



VALIDATION REPORT

“Santa Rosa Hydropower Plant Project” in Bolivia

REPORT No. 2007-1631

REVISION No. 02

DET NORSKE VERITAS



VALIDATION REPORT

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Approved by: Michael Lehmann	Organisational unit: Climate Change Services
Client: Compañía Boliviana de Energía Eléctrica S.A.	Client ref.: Héctor Baldívieso

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Project Name: "Santa Rosa Hydropower Plant Project"
Country: Bolivia
Methodology: ACM0002
Version: 06
GHG reducing Measure/Technology: Renewable energy based power generation unit.
ER estimate: 308 560 over 7 years

Size

- ☒ Large Scale
☐ Small Scale

Validation Phases:

- ☒ Desk Review
☒ Follow up interviews
☐ Resolution of outstanding issues

Validation Status

- ☐ Corrective Actions Requested
☐ Clarifications Requested
☒ Full Approval and submission for registration
☐ Rejected

In summary, it is DNV's opinion that the "Santa Rosa Hydropower Plant Project" in Bolivia, as described in the PDD of 12 August 2008, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0002 (version 06 of 19 May 2006). Hence, DNV will request the registration of the "Santa Rosa Hydropower Plant Project" as a CDM project activity.

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Report title: "Santa Rosa Hydropower Plant Project" in Bolivia		
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Key words:

Validation

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Abbreviations

AMS	Automated Measuring System
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH ₄	Methane
CL	Clarification request
COBEE	Compañía Boliviana de Energía Eléctrica
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
NPV	Net Present Value
ODA	Official Development Assistance
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change



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1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the “Santa Rosa Hydropower Plant Project” in Bolivia. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

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

The project participants are Compañía Boliviana de Energía Eléctrica S.A. and the Ministry of Development Planning of Bolivia. No participating Annex I Party is yet identified. The host Party Bolivia fulfills the participation criteria and has approved the project and authorized the project participants. The DNA from Bolivia confirmed that the project assists in achieving sustainable development.

The project aims to utilize the hydrological resource of the Zongo River in a hydropower facility to generate renewable electricity for the Bolivian national inter-connected electric grid.

The project correctly applies ACM0002 (version 06 of 19 May 2006) - Renewable energy based power generation unit..

By generating renewable energy which will displace fossil fuel based grid electricity, the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not the most economically attractive baseline alternative. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 44 080 tCO_{2e} per year over the selected 7 year crediting period. The emission reduction forecast has been checked and it is deemed likely that the state amount is achieved given that the underlying assumptions do not change.

The monitoring methodology has been correctly applied. The monitoring plan sufficiently specifies the monitoring requirements. Adequate training and monitoring procedures have been implemented.

Local stakeholders were invited through public discussion. No major comments from the local stakeholders were addressed.

In summary, it is DNV’s opinion that the “Santa Rosa Hydropower Plant Project” project, as described in the project design document (version PDD-SRHPP-07 of 11 August 2008) meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria. The project has correctly applied the baseline and monitoring methodology ACM0002 (version 06 of 19 May 2006). Hence, DNV requests the registration of the “Santa Rosa Hydropower Plant Project” as a CDM project activity.



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2 INTRODUCTION

Compañía Boliviana de Energía Eléctrica S.A. has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “Santa Rosa Hydropower Plant Project” located in the Coscapa Community in the Zongo River Valley, Murillo Province in the Department of La Paz, Bolivia. This validation report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

2.1 Objective

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

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0002 (version 06 of 19 May 2006) /36/. The validation team has, based on the recommendations in the Validation and Verification Manual /35/, employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

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



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3 METHODOLOGY

The validation consisted of the following three phases:

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

The following sections outline each step in more detail.

3.1 Desk Review of the Project Design Documentation

The following table lists the documentation that was reviewed during the validation:

- /1/ *Project Design Document for the “Santa Rosa Hydropower Plant Project”*. Version PDD-SRHPP-07 of 12 August 2008 and previous versions PDD-SRHPP-06 of 31 July 2008, PDD-SRHPP-05 of 17 June 2008, PDD-SRHPP-03 of 09 October 2007, PDD – SRHPP-02 of 28 September 2006 and version of April 2005 (applying AM0005).
- /2/ CTO 146/95 – Power Purchase Agreement between COBEE and Electropaz dated 6 June 1995.
- /3/ Superintendency of Electricity: Bolivian Electricity Law 1604 dated 21 December 1994
- /4/ EPC contract for the Santa Rosa HPP reconstruction project, dated 29 August 2004
- /5/ COBEE: Notice to proceed granted to EPC for Santa Rosa HPP reconstruction, dated 17 September 2004.
- /6/ Natsource LLC: Agreement to assist in PDD preparation, dated 1 October 2003
- /7/ Agreement signed between COBEE and Natsource LLC to obtain brokerage services to mediate the sale of CERs from the SRO HPP Project dated 02 December 2003.
- /8/ Ministry of Sustainable Development of Bolivia: Note of interest is obtained from the Bolivian Government to support the development of the SRO HPP Project as a CDM activity dated 2 August 2004
- /9/ COBEE: Spreadsheet with NPV calculation
- /10/ COBEE: Minutes of Board Meetings dated 15 June 2004 considering the investment necessary to Santa Rosa reconstruction
- /11/ Hydrocarbon and Energy Ministry: DINE Resolution N° 002/91
- /12/ COBEE: Project Accounting Closure for Surviving and Destroyed Assets
- /13/ Electricity Superintendence: Resolution SSDE 017/2002
- /14/ CNDC: Programme for May 2003 – April 2007 dated 13 March 2003
- /15/ Letter from HSB Special Risk Claims dated 21 August 2004
- /16/ Supreme Decree 24051 dated 29 June 1995
- /17/ Supreme Decree 26093 dated 2 March 2001



