1/ /43/	DR	It was discussed that projects such as "Caquende and Juliões Small Hydroelectric Power Plants" are not widely observed and commonly carried out in Brazil. As verified on Brazilian Electricity Market (ANEEL Generation Database 2007 only 1.75% of the Brazil's installed capacity comes from small-hydro projects, what corresponds to 1.99 GW. According the ANEEL, Brazil has 25.9 GW potential capacity from SHP not yet installed. /43/.		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/ /43/	DR	It was discussed that projects such as "Caquende and Juliões Small Hydroelectric Power Plants" are not widely observed and commonly carried out in Brazil. As verified on Brazilian Electricity Market (ANEEL Generation Database 2007 only 1.75% of the		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Brazil's installed capacity comes from small-hydro projects, what corresponds to 1.99 GW. According the ANEEL, Brazil has 25.9 GW potential capacity from SHP not yet installed. /43/.		
B.5.39 How were the <u>other</u> barriers assessed to be real? Are the other barriers substantiated by a source independent of the project participants**?**	/1/	DR	The power generation is directly dependent on the natural variation of the river flow. The feasible studies of Caquende and Juliões /9//10/ show that the Macaúbas River have restriction on flow during dry season and the load factor could reach only 53%, increasing the risk of operational result, as evidence on financial analysis. The above risks can explain the low interest of investors in SHP and can be considered when explaining why only 7.1% of the potential capacity from SHP is installed (1.99 GW out of 27.89 GW). Given the above barriers, it is sufficiently demonstrated that the project is not a likely baseline scenario for the 7-year renewable credit period and that emission reductions thus are additional to what would otherwise have occurred.		OK
B.5.40 How does CDM alleviate the other barriers?	/1/ /9/ /10/	DR	The power generation is directly dependent on the natural variation of the river flow. The feasible studies of Caquende and Juliões /9//10/ show that the Macaúbas River have restriction on flow during dry season and the load factor could reach only 53%, increasing		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			the risk of operational result, as evidence on financial analysis. The above risks can explain the low interest of investors in SHP and can be considered when explaining why only 7.1% of the potential capacity from SHP is installed (1.99 GW out of 27.89 GW). Given the above barriers, it is sufficiently demonstrated that the project is not a likely baseline scenario for the 7-year renewable credit period and that emission reductions thus are additional to what would otherwise have occurred.		
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/ /9/ /10/	DR	The power generation is directly dependent on the natural variation of the river flow. The feasible studies of Caquende and Juliões /9//10/ show that the Macaúbas River has restriction on flow during dry season and the load factor could reach only 53%, increasing the risk of operational result, as evidence on financial analysis. The above risks can explain the low interest of investors in SHP and can be considered when explaining why only 7.1% of the potential capacity from SHP is installed (1.99 GW out of 27.89 GW). Given the above barriers, it is sufficiently demonstrated that the project is not a likely baseline scenario for the 7-year renewable credit period and that emission reductions		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			thus are additional to what would otherwise have occurred.		
Common practice analysis (VVM para 119-121)					
B.5.42 What is the geographical scope of the common practice analysis? Is this justified?	/1//2/ /5//6/	DR	Brazil, the country of the project and its Electric Energy System.		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//2/ /5//6/	DR	Small Hydropower Plants of less than 30 MW, similar to the project.		OK
B.5.44 What is the data source(s) used for the common practice analysis?	/1/ /43/	DR	It was discussed that projects such as "Caquende and Juliões Small Hydroelectric Power Plants" are not widely observed and commonly carried out in Brazil. As verified on Brazilian Electricity Market (ANEEL Generation Database 2007 only 1.75% of the Brazil's installed capacity comes from small-hydro projects, what corresponds to 1.99 GW		OK
B.5.45 How many similar non-CDM-projects exist in the region within the scope?	/1/ /43/	DR	According the ANEEL, Brazil has 25.9 GW potential capacity from SHP not yet installed. /43/.		OK
B.5.46 How were possible essential distinctions between the project activity and similar activities assessed?	/1//2/ /5//6/	DR	Projects are considered similar.		OK
B.5.47 What is the conclusion of the common practice analysis?	/1//2/ /5//6/	DR	The above risks can explain the low interest of investors in SHP and can be considered when explaining why only 7.1% of the potential capacity from SHP is installed (1.99 GW out of 27.89 GW).		OK
Conclusion					
B.5.48 What is the conclusion with regard to the	/1/	DR	Given the above barriers, it is sufficiently		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
additionality of the project activity?			demonstrated that the project is not a likely baseline scenario for the 7-year renewable credit period and that emission reductions thus are additional to what would otherwise have occurred.		
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 insert parameter available at validation verified?	/1/ /30/ /36/	DR	Project emissions are considered zero for this project. Baseline emissions have been estimated based on the expected electricity generation from the proposed project activity and the ex ante calculated grid emission factor sourced from the Brazilian DNA. The grid emission factor published by the Brazilian DNA is based on the most recent information available at the time of publication of version 3 of the PDD /36/. Based on the expected electricity generation of 34 426 MWh per year and the grid emission factor for 2007 of 0.1842 tCO_2e/MWh. Considering the energy produced by the old Caquende unit, the expected electricity generation should be calculated as: $$EG_{add,\,y} = EG_{PJ,\,y} - EG_{existing,\,y}$$ Where: $EG_{add,\,y}$ =Net increase in electrical energy generation at existing plant in year *y*; kWh/y $EG_{PJ,\,y}$ =The total net actual electrical energy		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			produced in year *y* by the new project units; kWh/y $EG_{existing,\,y}$ = The estimated net electrical energy that would have been produced by existing units (installed before the project activity) in year *y* in the absence of the project activity, kWh/y considered as 0.8 MW of installed capacity /33/ as the produced electricity had reach only 0.78MW **/21/**: The PDD version 05.2 estimated amount of GHG emission reductions from the project is 44 387 tCO_2e during the first crediting period (7 years), resulting in estimated average annual emission reductions of 6 341 tCO_2e.		
Baseline emissions (VVM para 89-93)					
B.6.2 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Yes, they are according to AMS-I.D version 16		OK
