



VALIDATION REPORT

SANTANA I SHP CDM PROJECT (JUN1118)

Report No: 5891/08 – 08/344

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Final Validation Report:

Santana I SHP CDM Project (JUN 1118)

TÜV NORD JI/CDM Certification Program

P-No.: 5891/08 – 08/344



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Approved by: Mr. Eric Krupp	Organisational unit: TÜV NORD JI/CDM Certification Program
Client: Carbotrader Assessoria e Consultoria em Energia Ltda.	Client ref.: Mr. Arthur Augusto Clessie Moraes

Summary/Opinion:
Carbotrader Assessoria e Consultoria em Energia Ltda. has commissioned the TÜV NORD JI/CDM Certification Program (CP) to validate the project: "Santana I SHP CDM Project (JUN 1118)" with regard to the relevant requirements of the UNFCCC for CDM project activities, as well as criteria for consistent project operations, monitoring and reporting. UNFCCC criteria include article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakech Accords), the simplified modalities and procedures for small scale CDM project activities of annex II to decision 21/CP.8 and the relevant decisions by COP/MOP and CDM Executive Board.

The project activity exports the electrical power from a renewable energy source to the national electric grid (National Interconnected System – SIN). The project intends to reduce GHG emissions to the extent of equivalent electricity generated by fossil fuels based power plants of the grid.

A risk based approach has been followed to perform this validation. In the course of the pre-validation, 03 Corrective Action Requests (CARs) and 14 Clarification Requests (CRs) were raised and successfully closed. In addition 1 FAR has been issued and should be reviewed during the first verification.

The review of the project design documentation and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders and NGOs have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria. In detail the conclusions can be summarised as follows:

- The project is in line with all relevant host country criteria (Brazil) and all relevant UNFCCC requirements for CDM. Project activity approval was obtained from the Brazilian DNA on 23 June 2009.
- The project additionality is sufficiently justified in the PDD.
- The monitoring plan is transparent and adequate.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 98,483 tCO₂e are most likely to be achieved within the 7 years (renewable) crediting period (1st Nov 2010-31st Oct 2017).

The conclusions of this report show, that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation. The only difference between this version of the validation report (2.b) and the version 2a dated 2009-07-02 which was presented at the request for registration, is the inclusion of comments regarding the sensitivity analysis which were given in the response to the request for review raised. This was done in response to the EB request to include such explanations. The difference between version 2a and version 2, dated 2009-06-06 to which the LoA issued by the Brazilian DNA on 23 June 2009 refers to is the inclusion about the LoA itself.

Report No.: 5891/08 – 08/344	Subject Group: Environment
Report title: Santana I SHP CDM Project (JUN 1118)	
Work carried out by: Mr. Rainer Winter Ms. Maria Carolina C. Coelho Mr. Ricardo Ribeiro Lopes Ms. Alexandra Nebel Ms. Inga Nagel	
Work verified by: Mr. Eric Krupp	
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Indexing terms

Climate change
CDM
Validation
Kyoto Protocol

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Abbreviations

ABNT	Brazilian Association for Technical Standards
ANEEL	National Electric Energy Agency
BAU	Business as usual
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CIMGC	Brazilian DNA - <i>Comissão Interministerial para Mudança Global do Clima</i> - Interministerial Commission on Global Climate Change
CO₂	Carbon dioxide
CO₂e	Carbon dioxide equivalent
CP	Certification Program
CR	Clarification Request
DNA	Designated National Authority
EB	CDM Executive Board
GHG	Greenhouse gas(es)
HGA	Host Government Approval
IBGE	Brazilian Institute for Geography and Statistics
IRR	Internal Rate of Returns
LoA	Letter of Approval
MP	Monitoring Plan
M&P	Modalities and Procedures
ODA	Official Development Assistance
ONS	National Electric System Operator
PDD	Project Design Document
PP	Project Proponent
QC/QA	Quality control/Quality assurance
SHP	Small Hydro Power
SIN	National Interconnected System
SM&P	Simplified Modalities and Procedures
SSC	Small-Scale
UNFCCC	United Nations Framework Convention on Climate Change
VVM	Validation Verification Manual

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1 INTRODUCTION

Carbotrader Assessoria e Consultoria em Energia Ltda. has commissioned the TÜV NORD JI/CDM Certification Program (CP) to validate the project:

“Santana I SHP CDM Project (JUN 1118)”

with regard to the relevant requirements for CDM project activities.

1.1 Objective

The purpose of this validation is to have an independent third party assess the project design. In particular the project's baseline, the monitoring plan (MP), and the project's compliance with

- the requirements of Article 12 of the Kyoto Protocol; the CDM modalities and procedures as agreed in the Marrakech Accords under decision 17/CP.7; the annex to the decision; subsequent decisions made by COP/MOP & CDM Executive Board,
- other relevant rules, including the host country (Brazil) legislation and sustainability criteria

are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and identified criteria. Validation is seen as necessary to provide assurance to stakeholders on the quality of the project and its intended generation of certified emission reductions (CERs).

1.2 Scope

The validation scope is given as an independent and objective review of the project design, the project's baseline study and monitoring plan (based on AMS I.D. / Version 13: Grid connected renewable electricity generation), which are included in the PDD and other relevant supporting documents.

The items covered in the validation are described below:

- **UNFCCC & Host Country Criteria**

- UNFCCC/Kyoto Protocol requirements, in particular, the requirements of the CDM as set out in decision 17/CP.7 (Marrakech Accords), the present annex, and relevant decisions by COP/MOP & CDM Executive Board
- Host country requirements / criteria

- **CDM Project Description**

- Project design
- Project boundaries
- Predicted CDM project GHG emissions

- **Project Baseline**

- Baseline methodology
- Baseline GHG emissions
- **Monitoring Plan**
 - Monitoring methodology
 - Indicators/data to be monitored and reported
 - Responsibilities
- **Background investigation and follow up interviews**
- **Stakeholder consultation**
 - Publishing the PDD^{PDD/} on TUV NORD website
 - Review of comments
- **Draft validation reporting with CARs & CRs, if any**
- **Final validation reporting.**

The information included in the PDD and the supporting documents were reviewed against the requirements and criteria mentioned above. The TÜV NORD JI/CDM CP has, based on the requirements in the Validation and Verification Manual^{VVM/}, employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs. The validation is based on the information made available to TÜV NORD JI/CDM CP and on the contract conditions. TÜV NORD JI/CDM CP can not be held liable by any entities for making its validation opinion based on any false or misleading information supplied to it during the course of validation.

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

1.3 GHG Project Description

1.3.1 Project Scope

The considered GHG project can be classified as a CDM project in the sector given in Table 1-1 (according to List of Sectoral Scopes of UNFCCC).

Table 1-1: Project Scope(s)

No.	Project Scope
1	Energy industries (renewable - / non-renewable sources)

1.3.2 Project Parties

Brazil (Host Country) is the only party involved.

1.3.3 Project Entities

The following entities are involved in the developing of the project:

Project Participant 1 Firenze Energética S/A
Rua Prof. Fernando Moreira, 765
Curitiba
Paraná
Brazil

Contact person: Mrs. Simone Matico
Administrative Manager
Tel no.: +55 (41) 3221 0707
Email: simonematico@interalli.com.br

Project Participant 2 Carbotrader Assessoria e Consultoria em Energia Ltda.
Rua 23 de Maio, 790 – office 22A - Tebas
Jundiaí
São Paulo
Brazil

Contact Person: Mr. Arthur Augusto Clessie Moraes
Director
Tel No.: +55 (11) 4522 7180
Email: moraes.arthur@carbotrader.com

1.3.4 Project location

The project site is located in the river Santana, in the Central West of Brazil, State of Mato Grosso and municipality of Nortelândia. The geographical coordinates of the project (dam specifically) are as below:

Table 1-2: Project Location

Host Country	Brazil
Region	State of Mato Grosso
Project location address	Municipality of Nortelândia
Coordinates	
Latitude	56°49'44"W
Longitude	14°23'28"S

1.3.5 Technical project description

The proposed project activity is a small hydropower project; the installed capacity is 14.758 MW with a reservoir of 1.17 km² (acc. to version 2 of PDD). This type of enterprise is called as “run of river” plant.

As the project is a renewable energy project, the project is intended to reduce CO₂ emissions to displace the electricity generated to the National Interconnected System (SIN). The estimated amount of emission reductions over the chosen 7-year “renewable crediting period” is 98,483 tCO_{2e} (acc. to version2 of PDD) during 2010 to 2017.

The key parameters for the proposed project activity are given in the following table.

Table 1-3: Key technical indicators of the hydro turbines and the generators of the project

Turbines	
Type:	Simple Spiral Francis
Manufacturer:	To be defined
Quantity:	2
Power:	7,653
Flow rate:	11.09 m ³ /s
Rotation:	514 rpm
Generators	
Type:	3-Phase-Synchronous*
Manufacturer:	To be defined
Quantity:	2
Nominal Power	To be defined
Effective Power*	To be defined
Rotation	To be defined
Power Factor	To be defined

*according to PPs, the total effective power will not exceed 15MW.

2 VALIDATION TEAM

The Validation Team is led by

- **Mr. Rainer Winter.** He works at TÜV NORD as ISO 9001/ 14001 Auditor and environmental verifier for EMAS. He is also an approved emission verifier within the European Emission Trading Scheme. Mr. Winter is an authorized JI/CDM assessor and is global leader of the TÜV NORD JI/CDM CP. For this validation he was assisted by:

During this validation he was assisted by:

- **Maria Carolina Crisci Coelho**, BRTÜV-Brazil (TÜV NORD Brazil), Mrs. Coelho is ISO 14001 Auditor and Product Manager for CDM Services for BRTÜV. She is an appointed expert for the TÜV NORD JI/CDM certification program.
- **Ricardo Lopes**, BRTÜV (TÜV NORD Brazil) – São Paulo, Brazil. Mr. Lopes is an ISO 9001 GHG auditor and 14001 internal auditor. He has received extensive CDM training and has participated in several projects in the voluntary carbon market. Trainee.

Technical Review:

- **Alexandra Nebel**, TÜV NORD CERT GmbH, she works as an JI/CDM Expert in Essen.
- **Inga Nagel**, Environmental Scientist and presently with TÜV NORD CERT GmbH. She is a TÜV NORD Cert auditor for ISO 9001 and ISO 14001. Ms. Nagel is an appointed assessor for the JI/CDM CP of TÜV NORD.

The validation report is verified by:

- **Eric Krupp.** He is an expert in the field of environmental approval procedures as well as national and international Emission Trading. He worked in different projects in the framework of the German allocation procedure, the verification of the annual CO₂ emission reports and the validation/verification of several JI and CDM projects as part of the validation/verification teams of TÜV NORD CERT GmbH respectively TÜV NORD JI/CDM CP. Mr. Krupp is an appointed JI/CDM senior assessor and the deputy of TÜV NORD JI/CDM certification program.

3 METHODOLOGY

The validation of the project was carried out from October 2008 to March 2009. The validation consisted of the following three phases:

- A desk review of the PDD (incl. annexes) and supporting documents with the use of a customised validation protocol according to the Validation and Verification Manual;
- Back ground investigation and follow-up interviews with personnel of the project proponent, the consultant, legal authorities and other stakeholders;

- Reporting of validation findings taking into account the public comments received on TUV NORD website.

The draft validation report includes Corrective action and Clarification Requests (CAR and CR) identified in the course of this validation.

A **Corrective Action Request** is established if

- mistakes have been made in assumptions or the project documentation which directly will influence the project results,
- the requirements deemed relevant for validation of the project with certain characteristics have not been met or
- there is a risk that the project would not be registered by the UNFCCC or that emission reductions cannot be verified and certified.

A **Clarification Request** is issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the first verification.

The final validation started after issuance of proposed corrective action (CA) of these CAR and CR by the project proponent. The validator has assessed the proposed CA with a positive result and after the closure of these CAR and CR the project proponent has issued the final version of the PDD^{PDD/}. Based on this version this validation report and opinion was issued.