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- /18/ Electricity Superintendence: Resolution SSDE 184/2003
- /19/ Law 843 dated 30 April 2000
- /20/ COBEE: Financial Report of 2000, 2001 and 2002
- /21/ CNDC Transaction Report dated January 2004
- /22/ GTW Handbook, dated January 2003
- /23/ Electricity Superintendence: Resolution SSDE 121/2001
- /24/ CNDC: Node Price Study November 2003 – April 2004 dated 23 October 2003
- /25/ Supreme Decree 26037 dated 22 December 2000
- /26/ CNDC: Operation Results for the SIN, 2000
- /27/ CNDC: Operation Results for the SIN, 2003
- /28/ Ministry of Sustainable Development of Bolivia: Environmental License issued in 27 August 2004.
- /29/ COBEE: Spreadsheet with EF calculation
- /30/ COBEE: Environmental Impact Assessment
- /31/ CTO-085/07 - Convay between COBEE and the Coscapa community for compensation dated 23 August 2007.
- /32/ Stakeholders presentation and comments received – 19 to 21 May 2004
- /33/ Harvard Business Review: “Does the Capital Asset Pricing Model Work?” – article by David W. Mullins Jr. suggesting a discount rate of 15.40% for electric utilities projects
- /34/ CEPAL: Statistics of Net Foreign Direct Investment 1980 – 2006
- /35/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /36/ CDM-EB: *Approved Consolidated Baseline and Monitoring Methodology* ACM0002 - Renewable energy based power generation unit., version 06 of 19 May 2006.
- /37/ CDM EB: *Tool for the demonstration and assessment of additionality*. Version 03.
- /38/ Ministry of Planning of Development: Letter of Approval dated 12 September 2008
- /39/ COBEE: Weekly hydrological data of Santa Rosa from 1979 to 2002

3.2 Follow-up Interviews with Project Stakeholders

	Date	Name	Organization	Topics
/40/	16-17/04/2008	Héctor Baldivieso	Project Superintendent – COBEE	<ul style="list-style-type: none"> • Project starting date • Additionality of the project • Monitoring plan
/41/	16-	Oscar Montero	Financial Analyst	<ul style="list-style-type: none"> • Baseline scenario



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– COBEE

- Ex-ante emission reduction estimation
- Environmental licenses and legal compliance
- Stakeholders consultation process

Main changes between the version of the PDD published for the 30 days stakeholder commenting period and the final version submitted for registration:

- Changing in crediting period starting date;
- Inclusion of references that support additionality discussion;
- Updating of grid emission factor;
- Consideration of the energy generation estimation (80 GWh) obtained from the average hydrological data (1979 – 2002) instead of 85.5 GWh that is the estimative from CNDC;
- Removal of step 3 from additionality assessment;
- Minor format adjustments.

3.3 Resolution of Outstanding Issues

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

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

The validation protocol consists of three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the “Santa Rosa Hydropower Plant Project” is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of CDM criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

- i) mistakes have been made with a direct influence on project results;
- ii) CDM and/or methodology specific requirements have not been met; or
- iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

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Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities				
Requirement	Reference	Conclusion		
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	This is either acceptable based on evidence provided (OK), a Corrective Action Request (CAR) of risk or non-compliance with stated requirements or a request for Clarification (CL) where further clarifications are needed.		

Validation Protocol Table 2: Requirement checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
<i>The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.</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). A request for clarification (CL) 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 CAR or a CL, these should be listed in this section.</i>	<i>Reference to the checklist question number in Table 2 where the CAR or CL is explained.</i>	<i>The responses given by the 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



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3.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review of the draft validation report was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation Team

Role/Qualification	Last Name	First Name	Country
Team leader/CDM validator	Leiroz	Andrea	Brazil
CDM Validator	Antunes	Felipe	Brazil
GHG auditor	Ratton	Marco	Brazil
Sector expert	Lehmann	Michael	Norway
Technical reviewer.	Sharma	Anjana	India

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



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4 VALIDATION FINDINGS

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

The initial validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation of 12 August 2008.

4.1 Participation Requirements

The project participants are Compañía Boliviana de Energía Eléctrica S.A. (COBEE) – Bolivian Power Company Limited Sucursal Bolivia and Ministry of Development Planning of Bolivia. The host Party Bolivia meets all relevant participation requirements. No participating Annex I Party is yet identified.

The Bolivian DNA has issued a Letter of Approval on 12 September 2008 authorizing COBEE as project participant and confirming that the project is contributing to sustainable development in Bolivia /38/.

4.2 Project Design

The “Santa Rosa Hydropower Plant Project” is a renewable energy electricity project activity that displaces electricity generation in the SIN Grid (Nation Interconnected Grid), resulting in a reduction of emissions of greenhouse gases. The project is located in the Coscapa Community in the Zongo River Valley, Murillo Province in the Department of La Paz, Bolivia.

The proposed project involves the replacement of the old powerhouse destroyed by a landslide in February 2003 by building a new one 50 meters away from the original location. However, the current capacity of the plant will be 16.3 MW (under the proposed project activity) as compared to 12.5 MW of the old plant. Other infrastructure like intake channels etc. will remain the same (except some repair work on the same). Since there is no change in the water intake, no variation in the plant load factor is expected by the plant compared to the previous plant even with the increased installed capacity. Hence, the expected annual generation from the proposed project remains 80 GWh which is equivalent to the annual generation of the old damaged plant.

Under the proposed project activity, two new generating units will be installed and the equipments and structure that were damaged during the landslide will be repaired and improved as necessary. Total installed capacity of the project is 16.3 MW, with a predicted power supply to the grid of 80 GWh per year, according to the average energy calculation based on hydrological data from 1979 to 2002 presented to DNV /39/.

The project design engineering reflects good practice. Santa Rosa Plant utilizes one Francis turbine with an installed capacity of 6.2 MW and one Pelton turbine with an installed capacity of 10.1 MW.