B.6.3 Have conservative assumptions been used when calculating the baseline emissions?	/1//2/ /5//6/	DR	Yes, conservative assumptions have been used.		OK
B.6.4 Are uncertainties in the baseline emission estimates properly addressed?	/1//2/ /5//6/	DR	Yes, they are properly addressed.		OK
Project emissions (VVM para 89-93)					
B.6.5 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1//2/ /5//6/	DR	N/A. According to the baseline and monitoring methodology AMS-I.D version16.		OK
B.6.6 Have conservative assumptions been used when calculating the project emissions?	/1//2/ /5//6/	DR	N/A. According to the baseline and monitoring methodology AMS-I.D version16.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.6.7 Are uncertainties in the project emission estimates properly addressed?	/1//2/ /5//6/	DR	N/A. According to the baseline and monitoring methodology AMS-I.D version16.		OK
Leakage (VVM para 89-93)					
B.6.8 Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1//2/ /5//6/	DR	No sources of leakage emission were identified according to AMS-I.D (Version 16). It has been informed that electricity generation equipment is not transferred from any other activity.		OK
B.6.9 Have conservative assumptions been used when calculating the leakage emissions?	/1//2/ /5//6/	DR	As verified during the site visit, the equipments will be manufactured and delivered according the specification of flow and pressure of Caquende and Juliões SHP.		OK
B.6.10 Are uncertainties in the leakage emission estimates properly addressed?	/1//2/ /5//6/	DR	No sources of leakage emission were identified according to AMS-I.D (Version 16). It has been informed that electricity generation equipment is not transferred from any other activity.		OK
Emission Reductions (VVM para 89-93)					
B.6.11 Algorithms and/or formulae used to determine emission reductions: • 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	/1//2/ /5//6/	DR	The project is expected to reduce CO_2 emissions to the extent of 44 387 tCO2e (6 341 tCO2e/year on average) during the first renewable 7-year crediting period.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
submitted for registration.					
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//2/ /5//6/	DR	Yes, the approved monitoring methodology AMS-I.D version16 has been used.		OK
B.7.2 Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1//2/ /5//6/ /48/.	DR	Details of data to be collected, data recording frequency and its format are described in the PDD version 05.2 of 15 December 2010. The data will be archived in electronic form and be kept for two years after the end of the last crediting period. The electricity generated by the hydropower plant and supplied to the grid will be monitored with a calibrated meters according Brazilian standard /48//51/. The generated energy by power plant will be multiplied by the combined margin emission coefficient for the grid.		OK
B.7.3 In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1//2/ /5//6/	DR	Details of the data to be collected, the frequency of data recording and its format are described in the PDD version 05.2 of 15 December 2010. The data will be archived in electronic form and be kept for two years after the end of the last crediting period. The electricity generated by the hydropower plant and supplied to the grid will be monitored with a calibrated meter according to Brazilian standard /48//51/.		OK
B.7.4 In case parameters are measured, is the	/1/	DR	Details of the data to be collected, the		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.			frequency of data recording and its format are described in the PDD version 05.2 of 15 December 2010. The data will be archived in electronic form and be kept for two years after the end of the last crediting period.		
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/ /48/ /51/	DR	The calibration will be performed according to national standard according to Brazilian standard /48//51/.		OK
B.7.6 Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter**.**	/1/ /51/	DR	The calibration will be performed according to Brazilian standard /48//51/		OK
B.7.7 Is the recording frequency adequate for all monitoring parameters? Describe each parameter**.**	/1/	DR	Yes		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	Details of the data to be collected, the frequency of data recording and its format are described in the PDD version 05.2 of 15 December 2010. The data will be archived in electronic form and be kept for two years after the end of the last crediting period.		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)?			Not yet. Details of the data to be collected, the frequency of data recording and its format are described in the PDD version 05.2 of 15 December 2010.		OK
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	/1/	DR	Yes. Details of the data to be collected, the frequency of data recording and its format are described in the PDD version 05.2 of 15		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
and verified?			December 2010.		
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	The data will be archived in electronic form and be kept for two years after the end of the last crediting period.		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//2/ /5//6/	DR	The simplified monitoring methodology AMS-I.D version 16 and the Brazilian DNA don't require the monitoring of social and environmental indicators.		OK
B.7.13 Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1//2/ /5//6/	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//2/ /5//6/	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//2/ /5//6/	DR	The project starting date was 6 October 2006. The actual project starting date considering EB 49 is 12 March 2008 (Contract with turbine supplier) The first construction activity was initially planned to April 2008 and actual date was 2012.		OK
C.1.3 Is the stated expected operational lifetime of the project activity reasonable?	/1//2/ /5//6/ /45/	DR	The operational lifetime of the proposed project activity is expected to be 30 years, according the Federal Decree 41.019 article		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			79 which establish all types of electricity services in Brazil to be granted with 30 years of concession period. The concession will not be renewed.		
C.1.4 Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1//2/ /5//6/	DR	Yes, it is clearly defined and reasonable. A renewable 7-year crediting period (with the potential of being renewed twice) was selected, starting on 01 May 2013 or the date of registration, whichever is later.		OK
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/	DR	Yes, According to Brazilian environmental law a preliminary environmental assessment is required to grant the construction license. The application process was done under protocol numbers 438982/2007 and 630271/2007 for Caquende and Juliões SHPs respectively, with the LI granted on February 2009 valid until 2013.		OK
D.1.2 Does the project comply with environmental legislation in the host country?	/1//2/ /5//6/	DR	Yes. Also see D.1.1		OK
D.1.3 Will the project create any adverse environmental effects?	/1//2/ /5//6/	DR	No. Also see D.1.1		OK
D.1.4 Have identified environmental impacts been addressed in the project design?	/1//2/ /5//6/	DR	Yes. Also see D.1.1		OK