3.1 Validation Protocol

In order to ensure consideration of all relevant assessment criteria, a validation protocol was used. The protocol shows, in a transparent manner, criteria and requirements, means of verification and the results from pre-validating the identified criteria. The validation protocol serves the following purposes:

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

The validation protocol consists of three tables: Table 1 (Mandatory Requirements); Table 2 (Requirement Checklist); and Table 3 (Resolution of Corrective Action and Clarification Request) as described in Figure 1.

The completed validation protocol is enclosed in the annex to this report, identifying 03 Corrective Action Requests and 14 Clarification Requests and 1 Forward Action Request.

Validation Protocol Table 1: Mandatory Requirements			
Requirement	Reference	Conclusion	Cross reference
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<i>This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Validation report.</i>	<i>Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.</i>

Validation Protocol Table 2: Requirement checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
<i>The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>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.</i>	<i>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.</i>	<i>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). Clarification is used when the validation team has identified a need for further clarification.</i>

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
<i>If the conclusions from the draft Validation are either a Corrective Action Request or a Clarification Request, these should be listed in this section.</i>	<i>Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification Request is explained.</i>	<i>The responses given by the Client or other project participants during the communications with the validation team should be summarised in this section.</i>	<i>This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".</i>

Figure 1: Validation protocol tables

3.2 Review of Documents

The draft PDD^{/PDD/} submitted by Carbotrader Assessoria e Consultoria em Energia Ltda. in October 2008 and supporting background documents related to the project design and baseline were reviewed.

Furthermore, the validation team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data.

The documents that were considered during the validation process are given in chapter 7 of this report. They are listed as follows:

- Documents provided by the project proponent (Table 7-1)
- Background investigation and assessment documents (Table 7-2)
- Websites used (Table 7-3).

In order to ensure the transparency of the decision making process, the reference codes listed in tables 7-1 to 7-3 are used in the validation protocol and – as far applicable – in the report itself.

3.3 Follow-up Interviews

On 01 October 2008, the TÜV NORD JI/CDM CP performed interviews with the project owner, project developer, plant operating personnel and stakeholder to confirm selected information and to resolve issues identified in the document review.

The key interviewee and main topics of the interviews are summarised in Table 3-1.

Table 3-1 Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Project owner representatives, Project consultant representatives /IM01/	<ul style="list-style-type: none"> - Chronological description of the project activity - Technical details of the project realisation and Project Design Report - Approval procedures and status - Quality management system - Monitoring and measurement equipment - Crediting period and its starting date - Project activity starting date - Power purchase agreement with grid - Sustainable development benefits because of project - Analysis of local stakeholder consultation - Operational data – technical specification (capacity of turbine), water availability, plant load factor.

Interviewed Persons / Entities	Interview topics
	<ul style="list-style-type: none"> - Training & competency of the staff members w.r.t project management, monitoring and reporting - Editorial aspects of PDD - Methodology selection aspects - Baseline study, leakage and additionality - Details of emission reduction calculation - Debundling - Stakeholder process

3.4 Resolution of Clarification and Corrective Action Requests

In order to remedy any mistakes, problems or any other outstanding issues, which needed to be clarified for positive conclusion on the project design, CARs and CRs were raised. These requests can be resolved or “closed out” by the project proponent by providing the corresponding response in column 3 of table three as meant in Figure 1 and submission of revised PDD^{PDD/} and supporting documents.

In this validation report 03 CARs and 14 CRs were raised and successfully closed 01 FAR was also raised.

The CARs / CRs / FAR are documented in the Annex and addressed in section 4.

3.5 Public Stakeholder Comments

The PDD^{PDD/} was made publicly available through TÜV NORD JI/CDM CP website <http://cdm.unfccc.int/Projects/Validation/index.html>. Comments on the PDD^{PDD/} were invited within 30 days, i.e. 01/10/2008 to 30/10/2008.

No comments were received. In case comments would have been received, they would have also been made publicly available on this web site.

3.6 Finalising the report

The draft validation report was submitted to the project proponents. After reviewing the revised and resubmitted project documentation; resolving the CRs & CARs raised and outstanding concerns TÜV NORD JI/CDM CP issues this final validation report and opinion.

4 VALIDATION FINDINGS

In the following protocol the findings from the desk review of the draft PDD, visit, interviews and supporting documents are summarised.

The results are shown in table 4-1:

Table 4-1: Summary of CAR and CR issued

Validation topic ¹⁾	No. of CAR	No. of CR	No. of FAR
General description of project activity (A) - Project boundaries - Participation requirements - Technology to be employed - Contribution to sustainable development	1	2	1
Project baseline (B) - Baseline Methodology - Baseline scenario determination - Additionality determination - Calculation of GHG emission reductions Project emissions Baseline emissions Leakage - Emission reductions - Monitoring Methodology - Monitoring of Project emissions Baseline emissions Leakage Sustainable development indicators / environmental impacts - Project management planning	2	10	-
Duration of the Project / Crediting Period (C)	-	1	-
Environmental impacts (D)	-	1	-
Stakeholder Comments (E)	-	-	-
SUM	03	14	1

¹⁾ The letters in brackets refer to the validation protocol

For an in depth evaluation of all validation items it should be referred to the validation protocol (Annex). Annex also includes all CARs and CRs and FARs (Table 3).

4.1 Participation Requirements

Brazil, the host country, has ratified the Kyoto Protocol on 23rd August 2002, and as a non Annex I party meets all relevant participation requirements.

The Brazilian DNA assigned for CDM is the CIMGC (Global Climate Change Interministerial Commission) has issued a LoA for the project activity on 23 June 2009.

In the host country (Brazil), it's stated that SHP has to comply with the following condition:

- The area of the reservoir must be less than 3 km² (300 ha) and generation capacity must be between 1 MW and 30 MW.

4.2 Project design

The objective of the project activity is to reduce GHG emissions by replacing electricity of the SIN which has at least one fossil fuel unit. The project activity is estimated to reduce GHG emissions equivalent to 14,069 tCO₂e annually.

The proposed CDM project comprises a small power plant with capacity of 14.758 MW. The project design does reflect current good practices as the implemented technology is state-of-art. No technology transfer is involved in the project activity.

The project's spatial and system boundaries are clearly defined in the project documentation. The project encompasses the project power plant (Santana I SHP CDM Project – JUN 1118) and all physically connected power plants of the Brazilian National Interconnected System. The boundary definition is in line with the applied methodology.

Based on the financial information furnished by the project participant, no ODA contributes to financing of the project.^{/IM01/}

However, CAR A1 regarding to the project boundary, installed capacity, data of reservoir and CR A1 regarding to the geographical coordinates were raised and successful closed.

The manufacturers of the turbines and generators have not been decided yet. To ensure that the installed capacity will not exceed the 15 MW limit for small scale CDM projects a FAR A1 was raised.

For an in depth evaluation of all validation items please refer to the validation protocol (Annex). The Annex also includes all CARs, CRs and FAR (Table 3).

The project participant contributes to the sustainable development through the following actions: clean and renewable electricity generation, better working

conditions and increases opportunity for employment and contribution for local economy. More detailed information can be found in the section A.2 of the PDD.

Nevertheless the Brazilian DNA has not confirmed the sustainable development contribution yet, which will be addressed in the LoA.

4.3 Baseline and Additionality

The selected baseline methodology is in line with the approved baseline methodology AMS I.D. – Grid connected renewable electricity generation (Version 13).

The applicability criteria as stated in AMS I.D are fulfilled:

- The project activity is the installation of one SHP to generate energy from renewable source to the grid fed by at least one fossil fuel fired generation unit.
- The installed capacity is below 15 MW.

As prescribed in small scale type I.D. baseline methodology, the baseline will be the kWh produced/ displaced by the renewable generating unit multiplied by an emission coefficient of the grid (measured in kg CO_{2e}/kWh).

In this project, the grid emission coefficient is calculated by “combined margin method” consisting of the combination of “operating margin (OM)” and “build margin (BM)” according to the procedures prescribed in the “tool to calculate the emission factor for an electricity system”^{TEF/}. Thus emission reductions for this project activity will be the amount of electricity (kWh) supplied to the grid multiplied with the emission coefficient of the National Interconnected System (SIN).

As per Brazilian Designated National Authority (DNA) request¹, SIN must be considered as a unique System. Emission factors calculated for the single system have been made available on the DNA website ^{/dna/}. The calculation follows the methodological tool “Tool to calculate the emission factor for an electricity system” , version 1.1. approved by the CDM Executive Board.

The emission reductions (ER_y) of the project activity during the crediting period are the difference between the baseline emission (BE_y), project emission (PE_y) and leakage (L_y).

Baseline emission: BE_y is calculated by multiplying the electricity baseline emission factor or grid emission factor (EF_y) and the net electricity exported to the SIN (EG_y).

The grid emission factor will be determined *ex-post* and estimated as a combined margin (CM), consisting of the weighted average of dispatch data analysis operating margin (EF_{OM}) and build margin (EF_{BM}) factors to calculate the emissions reductions. The weight factors are default both for build and operating emission factors ($w_{OM} = w_{BM} = 0.5$). Thus $EF_{CM} = 0,5 * EF_{OM} + 0,5 * EF_{BM}$.

¹ <http://www.mct.gov.br/index.php/content/view/73318.html>

The calculation is based on data published by Brazilian DNA. For the ex-ante estimation of emission reductions the grid emission factors based on data of the year 2007 has been applied. Thus EF_{CM} is 0.18418 tCO₂/MWh (i.e., $EF_{OM} = 2.909$ tCO₂/MWh and $EF_{BM} = 0.075$ tCO₂/MWh).

In order to have proper access to the data used for the EF_{BM} and EF_{OM} calculation, the DOE/AIE Forum requested the Brazilian DNA for an opportunity to assess that the “tool to calculate the emission factor for an electricity system” was correctly applied in calculating the grid emission factor at their offices, observing its specific requirements, including confidentiality and non-removal of data from its offices^{/DFL/}. Through a meeting realized on 2009/02/05, in Brasília, the Brazilian DNA granted to one representative of the DOE/AEI Forum and one representative of each DOE the opportunity to assess the correct application of the tool^{/DNAOF/}. One representative of TÜV NORD CERT GmbH JI/CDM Certification Program attended this meeting. Sufficient evidence could be provided that the “tool to calculate the emission factor for an electricity system” is correctly applied by the Brazilian DNA for the EF_{BM} and EF_{OM} identification..

The validation team is convinced that the identified EF_{gridCM} is properly calculated. The emission coefficient calculation is deemed to be adequate and transparent. All data required for emission coefficient calculation are derived from publicly available data of DNA website.^{/dna/}

The power generated by Santana I SHP CDM Project is delivered to the grid (SIN). The net power generated is approximately 76,391 MWh as defined in the Document Design Report.^{/PDD/}

However, CR B1 regarding to data published (link), calculations, description of steps and parameters and CR B9 regarding to mention of tool applicable were raised and successfully closed.

For an in depth evaluation of all validation items please refer to the validation protocol (Annex). The Annex also includes all CARs, CRs and FAR (Table 3).

Additionality

The additionality was demonstrated acc. to § 28 of the simplified modalities and procedures for small-scale CDM project activities in connection with attachment A to appendix B as a barrier analysis.^{/SMP/}

The individual arguments presented in the PDD^{/PDD3/} to justify the additionality were summarised in table 4-2. This table as well as table 4 and 5 in the Annex includes the assessment of the validation team.