A 7 years renewable crediting period is selected (with the potential of being renewed twice), starting on 01 January 2009. The starting date of the project activity is 17 September 2004, corresponding to the date of the formal noticed to proceed granted to the contractor for the



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Santa Rosa HPP Reconstruction /5/. The project activity expected operational lifetime of 40 years.

The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Bolivia.

4.3 Baseline Determination

The project applies the approved consolidated baseline methodology ACM0002 (version 06 of 19 May 2006) - Renewable *energy based power generation unit*. /36/. This methodology is applicable to the project as this project consists of a renewable energy generation plant for supplying electricity to the Bolivian grid. The project meets the applicability conditions of ACM0002 as:

- applies electricity capacity addition of a run-of-river hydro power plant;
- not involve switching from fossil fuel to renewable energy at the site of the project activity;
- it is clear identified the geographic and system boundaries for the SIN and information on the characteristics of the grid.

The project's boundaries are the limits of the plant, connected to the SIN grid. The project (electricity) system's boundary is limited to the SIN grid, to which the plant is connected by transmission lines.

DNV could confirm that after the destruction of the original Santa Rosa power plant COBEE has not been subject to any demand for compliance of energy supply agreements. The company has a 90 MW Power Purchase Agreement in place with Electropaz /2/, and the destruction of the original plant (a force majeure event) reduced COBEE's capacity from 180 MW to 167.5 MW. Besides that, under the terms of the Concession Supreme Resolutions and the Electricity Law /3/ no generator in the Bolivian system is obliged to rebuild a power plant that has been destroyed by natural causes

In line with the methodology, the baseline scenario is defined as the electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources in the SIN grid, as reflected in the combined margin (CM) calculations. The electricity baseline emission factor is determined as a combined margin consisting of the combination of the operating margin (OM) emission factor and build margin (BM) emission factor according to the dispatch data analysis approach and will be calculated *ex-post* for the first renewable 7 year crediting period (see section 4.6).

4.4 Additionality

In accordance with ACM0002, the additionality of the project is demonstrated through the "*Tool for the demonstration and assessment of additionality*".

The start date of the project activity is 17 September 2004, corresponding to the date of the formal Noticed to Proceed granted to the contractor for the Santa Rosa HPP Reconstruction /5/. This can be considered the earliest of the implementation, construction or real action dates and is in DNV's opinion correctly selected as the starting date of the project.

DNV was able to verify that CDM benefits were taken into account before the starting date of the project. It was demonstrated that CDM benefits were considered prior to the project starting by i) the agreement signed with Natsource LLC to obtain assistance for the PDD



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preparation in 1 October 2003 /6/; ii) the agreement signed with Natsource LLC to obtain brokerage services to mediate sale of CERs from the project /7/; and iii) the note of interest from the Bolivian Government to support the development of the project as a CDM project activity /8/.

The additionality of the project is demonstrated following the steps of the additionality tool:

Step 1 - Identification of alternatives to the project activity consistent with current laws and regulations: The possible identified scenarios are 1) the proposed project not undertaken as a CDM project activity, 2) rebuilt the plant with original characteristics, 3) no project is implemented, which corresponds to the continuation of current practice of electricity supply from the grid, and 4) implementation of a 48 MW generation capacity in the form of natural gas fired thermal plant connected to the same Bolivian grid system.

The provided alternatives are in compliance with the legal and regulatory requirements. DNV could confirm with the characteristics of the power infrastructure built in the SIN that all alternative scenarios are plausible.

Step 2 - Investment analysis: Apply investment comparison analysis

To determine whether the proposed CDM project activity is, without the revenues from the sale of certified emission reductions, less economically and financially attractive than at least one of the alternatives, the project participants used an investment comparison analysis /9/. The financial indicator used was the NPV.

The old power plant was insured and the insurance proceeds are US\$ 13.953 million /15/ in case the power plant is reconstructed (the underwriters are obliged to cover the current cost of re-building a power station of similar characteristics to the one destroyed). The insurance proceeds are US\$ 3.65 million only if no new power plant is built (underwriters are obliged to cover only the book value (depreciated value) of destroyed assets).

Although scenario 3 apparently does not consist of an investment, it is an alternative in the decision-making context for COBEE and due to the insurance proceeds received, this alternative can be described with the financial indicator NPV. Hence, DNV accepted the choice of a NPV comparison for the proposed scenarios.

The results the NPV analysis were as follows: NPV for alternative 1 = US\$ 422,936; NPV for alternative 2 = US\$ 903,232; NPV for alternative 3 = US\$ 4,529,456 and NPV for alternative 4 = US\$ (4,390,866). DNV could confirm the following input values and assumptions:

- An escalation factor of 2.5% was used. DNV considers this value reasonable;
- The original investment of US\$ 16.453 million is supported by the Minutes of the Meeting of the Board of Directors held on 15 June 2004 /10/.
- The depreciation structure is based on the DINE Resolution N° 002/91 /11/. The civil works support the 2% depreciation rate, and the depreciation rate for electromechanical equipment is 4.0%.
- Assets book value prior to the destruction /12/.
- Regulated capacity and energy tariffs: estimated based on Resolution SSDE 017/2002 /13/;
- Spot energy prices estimated based on the CNDC planning for 2003 – 2007 /14/.
- Capital gain calculated according to the Supreme Decree 24051 /16/.
- CNDC fee rate of 0.80% calculated according to the Supreme Decree 26093 /17/.