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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/ /2/ /5/ /6/	DR	Local stakeholders were invited to comment on the project in accordance with the requirements of Resolution 7 of the Brazilian DNA.		OK
E.1.2 Have appropriate media been used to invite comments by local stakeholders?	/1/ /2/ /5/ /6/	DR	Yes, Also see E.1.1		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/ /2/ /5/ /6/	DR	Yes, According Brazilian DNA Resolution 7		OK
E.1.4 Is a summary of the stakeholder comments received provided?	/1//2/ /5//6/	DR	No comments were received.		OK
E.1.5 Has due account been taken of any stakeholder comments received?	/1//2/ /5//6/	DR	Not Applicable		OK

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APPENDIX B

INITIAL CDM VALIDATION PROTOCOL

Table 2 Requirements Checklist

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A. General Description of Project Activity					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	**/1//2/ /5//6/**	DR	The project is located in the municipality of Bonfim, Minas Gerais State, Brazil. Caquende SHP is located at geographical coordinates of 20°23'22" S and 44°11'21"W, and Juliões SHP is located at geographical coordinates of 20°22'05" S and 44°11'45"W		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	**/1//2/ /5//6/**	DR	The project boundary is defined as the physical, geographical site of the renewable generation source. So, in accordance with AMS-I.D version 16, the project boundary includes the Brazilian interconnected grid system to which the project plants will be connected by transmission line.		OK
A.2. Participation Requirements *Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.*					
A.2.1. Which Parties and project participants are participating in the project?	**/1//2/ /5//6/**	DR	The Project participant is Companhia Energética Integrada Ltda of Brazil and Mitsubishi UFJ Morgan Stanley Securities Co. Ltd., former Mitsubishi UFJ Securities Co. Ltd. of Japan. The host Party Brazil and the Annex I Party Japan meet all relevant participation requirements.		OK
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all	**/1//2/**	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.
private/public project participants been authorized by an involved Party?	/5//6/		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.2.3. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1//2/ /5//6/	DR	Yes, Brazil fulfils all requirements.		OK
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1//2/ /5//6/	DR	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.		OK
A.3. Technology to be employed *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					
A.3.1. Does the project design engineering reflect current good practices?	/1//2/ /5//6/	DR	The project design engineering reflects good practice. Caquende SHP utilizes two Francis turbines with an installed capacity of 1.625 MW each, and one Francis turbine with an installed capacity of 0.75 MW. Juliões SHP utilizes two Francis turbines with an installed capacity of 1.4 MW each, and one Francis turbine with an installed capacity of 0.6 MW. According to the ANEEL resolutions # 1687 and #2821, the Caquende SHP will have 3.3 MW of installed capacity while Juliões SHP will have 2.65 MW of installed capacity, respectively instead of the values reported in the PDD. DNV	~~CL 1~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			requests further clarifications about this difference in the installed **capacity.** Relevant documents related to project design have not been provided to DNV. The following documents are therefore requested: - copy of the Feasibility Study, in particular the part that presents the estimation of plant capacity factor, plant generation per year and power dispatched to the grid; - copy of the Power Purchase Agreement; - registration of the plant in the National Electricity Agency.	~~CL 2~~	OK
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	**/1//2/ /5//6/**	DR	There was no transfer of technology, as the one used in the project activity is Brazilian.		OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	**/1//2/ /5//6/**	DR	The project documentation does not report about provisions for meeting training and maintenance needs.	~~CL 9~~	OK
A.4. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	**/1//2/ /5//6/**	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.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	**/1//2/**	DR	The project is expected to bring social, environmental, economic, resources management		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	/5//6/		and technological and infrastructure benefits, thus contributing to sustainable development objectives of the Brazilian Government.		
A.5. Small scale project activity *Tit is assessed whether the project qualifies as small-scale CDM project activity*					
A.5.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?	/1//2/ /5//6/		The project applies the simplified baseline methodology for selected small-scale CDM project activity AMS-I.D version16 – "Grid connected renewable electricity generation" for Type I – Renewable Energy Project as outlined in the Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities": Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities. This category is applicable as the project is a run of river hydroelectric power plant with total installed capacity below the 15 MW thresholds, and it supplies electricity to a Brazilian electricity grid. The electricity generation capacity is 7.4 MW.		OK
A.5.2. Is the small scale project activity not a debundled component of a larger project activity?	/1//2/ /5//6/		The project has been confirmed not to be a de-bundled component of a larger project activity.		OK
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline*					

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
methodology.					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	**/1//2/ /5//6/**	DR	The project applies the simplified baseline methodology for selected small-scale CDM project activity AMS-I.D version16 – "Grid connected renewable electricity generation" for Type I – Renewable Energy Project as outlined in the Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities": Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities		OK
B.1.2. (Are the applicability criteria in the baseline methodology all fulfilled?	**/1//2/ /5//6/**	DR	The AMS-I.D version16 is applicable as the project is a run of river hydroelectric power plant with total installed capacity below the 15 MW thresholds, and it supplies electricity to a Brazilian electricity grid. The electricity generation capacity is 7.4 MW.		OK
B.2. Baseline Scenario Determination *The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.*					
B.2.1. What is the baseline scenario?	**/1//2/ /5//6/**	DR	The baseline scenario is defined as the electricity being generated by the grid, dominated by large hydropower and fossil fuel-based power plants,		OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	**/1//2/ /5//6/**	DR	The other alternative scenarios is the continuation of the current practice of electricity generation with significant participation of large hydropower plants and fossil fuel-fired thermal plants in the grid and no implementation of the project activity		OK
B.2.3. Has the baseline scenario been determined according to the methodology?	**/1//2/ /5//6/**	DR	See B.2.1.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	**/1//2/ /5//6/**	DR	See B.2.1.		OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	**/1//2/ /5//6/**	DR	See B.2.1.		OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	**/1//2/ /5//6/**	DR	See B.2.1.		OK
B.2.7. Have the major risks to the baseline been identified?	**/1//2/ /5//6/**	DR	See B.2.1.		OK
B.3. Additionality Determination *The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.*					
B.3.1. Is the project additionality assessed according to the methodology?	**/1//2/ /5//6/**	DR	The additionality of the project is demonstrated by applying the Attachment A to the Appendix B of the simplified modalities and procedures for CDM small-scale project activities.		OK
B.3.2. Are all assumptions stated in a transparent and conservative manner?	**/1//2/ /5//6/**	DR	Regarding to the project additionality, the presented barriers are not clearly justified. The investment barrier needs to be further substantiated. Technological and prevailing business practice barriers need to be clarified. Why hydrological risk could be considered as a technological barrier? All technologies involved in this scenario are available in the market, and have been widely used in Brazil. DNV request a	~~CAR 1~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			transparent discussion about the barriers. In addition, DNV requests evidences that support the barriers presented.		
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	**/1//2/ /5//6/**	DR	The starting date and thus the commitment to significant expenditures were in March 2008. However, the actual investment decision date for the project (the decision in October 2006 was to develop this project as a CDM project. The project should demonstrate that the project is not financially attractive in absence of the CDM when they made the decision to invest into the project in March 2008.	~~CAR 3~~	OK
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	**/1//2/ /5//6/**	DR	The preview starting date of the project activity was 6 October 2006. The starting date of a project activity should be the earliest of implementation, construction and real action. Please clarify what event corresponds to the chosen date. According to the Aneel resolutions # 70 issued on 9 February 2000, Caquende SHP has been operating since 1994. DNV requests further clarifications regarding the starting date of the project.	 ~~CL 3~~ ~~CL 4~~	OK
B.4. Calculation of GHG Emission Reductions – Project emissions *It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	**/1//2/ /5//6/**	DR	N/A. According to the baseline and monitoring methodology AMS-I.D version16.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4.2. Have conservative assumptions been used when calculating the project emissions?	**/1//2/ /5//6/**	DR	See B.4.1.		OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	**/1//2/ /5//6/**	DR	See B.4.1.		OK
B.5. Calculation of GHG Emission Reductions – Baseline emissions *It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	**/1//2/ /5//6/**	DR	The methodologies for calculating emissions reductions are not transparently documented. In the item B.6.3 of the PDD, the relevant equations applied for the calculation of baseline emissions are not provided. No sources of leakage emission were identified according to AMS-I.D version 16. It has been informed that electricity generation equipment is not transferred from any other activity. DNV requests evidence that no renewable energy equipment will be transferred to or from the activity creating a leakage **situation.** Project emissions are considered zero for this project. Baseline emissions are calculated by multiplying the electricity exported by the project activity to the Brazilian grid with an ex-ante determined baseline grid emissions factor. The emission reduction calculations have been presented, considering the energy to be delivered	~~CL 11~~ ~~CL 5~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			to the grid and the Combined Margin, consisting of the average of the operating margin (OM) and build margin (BM) for the Brazilian grid. For the calculation of the OM, option (b) simple adjusted OM was utilized. Besides, Option (1) was selected in order to calculate the BM emission factor EF_{BM} ex-ante. The values calculated for build margin (BM) is 0.0775 tCO2e/MWh and operating margin (OM) is 0.2909 tCO2equiv/MWh, respectively. The emission factor is 0.1842 tCO2/MWh. The calculations are based on the National Electricity System Operator (ONS) for the electricity generated in the Brazilian grid in the 2007 /36/. The combined margin emission coefficient for the Brazilian grid is determined ex-ante in accordance with "Tool to calculate the emission factor for an electricity system" /30/. The calculations are based on electricity generation data provided by the National Electricity System Operator (ONS) for the electricity generated in grid in the years 2003-2005, in spite of in the years 2004-2006. For the determination of the grid emission factor, electricity generation data from the period 2003-2005 is adopted in PDD version 1. This is not the most recent available electricity generation data by the time the PDD version 1 was published The λ factor was calculated by interpolating daily dispatch data for thermal power plants and daily dispatch data for hydropower plants. The selected approach for calculating λ is in accordance with "Tool to calculate the emission factor for an		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			electricity system" The PDD version 05.2 estimated amount of GHG emission reductions from the project is 44 387 tCO_2e during the first crediting period (7 years), resulting in estimated average annual emission reductions of 6 341 tCO_2e. A spreadsheet for the calculation of the emission reductions was not provided to confirm this estimation. DNV requests the data used for the baseline determination, the calculation sheet for the grid emission factor, the calculations of the OM and BM emission coefficient used to estimate emission reductions. The data used for calculation has to be provided along with the data sources.	**CAR 2** ~~CL 12~~	
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	**/1//2/ /5//6/**	DR	The baseline scenario is defined as the electricity being generated by the grid, dominated by large hydropower and fossil fuel-based power plants, however as the old Caquende SHP was restarted on 2006 and operate until the present date, the baseline scenario should be the continuation of Caquende SHP. DNV request more information.	~~CAR 4~~	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	**/1//2/ /5//6/**	DR	See B.5.1.		OK
B.6. Calculation of GHG Emission Reductions – Leakage *It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of*					