Table 4-2: Additionality assessment

Type of barrier ¹⁾	Argument	Assessment
(a)	The PP chose the investment barrier analysis to prove additionality, comparing to a benchmark, i.e., SELIC rate average of 16.99%. The IRR presented is of 11.9%. Thus, the <u>Project IRR</u> of Santana I SHP (without CDM revenue) is calculated to be 11.9% which is below the indicator of benchmark. Even considering the revenues from the sales of CERs, the <u>Project IRR</u> (12.8%). remains below the benchmark	<input type="checkbox"/> Argument not justified <input type="checkbox"/> Argument not convincing <input type="checkbox"/> Argument justified but not a decisive barrier <input checked="" type="checkbox"/> Argument justified / significant barrier See assessment in table 4 and 5 of the Annex.
(c)	Acc. to history of the Brazilian Electric Sector, the sources that prevail are large hydroelectric centrals, thermoelectric, nuclear plants and for last, small hydropower plants. Thus, it is not common practice implant SHP.	<input type="checkbox"/> Argument not justified <input type="checkbox"/> Argument not convincing <input checked="" type="checkbox"/> Argument justified but not a decisive barrier <input type="checkbox"/> Argument justified / significant barrier See assessment in table 4 and 5 of the Annex.
(d)	The PP argues that the poor conditions in the region are a barrier, to be necessary infra-structure investments in communication to attend the necessities to the enterprise implementation.	<input type="checkbox"/> Argument not justified <input type="checkbox"/> Argument not convincing <input checked="" type="checkbox"/> Argument justified but not a decisive barrier <input type="checkbox"/> Argument justified / significant barrier See assessment in table 4 and 5 of the Annex.
Assessment of the validation team		<input checked="" type="checkbox"/> Project is additional <input type="checkbox"/> Project is not additional

¹⁾ Classification acc. to Attachment A to Appendix B of the simplified modalities and procedures
a) investment barrier; b) technological barrier; c) barrier due to prevailing practice; d) other barriers

Although barriers due to prevailing practice and other barrier (poor infrastructure in the region) as described above in table 4-2 are considered justifiable, TÜV understands that the investment barrier is decisive for the additionality determination of the project.

A benchmark analysis is applied to demonstrate that the project is not financially attractive. The IRR calculation was reproduced by the validation team. The source of IRR calculation is assessed to be adequate and the assumptions stated in the reports are assessed to be reasonable. For a detailed assessment of parameters considered for IRR calculation please refer to table 5 in the Annex. The project's IRR was estimated to be 11.9% without CERs. This IRR considers an electricity price of R\$ 158 per MWh based on the Power Purchase Agreement with Perdigão Agroindustrial S.A. (private industrial consumer) and is based on the project lifetime of 28 years.

This IRR is compared with the Brazilian Real benchmark interest rate (SELIC-government bonds) of 16.99% , resulting from the average for the period 2003-2008, which is considered appropriate as the SELIC has not severely fluctuate for this

period. Even considering the revenues from CERs, the IRR goes to 12.8% which is still about 4% below the SELIC.

The SELIC is the basic interest rate of the Brazilian economy from which all others derive. Brazil has had historically the (or one of the) highest interest rates in the world. However, it must be mentioned that the SELIC rate of 16.99% is only indicative and does not represent a project type specific benchmark (i.e. the standard returns in the market considering the specific risk of small hydroelectric projects).

Currently in Brazil, the standard low risk investment options available in the banks are attached to the SELIC rate. As investors can obtain rates very close to the SELIC with no or very low risk, then it is fair to assume that expected returns in the market considering the specific risk of a small hydroelectric project are therefore very likely to be higher than SELIC.

The sensibility analysis provided by the PP clearly shows that the financial barrier is very robust, as in no case a variation of $\pm 10\%$ put the IRR of the project even close to the average SELIC rate (the source is the Central Bank of Brazil), which can be considered a conservative rate, once it is only an indicative rate and not a specific sectorial benchmark applicable to the risk profile of the project, once it refers to government bonds and it is expected that an investor would not likely decide to take risks in a private enterprise such as a small hydro project and receive a lower return than the much safer government bonds.

Furthermore, the breakeven point analysis shows that variations ranging from 23% (Investment) to 147% (Maintenance costs) are required to meet the indicated SELIC rate, which likelihood is deemed low, as it is quite well explained in the PDD and explained in our assessment below:

Likelihood of scenarios occurrence

Investment (R\$)

The value applied by the PP was considered adequate considering the technical characteristics of the SHP, and it was cross checked with the *Eletrobras Standard Budget*, which is part of the executive project of the SHP assessed and approved by the National Electric Agency (ANEEL), which is the regulatory agency of electrical energy in the host country and also from the point of view of cost index of investment - R\$ per installed capacity in MW.

The cost index of investment (R\$/MW installed) of this project is R\$ 2,825.37 per installed MW, using the validated costs presented in the Table 5 of the validation report (R\$41,696,900.00).

Comparing the Santana I cost index of investment to registered CDM projects, we can observe that the project activity has comparative and conservative values for this index. For example, TÜV has made a random research of registered projects in order to compare with the present project activity. As a result "Rialma Companhia Energética I S/A. – Santa Edwiges I Small Hydro Power Plant – Small Scale CDM

Project” Ref. no. 0830², has presented a cost index of investment of 4,289.09 (R\$/MW installed); the project “Saldanha Small Hydroelectric Project” Ref. no. 1526³, has presented 5,668.04 (R\$/MW installed); “Rialma Companhia Energética III S/A. – Santa Edwiges III Small Hydro Power Plant – Small Scale CDM Project” Ref. no. 2165⁴, has presented 4,989.94 (R\$/MWh installed). Those projects was developed using the same methodology as Santana I SHP.

Considering the data above presented, it can be considered that the input value for investment costs used in the financial analysis is adequate/suitable as well as conservative.

Energy Price (R\$/MWh)

The signature of a PPA prior to project implementation is common practice in Brazil.

The PPA was signed for 20 months, and committed most energy to be produced by the SHP (8.2MW). As correctly indicated by the PP, the contracted price is higher than the prices in the energy auctions and thus it is considered unlikely that this price could be further increased. In addition, TUV considered that the longer the time, the lower the price that can be negotiated in a PPA and therefore it is conservative to consider that if the length of time contracted were higher, the price fetched would likely be lower than the considered one.

It is possible that a small quantity of exceeding energy can be sold in the spot market. However, the prices in the spot market are significant lower than those in energy auctions and the price in the signed PPA. The current prices practiced in the spot market of energy have ranged from R\$74.28/MWh (data from October 2008⁵, date when the project was made publicly available in the UNFCCC website) to R\$16.31/MWh (current prices – September 2009⁶), released by CCEE (Electric Power Commercialization Chamber).

Considering the above said, the audit team considers that it is highly unlikely that the energy price can be higher than the price validated by TUV.

Plant Load Factor (MW)

The data applied comes from the dispatch of ANEEL and the document was reviewed by the validation team.

ANEEL has a body of technical project reviewers who properly analyses generation projects in different sectors in Brazil. The main technical issues that influence the value of Plant Load Factor are the series of hydrological data and flow that historic occurred, climate conditions, topography, regular flow of the river, among others, that the ANEEL’s technical body is capable of analyzing these conditions and provide data for firm generation or assured generation of SHP projects.

² <http://cdm.unfccc.int/Projects/DB/BVQI1167161981.54/view>

³ <http://cdm.unfccc.int/Projects/DB/DNV-CUK1200486228.81/view>

⁴ <http://cdm.unfccc.int/Projects/DB/TUEV-SUED1218634643.54/view>

⁵ Document reference: http://www.ccee.org.br_cceeinterdsm_CCEE_template_print_October_2008

⁶ Document reference: http://www.ccee.org.br_cceeinterdsm_CCEE_template_print_September_2009

As ANEEL is an independent third party, and the country's agency responsible for the regulation of the electrical energy market, with the necessary experience and competence to evaluate technical data of hydro projects, the value presented was accepted by the audit team as reliable and accurate.

O&M costs

The values were provided by the financial/accountant consultant Correcto, which is a specialized company in this sector as it could be verified also by visiting its website, which presents in its first page the "Administrative and Operational Management of Small Hydro Plants" as one of its core services. The company has been providing consulting services for other SHP projects such as Cristalino SHP (CDM project registered at UNFCCC ref # 1800) and Rio Tigre SHP (under validation - bundled project Electra Power CDM project). As discussed during the interview with this third party, the costs are considered suitable, because they take into account the specific conditions of the project. Several factors influence the data provided and validated, as explained in the PDD.

Furthermore, the breakeven point analysis shows that a variation of 56% of the total costs is required to pass the indicative comparison rate (average SELIC). Accordingly a much higher variation in each individual parameter would be required to meet the comparison rate.

For example, for the parameter Maintenance alone, which is the component of O&M costs with the highest weight, if the value applied was zero (which is of course not feasible), the IRR would go to 15.4%, which is still 1.5% below the average SELIC). Likewise, if the value applied in the excel sheet for Administration costs was zero, the IRR would be 13.8% and if the value for insurance was zero, the resulting IRR would not pass 14.6%. Of course zero values for such parameters are just hypothetical and far from feasible

Period of Assessment & Residual value

Furthermore, the cash flow calculation considers 28 years of operation which is considered extremely conservative. In line with that reasoning, the residual value of 40% considered by the PP is also assessed by TUV as very conservative, as according to accounting regulations in Brazil, the book value for the asset will be zero at the end of the assessment period.

Taxes and Depreciation

All taxes applied were correctly applied according to the relevant laws (Federal Law 10.637 and Federal Law 9.718) and also depreciation was not considered in the cash flow, as Brazilian legislation allows the modality of vain profit (lucro presumido), according to which the income taxes are calculated over a given percentage of the revenues instead of the profit, and thus it is not necessary to include the depreciation in the cash flow.

Exactness of calculations

Moreover, the financial spreadsheet presented was thoroughly checked so that each formula, reference and input value was reviewed to ensure that the calculations were correctly presented.

Conclusions

Finally, considering the provided documents, interviews with the financial consultant, the result of the financial calculation and TÜV's local expertise, the validator considers the financial barrier robust and therefore CDM income decisive for project implementation.

Considering the above, it is TÜV's opinion that it is sufficiently demonstrated that the project is not financially attractive and therefore faces an investment barrier in addition to the two other justifiable barriers described in table 4-2 above.

However, CR B10 regarding to values for the SELIC rate, reference of link and source, translation of table to the English language and CAR B3 concerning the previously proposed WACC calculation were raised and successfully closed out.

For an in depth evaluation of all validation items please refer to the validation protocol (Annex). The Annex also includes all CARs, CRs and FAR (Table 3).

Evidence of Management Decision

The PP has presented a spreadsheet with starting data of investments. In compliance with the CDM Glossary of Terms^{/GT/} it was considered 01/03/2009 as starting date of the project activity, as the real commitment to the most significant investments (civil works and turbines/generators) are planned to start in March 2009.

However, CR C1 regarding to project's starting date was raised and successful closed.

For an in depth evaluation of all validation items please refer to the validation protocol (Annex). The Annex also includes all CARs, CRs and FAR (Table 3).

4.4 Crediting Period

The starting date of the crediting period as mentioned in the PDD^{/PDD/} under Section C.2. is 01/11/2010. The intended crediting period of the project is for a renewable period of seven years. The starting date of the project activity as mentioned in the PDD^{/PDD} under Section C.1 and verified by the validation team is 01/03/2009 which is the start of the significant investments. The project life time (28 years duration) indicated in the Section C.1.2 of the PDD^{/PDD/} was verified by the validation team.

However, CR C1 regarding to project's starting date was raised and successful closed.

For an in depth evaluation of all validation items please refer to the validation protocol (Annex). The Annex also includes all CARs, CRs and FAR (Table 3).

4.5 Monitoring Plan

The project applies the monitoring methodology AMS I.D.: Grid connected renewable electricity generation (Version 13) for small scale CDM project activities.

The monitoring of all baseline parameters is sufficiently addressed. It consists of metering the net electricity delivered to the grid (EG_y) and the grid emission factor ($EF_{grid,CM,y}$) based on combined margin (CM), consisting of the weighted average of operating margin (EF_{OM}) and build margin (EF_{BM}) factors. The $EF_{grid,CM,y}$ will be determinate *ex-post*, according to values published by DNA publication. EG_y will be measured continuously and recorded monthly. Monitoring of project and leakage emissions is not necessary as both are considered zero for this project activity.

The procedure for calibration, accuracy and maintenance of monitoring equipment and the responsibilities are clearly mentioned in section B.7. and Annex 4 of the PDD^{/PDD/}.

The data from the energy meters will be cross checked with the CCEE data bank (Electric Power Commercialization Chamber in Brazil) or with invoice of energy sales in the way to verify the coherency of the data. The cross-check can not rely exclusively on sales invoices as they might reflect the energy contracted and not the actual energy delivered to the grid. The data from CCE system is independent and reliable as it is audit by a third party.