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- SIRESE fee rate of 1% established by the Resolution SSDE 184/2003 /18/.
- Transaction tax rate of 3% established in the Law 843 /19/.
- Income tax rate of 25% established in the Law 843 /19/.
- O&M costs estimated based on the historical O&M costs for the last three operation years prior to the event /20/.
- Unit wheeling tool based on the CNDC Transaction Report /21/.
- Value Added Tax rate of 13% (IVA) was established in the Law 843 /19/.
- Discount Rate of 15% corresponding to the minimum corporate discount rate used as cost of equity to analyze all COBEE projects. This is supported by the CAPM (Capital Asset Price Model) and similar benchmarks /33/.
- Investments for scenario 2 is based on the initial amount approved by underwriters (US\$ 12.85 million) /15/ plus an additional amount of insurance proceeds estimated by COBEE (US\$ 1.10 million).
- For scenario 3 the US\$ 7.28 million is the initial amount estimated by COBEE for the book value of all Santa Rosa assets prior to the event /12/. In this case insurance proceeds amount to US\$ 3.65 million because the underwriters are obliged to cover only the book value of destroyed assets if COBEE decides not to re-build the power station and go after a clean cash-in of insurance proceeds.
- The Santa Rosa Hydropower Plant is one of a series of hydro plants installed in Zongo Valley by COBEE., the destruction of the Santa Rosa Hydropower Plant causes a reduction in energy generation in the power station immediately downstream by 6,382 MWh/year. According to the Bolivian Electricity Law 1604 /3/, the electricity tariff is defined in such a way that achieves 9% of rate base return for the whole company. Hence, the investment analysis of scenario 3 includes the correspondent revenue from the changes in the capacity tariff (applicable only until 2008, according to the law) and cost from the reduction of energy generation in the next power station streams.
- Investments for scenario 4 is based on the turbine supplier GTW Handbook /22/ and the Resolution SSDE 121/2001 /23/.
- O&M costs for scenario 4 based on the turbine supplier GTW Handbook /22/ and the CNDC Node Price Study from October 2003 /24/.

A sensitivity analysis was carried on considering a combination of the following variations:

- Discount Rate from 12% to 18%;
- Investment from 85% to 115%;
- Plant Factor from 50% to 62%.

The sensitivity analysis confirmed that the project activity scenario is not the most financially attractive.

DNV could confirm that the NPV for scenario 1 considering CDM revenue increases to USD 1,003,992. Although scenario 3 is still more attractive than scenario 1 with CDM, the project participant claim that the reduction in the gap between both alternatives was a sufficient incentive to resume investing into hydropower in Bolivia after some years without any investments.



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DNV could also confirm in a study of CEPAL /34/ that there was a substantial reduction in foreign investment in Bolivia in 2003. Besides that, a study from CAF shows Bolivia graded in 73rd place of the Financing Access Index.

Step 3 - Barrier analysis: Not selected.

Step 4 - Common practice analysis: The hydro power plants implemented since 1998 in Bolivia may not be considered similar to the proposed project activity due to the following: i) reduced natural gas price caps in 2000 established by the Bolivian Government has limited the energy price in the spot market /25/; ii) short cost-plus basis period guaranteeing capacity and energy prices in the spot market /26/; iii) a combination of unstable and low growth in the electricity demand /27/; and iv) minimum project financial indicators displaced as the governing figure for investment decision. DNV could confirm that the last hydro power plants built in Bolivia did not face the above mentioned barriers.

It can be concluded that the emission reductions resulting from the project activity are additional and would not have occurred in the absence of proposed project activity.

4.5 Monitoring

The project applies the approved consolidated monitoring methodology ACM0002 (version 06 of 19 May 2006) - Renewable energy based power generation unit..

The proposed monitoring methodology adopted is applicable to electricity capacity additions from run-of-river hydroelectric power plants.

4.5.1 Parameters monitored ex-post

The monitoring plan allows for collection and archiving of the following key parameters related to the determination of emission reductions resulting from the project activity:

- Carbon content of each type of fuel - 2006 IPCC default values have been used since the local country specific values are not available.
- Oxidation factor of each type of fuel – 2006 IPCC default values have been used since local country specific values are not available.
- EG_n : Net electricity supplied by the project to the SIN grid, directly measured based on information provided by CNDC and registered each 15 minutes.
- EF_y : Grid emission factor - calculated annually based on the latest information from CNDC.
- EF_{OM} : Operating margin emission factor - calculated annually based on the latest information from CNDC.
- EF_{BM} : Build margin emission factor - calculated annually based on the latest information from CNDC.
- Fuel Consumption: obtained through heat rate values applicable for different power plant loads and energy generation for each power plant in the SIN, forcing to express the amount of fuel in energy units, i.e. TJ. DNV could confirm that fuel consumption is not available at CNDC.
- Net calorific value – Data to be obtained from CNDC.



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- Hourly generation of all units connected to SIN – Data to be obtained from CNDC.
- Set of power plants used for OM and BM calculations – Data to be obtained from CNDC.
- Merit order.

Details of data to be collected, the frequency of data recording, its certainty and format and storage location are described. The format for data archiving and the recording frequency of data seem appropriate for the project. All data will be kept until two years after the end of the crediting period.

In conclusion, it is DNV's opinion that the monitoring plan correctly addresses the requirements of the methodology ACM0002.

4.5.2 Parameters monitored ex-ante

The parameters used in the emission reduction calculations that are available *ex ante* are as given below:

- Conversion constant for C content to CO₂ emission factor - 2006 IPCC default values of 44/12 has been used.

4.5.3 Management system and quality assurance

The authority and responsibility for registration, monitoring, measurement and reporting project activities has been established. The Project Superintendent Branch will be in charge about provisions for meeting training needs.

The electrical meters used will be maintained and calibrated as per CNDC standards which are considered appropriate. The meter readings at the site will be compared to the sale receipts provided by CNDC on the project electricity delivered into their system. The monitoring practices are considered appropriate.

4.6 Estimate of GHG Emissions

Baseline emissions due to displacement of electricity are calculated by multiplying the electricity exported by the project activity to the SIN grid times the combined margin emission coefficient determined for this grid. The project is not expected to result in GHG emissions due to the use of a renewable energy source for electricity generation. No potential emission sources of leakage were identified for the project.