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
default factors and values – where applicable – is justified.					
B.6.1. Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	**/1//2/ /5//6/**	DR	No sources of leakage emission were identified according to AMS-I.D version 16. It has been informed that electricity generation equipment is not transferred from any other activity. DNV requests evidence that no renewable energy equipment will be transferred to or from the activity creating a leakage **situation.**	~~CL 5~~	OK
B.6.2. Have conservative assumptions been used when calculating the leakage emissions?	**/1//2/ /5//6/**	DR	See B.6.1.		OK
B.6.3. Are uncertainties in the leakage emission estimates properly addressed?	**/1//2/ /5//6/**	DR	See B.6.1.		OK
B.7. Emission Reductions *The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.*					
B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	**/1//2/ /5//6/**	DR	The project is expected to reduce CO_2 emissions to the extent of 44 387 tCO2e (6 341 tCO2e/year on average) during the first 7-year renewable crediting period.		OK
B.8. Monitoring Methodology *It is assessed whether the project applies an appropriate monitoring methodology.*					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	**/1//2/ /5//6/**	DR	Yes, the approved monitoring methodology AMS-I.D version16 – "Grid connected renewable electricity generation" for Type I – Renewable Energy Project, according to the Appendix B of the "Simplified modalities and procedures for small-scale CDM project activities": Indicative simplified baseline and monitoring		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			methodologies for selected small-scale CDM project activities has been used.		
B.8.2. 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//2/ /5//6/**	DR	The data will be archived in electronic form and be kept for two years after the end of the last crediting period.		OK
B.9. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
I. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	**/1//2/ /5//6/**	DR	According to the project category and the corresponding methodology, project emissions are zero.		OK
B.9.1. Are the choices of project GHG indicators reasonable and conservative?	**/1//2/ /5//6/**	DR	See B.9.1		OK
B.9.2. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	**/1//2/ /5//6/**	DR	See B.9.1		OK
B.9.3. Is the measurement equipment described and deemed appropriate?	**/1//2/ /5//6/**	DR	See B.9.1		OK
B.9.4. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	**/1//2/ /5//6/**	DR	See B.9.1		OK
B.9.5. Is the measurement *interval* identified and	**/1//2/**	DR	See B.9.1		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
deemed appropriate?	/5//6/				
B.9.6. Is the *registration, monitoring, measurement* and *reporting* procedure defined?	/1//2/ /5//6/	DR	See B.9.1		OK
B.9.7. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	/1//2/ /5//6/	DR	See B.9.1		OK
B.9.8. 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//2/ /5//6/	DR	See B.9.1		OK
B.10. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.*					
B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1//2/ /5//6/	DR	Details of the data to be collected, the frequency of data recording and its format are described in the PDD. The data will be archived in electronic form and be kept for two years after the end of the last crediting period. The electricity generated by the hydropower plant and supplied to the grid will be monitored with a calibrated meter and recorded according to Brazilian standards requirements. The generated energy by power plant will be multiplied by the combined margin emission coefficient for the grid. The meters calibration is according to Brazilian standard /48//51/.		OK
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1//2/ /5//6/	DR	The monitoring plan had considered the emission factor of the Brazilian grid as ex ante (B6.2) and	~~CL 15~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			ex post (B.7.1) figure. DNV request clarify.		
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	**/1//2/ /5//6/**	DR	According to AMS-I.D version 16, the amount of each fossil fuel consumed by each power source, the CO2 emission coefficient of each fuel type, the electricity generation of each power source, the identification of power source for the OM and BM, the electricity imported to the project electricity system and CO2 emission coefficient of fuels used in connected electricity systems (if imports occur) need to be specified ex-ante. However, section B.6.2 of the PDD does not mention all the parameters that need to be available for the validation stage. Parameter values from IPCC 2006 guidelines are required to be used. In section B.6.2 of the PDD, value from the IPCC 1996 was used for the emission factor.	~~CL 6~~ ~~CL 7~~	OK
B.10.4. Is the measurement *equipment* described and deemed appropriate?	**/1//2/ /5//6/**	DR	Yes Also see B.10.1.		OK
B.10.5. Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	**/1//2/ /5//6/**	DR	At the Brazilian Electricity Market, and verified during the site visit for Caquende and Juliões project, the electricity exported to the grid is measured and and recorded according to national standards requirements..		OK
B.10.6. Is the measurement *interval* for baseline data identified and deemed appropriate?	**/1//2/ /5//6/**	DR	Yes. Monthly		OK
B.10.7. Is the registration, *monitoring*, *measurement* and *reporting* procedure defined?	**/1//2/ /5//6/**	DR	The authority and responsibility for project management, monitoring, measurement, review and reporting has been established.	~~CL 8~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Responsibilities and authorities for organizing and training of the staff in the appropriate monitoring, measurement and reporting techniques are not clearly defined.		
B.10.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	**/1//2/ /5//6/**	DR	The project documentation does not report about provisions for meeting training and maintenance needs. The equipments will be calibrated according to Brazilian standard /48//51/.	~~CL 9~~	OK
B.10.9. 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//2/ /5//6/**	DR	Details of the data to be collected, the frequency of data recording and its format are described in the PDD. The data will be archived in electronic form and be kept for two years after the end of the last crediting period.		OK
B.11. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					
B.11.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	**/1//2/ /5//6/**	DR	No sources of leakage emission were identified according to AMS-I.D version 16. It has been informed that electricity generation equipment is not transferred from any other activity. DNV requests evidence that no renewable energy equipment will be transferred to or from the **activity creating a** leakage **situation.**	~~CL 5~~	OK
B.11.2. Are the choices of project leakage indicators reasonable and conservative?	**/1//2/ /5//6/**	DR	See B.11.1.		OK
B.11.3. Is the measurement method clearly stated for each leakage value to be monitored and deemed appropriate?	**/1//2/ /5//6/**	DR	See B.11.1.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	**/1//2/ /5//6/**	DR	The simplified monitoring methodology AMS-I.D neither the Brazilian DNA does not require the monitoring of social and environmental indicators.		OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	**/1//2/ /5//6/**	DR	See B.12.1		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	**/1//2/ /5//6/**	DR	See B.12.1		OK
B.13. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
B.13.1. Is the authority and responsibility of overall project management clearly described?	**/1//2/ /5//6/**	DR	The authority and responsibility for project management, monitoring, measurement, review and reporting has been established. Responsibilities and authorities for organizing and training of the staff in the appropriate monitoring, measurement and reporting techniques are not clearly defined. No specific procedures beyond the already established QA/QC procedures will be necessary. The established procedures reflect good monitoring and reporting practices.	~~CL 8~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.13.2. Are procedures identified for training of monitoring personnel?	**/1//2/ /5//6/**	DR	The project documentation does not report about provisions for meeting training and maintenance needs.	~~CL 9~~	OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	**/1//2/ /5//6/**	DR	No unintended emissions are foreseen.		OK
B.13.4. Are procedures identified for review of reported results/data?	**/1//2/ /5//6/**	DR	There are no procedures identified for project performance reviews and corrective actions.	~~CL 10~~	OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	**/1//2/ /5//6/**	DR	See B.13.4.		OK
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	**/1//2/ /5//6/**	DR	The project starting date was 6 October 2006. The actual project starting date considering EB 49 is 12 March 2008(Contract with turbine supplier) The expected lifetime for these small hydro powers facilities is 30 years. The starting date of a project activity should be the earliest of implementation, construction and real action. Please clarify what event corresponds to the chosen date.	~~CL 3~~	**OK**
C.1.2. Is the start of the crediting period clearly defined and reasonable?	**/1//2/ /5//6/**	DR	A renewable 7-years crediting period (with the potential of being renewed twice) was selected, starting on 01 May 2012 or the date of registration, whichever is later.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
D. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
D.1.1. Does host country legislation require an analysis of the environmental impacts of the project activity?	**/1//2/ /5//6/**	DR	As stated in the PDD, the project has started the application process of the construction license. According to Brazilian environmental law a preliminary environmental assessment is required to grant the construction license. DNV requests documented evidences of the preliminary environmental assessment.	~~CL 13~~	OK
D.1.2. Does the project comply with environmental legislation in the host country?	**/1//2/ /5//6/**	DR	Yes. Also See D.1.1.	~~CL 13~~	OK
D.1.3. Will the project create any adverse environmental effects?	**/1//2/ /5//6/**	DR	No. Also See D.1.1.		OK
D.1.4. Have environmental impacts been identified and addressed in the PDD?	**/1//2/ /5//6/**	DR	Yes. Also See D.1.1.		OK
E. Stakeholder Comments *The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.*					
E.1.1. Have relevant stakeholders been consulted?	**/1//2/ /5//6/**	DR	Local stakeholders were invited to comment on the project in accordance with the requirements of Resolution 1 of the Brazilian DNA.	~~CL 14~~	OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	**/1//2/ /5//6/**	DR	Yes, Also See E.1.1		OK
E.1.3. If a stakeholder consultation process is required	**/1//2/**	DR	Yes, According Brazilian DNA Resolution 7		OK