The class of accuracy in the measurement equipment that will be used in the project activity follows national standards (NBR 14519 from ABNT – Brazilian Association for Technical Standards) indicated by the ONS.

However, CR A2 regarding to training, CR B2 regarding to information of the meters, CR B3 regarding to data collection procedures and to deal with erroneous measurements, CR B4 regarding to improvement of parameters description, CR B5 regarding to recording frequency of parameter, CR B7 regarding to training and monitoring personnel, CR B8 regarding to corrective actions in case of discrepancies data and CR B6 regarding to authority/responsibility of overall project management were raised and successfully closed out.

For an in depth evaluation of all validation items it please refer to the validation protocol (Annex). The Annex also includes all CARs, CRs and FAR (Table 3).

4.6 Calculation of GHG Emissions

Methodologies for calculating emission reductions are documented. The project intends to reduce carbon dioxide (CO_2) emissions by generating electricity from a small hydroelectric project, which would be exported to the SIN.

Project emission: The project emission is considered as zero.

Leakage: The technology introduced is not transferred to or from another project activity. Thus leakage can be ignored.

The emission reduction calculation was reviewed by the validation team. All underlying data/ values are transparent presented and assessed to be adequate.

The assured energy (8,72 MW) used for the calculation is provided in the Dispatch #3301 issued on 04/09/2008 ANEEL (the government energy agency which reviews and authorizes the implementation of power projects) which approved the basic project of Santana I SHP.

Acc. to the final PDD the project is expected to reduce emissions of **98,483 tCO_{2e}** over the 7 years crediting period.

However, CAR B2 regarding to considered the installed potential authorized by ANEEL's declaration was raised and successfully closed out.

For an in depth evaluation of all validation items please refer to the validation protocol (Annex). The Annex also includes all CARs, CRs and FAR (Table 3).

4.7 Environmental Impacts

An Environmental Diagnosis form was conducted and presented to Environmental Body ^{/ED/}, which demonstrates the impacts and plans to mitigate them. The identified adverse impacts are not considered significant.

However, CR D1 regarding to mention of impacts was raised and successfully closed out.

4.8 Comments by Local Stakeholders

According to the Resolution number 1 of the Brazilian Inter-Ministerial Commission on Climate Change², invitations for comments by local stakeholders are required by the Brazilian Designated National Authority (DNA) as part of the procedures for analyzing CDM projects and issuing letters of approval.

The DNA required project participants to communicate with the public through letters, to be sent inviting for comments to: Brazilian national NGO's forum; local attorneys' and prosecutors' agency; municipality's chamber (mayor and assembly men); State's and municipal's environmental authorities and local communities' associations.

As defined by the Designated National Authority (DNA), PP informed various stakeholders about the project details through letter invitation mentioning an electronic address where the Portuguese version of the PDD was available, according to DNA's Resolution ^{/R7/}. The project participant should leave 30 days opened for comments. No comment was received.

As a result from the stakeholder involvement process it can be concluded that no relevant concerns of the local stakeholders are existing. The stakeholder process was conducted in compliance with the requirements of the Brazilian DNA.

5 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

According to the modalities for the validation of CDM projects, TÜV NORD JI/CDM CP published the draft PDD on its website <http://cdm.unfccc.int/Projects/Validation/index.html> on 01/10/2008 and invited comments within 30 days, until 30/10/2008 by parties, stakeholders and UNFCCC accredited non-governmental organisations. No comment was received.

6 VALIDATION OPINION

Carbotrader Assessoria e Consultoria em Energia Ltda. has commissioned the TÜV NORD JI/CDM Certification Program (CP) to validate the project: “Santana I SHP CDM Project (JUN 1118)” with regard to the relevant requirements of the UNFCCC for CDM project activities, as well as criteria for consistent project operations, monitoring and reporting. UNFCCC criteria include article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakech Accords), the simplified modalities and procedures for small scale CDM project activities of annex II to decision 21/CP.8 and the relevant decisions by COP/MOP and CDM Executive Board.

The project activity exports the electrical power from a renewable energy source to the national electric grid (National Interconnected System – SIN). The project intends to reduce GHG emissions to the extent of equivalent electricity generated by fossil fuels based power plants of the grid.

A risk based approach has been followed to perform this validation. In the course of the pre-validation, 03 Corrective Action Requests (CARs) and 14 Clarification Requests (CRs) were raised and successfully closed. In addition 1 FAR has been issued and should be reviewed during the first verification.

The review of the project design documentation and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and review of comments by parties, stakeholders and NGOs have provided TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

In detail the conclusions can be summarised as follows:

- The project is in line with all relevant host country criteria (Brazil) and all relevant UNFCCC requirements for CDM. The LoA was obtained from the Brazilian DNA on 23 June 2009.
- The project additionality is sufficiently justified in the PDD.
- The monitoring plan is transparent and adequate.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 98,483 tCO₂e are most likely to be achieved within the 7 years (renewable) crediting period (1st Nov 2010-31th Oct 2017).

The conclusions of this report show, that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation.

Essen, 2010-01-07



Rainer Winter
TÜV NORD JI/CDM Certification Program
Validation Team Leader

Essen, 2010-01-07



Eric Krupp
TÜV NORD JI/CDM Certification Program
Senior Assessor

7 REFERENCES

Table 7-1: Documents provided by the project proponent

Reference	Document
/AD1/	ANNEL's Declaration (<i>Despacho</i>) #3301 of 04/09/2008
/BBC/	Ballot of bank credit (draft) – between Firenze Energética S.A. and Bank Daycoval S.A. - 06/08/2008
/CRS/	Contract of Rendering of Service between Firenze Energética S.A. and Carbotrader Ltda. – 03/07/2008
/DC/	Draft Contract with price of energy and quantity of assured energy
/ED/	Environmental Diagnosis (Appendices D of Basic Project)
/EMAILe/	Email from Mr. Michel Sehn (Electraenergy) legalizing the proposal – 16/09/2008
/EMAILp/	Email from Roberto Fukumoto (Perdigão) authorizing to continue with accept of PPA proposal – 17/09/2008
/EP/	Environmental program in spreadsheet
/IL/	Installation License SUIMIS55954/2008 valid: 14/01/2010 Request of Installation License #589119/2008 of 30/09/2008
/INF/	Information of industrial electronic meters (commercial and technical – Landis + Gyr)
/LoA/	Letter of Approval issued by CIMGC (DNA) on 23 June 2009.
/PR/	Proof of Receipt of stakeholder consultation documentation
/OPE/	Executive project PCH Santana I and Budget standard of Eletrobrás – 30/01/2008
/PDD/	<ul style="list-style-type: none"> - Draft Project Design Document entitled “Santana I SHP CDM Project (JUN 1118)” Version 01; June 26th, 2008 (hosted for public comments during 01/10/2008 to 10/10/2008) - Project Design Document entitled “Santana I SHP CDM Project (JUN 1118)” Version 02; February 18th, 2009 - Project Design Document entitled “Santana I SHP CDM Project (JUN 1118)” Version 03; March 11th, 2009

Reference	Document
	- Project Design Document entitled “Santana I SHP CDM Project (JUN 1118)” Version 03a; December 15 th , 2009
/PPA/	Power Purchase Agreement EE/PPA 008/2008 between Firenze Energética S.A. and Perdigão Agroindustrial S.A.
/PHR/	Photographic report of August 2008
/QU/	Spreadsheet “Quadros e Usos” demonstrating the investment prevision
/SW/	Schedule of workmanship – 20 months
/XCLa/	Spreadsheet calculation – analysis
/XCLc/	Spreadsheet CERs JUN1118 – revision 2
/XCLcp/	Spreadsheet calculation – common practice
/XCLhs/	Spreadsheet calculation – historic SELIC rate

Table 7-2: Background investigation and assessment documents

Reference	Document
/AMS I.D./	“Grid-connected renewable electricity generation” (Version 13), EB 36
/CPM/	TÜV Nord JI / CDM CP Manual (incl. CP procedures and forms)
/DFL/	DOE/AIE Forum request letter for opportunity to assess that the “tool to calculate the emission factor for an electricity system” was correctly applied.
/DNAOF/	Brazilian DNA Official Letter inviting the DOE to have an opportunity to assess that the “tool to calculate the emission factor for an electricity system” was correctly applied.
/GCSCP/	UNFCCC: Guidelines for completing the simplified project design document (CDM-SSC-PDD) and the form for submissions on methodologies for small-scale CDM project activities (F-CDM-SSC-Subm)
/GT/	CDM Glossary of Terms, UNFCCC
/IPCC-GP/	IPCC Good Practice Guidance & Uncertainty Management in National

Reference	Document
	Greenhouse Gas Inventories, 2000
/IPCC-RM/	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual
/KP/	Kyoto Protocol (1997)
/MA/	Decision 17/CP. 7 (Marrakesh – Accords & Annex to decision 17/CP.7)
/R7/	DNA's Resolution #7 of 05/03/2008
/R8/	DNA's Resolution #8 of 26/05/2008
/SMP/	Simplified modalities and procedures for small-scale clean development mechanism project activities (Annex II to Decision 21/CP.18)
/TEF/	"Tool to calculate the emission factor for an electricity system" (Version 01.1), EB 35
/VVM/	Validation and Verification Manual (Version 1, EB 44, Annex 3)

Table 7-3: Websites used

Reference	Link	Organisation
/aneel/	http://www.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.asp http://www.aneel.gov.br/aplicacoes/capacidadebrasil/OperacaoCapacidadeBrasil.asp	ANEEL
/bcb/	www.bcb.gov.br http://www.bcb.gov.br/?COPOMJUROS http://www.bcb.gov.br/?SELICDIA	Central Bank of Brazil
/bi/	http://pages.stern.nyu.edu/~adamodar/	Damodaram online
/bovespa/	http://www.bovespa.com.br/Priorincipal.asp http://www.bovespa.com.br/Mercado/RendaVariavel/Indices/FormConsultaAnuaisFechVariacoes.asp?Indice=Ibovespa	Stock exchange

Reference	Link	Organisation
/carbotrader /	http://www.carbotrader.com/jun1118a3.pdf http://www.carbotrader.com/jun1118dcp.pdf	Carbotrader
/correcto/	http://www.correcto.com.br/	Correcto Organização Contabil
/dna/	http://www.mct.gov.br/index.php/content/view/72899.html http://www.mct.gov.br/index.php/content/view/72901.html	DNA of Brazil
/ibge/	www.ibge.gov.br	IBGE
/ipcc/	www.ipcc-nggip.iges.or.jp	IPCC publications
/fazenda/	www.receita.fazenda.gov.br	Ministry of Economy of Brazil – Tax Service
/unfccc/	http://cdm.unfccc.int	UNFCCC

Table 7-4: List of interviewed persons

Reference	Mol ¹		Name	Organisation / Function
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms	Arthur A. C. Moraes	Carbotrader Assessoria e Consultoria em Energia Ltda. / Director
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Luiz Fernando M. Serrano	Carbotrader Assessoria e Consultoria em Energia Ltda. / Project Manager
/IM01/	V	<input checked="" type="checkbox"/> Mr. <input type="checkbox"/> Ms.	Walter Camargo	Correcto Organização Contábil / Director and Financial Consultant
/IM01/	V	<input type="checkbox"/> Mr. <input checked="" type="checkbox"/> Ms.	Simone Matico	Firenze Energética S.A. / Administrative Manager

¹⁾ Means of Interview: (Telephone, E-Mail, Visit)

Final Validation Report:

Santana I SHP CDM Project (JUN 1118)

TÜV NORD JI/CDM Certification Program

P-No.: 5891/08 – 08/344



ANNEX

Final Validation Protocol

ANNEX : DRAFT VALIDATION PROTOCOL

Table 1: Mandatory Requirements for (CDM) Project Activities

Requirement	Reference	Conclusion
Parties		
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	OK Annex 1 Party will be identified in due time.
The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
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	OK
The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK
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	OK No public funding was used to project activity.
Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK

Requirement	Reference	Conclusion
The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	It's an unilateral project. Annex 1 Party will be identified in due time.
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	It's an unilateral project. Annex 1 Party will be identified in due time.
Additionality		
Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK
Forecast emission reductions and environmental impacts		
The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
Environmental impacts		
Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an	CDM Modalities and Procedures §37c	OK