The combined margin emission coefficient for the SIN Bolivian grid will be determined ex-post in accordance with ACM0002. The combined margin emission factor will be calculated as a combination (50:50) of the operating margin (OM) and build margin (BM) emission factors. For the ex-ante estimations, the emission factor has been calculated as follows:

(i) The "operating margin" emission factor has been estimated to be 0.661 tCO₂/MWh using the dispatch data analysis method based on 2007 data, which is the most recent data available at the time of development of the PDD of 11 August 2008. The hourly generation data for the grid is available and hence the dispatch data analysis was the methodological choice for the estimation of the OM emission coefficient. Data on the amount of fuel consumed by relevant power sources are available in Bolivia in energy basis (Btu). To determine the set of plants (*n*), the following data was obtained from the national dispatch center: (a) the grid system dispatch order of operation for each power plant of the system; and (b) the amount of power generated that is dispatched from all plants in the system during each hour that the project



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activity is operating. At each hour h , each plant's generation was stacked using the merit order. The set of plants (n) consists of those plants at the top of the stack (i.e., having the least merit), whose combined generation comprises 10% of total generation from all plants during that hour.

(ii) The “build margin” is estimated as the weighted average emissions (in $\text{tCO}_2\text{e/kWh}$) of recent capacity additions to the system, where capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants. For the build margin, the 20% most recently installed plants have correctly been chosen in terms of electricity generation. The BM emission factor accounts to $0.440 \text{ tCO}_2/\text{MWh}$.

The plant emission factors used for the calculation of operating and build margin emission factors have been calculated based on plant's efficiency data provided by CNDC. It has been confirmed with CNDC that there is no data available of fuel consumption per plant.

The baseline grid emission factor, which is the weighted average ratio for OM and BM at 50:50 ratios, is estimated to be $0.551 \text{ tCO}_2/\text{MWh} /29/$.

The estimated amount of GHG emission reductions from the project is calculated to be 308 560 tCO_2e during the selected first 7-year crediting period (with the potential of being renewed twice), resulting in estimated average annual emission reductions of 44 080 tCO_2e . The completeness of the set of power plants as well as the correctness of the reported fuel consumption and electricity generation data has been verified. All data has been sourced from data published by the National Dispatch Center (CNDC), while the oxidation factor and the carbon content of fuel have been sourced from IPCC default values, since local values are not available.

4.7 Environmental Impacts

The “Santa Rosa Hydropower Plant Project” has been granted an Environmental Licence issued on 27 August 2004 by the Ministry of Sustainable Development of Bolivia /28/. The project issued an Environmental Impact Assessment /30/, which was approved by the local authorities. No major environmental impacts were considered to be produced by the implementation of the project activity. DNV could verify evidence of the compensation agreement established between COBEE and the local community /31/.

4.8 Comments by Local Stakeholders

Local stakeholders, such as local communities within the project area and local authorities were invited to participate and present any requirements that they wish to be taken into account by the project proponent at the moment of the project's implementation. As no NGO works in the project's area of influence, none was included in the consultation process. The consultation process was part of the permitting process. DNV considers that the process was carried on accordingly and could verify the evidences of the stakeholders consultation process and the comments received /32/. All pertinent local stakeholders' comments were taken into consideration.



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4.9 Comments by Parties, Stakeholders and NGOs

The PDD of April 2005 applying AM0005 was made publicly available on DNV's climate change website¹ and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 12 May 2005 to 11 June 2005. No comments were received.

After the revision of the PDD to apply version 06 of ACM0002 the PDD of 28 September 2006 was again made publicly available on DNV's climate change website² and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 04 February 2007 to 05 March 2007. No comments were received.

Finally, the PDD of 09 October 2007 applying the updated CDM-PDD format version 03.1 was again made publicly available on DNV's climate change website³ and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 11 October 2007 to 09 November 2007. No comments were received.

¹ http://www.dnv.com/focus/climate_change/Projects/ProjectDetails.asp?ProjectId=175

² http://www.dnv.com/focus/climate_change/Projects/ProjectDetails.asp?ProjectId=967

³ <http://www.dnv.com/focus/climatechange/Projects/ProjectDetails.asp?ProjectId=1523>

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Project Activities

Requirement	Reference	Conclusion
About 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 Table 2, Section E.4.1 No participating Annex 1 Party is yet identified.
The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK Table 2, Section E.4.1.
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 Bolivian Letter of Approval issued on 12 September 2008.
1. 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 Table 2, Section A.3 Bolivian Letter of Approval issued on 12 September 2008.
2. 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 The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Bolivia.
3. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK The Bolivian designated national authority for the CDM is the Ministry of Planning of Development.

Requirement	Reference	Conclusion
4. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK Bolivia has ratified the Kyoto Protocol on 30 November 1999. No participating Annex 1 Party is yet identified.
5. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	N/A No participating Annex 1 Party is yet identified.
6. 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	N/A No participating Annex 1 Party is yet identified.
About additionality		
7. 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	Table 2, Section B.3.1 CAR-2 CL-4 CL-5 OK
About forecast emission reductions and environmental impacts		
8. 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 Table 2, Section B.4 to B.7
For large-scale projects only		
9. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as	CDM Modalities and Procedures §37c	OK Table 2, Section D.