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by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	**/5//6/**		Also See E.1.1		
E.1.4. Is a summary of the stakeholder comments received provided?	**/1//2/ /5//6/**	DR	No comments were received. Also See E.1.1		OK
E.1.5. Has due account been taken of any stakeholder comments received?	**/1//2/ /5//6/**	DR	Not Applicable Also see E.1.1 and E.1.4		OK

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Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR 1 Regarding to the project additionality, the presented barriers are not clearly justified. The investment barrier needs to be further substantiated. Technological and prevailing business practice barriers need to be clarified. Why hydrological risk could be considered as a technological barrier? All technologies involved in this scenario are available in the market, and have been widely used in Brazil. DNV request a transparent discussion about the barriers. In addition, DNV requests evidences that support the barriers presented.	B.3.2 B.3.3	Regarding the investment barrier, the IRR values were provided in PDD version 5.2. IRR analyses demonstrate the low attractiveness of the project taking into account the high investment to start the project. Regarding prevailing practice, the common practice in Brazil has been the construction of large-scale hydropower plants, and more recently of thermal fossil fuel plants with natural gas, which also receive incentives from government. According to the 2007 Generation Database (BIG – *Banco de Informações de Geração*, updated in 11/08/2007) created by ANEEL[12], 21.09% of the electricity in the country is generated by thermal power plants, and this number tends to increase in the short term, since 47.45% of the projects approved between 1998 and 2007 are thermal power plants (compared to only 12.43% of small hydropower plants). Only 1.75% of the Brazilian installed capacity is generated from SHP sources (1.75 GW out of a total of 100.17 GW). In addition, out of 6.64 GW to be generated from the power plants under construction in the country, only 1.2 GW will be generated in SHPs	The IRR considering 30 years reach 12.15%, which is below the selected benchmark (SELIC) of 15.47% mentioned above. DNV compared the input parameters for the financial analysis included in the PDD version 05.2 of 15 December 2010 with the parameters stated in the Feasible Study reports /11//12/, electricity auctions /39/ as well as other relevant document, and was able to confirm that the values applied are consistent with the values stated in the mentioned before. In addition, as verified on Brazilian Electricity Market (ANEEL Generation Database 2007 only 1.75% of the Brazil's installed capacity comes from small-hydro projects, what corresponds to 1.99 GW. According the ANEEL, Brazil has 25.9 GW potential capacity from SHP not yet installed. The power generation is directly dependent on the natural variation of the river flow. The feasible studies of Caquende and Juliões /9//10/ show that the Macaúbas