Requirement	Reference	Conclusion
environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.		
Stakeholder involvement		
Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK
Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK
Requirements for small-scale projects only		
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	OK

Requirement	Reference	Conclusion
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	OK
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	OK

Table 2: Requirements Checklist

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity <i>The project design is assessed.</i>					
A.1. Project Boundaries <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	/PDD/ (A 4.1.4), (B.3.) /R8/	DR	<p>The project is located in the river Santana, in the Central West of Brazil, State of Mato Grosso and municipality of Nortelândia.</p> <p>However, the unique geographic identification of the project activity as geographical coordinates should be more clearly indicated, as the expression "Datum WGS 84" appears to be merged with the longitude coordinates.</p> <p>Electricity generated by the project activity is sent through local grid to National Interconnected System (SIN). Thus SIN is defined as the project boundary. Acc. to DNA ^{/R8/}, it adopts a unique system of the electric grid.</p>	CR A1	OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/PDD/ (A.4.2) (B.3) /IM01/ /AD1/ /IL/	DR, I	The PDD in section A.2. and Table 1 in section A.4.2 mentions to 13.1 MW of installed capacity. Each turbine has a capacity of 6.896MW (or 6.500MW effective), so the total would be 13.79MW (or 13MW effective) so revision is necessary. However, new studies about the river potential by ANEEL demonstrated that the plant can have 14.758	CR A1	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>MW. ANEEL' s Declaration ^{/AD1/} for such figure was available to the validator. Also the Installation license ^{/IL/} mentions an area of reservoir of 1.17 km² and such data is not compatible with that mentioned in the PDD in section A.2. and A.4.2 (1.078 km²).</p> <p>In addition, the project category name stated in section A.4.2 is incorrect (renewable electricity for a grid) as it should be "electricity generation for a system" as per Appendix B of the SMP.</p> <p>And also in table 1, page 8 the value of 8,21 is not identified and several lines are blank and also the source for the capacity factor of 0,627 should be explained.</p> <p>In addition, in section B.3, a diagram showing the project boundary (including grid connection point, number and location of meters, substation, joint meter (if applicable), turbines) need to be provided so that scenario is clearly shown in the PDD.</p> <p>Revision is necessary.</p> <p>The manufacturers of the turbines and generators have not been decided yet. To ensure that the installed capacity will not exceed the 15 MW limit for small scale CDM projects a FAR A1 was raised.</p>	FAR 1	FAR 1

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A.2. Participation Requirements <i>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.</i>					
A.2.1. Which Parties and project participants are participating in the project?	/PDD/ (A.3) (Annex 1) /IM01/	DR, I	<p>The only party involved in the project activity is Brazil (Host Party).</p> <p>The project participants are: Carbotrader Assessoria e Consultoria em Energia Ltda. and Firenze Energética S/A.</p>	OK	OK
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party?	/PDD/ /dna/ /LoA/	DR	<p>In accordance with the CDM M&P at the stage of validation a Party involved may or may not have provided its approval at the time of making the PDD public. The approval of the parties involved is required at the time of requesting registration.</p> <p>The LoA for the project activity was issue by the Brazilian DNA on 23 June 2009.</p>	OK	OK
A.2.3. Do all participating Parties fulfil the participation requirements as follows: – Ratification of the Kyoto Protocol	/unfccc/ /dna/	DR	Brazil, the host country, has ratified the Kyoto Protocol on 23 rd August 2002. The Brazilian DNA assigned for CDM is the “Global Climate Change international Commission”.	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<ul style="list-style-type: none"> – Voluntary participation – Designated a National Authority 					
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/PDD/ (A.4.4, Annex 2) /IM01/	DR, I	Public funding from an Annex I - country is not used to finance the project activity.	OK	OK
A.3. Technology to be employed <i>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.</i>					
A.3.1. Does the project design engineering reflect current good practices?	/PDD/ (A.4.2.)	DR, I	Yes, the project is a run-of-river hydropower plant. It mainly consists of a small reservoir and a power house. In PDD, section A.4.2, description of the technology is provided. The technology is domestic and environmentally safe and sound.	OK	OK
A.3.2. Does the project use	/PDD/	DR	Small hydro power is a technology to generate GHG	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	(A.4.2.)		emission free electricity. The components utilized are new and state of the art. All components are of Brazilian origin, thus a technology transfer doesn't happen.		
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/PDD/ (B.7.2.)	DR	It is mentioned in the PDD, section B.7.2 that there will be a maintenance and damage repair procedure, which will follow national regulations specifications. But nothing about training was mentioned. Clarification is necessary.	CR A2	OK
A.4. Contribution to Sustainable Development <i>The project's contribution to sustainable development is assessed.</i>					
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	/dna/	DR	Yes, the Brazilian DNA issued a LoA for the project on 23 June 2009 which clearly states the project contributes for the sustainable development of Brazil..	OK	OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/PDD/ (A.2.) /IM01/	DR I	The view of the project participants on the contribution of the project activity towards sustainable development is briefly described in section A.2. Besides GHG reduction, the project also helps reducing	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the reliance on fossil fuel for power generation and reducing pollution caused by it. Moreover, It increases job opportunities to local people.		
Small scale project activity <i>Is it assessed whether the project qualifies as small-scale CDM project activity</i>					
A.4.3. 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?	/PDD/ (B.2.) /AMS I.D./	DR	In section B.2. of the PDD, it is explained why the project activity refers to AMS I.D. It fulfils the criteria of total capacity lower than 15 MW. It also fulfils the criteria of connecting to a grid electricity from which is or would have been supplied by at least one fossil fuel fired generating unit.	OK	OK
A.4.4. Is the small scale project activity not a debundled component of a larger project activity?	/PDD/ A.4.5	DR	No, the small scale project activity is not a debundled component of a larger project activity.	OK	OK
A.5. General Topics					
A.5.1. Has the PDD been duly filled?	/PDD/	DR	Refer to the CRs/CARs.	Not yet	OK
A.5.2. Has all necessary information been made available to the validator?	/PDD/	DR, I	Yes. The necessary information has been made available to the validator.	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B. Project Baseline <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
B.1. Baseline Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	/PDD/ (B.1) /AMS I.D./	DR	Yes, the project applies the approved small scale methodology AMS I.D. Version 13 (EB 36): "Grid connected renewable electricity generation". However the Tool to Calculate the Emission Factor should be mentioned in section B.1.	CR-B9	OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/PDD/ (B.2.), /AMS I.D./	DR	In section B.2. of the PDD, it is explained why the project activity refers to AMS I.D. It is a small hydro generating unit that fulfils the criteria of total capacity lower than 15 MW. It also fulfils the criteria of displacing electricity from a grid which is or would have been supplied by at least one fossil fuel fired generating unit.	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.2. Baseline Scenario Determination <i>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.</i>					
B.2.1. What is the baseline scenario?	/PDD/ (B.4.) /AMS I.D./ /dna/	DR	In the absence of the project activity, the electricity would be supplied by the existing mix of power plants connected to the SIN. In Section B.4 it is clearly indicated that the baseline is the electricity generated by the proposed renewable electricity generating unit multiplied by an emission coefficient, which is in compliance with AMS I.D, version 13, item 9.	OK	OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/PDD/ (B.4.) /AMS I.D./	DR	It is clearly indicated that the baseline is the kWh produced by the renewable energy facilities times the emission coefficient of the applicable electricity grid. No other alternative scenarios have been considered.	OK	OK
B.2.3. Has the baseline scenario been determined according to	/PDD/ (B.4.), /AMS I.D./	DR	Yes, the baseline is determined as electricity produced by the proposed renewable electricity generating unit multiplied by an emission coefficient, which is in	OK	OK

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
the methodology?				compliance with AMS I.D, version 13.		
B.2.4.	Has the baseline scenario been determined using conservative assumptions where possible?	/PDD/ (B.4.), /AMS I.D./	DR	Yes, the baseline scenario was determined according to approved methodology AMS I.D. version 13.	OK	OK
B.2.5.	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/PDD/ (B.4.), /AMS I.D./	DR	Yes, the baseline scenario take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations.	OK	OK
B.2.6.	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/PDD/ (B.4.) /AMS I.D./ /R8/ /dna/	DR	Yes, the emission factor applied is published and calculated by DNA utilizing ONS' records.	OK	OK
B.2.7.	Have the major risks to the baseline been identified?	/PDD/	DR	No major risks were identified and are not to be expected.	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.3. Additionality Determination <i>The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.</i>					
B.3.1. Is the project additionality assessed according to the methodology?	/PDD/ (B.5.), /AMS I.D./ /XCLhs/ /XCLcp/ /XCLa/ /aneel/ PPA/	DR, I	<p>Yes, in section B.5 of the PDD the additionality is justified according to attachment A to appendix B of the simplified modalities and procedures. Investment Barrier Analysis, Barriers due to Prevailing Practice and Other Barrier Analysis are described.</p> <p>1. Investment Barrier Analysis:</p> <p>The investment barrier is based on the calculation of the Project Internal Rate of Return (IRR) compared to the SELIC rate (government bonds), the basic interest rate of the Brazilian economy from which all other rates derive. (please refer to Table 3 and section 4.3 of this Validation Report).</p> <p>The IRR of the proposed activity without CDM revenue is 11.9%, lower than SELIC rate (16,99%)^{/xclhs/}.</p> <p>Even with the CDM revenues the IRR (12,8%) is still below the SELIC benchmark..</p> <p>Therefore conclusion can be made that the project activity without CDM is not a financially attractive option.</p> <p>2. Barriers due to Prevailing Practice:</p> <p>Small Hydroelectric plants without CDM are unusual in</p>	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>Brazil. According to ANEEL, the sources which prevail in the grid are large hydropower plant and thermoelectric plant.</p> <p>3. Other Barrier:</p> <p>It regards the availability of qualified workers and qualification of new professionals in the region as well the infra-structure investments in communication to implement the activity project.</p>		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	/PDD/ (B.5.) /XCLhs/ /XCLa/ PPA/ /OPE/ /BBC/ /DC/	DR, I	<p>The following data was evidenced:</p> <p>Spreadsheet calculation ^{/XCLhs/ /XCLa} Contract of energy ^{/PPA/} Assured potential ^{/OPE/} Loan form Bank Daycoval S.A. ^{/BBC/} Price of energy ^{/DC/}</p> <p>Depreciation was not included in the calculations of IRR since the income tax is calculated using the PRESUMED PROFIT modality (a percentage over the gross revenues) and therefore the depreciation does not alter the value of tax and as it is a non-cash item it does not need to be included in the cash flow.</p> <p>However, the following items need revision:</p> <p>PDD:</p> <p>1. in section B.5., the values for the SELIC rate differ slightly (17,60% in page 15 and 17,70% in table 2,</p>	CR-B10	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>page 16).</p> <p>2. Please detail link for source of table 4.</p> <p><u>Excel Sheet Análise Santana-I:</u></p> <p>3. The Excel sheets need to be presented in English</p> <p><u>Excel Sheet Historico Selic rev0:</u></p> <p>4. The Excel sheets need to be presented in English</p> <p>5. In the sheet WACC, please indicate the source for the values of capital structure and the interest rate for financing in order to be more transparent. In addition in cell B6 it is mentioned BNDES but the loan was made from Bank Daycoval S.A. ^{/BBC}. Revision is necessary.</p>		
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	/PDD/ (B.5.)	DR, I	Refer to B.3.1 and B.3.2	CR B10	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?	/PDD/ (B.5.) /CRS/ /GT/	DR, I	<p>The date considered for the start of the activity project is 01/03/2009, which is after the date of beginning of validation.</p> <p>This date is in accordance with the Glossary of Terms, as it is the date where the commitment to the major expenditures of the project is expected to occur (beginning of construction of dam and purchase of turbines and generators).</p>	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.4. Calculation of GHG Emission Reductions – Project emissions <i>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.</i>					
B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/PDD/ (B.6.) /AMS.I.D/	DR	According to AMS I.D project emissions are not to be considered.	OK	OK
B.4.2. Have conservative assumptions been used when calculating the project emissions	/PDD/ (B.6.)	DR	Refer B.4.1	N/A	N/A
B.4.3. Are uncertainties in the project emission estimates properly addressed?	/PDD/ (B.6.)	DR	Refer B.4.1	N/A	N/A