Requirement	Reference	Conclusion
required by the Host Party shall be carried out.		
About stakeholder involvement		
10. 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 Table 2, Section E.
11. 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		
12. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK Table 2, Section B.1.1 and D.1.1
13. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	Table 2, Section B.2
14. 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 Table 2, Section B.2
15. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK The project design document conforms to version 03.1 of the CDM-PDD.
16. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK Table 2, Section D

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?	/1/	DR	The project is located in the Coscapa Community in the Zongo River Valley, Murillo Province in the Department of La Paz, Bolivia. The geographical coordinates are 16°07'41.8'' S and 68°06'28.4'' W		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR	The project's boundaries are the limits of the plant, connected to the SIN grid. The project (electricity) system's boundary is limited to the SIN grid, to which the plant is connected through transmission lines.		OK
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?	/1/	DR	The Project participants are Compañía Boliviana de Energía Eléctrica S.A. – Bolivian Power Company Limited Sucursal Bolivia and Ministry of Development Planning of Bolivia. The host Party Bolivia meets all relevant participation requirements. No participating Annex I Party is yet		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			identified.		
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?	/1/	DR	DNV requests written approval of voluntary participation from the DNA of Bolivia including the confirmation that the project assists it in achieving sustainable development.	CAR-1	OK
A.2.3. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1/	DR	Yes, Bolivia fulfils all requirements. The Bolivian designated national authority for the CDM is the Ministry of Planning of Development. Bolivia has ratified the Kyoto Protocol on 30 November 1999. DNV requests written approval of voluntary participation from the DNA of Bolivia including the confirmation that the project assists it in achieving sustainable development.	CAR-1	OK
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Bolivia.		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?	/1/	DR	The project design engineering reflects good practice. Santa Rosa Plant utilizes one Francis turbine with an installed capacity of 6.2 MW and one Pelton turbine with an	CAR-4	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			installed capacity of 10.1 MW. The project proponent is required to clarify why in the PDD is was used 85.5 GWh of annual generation and in the financial analysis was used 80 GWh.		
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR	Technology similar to the Pelton turbine has been used in the Zongo River Valley, while the Francis turbine will be the first of its type to be installed in this River system.		OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	The project documentation does not report about provisions for meeting training and maintenance needs.	CL-9	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?	/1/	DR	DNV requests written approval of voluntary participation from the DNA of Bolivia including the confirmation that the project assists it in achieving sustainable development.	CAR-1	OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project is expected to support the improvement the quality of life of the region's inhabitants and work for the conservation of the environmental quality within the project are, thus contributing to sustainable development objectives of the Bolivian Government.		OK
B. Project Baseline <i>The validation of the project baseline establishes whether the</i>					

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<i>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?	/1/	DR	The project applies the approved consolidated baseline methodology ACM0002 (version 06 of 19 May 2006) - <i>Renewable energy based power generation unit..</i>		OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/1/	DR	Yes, the project fulfils the conditions under which ACM0002 is applicable: <ul style="list-style-type: none"> • applies electricity capacity addition of a run-of-river hydro power plant; • not involve switching from fossil fuel to renewable energy at the site of the project activity; • it is clear identified the geographic and system boundaries for the SIN and information on the characteristics of the grid. 		OK
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?	/1/	DR	DNV requests further clarifications about the baseline scenario. The PDD does not clearly describe which is the baseline scenario in the	CL-3	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			absence of project activity. It is not clear if the original Santa Rosa Plant stopped operation completely or not. If COBEE is an electric company that has been granted a concession under Supreme Resolutions 15 to generate electricity for 40 years, further explanations should be provided whether a decision to stop operating due to accident would not hurt any contractual agreement of energy supply assurance. Moreover, DNV requests a copy of these supreme resolutions.		
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/	DR	See B.2.1.	CL-3	OK
B.2.3. Has the baseline scenario been determined according to the methodology?	/1/	DR	See B.2.1.	CL-3	OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	See B.2.1.	CL-3	OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /9/	DR	See B.2.1.	CL-3	OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	See B.2.1. According to ACM0002, the CO2 emission coefficient of each fuel type should be monitored instead of specified ex-ante in section B.6.2 of the PDD. Parameters such as	CL-3 CL-7	OK

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			the relation between CO ₂ and C molecular masses in a CO ₂ molecule should be specified ex-ante. All literature and sources are clearly referenced.		
B.2.7. Have the major risks to the baseline been identified?	/1/	DR	See B.2.1.	CL 3	OK
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?	/1/	DR	In accordance with ACM0002, the additionality of the project is demonstrated through the “ <i>Tool for the demonstration and assessment of additionality</i> ” version 3. The last approved version of the “Tool for the determination and assessment of additionality” should be used.		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	/1/	DR	Step 1 - <i>Identification of alternatives to the project activity consistent with current laws and regulations</i> : The possible identified scenarios are i) the proposed project not undertaken as a CDM project activity ii) rebuilt the plant with original characteristics iii) no project or other alternative are undertaken, and iv) implementation of a 48 MW generation capacity in the form of natural gas fired thermal plant connected to	CL 4	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>the same Bolivian grid system.</p> <p>The provided alternatives are in compliance with the legal and regulatory requirements.</p> <p>The project participants are requested to justify that these alternative scenarios are plausible.</p> <p><i>DNV requests written approval of voluntary participation from the DNA of Bolivia including the confirmation that the project assists it in achieving sustainable development.</i></p> <p><i>Step 3 - Barrier analysis:</i> Not selected.</p> <p><i>Step 4 - Common practice analysis:</i> The hydro power plants implemented since 1998 in Bolivia may not be considered similar to the proposed project activity under the following conditions: natural gas price caps that govern the market energy price, extended cost plus basis that minimize energy price variation in the spot market, a combination of unstable and low growth in the electricity demand, and minimum project financial indicators displaced as the governing figure for investment decision.</p>	CAR-2	
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	/1/ /8/	DR	DNV requests evidences that support the additionality discussion.	CL 5	
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence	/1/	DR	The starting date of the project activity is 17 September 2004 with an expected operational		

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?			lifetime of 40 years. The starting date of a project activity is the earliest of implementation, construction and real action. Please clarify what event corresponds to the chosen date. Moreover, evidence that Compañía Boliviana de Energía Eléctrica seriously considered the CDM in the decision to proceed with the project should be provide.	CL2	OK
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?	/1/	DR	The project is not expected to result in GHG emissions due to the use of a renewable energy source for electricity generation.		OK
B.4.2. Have conservative assumptions been used when calculating the project emissions?	/1/	DR	See B.4.1.		OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	/1/	DR	See B.4.1.		OK
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</i>					