[12] ANEEL Generation Database 2007. Available online (www.aneel.gov.br).

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		and 3.93 GW will be generated by large hydropower plants. The project faces no Technological barriers. PDD version 5.2 assumes hydrological risk as Other Barriers instead of Technological barrier.	River has restriction on flow during dry season and the load factor could reach only 53%, increasing the risk of operational result, as evidence on financial analysis. Due this, had been considered that risks are significant and the project would be not the likely scenario without the CDM. Therefore this CAR is closed.
CAR 2 The combined margin emission coefficient for the Brazilian grid is determined ex-ante in accordance with "Tool to calculate the emission factor for an electricity system" /30/. The calculations are based on electricity generation data provided by the National Electricity System Operator (ONS) for the electricity generated in grid in the years 2003-2005, in spite of in the years 2004-2006. For the determination of the grid emission factor, electricity generation data from the period 2003-2005 is adopted in PDD version 1. This is not the most recent available electricity generation data by the time the PDD version 1 was published.	B.5.1 B.5.2 B.5.3	In the PDD version 05.2 the emission factor, The BM and OM were calculated by the Designated National Authority (DNA) according to the "Tool to calculate emission factor" (version 01), for the year. The baseline estimation had applied the EF of 2007 and the monitoring will be calculated *ex-post* based on data of the year in which the project activity displaces grid electricity and the emission factor will be updated annually during monitoring.	Version 05.2 of the PDD was assessed and complies with the "Tool to calculate the emission factor for an electricity system". Therefore this CAR is closed.
CAR 3 The starting date and thus the commitment to significant expenditures were in March 2008. However, the actual investment decision date for the project (the decision in October 2006 was to develop this project as a CDM project. The project should demonstrate that the project is not financially attractive in absence of the CDM when	B.3.3	The reviewed PDD version 05.2 of 15 December 2010 had considered the time difference between the date when project owner decided to implement project as CDM and the actual starting date of the project activity, most updated financial analysis uses average values for SELIC rate of the most recent three years before actual project starting date (SELIC	The benchmark as SELIC for the three years before the decision to invest into the project, March 2008, had demonstrated the additionality of project. Therefore this CAR is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
they made the decision to invest into the project in March 2008.		values from January 2005 until December 2007 are considered). SELIC rate average for this period is 15.47%, which still is higher than project IRR. Under this circumstance, a bank deposit is more attractive and less risky than investing in the project	
CAR 4 The baseline scenario is defined as the electricity being generated by the grid, dominated by large hydropower and fossil fuel-based power plants, however as the old Caquende SHP was restarted on 2006 and operate until the present date, the baseline scenario should be the continuation of Caquende SHP. DNV request more information.	B.5.2	Old Caquende SHP was constructed by an iron company in 1980 for the sole purpose of attending to its own electricity demand. The steel company who owned the hydro power plant decommissioned it in 2001 and moved the steel facility to another region. CEI purchased the plant in 2006, planning to connect it to the grid for the purpose of using it as a pilot project. In 2005, CEI conducted an inventory study of Macaubas River, before they purchased the plant. This inventory study is a standard requisite for any small hydro power project developer in Brazil. In May 2006, CEI submitted a request to ANNEL (Brazilian Electricity Regulatory Agency) to recognize the inventory study, and ANEEL granted the recognition and officially registered the study in July of the same year via the Dispatch number 1452. As the plant was operating until the present date, the reviewed PDD version 05.2 had	The reviewed PDD version 05.2 had considered the hydro power capacity on 800 KW, as established on ANEEL resolution 52, /33/ as the maximum of actual and estimated electricity generated by the old facilities of Caquende, according the AMS.I.D Version 16 and calculated as the estimated net electrical energy that would have been produced by the existing units under the observed availability of the renewable resources was assessed from the ANEEL regulation # 52 /33/ and the net electricity to be considered as baseline emissions will be calculated as $EG_{add,\,y} = EG_{PJ,\,y} - EG_{\grave{e}xisting,}$. Therefore this CAR is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		changed the baseline and included the $EG_{exisitnq,\ y:}$ (The estimated net electrical energy that would have been produced by existing units (installed before the project activity) in year *y* in the absence of the project activity, kWh/y) considering the total capacity of the old equipment of 800 kW as ANEEL Resolution 52 according AMS.I.D v 16	
CL 1 According to the ANEEL resolutions # 1687 and #2821, the Caquende SHP will have 3.3 MW of installed capacity while Juliões SHP will have 2.65 MW of installed capacity, respectively instead of the values reported in the PDD. DNV requests further clarifications about this difference in the installed capacity.	A.3.1	The values in resolutions # 1687 and # 2821 are from a preliminary study of the whole Macaubas river. The values presented in the PDD version 05.2 correspond to the resulting values from the Basic Project, which is specific for both plants. The data of the Basic Project are more precise than the preliminary study of whole river, because it focuses in the Caquende and Juliões plants. The values stated in the PDD and in the Basic Project were already submitted to ANEEL. For Juliões SHP it was already approved though ANEEL decision 979 of 12 March 2008. Project participant is waiting ANEEL decision with regards to Caquende SHP. The Basic Project with the updated install capacity of Caquende corresponding to 4 MW, was sent in October 17th, 2007. It is confirmed by the protocol number in ANEEL 48500002836/2007-19	According to ANEEL resolution # 979 dated 12 March 2008, the 3.40 MW installed capacity was approved for Juliões SHP. For Caquende SHP, the PP submitted the basic project to ANEEL under the Protocol number # 48500002836/2007-19 and is waiting the answer. Therefore this CL is closed.
CL 2 Relevant documents related to project design have not been provided to DNV. The following	A.3.1	A copy of the Basic Project (most recent feasibility study) is provided to DNV.	A copy of the feasibility study including the Basic Project for Caquende and Juliões SHP were analyzed and the evidenced the