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.5. Calculation of GHG Emission Reductions – Baseline emissions <i>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.</i>					
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/PDD/ (B.6.1.2, Annex 3) /AMS I.D./ /ACM0002/ /dna/	DR	Yes, the calculation of the baseline emissions follows the provisions of AMS I.D. version 13. The key assumptions and rationale used to determine the baseline emissions (variables, parameters, data sources) is given by reference of data registered by the ONS and emission factor published by the DNA. However, the following points need revision: <ol style="list-style-type: none"> 1. the link presented in page 10, section B.4, is not available. Please update it. 2. the numbered sub-items should not be utilized as they are not in accordance with the version 3 of the CDM-SSC-PDD template. 3. sub-item B.6.1.1 calculations should be deleted, since according to AMS I.D such calculations are not necessary once project emissions are not considered in the methodology. 4. in sub-item B.6.1.2, the description of the steps should be removed as the combined margin and operating margin are publicly available data 	CR-B1	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			provided by the Brazilian DNA. 1. In B.6.2 the tables of the parameters should be removed as these are all monitored parameters and are included in B.7.1. The values used for estimation of emission reduction should be included in the respective tables in B.7.1		
B.5.2. Have conservative assumptions been used when calculating the baseline emissions	/PDD/ (B.6.1.2, Annex 3) /TEF/ /R8/ /dna/ /XCLa/ /IL/ /AD1/	DR	The baseline emissions are calculated based on kWh produced and multiplied by the emission factor (EF) which consists of the combination between the operation margin and the build margin, which are calculated and published by Brazilian DNA. But, the quantity of kWh should be calculated according to installed potential authorized by ANEEL's declaration ^{/AD1/} .	CAR B2	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/PDD/ (B.6.1.2)	DR	No uncertainties are expected in estimating the baseline emissions.	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.6. Calculation of GHG Emission Reductions – Leakage <i>It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.6.1. Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/PDD/ (B.6.1.3)	DR	No equipment is transferred from other activity. It is a new project, so according to AMS I.D., the leakage is zero	OK	OK
B.6.2. Have conservative assumptions been used when calculating the leakage emissions?	/PDD/ (B.6.1.3)	DR	See comments in B.6.1.	N/A	N/A
B.6.3. Are uncertainties in the leakage emission estimates properly addressed?	/PDD/ (B.6.1.3)	DR	Not applicable since leakage is not considered.	N/A	N/A

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.7. Emission Reductions <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i>					
B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	/PDD/ (B.6.)	DR	The CARs/CRs given in section B have to be closed satisfactorily before forming an opinion.	Not yet	OK
B.8. Monitoring Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/PDD/ (B.7.1) (B.7.2) (Annex 4)	DR	<p>The methodology applied is AMS I.D. The monitored parameters are electricity exported to grid and the grid emission factor (EF). The EF will be monitored through ex-post calculation, utilizing the build margin and operating margin calculated by the Brazilian DNA according to the “tool to calculate the emission factor for an electricity system”.</p> <p>However, the description of the monitoring plan (section B.7.2) and the table in B.7.1 which describes parameter EG should be improved as the text is not very clear and the parameter should be described as “<u>net</u> electricity of</p>	CR-B4	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>Santana...”</p> <p>More detailed information of the meters (e.g. quantity, location, accuracy range, if uni or bidirectional) should be provided.</p> <p>Data collection procedures and procedures to deal with erroneous measurements are not clearly identified.</p>	<p>GR-B2</p> <p>OK</p> <p>GR-B3</p> <p>OK</p>	<p>OK</p> <p>OK</p>
<p>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?</p>	/PDD/ (B.7.1, B.7.2.)	DR	Yes, the data will be archived during the crediting period and two years after its end. This is indicated in B.7.1 and B.7.2. of the PDD.	OK	OK
<p>B.9. Monitoring of Project Emissions</p> <p><i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i></p>					
<p>B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary</p>	/PDD/ (B.7.)	DR	Project emissions are considered zero, monitoring is not necessary.	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?					
B.9.2. Are the choices of project GHG indicators reasonable and conservative?	/PDD/ (B.7.)	DR	See comment B.9.1.	N/A	N/A
B.9.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	/PDD/ (B.7.)	DR	See comment B.9.1.	N/A	N/A
B.9.4. Is the measurement equipment described and deemed appropriate?	/PDD/ (B.7.)	DR	See comment B.9.1.	N/A	N/A
B.9.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/PDD/ (B.7.)	DR	See comment B.9.1.	N/A	N/A

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.9.6. Is the measurement interval identified and deemed appropriate?	/PDD/ (B.7.)	DR	See comment B.9.1.	N/A	N/A
B.9.7. Is the registration, monitoring, measurement and reporting procedure defined?	/PDD/ (B.7.)	DR	See comment B.9.1.	N/A	N/A
B.9.8. Are procedures identified for maintenance of monitoring equipment and installations? Are the calibration intervals being observed?	/PDD/ (B.7.)	DR	See comment B.9.1.	N/A	N/A
B.9.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/PDD/ (B.7.)	DR	See comment B.9.1.	N/A	N/A

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.10. Monitoring of Baseline Emissions <i>It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.</i>					
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?	/PDD/ (B.7., Annex 4) /TEF/	DR	Yes. The monitoring plan includes the electricity exported to the grid as well as the operating and build margin emission factor to calculate the combined margin emission factor. For operating and build margin emission factor the annually updated data published by Brazilian DNA will be applied. Therefore the parameters required to calculate operating and build margin emission factor as stipulated in the "Tool to determine the emission factor for an electricity system" do not have to be monitored by the PP.	OK	OK
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/PDD/ (B.7.)	DR	Yes, the chosen baseline GHG indicators (net energy delivered to the grid, emission coefficients) are conservative and in compliance with the monitoring methodology.	OK	OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/PDD/ (B.7., Annex 4)	DR	Yes, electricity exported to grid will be measured by electricity meters. The electricity exported to grid will be managed by system software providing hourly, daily or monthly energy generation reports by the project owner. Electricity sales invoices will be kept by the project owner for cross-check. Records will be kept till 2 years after crediting period.	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			The combined margin emission factor will be calculated using the operating margin and build margin emission factors published by the Brazilian DNA.		
B.10.4. Is the measurement equipment described and deemed appropriate?	/PDD/ (B.7., Annex 4) /INF/	DR	More detailed information of the meters (e.g. quantity, location, accuracy range, uni or bi direction) should be provided.	CR-B2	OK
B.10.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/PDD/ (B.7.) /MM/ /INF/	DR I	See CR B2 See CR B3 .	CR-B2 CR-B3	OK OK
B.10.6. Is the measurement interval for baseline data identified and deemed appropriate?	/PDD/ (B.7., Annex 4)	DR	Yes, it is indicated that the measurements of electricity will be registered by software hourly. However in Annex 4 the recording frequency of the operating margin emission factor is hourly. Correction is necessary.	OK CR-B5	OK OK
B.10.7. Is the registration, monitoring, measurement and reporting procedure defined?	/PDD/ (B.7., Annex 4)	DR	See CR B3 and CR B4	CR-B3	OK
B.10.8. Are procedures identified for maintenance of monitoring equipment	/PDD/ (B.7., Annex 4)	DR	Yes, it is indicated in B.7.2 that maintenance and damage repair procedures based on national regulation specifications are in place and that calibration procedures	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
and installations? Are the calibration intervals being observed?			follow national guidelines set by the National Grid Operator (ONS) and meters will be calibrated according to industrial standards.		
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)	/PDD/ (B.7., Annex 4)	DR	The records are managed by a software system providing energy generation reports. The hourly reports will be used in the project activity and the data will be archived monthly (electronic). It will be archived during the credit period and for two years after its end.	OK	OK
B.11. Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
B.11.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/PDD/ (B.7.)	DR	As leakage is not to be considered, monitoring is not necessary.	N/A	N/A
B.11.2. Are the choices of project leakage indicators reasonable and conservative?	/PDD/ (B.7.)	DR	See comment above.	N/A	N/A

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.11.3. Is the measurement method clearly stated for each leakage value to be monitored and deemed appropriate?	/PDD/ (B.7.)	DR	See comment above.	N/A	N/A
B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts <i>It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/PDD/ (B.7.) /EP/ /ED/	DR	The legislation in the host country does not request monitoring of sustainable development indicators. However, some environmental monitoring is requested: reforestation, environmental education, rescue and monitoring of animals, environmental management plan and reservoir wadding plan. The plan was evidenced in Environmental Diagnosis ^{/ED/} .	OK	OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/PDD/ (B.7.)	DR	See comment above.	OK	OK
B.12.3. Are the sustainable	/PDD/	DR	See comment in B.12.1.	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
development indicators in line with stated national priorities in the Host Country?	(B.7.)				
B.13. Project Management Planning <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
B.13.1. Is the authority and responsibility of overall project management clearly described?	/PDD/ (B.7.)	DR	The authority and responsibility of overall project management is not clearly described. Revision is necessary.	CR-B6	OK
B.13.2. Are procedures identified for training of monitoring personnel?	/PDD/ (B.7.)	DR	Procedures for training and monitoring personnel should be addressed in PDD. Revision is necessary.	CR-B7	OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/PDD/	DR	No emergencies are envisaged leading to higher GHG emissions.	OK	OK
B.13.4. Are procedures identified for review of reported results/data?	/PDD/ (B.7.1)	DR	Yes, it is indicated in B.7.1 that data from meters will be cross-checked against relevant electricity sales invoices or the CCEE data bank.	OK	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/PDD/ (Annex 4)	DR	In Annex 4 of PDD, it is mentioned that a reconciliation of data will be adopted to highlight discrepancies between energy generation data and sales invoices. but it does not mention corrective actions in case of discrepancies are found. Revision is necessary.	CR-B8	OK
C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
C.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	/PDD/ (C.1.) /IM01/ /CRS/	DR, I	The expected operational lifetime is defined as 28 years in Section C.1.2. The project's starting date indicated in section C.1.1. in the PDD is 03/07/2008. This is the date of signature of the contract between Firenze and Carbotrader ^{/CRS/} . However, according to the CDM Glossary of Terms, the starting date of the project should be the date where real commitment to major expenditures occurred. Please revise accordingly making it clear what the date refers to in section C.1.1.	CR-C1	OK
C.2. Is the start of the crediting period clearly defined and reasonable?	/PDD/ (C.2.)	DR	The starting date of the crediting period in PDD is 01/11/2010.	OK	OK
D. Environmental Impacts <i>Documentation on the analysis of the</i>					

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>						
D.1.	Has an analysis of the environmental impacts of the project activity been sufficiently described?	/PDD/ (D.1.) /ED/ /IM01/	DR, I	It was prepared an environmental diagnosis ^{/ED/} which demonstrates the impacts and plans to mitigate it. However, the impacts are not mentioned on PDD. Revision is necessary.	CR-D1	OK
D.2.	Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/PDD/ (D.1.) /ED/ /IM01/	DR, I	An Environmental Diagnosis ^{/ED/} is stipulated by the host party to issue the installation license. It [/] was available to the validation team.	OK	OK
D.3.	Will the project create any adverse environmental effects?	/PDD/ (D.1.) /ED/ /EP/	DR	No significant environmental impacts are expected from the project. However, plans are elaborated to mitigate some identified impacts. See comment in B.12.1.	OK	OK
D.4.	Are transboundary environmental impacts considered in the analysis?	/PDD/ (D.1.) /ED/	DR	According to environmental diagnosis ^{/ED/} , no transboundary effects are expected.	OK	OK
D.5.	Have identified environmental impacts	/PDD/ (D.1.) /ED/	DR	Refer to D.1.	CR-D1	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
been addressed in the project design?					
D.6. Does the project comply with environmental legislation in the host country?	/PDD/ (D.1.) /IL/ /AD1/	DR	Yes, the project was granted an Installation License ^{/IL/} and has applied for a new one (due the change of the capacity of project, according to authorization of ANEEL ^{/AD1} (14.758 MW). The documents were available to the validation team.	OK	OK
For Small- scale projects					
D.7. Does host country legislation require an analysis of the environmental impacts of the project activity?	/PDD/ (D.1) /ED/ /EP/	DR	The host country requires an Environmental Diagnosis. The evidence was available to TUV. Refer D.2.	OK	OK
D.8. Does the project comply with environmental legislation in the host country?	/PDD/ (D.1.) /IL/ /AD1/	DR	Yes, refer D.6.	OK	OK
D.9. Will the project create any adverse environmental effects?	/PDD/ (D.1.) /ED/ /EP/	DR	Refer D.3	OK	OK
D.10. Have environmental impacts been identified and addressed in the PDD?	/PDD/ (D.1.) /ED/	DR	Refer to D.1.	CR-D1	OK