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<i>– where applicable – is justified.</i>					
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	<p>Baseline emissions due to displacement of electricity are calculated by multiplying the electricity exported by the project activity to the SIN grid times the combined margin emission coefficient determined for this grid. The project is not expected to result in GHG emissions due to the use of a renewable energy source for electricity generation. No potential emission sources of leakage were identified for the project.</p> <p>The combined margin emission coefficient for the SIN Bolivian grid will be determined ex-post in accordance with ACM0002. The combined margin emission factor will be calculated as a combination (50:50) of the operating margin (OM) and build margin (BM) emission factors. For the ex-ante estimations, the emission factor has been calculated as follows:</p> <p>(i) The “operating margin” emission factor has been estimated to be 0.661 tCO₂/MWh using the dispatch data analysis method based on 2007 data, which has been confirmed to be the most recent data available at the time of the PDD submission for validation. The hourly generation data for the grid is available and hence the dispatch data analysis was the methodological choice for the estimation of OM. Data on the amount</p>	CL 11	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			<p>of fuel consumed by relevant power sources are available in Bolivia in energy basis (Btu). To determine the set of plants (n), the following data was obtained from the national dispatch center: (a) the grid system dispatch order of operation for each power plant of the system; and (b) the amount of power generated that is dispatched from all plants in the system during each hour that the project activity is operating. At each hour h, each plant's generation was stacked using the merit order. The set of plants (n) consists of those plants at the top of the stack (i.e., having the least merit), whose combined generation comprises 10% of total generation from all plants during that hour.</p> <p>(ii) The "build margin" is estimated as the weighted average emissions (in tCO₂e/kWh) of recent capacity additions to the system, where capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants. For the build margin, the 20% most recently installed plants have correctly been chosen in terms of electricity generation. The BM emission factor accounts to 0.440 tCO₂/MWh.</p> <p>The plant emission factors used for the calculation of operating and build margin emission factors have been calculated based</p>	CL-13	

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			on plant's efficiency data provided by CNDC. It has been confirmed with CNDC that there is no data available of fuel consumption per plant. The baseline grid emission factor, which is the weighted average ratio for OM and BM at 50:50 ratios, is estimated to be 0.551 tCO ₂ /MWh.		
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	See B.5.1.	CL-11 CL-13	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	See B.5.1.	CL-11 CL-13	OK
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?	/1/	DR	No potential emission sources of leakage were identified for the project.		OK
B.6.2. Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	See B.6.1.		OK
B.6.3. Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	See B.6.1.		OK