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
documents are therefore requested: - copy of the Feasibility Study, in particular the part that presents the estimation of plant capacity factor, plant generation per year and power dispatched to the grid; - copy of the Power Purchase Agreement; - registration of the plant in the National Electricity Agency.		PPAs are not established yet for both plants. The current registration at ANEEL is not updated; the updated registration will be provided to DNV as soon as obtained.	optimum assured energy of Caquende with 2.138 MW and Juliões with 1.792 MW respectively. Therefore this CL is closed
CL 3 The starting date of a project activity should be the earliest of implementation, construction and real action. Please clarify what event corresponds to the chosen date.	B.3.4 C.1.1	The chosen date corresponds to the date the turbines were purchased for both plants.	According the resolution EB 49 (para 6), the project starting date is 12 March 2008 which is the date when the contract for the turbine was signed between the SHP operator and the manufacturer. Therefore this CL is closed
CL 4 According to the Aneel resolutions # 70 issued on 9 February 2000, Caquende SHP has been operating since 1994. DNV requests further clarifications regarding the starting date of the project.	B.3.4	Caquende SHP operated until 2000. From 2000 to 2006, this plant was abandoned (i.e. not operating). In 2006, when CEI bought RECIMAP, which was the original owner of the plant, it was re-started as a pilot plant to test it, to obtain hydrological information of the river, and to obtain experience in running a small hydropower plant. Although project developer kept the same name, this SHP was not operating between 2000 and 2006. Juliões is a completely new SPH.	As verified during the site visit and explained by the reviewed PDD version 05.2, the old SHP, with low capacity and high inefficiency will be completely decommissioned and only the site in the river will be used, and considering in the licenses of the new facilities. In addition, as verified at the project **/15/**, the new SHP will be constructed with different design, which needs construction of a tunnel with 550 m extension into the rock for each facility, in order to use the new difference levels of river (33m to 45 m), new equipments and installations. Therefore this CL is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 5 No sources of leakage emission were identified according to AMS-I.D version 16. It has been informed that electricity generation equipment is not transferred from any other activity. DNV requests evidence that no renewable energy equipment will be transferred to or from the activity creating a leakage situation.	B.5.1 B.5.2 B.5.3 B.6.1 B.6.2 B.6.3 B.11.1 B.11.2 B.11.3	All the equipments used in the project activity will be new equipments. CEI will buy and build both plants with new equipments. Evidences will be checked during the site visit.	As verified during the site visit, the equipments will be manufactured and delivered according the specification of flow and pressure of Caquende and Juliões SHP. Therefore this CL is closed.
CL 6 According to AMS-I.D version 16, the amount of each fossil fuel consumed by each power source, the CO_2 emission coefficient of each fuel type, the electricity generation of each power source, the identification of power source for the OM and BM, the electricity imported to the project electricity system and CO_2 emission coefficient of fuels used in connected electricity systems (if imports occur) need to be specified ex-ante. However, section B.6.2 of the PDD does not mention all the parameters that need to be available for the validation stage.	B.10.3	Please refer to the PDD version 05.2, section B.6.2.	As verified on Brazilian DNA website the emission factor was calculated according the "Tool to calculate the emission factor for an electricity system" considering the dispatch approach and should be considered and validated *ex-post* to be calculated the CERs. Therefore this CL is closed.
CL 7 Parameter values from IPCC 2006 guidelines are required to be used. In section B.6.2 of the PDD, value from the IPCC 1996 was used for the emission factor.	B.10.3	The PDD version 5.2 uses parameter values from IPCC 2006.	Version 05.2 of the PDD was assessed and parameters values from IPCC 2006 were used in section B.6.2. Therefore this CL is closed.
CL 8 The authority and responsibility for project management, monitoring, measurement, review	B.10.7 B.13.1	Please refer to PDD version 5.2, section B.7.2.	Version 05.2 of the PDD was assessed and the changes done in the monitoring plan

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
and reporting has been established. Responsibilities and authorities for organizing and training of the staff in the appropriate monitoring, measurement and reporting techniques are not clearly defined.			(section B.7.2) are sufficient. Therefore this CL is closed.
CL 9 The project documentation does not report about provisions for meeting training and maintenance needs.	A.3.3 B.10.8 B.13.2	Please refer to PDD version 5.2, section B.7.2.	Version 05.2 of the PDD was assessed and the changes done in the monitoring plan (section B.7.2) are sufficient. Therefore this CL is closed.
CL 10 There are no procedures identified for project performance reviews and corrective actions.	B.13.4 B.13.5	Please refer to PDD version 5.2, section B.7.2.	Version 05.2 of the PDD was assessed and the changes done in the monitoring plan (section B.7.2) are sufficient. Therefore this CL is closed.
CL 11 The methodologies for calculating emissions reductions are not transparently documented. In the item B.6.3 of the PDD, the relevant equations applied for the calculation of baseline emissions are not provided.	B.5.1 B.5.2 B.5.3	Corrections were done in PDD version 5.2.	The spreadsheet "CERs-version 05.2 **/9/**" could evidence the baseline emission reduction. Therefore this CL is closed.
CL 12 A spreadsheet for the calculation of the emission reductions was not provided to confirm this estimation. DNV requests the data used for the baseline determination, the calculation sheet for the grid emission factor, the calculations of the OM and BM emission coefficient used to estimate emission reductions. The data used for calculation has to be provided along with the data sources.	B.5.1 B.5.2 B.5.3	The spreadsheet is provided together with the PDD document version 5.2	The spreadsheet "Caquende Juliões CERs-version 05.2" **/8/** could evidence the baseline emission reduction. Therefore this CL is closed.
CL 13	D.1.1	The application in FEAM/COPAM to obtain the	A copy of the Environmental License

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
As stated in the PDD, the project has started the application process of the construction license. According to Brazilian environmental law a preliminary environmental assessment is required to grant the construction license. DNV requests documented evidences of the preliminary environmental assessment.	D.1.2 D.1.3	environmental license was done under protocol numbers 438982	protocols and of the Preliminary Environmental Assessments was provided. Therefore this CL is closed.
CL 14 Local stakeholders were invited to comment on the project in accordance with the requirements of Resolution 1 of the Brazilian DNA. The letters sent to the local stakeholders were not evidenced. DNV requests a copy of these.	E.1.1 E.1.2 E.1.3 E.1.4 E.1.5	The copy of the letters and/or the document that proves the receipt of them is provided together with the PDD version 5.2	A copy of all the letters were sent to DNV. Therefore this CL is closed. .
CL 15 The monitoring plan had considered the emission factor of the Brazilian grid as ex ante (B6.2) and ex post (B.7.1) figure. DNV request to clarify this.	B.10.2	The PDD version 05.2 of 15 December 2010 had considered the monitoring of Brazilian grid emission factor *ex-post* according to calculation by DNA based on the "Tool to calculate the emission factor for an electricity system" (version 02), based on data of the year in which the project activity displaces grid electricity.	The clarification is according the methodology. Therefore this CL is closed.