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
E. Stakeholder Comments <i>The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i>						
E.1.	Have relevant stakeholders been consulted?	/PDD/ (E.1.) /PR/ /R7/ /IM01/	DR, I	The stakeholders addressed on PDD have been consulted according to DNA's Resolution ^{/R7/} . The proof of receipt ^{/PR/} from stakeholder consultation was available to TUV.	OK	OK
E.2.	Have appropriate media been used to invite comments by local stakeholders?	/PDD/ (E.1.) /PR/ /R7/ /IM01/	DR, I	Yes, the stakeholder consultation was conducted in the form of letter invitation mentioning an electronic address were the Portuguese version of the PDD was available, according to DNA's Resolution ^{/R7/} . The proof of receipt ^{/PR/} from stakeholder consultation was available to the validation team.	OK	OK
E.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?	/PDD/ (E.1.) /PR/ /R7/ /IM01/	DR, I	Yes. The procedure requested by Brazilian DNA ^{/R7/} has been followed.	OK	OK
E.4.	Is a summary of the stakeholder comments	/PDD/ (E.2.)	DR	No comment was received.	OK	OK

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
received provided?						
E.5.	Has due account been taken of any stakeholder comments received?	/PDD/ (E.3.)	DR	No comment was received.	OK	OK

Table 3: Resolution of Corrective Action and Clarification Requests

Draft report clarification requests and corrective action requests by validation team	Ref. To checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>CAR A1</p> <p>The PDD in section A.2. and Table 1 in section A.4.2 mentions to 13.1 MW of installed capacity. Each turbine has a capacity of 6.896MW (or 6.500MW effective), so the total would be 13.79MW (or 13MW effective) so revision is necessary. However, new studies about the river potential by ANEEL demonstrated that the plant can have 14.758 MW. ANEEL's Declaration ^{/AD1/} for such figure was available to the validator. Also the Installation license ^{/IL/} mentions an area of reservoir of 1.17 km² and such data is not compatible with that mentioned in the PDD in section A.2. and A.4.2 (1.078 km²).</p> <p>In addition, the project category name stated in section A.4.2 is incorrect (renewable electricity for a grid) as it should be "electricity generation for a system" as per Appendix B of the SMP.</p> <p>And also in table 1, page 8 the value of 8.21 is not identified and several lines are blank and also the source for the capacity factor of 0.627 should be explained.</p> <p>In addition, in section B.3, a diagram showing the project boundary (including grid connection point, number and location of meters, substation, joint meter (if applicable), turbines) need to be provided so that scenario is clearly shown in the PDD.</p> <p>Revision is necessary.</p>	A.1.2	<p>Regarding the issues related to the installed capacity of the Santana I SHP, we are adopting the new capacity demonstrated by the ANEEL studies of the river potential. The new installed capacity is 14.758 MW and it is described in the new version of the PDD – version 2. The Dispatch 3301 from ANEEL was provided to the validation team in the beginning of the validation.</p> <p>In the same document is mentioned the area of the reservoir – 1.17 km², which is adopted in the project activity.</p> <p>As per Appendix B of the Simplified Modalities and Procedures for Small Scale Project Activities, a correct project category name in the section A.4.2 is provided.</p> <p>The table 1 of the PDD contains technical information about the project activity. Corrections regarding the identification of the values were done following the</p>	<p>Revision of values of installed capacity and the reservoir was done and corrected.</p> <p>The project category was corrected.</p> <p>The value of ANEEL's declaration was used correctly. However in version 2 of the PDD it was revealed that</p>

Draft report clarification requests and corrective action requests by validation team	Ref. To checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>suggestions. But, is important to emphasize that the value “8.21” was the assured energy (free translation) of the SHP in MW unit. But, this value changed to 8.72 MW, where its source are the calculations provided by the technical assessor contracted by Firenze Energética – project participant. The change in this data follows the ANEEL's declaration.</p>	<p>that the values for the generator, especially the effective power, which ultimately defines the installed capacity are not yet defined, as the manufacturer have not been chosen and some slight changes might occur in the estimated values. Considering the capacity of the turbines presented is above 15MW and the effective power was very close to the limit for small scale CDM project, FAR A1 is raised to ensure that the installed capacity (effective power of the generators) will not exceed the threshold of 15MW after implementation of the project. Please refer to FAR 1 below.</p>

Draft report clarification requests and corrective action requests by validation team	Ref. To checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>Talking about the capacity factor (CF) of the small hydropower plant, the source of this data is a calculation, where it can be viewed below:</p> <p>CF = 8.72 MW / 14.758 MW</p> <p>CF = 0.59</p> <p>Obs.: in the calculation of CF the data from the ANEEL's declaration is used.</p> <p>Regarding the project activity boundary, a description was inserted addressing items solicited. This description was provided in the section B.3 of the PDD.</p> <p>As mentioned above, all the clarifications provided are included in the PDD version 2.</p>	<p>The capacity factor was clarified by PP.</p> <p>Clarification about project activity boundary was given and a diagram included in section B.3.</p> <p>Thus, CAR A1 is closed.</p>
<p>CAR B2</p> <p>The quantity of kWh should be calculated according to installed potential authorized by ANEEL's declaration^{/AD1/}.</p>	B.5.2	<p>The new planned net electricity (in MWh) is provided in the Table 1 of the PDD, which table is actualized. The net electricity is calculated according to installed potential</p>	<p>The correction was done. CAR B2 is closed.</p>

Draft report clarification requests and corrective action requests by validation team	Ref. To checklist question in table 2	Summary of project owner response	Validation team conclusion
		authorized by ANEEL Dispatch 3301.	
<p>CAR B3</p> <p>(a) Concerning the benchmarks, please include year 2008 in the average calculation in order to use more recent data.</p> <p>(b) For the WACC calculation, according to guidance # 14 of page 15 of the “tool for demonstration of additionality, version 5.2”, <i>“It is not considered reasonable to apply the rate general stock market returns as a risk premium for project activities that face a different risk profile than an investment in such indices.”</i> As the risk profile of the project activity can not be considered similar to that of investment in the stock market, correction is necessary.</p>	Please refer to conclusion in CR B10 below.	<p>(a) Year 2008 was included in the calculation of the Selic averaged rate (2003-2008 instead of 2003-2007).</p> <p>(b) The PP intended the WACC to be a second benchmark to support the Selic rate. As it is not a requirement and the PP could not find a suitable sectorial rate which would fit the same risk profile of the project activity, it was decided to remove the WACC benchmark from the analysis in section B.5 and excel sheet.</p>	<p>(a) Year 2008 was included in the calculation of the Selic rate.</p> <p>(b) The presentation of a second benchmark is not a requirement and therefore this CAR could be closed out.</p>
<p>CR A1</p> <p>The unique geographic identification of the project activity as geographical coordinates should be more clearly indicated, as the expression “Datum WGS 84” appears to be merged with the longitude coordinates.</p>	A.1.1	A correction of the geographic coordinates of the project activity was done in the section A.4.14. of the PDD, where this is: 56° 49’ 44” West and 14° 23’ 28” South such as indicated in the Aneel Dispatch 3301.	The geographic coordinates were corrected. CR A1 is closed.
<p>CR A2</p> <p>Is mentioned on PDD, section B.7.2 that there will be a maintenance and damage repair procedure, which will</p>	A.3.3	The real action that will be taken in the monitoring period is that all the maintainance and damaged	It was clarified in section B.7.2. CR A2 is closed.

Draft report clarification requests and corrective action requests by validation team	Ref. To checklist question in table 2	Summary of project owner response	Validation team conclusion
follow national regulation specifications. But nothing about training was mentioned. Clarification is necessary.		<p>repairs will follow the national sectorial regulation specification.</p> <p>The training necessary for the plant operational team, with respect to monitoring of the project activity, will be provided in due course, which is expected after the team structuring to enable the implementation of this procedures.</p>	
<p>CR B1</p> <p>However, the following points need revision:</p> <ul style="list-style-type: none"> - the link presented in page 10, section B.4, is not available. Please update it. - the numbered sub-items should not be utilized as they are not in accordance with the version 3 of the CDM-SSC-PDD template. - sub-item B.6.1.1 calculations should be deleted, since according to AMS I.D such calculations are not necessary once project emissions are not considered in the methodology. - in sub-item B.6.1.2, the description of the steps should be removed as the combined margin and operating margin are publicly available data provided by the Brazilian DNA. - In B.6.2 the tables of the parameters should be removed as these are all monitored parameters and are included in B.7.1. The values used for estimation of emission reduction should be included in the 	B.5	<p>For the CR B1, corrections in the PDD is provided in the new version of the PDD and a justification for the corrections provided correspond to:</p> <ul style="list-style-type: none"> - The link is updated. - The related sub-items were removed according to the template. - Sections B.6.1 was revised. -The tables in B.6.2. were deleted and the values used for ex-ante estimate are in B.7.1. 	<p>Corrections were done accordingly. CR is closed.</p>

Draft report clarification requests and corrective action requests by validation team	Ref. To checklist question in table 2	Summary of project owner response	Validation team conclusion
respective tables in B.7.1.			
CR B2 More detailed information of the meters (e.g. quantity, location, accuracy range, if uni or bi directional) should be provided.	B.8.1	A new description about the monitoring plan was described in the section B.7.2 and in the Annex 4. Also more evidence was provided.	Descriptions of power generation and measurement system, monitoring data, quality control, data management were given. CR B2 is closed.
CR B3 Data collection procedures and to deal with erroneous measurements are not clearly identified.	B.8.1	The monitoring plan was revised and more details were provided.	The methodology to estimate data, according to Procedure of Energy Commercialization will be followed. CR B2 is closed.
CR B4 However, the description of the monitoring plan (section B.7.2) and the table in B.7.1 which describes parameter EG should be improved as the text is not very clear and the parameter should be described as “ <u>net</u> electricity of Santana...”	B.8.1	The monitoring plan was revised and more details was provided The term suggested: “Net electricity of Santana I SHP” was adopted in the PDD.	Correction was done. CR B4 is closed.
CR B5 In Annex 4 the recording frequency of the operating margin emission factor is hourly. Correction is necessary	B.10.5	The recording frequency of the operating margin emission factor in the table of the Annex 4 is annually and it was corrected.	Correction was provided. CR B5 is closed.
CR B6 The authority and responsibility of overall project management is not clearly described. Revision is	B.13.1	More details were provided.	Clarification about authority and responsibility was

Draft report clarification requests and corrective action requests by validation team	Ref. To checklist question in table 2	Summary of project owner response	Validation team conclusion
necessary.			given in section B.7.2 of the PDD. CR B6 is closed.
CR B7 Procedures for training and monitoring personnel should be addressed in PDD. Revision is necessary.	B.13.2	The training necessary for the plant operational team, with respect to monitoring of the project activity, will be provided in due course, which is expected after the team structuring to enable the implementation of this procedures. Revision on the PDD was done.	Clarification was given and PDD was revised. CR B7 is closed.
CR B8 In Annex 4 of PDD, it is mentioned that a reconciliation of data will be adopted to highlight discrepancies between energy generation data and sales invoices. Here no corrective actions in case of discrepancies are mentioned. Revision is necessary.	B.13.5	More details were provided.	It is provided in section B.7.2. CR B8 is closed.
CR B9 The Tool to Calculate the Emission Factor should be mentioned in section B.1.	B.1.1	The "Tool to Calculate the emission factor for an electricity system" version 01.1, EB 35 was mentioned in the new version of the PDD.	Tool was Included. CR B9 is closed.
CR B10 The following items need revision: PDD: 1. in section B.5., the values for the SELIC rate differ slightly (17.60% in page 15 and 17.70% in table 2, page 16).	B.3.2	Corrections was provided in the following items: PDD: 1. A correction was provided regarding the value of the SELIC. The value 17.60%	Although all requested corrections were performed in version 2 of the documents, after assessing the sheets translated into English language,

Draft report clarification requests and corrective action requests by validation team	Ref. To checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>2. Please detail link for source of table 4.</p> <p><u>Excel Sheet Análise Santana-I:</u></p> <p>3. The Excel sheets need to be presented in English</p> <p><u>Excel Sheet Historico Selic rev0:</u></p> <p>4. The Excel sheets need to be presented in English</p> <p>5. In the sheet WACC, please indicate the source for the values of capital structure and the interest rate for financing in order to be more transparent. In addition in cell B6 it is mentioned BNDES but the loan was made from Bank Daycoval S.A. /BBC/. Revision is necessary</p>		<p>was inserted in the table 2.</p> <p>2. The link for source of table 4 is provided in the footnote of the page related to the table. The link inserted is: http://www.ccee.org.br/cceei/nterdsm/v/index.jsp?vgnextoid=3df6a5c1de88a010VgnVCM100000aa01a8c0RCRD</p> <p><u>Excel Sheet Análise Santana-I:</u></p> <p>3. The Excel sheet was provided</p> <p><u>Excel Sheet Historico Selic rev0:</u></p> <p>4. The Excel sheet was provided.</p> <p>5. The source of the values of capital structure, interest rate for financing and other items was inserted in the Excel sheet. Regarding the source of the capital of third, it was changed to Bank Daycoval S.A.</p>	<p>some questions about the benchmarks arose and therefore CAR B3 was raised. Please refer to CAR B3. CR B10 is closed.</p>
<p>CR C1</p> <p>The project's starting date indicated in section C.1.1. in the PDD is 03/07/2008. This is the date of signature of the contract between Firenze and Carbotrader /CRS/. However, according to the CDM Glossary of Terms, the</p>	<p>C.1</p>	<p>The starting date was corrected considering the concept contained in the CDM Glossary of Terms.</p>	<p>The data considered is 01/03/2009, acc. to prevision of start of the most significant investments^{/QU/}</p>

Draft report clarification requests and corrective action requests by validation team	Ref. To checklist question in table 2	Summary of project owner response	Validation team conclusion
starting date of the project should be the date where real commitment to major expenditures occurred. Please revise accordingly making it clear what the date refers to in section C.1.1.			referring to beginning of construction (civil works) and acquisition of turbines and generators. CR closed.
CR D1 It was prepared an environmental diagnosis ^{/ED/} which demonstrates the impacts and plans to mitigate it. However, the impacts are not mentioned on PDD. Revision is necessary.	D.1	A revision in the PDD was made following the environmental diagnosis. The impacts were inserted.	The impacts were inserted as requested in section D. CR D1 is closed.
FAR A1 The installed capacity of the project (i.e. the effective power of the generators) shall be verified in order to ensure that it will not exceed the 15MW limit for small scale CDM project.	Refer to conclusion in CAR A1 above		To be verified in the course of the first periodic verification.

Table 4: Assessment of Barrier Analysis

Kind of Barrier (invest, tech, other)	Description of Barrier	Evidence used	Assessment of validation team	
			Appropriateness of information source	Explanation of final result
Investment	The PP chose the investment barrier analysis to prove additionality, comparing to a benchmark, i.e., SELIC rate average of 16.99%. The IRR presented is of 11.9%. Thus, the <u>Project IRR</u> of Santana I SHP (without CDM revenue) is calculated to be 11.9% which is below the indicator of benchmark. Even considering the revenues from the sales of CERs, the <u>Project IRR</u> (12.8%) remains below the benchmark	/bcb/ /bi/ /bovespa/ /td/ /XCLa/ /XCLc/ /XCLhs/ /BBC/ /OPE/	<input checked="" type="checkbox"/>	Even considering the revenues from the sales of CERs, the project IRR remains more than 4% below the benchmark. This barrier is decisive.
Prevailing practice	In the Brazilian Electric Sector, the sources that prevail are large hydroelectric centrals, thermoelectric, nuclear plants and for last, small hydropower plants.	/aneel/ /XCLcp/	<input checked="" type="checkbox"/>	According to the review of the argumentation and sources and also considering the local experience of the validation team, it is not common practice to implant SHP in Brazil, thus the validation team considers this barrier justifiable.

Other barriers	The PP argues that the poor conditions in the region are a barrier, to be necessary infrastructure investments in communication to attend the necessities to the enterprise implementation.	/IM01/	<input checked="" type="checkbox"/>	In fact, during on site visit it could be observed that the SHP is indeed located in a region with very poor infrastructure. The validation team considers this barrier justifiable.
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Table 5: Assessment of Financial Parameters

<input type="checkbox"/>	No financial parameters are used for additionality justification						
<input checked="" type="checkbox"/>	Assessment of all financial parameters see below						
Parameter	Value applied	Unit	Source of Information (please indicate document and page)	Reference	DOE ASSESSMENT		
					Correctness of value applied	Appropriateness of information source	Comment
Total investment	41,696.90	in thousands R\$	Standard Budget - Eletrobrás which is part of the Executive project PCH Santana I, approved by ANEEL.	/OPE/	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	The value used as total investment was evidenced in the Standard Budget Eletrobras, which is a document following the standard used by Eletrobras for its projects. This Budget is part of the Document Executive Project PCH Santana I, which was review and approved by ANEEL.
Assured energy /Net power	8.72	MW	Dispatch N° 3301 of 04/09/2008 issued on 05/09/2008 by ANEEL	/AD1/	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	This data comes from the dispatch by ANEEL (the government energy agency which reviews and authorizes the implementation of power projects) which approves the basic project of Santana I SHP,
Price of energy	158	R\$ per MWh	Power Purchase Agreement EE/PPA 008/2008 between Firenze Energética S.A. and Perdigão Agroindustrial S.A – page 08	/PPA/ /EMAILe/ /EMAILp/	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	This is the price evidenced in the Power Purchase Agreement with Perdigão (agroindustrial company). It will be corrected annually according to the IGP, a basic inflation rate, in order to keep the monetary value of the agreed price.

Income tax	15	%	Federal Law # 10.637 Federal Law # 9.718	/fazenda/	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<p>Brazilian Federal Law # 10.637 from 30 December 2002 and the Law # 9.718 from 27 November 1998 defined that companies with gross revenue below R\$ 48 million can apply the modality of tax call "Presumed (vain) tax profit-free translation".</p> <p>Therefore the presumed profit and the taxes are calculated as follows:</p> <ul style="list-style-type: none"> • COFINS (Contribution for Financing social Security) – 3% over the Gross Profit; • PIS/PASEP (Programa de Integração Social/ Programa de Formação de Patrimônio do Servidor Público) – 0.65% over the Gross Profit; • Income tax – 15% over 8% (presumed profit) over the Gross Profit • Additional Income tax – 10% over the presumed profit (8%) which exceeds R\$ 240 thousand/year • Social contribution – 9% over 12% (presumed profit) over the Gross Profit
Additional income tax	10						
Social Contribution	9						
Cofins	3						
PIS/PASEP	0.65						
SELIC rate	16.99	%	http://www.bcb.gov.br/?SELICDIA and http://www.bcb.gov.br/?COPOMJUROS	/bcb/	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<p>The SELIC Rate (government bonds) is the basic rate of the Brazilian economy, from which all other interest rates derive and it can be considered the risk free (or lowest risk rate) of the country. The period between 2003-2008 has been used to calculate the average SELIC rate, which can be considered an appropriate time span, as the rate has not fluctuated wildly in the period (compared to previous years). Brazilian interest rates have historically been the (or one of the) world's highest. The source for the data is</p>

							the Central Bank of Brazil,
O&M Costs	4,456.35	in thousands R\$/year	Correcto Contabil	/IM01/ /XCLa/ /correcto /	☒	☒	<p>The source of the values is Correcto Contábil, which is Firenze's financial/account third party consultant with large experience in energy projects.</p> <p>Mr Walter Camargo from Correcto was interviewed during site visit and explained that the values used for O&M are based on his company's experience with other SHP management in Brazil.</p> <p>Correcto is a specialized company in this sector as it could be verified also by visiting its website /correcto/, which presents in its first page the "Administrative and Operational Management of Small Hydro Plants" as one of its core services.</p> <p>It has been providing consulting services for other SHP projects such as Cristalino SHP (CDM project registered at UNFCCC) and Rio Tigre SHP (under validation).</p> <p>As a third party consultant in SHP management, the data used for all O&M costs assumptions listed in the XCLa sheet, assumptions, cells F11 to F25, is considered reliable as they are based on the company's experience with SHP projects.</p>
Residual Value	40	%	Correcto Contabil	/IM01/ /XCLa/ /correcto /	☒	☒	<p>The source is Firenze's financial/account third party consultant with large experience in energy projects. Please see comment just above.</p> <p>The validation team considers this rate very conservative.</p>
Depreciation	0	N/A	N/A	N/A	N/A	N/A	<p>It is not applicable to the cash flow calculations because according to the modality of vain profit correctly applied and above mentioned, the gross revenue is the basis for calculation of all taxes and therefore the consideration of</p>

							depreciation does not have any impact in the cash flow and IRR calculation.
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CERTIFICATES



CERTIFICATE OF APPOINTMENT

Mr. Dipl.-Ing. Rainer Winter

born on 1963-02-21

satisfies the requirements as specified in the TÜV NORD
JI/CDM CP directives and is hereby appointed as

TÜV NORD JI/CDM Senior Assessor

The present appointment will terminate on 2010-07-05

Certification registration No. 04 02 154-03

Essen, 2007-07-06

Deputy of TÜV NORD JI/CDM Certification Program
of TÜV NORD CERT GmbH



CERTIFICATE OF APPOINTMENT

Mr. Dipl.-Ing. Eric Krupp

born on 1971-06-25

satisfies the requirements as specified in the TÜV NORD
JI/CDM CP directives and is hereby appointed as

TÜV NORD JI/CDM Senior Assessor

The present appointment will terminate on 2010-07-05

Certification registration No. 06 05 01 - 017

Essen, 2007-07-06


Head of TÜV NORD JI/CDM Certification Program
of TÜV NORD CERT GmbH



CERTIFICATE OF APPOINTMENT

Ms. Maria Carolina Crisci Coelho
born on 1977-01-01
satisfies the requirements as specified in the TÜV NORD
JI/CDM CP directives and is hereby re-appointed as

TÜV NORD JI/CDM Expert

The present appointment will terminate on 2012-02-24
Certification registration No. 09 02 01 - 015

Essen, 2009-02-25



Head of TÜV NORD JI/CDM Certification Program
of TÜV NORD CERT GmbH



CERTIFICATE OF APPOINTMENT

Ms. Inga Nagel
born on 1971-12-12
satisfies the requirements as specified in the TÜV NORD
JI/CDM CP directives and is hereby appointed as

TÜV NORD JI/CDM Assessor

For the following scopes: 1, 8, 13, 14, 15
The present appointment will terminate on 2012-01-15
Certification registration No. 09 01 01 - 45

Essen, 2009-01-16



Head of TÜV NORD JI/CDM Certification Program
of TÜV NORD CERT GmbH



CERTIFICATE OF APPOINTMENT

Ms. Alexandra Nebel
born on 1980-07-25
satisfies the requirements as specified in the TÜV NORD
JI/CDM CP directives and is hereby appointed as

TÜV NORD JI/CDM Expert

For the following scopes: 1, 14, 15
The present appointment will terminate on 2012-02-03
Certification registration No. 09 02 01 - 95

Essen, 2009-02-04



Head of TÜV NORD JI/CDM Certification Program
of TÜV NORD CERT GmbH