APPENDIX C

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

DET NORSKE VERITAS

Andrea Leiroz

Mrs. Andrea Leiroz holds a Bachelor's Degree in Chemical Engineering, Master Degree in Material Science and Doctor Degree in Mechanical Engineering. Having an overall experience of around Thirteen years.
She has experience of around 4 years in validation and verification of numerous CDM projects in DNV, both in Brazil & abroad.
Her qualification, experience in CDM demonstrates her sufficient sectoral competence in Energy Generation from renewable energy sources, Waste handling and disposal and Animal waste management.

Professional Experience:
2006: GHG Auditor, DNV – Det Norske Veritas – Rio de Janeiro, Brazil
*Validation in the following fields of activities: landfill gas, hydro power, wind, biomass, other renewable, cement, waste-gas recovery, efficiency of thermal plants, fuel switch, manure management, wastewater treatment, energy efficiency, N2O, charcoal, CO2 recovery and biofuel.
Verification in the following fields of activities: fuel switch, manure management, hydro power, grid connection of isolated electricity system and landfill gas.
CDM validator - hydro power, biomass, manure management
CDM verifier - landfill gas, hydro power, wind power, other renewable, grid connection of isolated system, manure managment, waste / wastewater treatment, charcoal and non-renewable biomass
Technical reviewer - renewable and biomass (only for verification)
- 1996: Engineering Trainee, CEDAE - Companhia Estadual de Águas e Esgotos – Water Quality Control Division - Rio de Janeiro, Brazil.
Teaching Experience:
1994: Teaching Assistant for Experimental Qualitative Analitical Chemistry , Course Level: Undergraduate. Department of Analytical Chemistry, Universidade Federal Fluminense.
- 2000: Teaching Assistant for Experimental methods in Mechanical Engineering, Course Level: Undergraduate. Department of Mechanical Engineering, Pontifícia Universidade Católica do Rio de Janeiro.
- 2005: Instructor for Transport Phenomena, Course Level: Undergraduate. Department. of Mechanical Engineering, Pontifícia Universidade Católica do Rio de Janeiro.

Luis Filipe 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 tree 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.

Gabriel Baines

Gabriel Baines holds a Bachelor's Degree in Environmental Engineering in the University of São Paulo (Brazil) and has done a short term course in the Environmental School of the University of Leeds (England), having an overall work experience of around 5 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 140001.

He has experience of around 1 year in validation and verification of numerous CDM projects in DNV, both in Brazil and abroad.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in 9.1. metal production

Francisco Chávez

Francisco Chávez V. holds a Technical Degree in Electricity, a Bachelor Degree in Engineering Physics with specialization in Thermodynamics and IT systems, and a Master Degree in Business Administration with special focus in Strategy, Leadership, Marketing and Project Management. He has an overall working experience of around 27 years. Prior to joining DNV having 10 years experience in hydro power and renewable energy projects, electricity systems (transmission, distribution, supply, demand, generation and rural electrification) and electricity markets, electrical equipment and installations, and 10 years of experience within the oil and gas industry, and around 5 years of business experience in several areas. During these years he has covered the areas of: Project Management, Manufacturing, Supervision, Consultancy and Advisory, Research and Testing of prototype equipment, Field, Maintenance and Repair work, etc.
He has approximately 2 years of experience in validation and verification of CDM projects/JI and other 3rd party validation/verification services.
His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in: Energy generation from renewable energy sources, electricity distribution, Energy demand, Manufacturing of electrical equipment, and Oil and Gas industry.
Francisco Chávez V. holds the following degrees: Electrician (Technical level), Engineering Physics (to Master level) with specialisation in Thermodynamics and IT systems, and Business Administration (Master level). In addition he has broad international experience from European, American, Latin American and Asian business cultures through 25 years of field work in O&M and construction, and consultancy assignments in the areas of hydropower and oil &gas exploration and production, both on- and offshore. His experience also covers the assessment of environmental and social impact analysis, biogas systems for production of methane, data and voice communication, economic evaluation of renewable energy projects, assessment of electricity markets and its transition to competitive markets, formulation of energy policies, analysis of business concepts, formulation of business strategy and design e implementation of management systems.
Having joined DNV recently, he is already leading a portfolio of CMD validation and certification projects worldwide, and is performing as sector expert for hydropower projects with GHG emission reduction.

Ramesh Ramachandran

Holds a Master's Degree in Environmental Engineering and a Post Graduate Diploma in Operations Management.
Possesses a combined experience of more than 15 years in the field of a) design and operation/maintenance of wastewater treatment (as part of working in wastewater design & equipment supply, firm), b) environmental consulting and c)production integrated environmental auditing. His experience also covers the fields of developing & designing EMS systems, resource/energy conservation, waste minimisation and cleaner production in various manufacturing,process and chemical industries.

In DNV he has experience of more than 5 years in validation and verification of numerous CDM projects in DNV, both in India & abroad. He has also been involved as a Lead Auditor in Management System Audits such as ISO 9001, ISO 140001 and OHSAS 18001 standards in various industrial sectors for more than 5 years in DNV.
His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in energy generation from renewable energy sources , electrical distribution, waste handling and disposal and animal waste management.

Michael Lehmann

Michael Lehmann holds a Master Degree in Environmental Sciences with a specialisation in environmental chemistry. He has an overall working experience of around 13 years.

Since 1999 he has worked in the climate change field and has closely followed the international response to the climate change challenge (UNFCCC, Kyoto Protocol) and the responses by national governments (EU ETS, UK ETS) and business. He has managed the validation and verification of many CDM and JI projects and thas carried out the technical review of numerous climate change project validations and verifications.

Through his extensive work with validation and verification of CDM and JI projects, he has aquired sectoral competence within energy generation from renewable energy sources, electricity distribution, waste handling and disposal and animal waste management.

CERTIFICATE OF COMPETENCE

Anjana Sharma

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas					Jan 2009	Jan 2009
Renewables	*Hydro power*	Jan 2009			Jan 2009	Jan 2009
	Wind power					
	Other renewable					
Biomass						
Grid connection of isolated system						
Cement						
Waste-heat / waste-gas recovery						
Efficiency of thermal power plants						
Coal mine methane						
Fuel switch						
Manure management						
Waste / wastewater treatment						
Energy efficiency						
N_2O						
HFCs						
Flare reduction						
PFCs						
Charcoal						
CO_2 recovery						
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF_6						