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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.	/1/	DR	<p>The project is expected to reduce CO2 emissions to the extent of 308 560 tCO2e (44 080 tCO2e/year on average) during the first renewable 7 years crediting period.</p> <p>According to the tables A.4.4 and B.6.4 of the PDD, the calculation of the emission reductions is not according to the starting date of the credit period.</p>	CL-12	OK
B.8. Monitoring Methodology <i>It is assessed whether the project applies an appropriate monitoring methodology.</i>					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Yes, the approved monitoring methodology which is in conjunction with the baseline methodology ACM0002 has been used.		OK
B.8.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	All data will be kept until two years after the end of the crediting period.		OK
B.9. Monitoring of Project Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data	/1/	DR	The project consists of a run-of-river hydroelectric power plant and no project		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?			emissions are foreseen.		
B.9.2. Are the choices of project GHG indicators reasonable and conservative?	/1/	DR	See B.9.1		OK
B.9.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	/1/	DR	See B.9.1		OK
B.9.4. Is the measurement equipment described and deemed appropriate?	/1/	DR	See B.9.1		OK
B.9.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR	See B.9.1		OK
B.9.6. Is the measurement <i>interval</i> identified and deemed appropriate?	/1/	DR	See B.9.1		OK
B.9.7. Is the <i>registration, monitoring, measurement and reporting</i> procedure defined?	/1/	DR	See B.9.1		OK
B.9.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR	See B.9.1		OK
B.9.9. Are procedures identified for day-to-day records handling (including what records to keep, storage	/1/	DR	See B.9.1		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
area of records and how to process performance documentation)					
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?	/1/	DR	<p>Details of data to be collected, the frequency of data recording, its certainty and format and storage location are described. The format for data archiving and the recording frequency of data seem appropriate for the project. All data will be kept until two years after the end of the crediting period.</p> <p>The table B.7.1 of the PDD is not mentioning all data to be monitored. If the combined margin emission coefficient for the SIN Bolivian grid will be determined ex-post, the CO2 emission coefficient of each fuel type, the electricity imported to the project electricity system, CO2 emission coefficient of fuels used in connected electricity systems (if imports occur), the net calorific value, the oxidation factor of the fuel and the CO2 emission factor should be monitored. Moreover, some parameters such as the amount of each fossil fuel consumed by each power source/plant and the electricity generation of each power source/plant are mentioned twice. These parameters for the BM calculation are analogous to the variables described for the OM method. In addition,</p>	CAR-3	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the data unit mentioned in the PDD for the parameter amount of each fossil fuel consumed by each power source/plant is not according to the methodology. This parameter should be presented in mass or volume instead of energy.		
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/	DR	See B.10.1.	CAR-3	OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/	DR	Electricity generation will be monitored. The project participants are requested to clarify if the electricity meters at the plant site will comply with the CNDC standards and will be periodically calibrated. According to ACM0002, the CO2 emission coefficient of each fuel type should be monitored instead of specified ex-ante in section B.6.2 of the PDD. Parameters such as the relation between CO2 and C molecular masses in a CO2 molecule should be specified ex-ante.	CL-6 CL-7	OK
B.10.4. Is the measurement <i>equipment</i> described and deemed appropriate?	/1/	DR	See B.10.1.	CL-6 CAR-3	OK
B.10.5. Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR	See B.10.1.	CL-6 CAR-3	OK
B.10.6. Is the measurement <i>interval</i> for baseline data identified and deemed appropriate?	/1/	DR	See B.10.1.	CAR-3	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.10.7. Is the registration, <i>monitoring, measurement and reporting</i> procedure defined?	/1/	DR	The authority and responsibility for registration, monitoring, measurement and reporting project activities has been established. However, the authorities and responsibilities for organising and training of the staff in the appropriate monitoring, measurement and reporting techniques are not clearly defined.	CL-8	OK
B.10.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR	The project documentation does not report about provisions for meeting training and maintenance needs.	CL-6 CL-9	OK
B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	See B.10.1.	CAR-3	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?	/1/	DR	No potential emission sources of leakage were identified for the project.		OK
B.11.2. Are the choices of project leakage indicators reasonable and conservative?	/1/	DR	See B.11.1.		OK
B.11.3. Is the measurement method clearly stated for each	/1/	DR	See B.11.1.		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
leakage value to be monitored and deemed appropriate?					
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?	/1/	DR	Neither the monitoring methodology ACM0002 nor the Bolivian DNA requires the monitoring of sustainable development indicators.		OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	See B.12.1		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	See B.12.1		OK
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?	/1/	DR	The authority and responsibility of the project management are clearly described.		OK
B.13.2. Are procedures identified for training of	/1/	DR	The authority and responsibility for	CL-8	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
monitoring personnel?			registration, monitoring, measurement and reporting project activities has been established. However, the authorities and responsibilities for organising and training of the staff in the appropriate monitoring, measurement and reporting techniques are not clearly defined.		
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	No unintended emissions are foreseen.		OK
B.13.4. Are procedures identified for review of reported results/data?	/1/	DR	There are no procedures identified for project performance reviews and corrective actions.	CL 10	OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	See B.13.4.	CL 10	OK
C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	/1/	DR	The project starting date is 17 September 2004. The expected lifetime of the project is 40 years. The starting date of a project activity is the earliest of implementation, construction and real action. Please clarify what event corresponds to the chosen date. Moreover, evidence that Compañía Boliviana de Energía Eléctrica seriously considered the CDM in the decision to proceed with the	CL 2	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			project should be provide.		
C.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR	A renewable 7-year crediting period (with the potential of being renewed twice) was selected, starting on 01 January 2009. The crediting period could not start before the registration of the project.	CL4	OK
D. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	The “Santa Rosa Hydropower Plant Project” has been granted an Environmental Licence issued on 27 August 2004 by the Ministry of Sustainable Development of Bolivia. The project issued an Impact Assessment Study, which was approved by the local authorities. No major environmental impacts were considered to be produced by the implementation of the project activity. DNV requests updated evidences of licenses (for example, operating license) and/or other documents such as construction or water permits and the complete EIA for the plant. Also, according to the Analysis of Environmental Impacts & Public Consultation (Annex 6 of the PDD), COBEE was responsible for providing fair compensation of the affected lands or other productive areas. DNV asks for an updated	CL14	OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			status of compliance with this requirement.		
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	See D.1.1.	CL 14	OK
D.1.3. Will the project create any adverse environmental effects?	/1/	DR	See D.1.1.	CL 14	OK
D.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	See D.1.1.	CL 14	OK
D.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	See D.1.1.	CL 14	OK
D.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	See D.1.1.	CL 14	OK
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.1.1. Have relevant stakeholders been consulted?	/1/	DR	Local stakeholders, such as local communities within the project area and local authorities were invited to participate and present any requirements that they wish to be taken into account by the project proponent at the moment of the project's implementation. As no NGO works in the project's area of influence, none was included in the consultation process. The consultation		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			process was part of the permitting process. All pertinent local stakeholders' comments were taken into consideration. DNV requests evidence of the stakeholder invitation for comments, the comments received and the answers provided by the project proponent.	CL-15	
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	See E.1.1	CL-15	OK
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	See E.1.1	CL-15	OK
E.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	See E.1.1	CL-15	OK
E.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	See E.1.1	CL-15	OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>CAR 1</p> <p>DNV requests written approval of voluntary participation from the DNA of Bolivia including the confirmation that the project assists it in achieving sustainable development.</p>	<p>A.2.2</p> <p>A.2.3</p> <p>A.4.1</p>	<p>The DNA of Bolivia issued the LoA in 28 July 2008.</p>	<p>This CAR is closed.</p>
<p>CAR 2</p> <p><i>Step 2 - Investment analysis: Apply investment comparison analysis</i></p> <p>To determine whether the proposed CDM project activity is, without the revenues from the sale of certified emission reductions, less economically and financially attractive than projects based on other energy sources, the project participants used the investment comparison analysis. The investment analysis was not carried out according to the <i>Tool for the demonstration and assessment of additionality</i>. An excel spreadsheet, which has to be enclosed for the CDM registration, was not provided. The comparison of financial indicators was not presented in a transparent manner although the NPV calculation has been demonstrated for each other alternatives. According to the <i>Tool for the demonstration and assessment of additionality</i> the NPV calculation should</p>	<p>B.3.2</p>	<p>The investment analysis has been carried out according to the Tool for the demonstration and assessment of additionality. The comparison of financial indicators was presented in a transparent manner as follows: (i) a summary of the NPV calculation for each other alternatives is included in section B.5 of the PDD, (ii) a detailed NPV calculation for each other alternatives is included in Annex 5 of the PDD, and (iii) an excel spreadsheet including all relevant assumptions for the NPV calculation was submitted in separate annexes to the PDD, so that a reader can reproduce the analysis and obtain the same results. The excel spreadsheet mentioned in (iii) is again included as Annex CAR 1 to the present Validation Protocol.</p>	<p>The NPV spreadsheet and the correspondent evidences of the input values were provided and found OK to DNV's satisfaction.</p> <p>Therefore this CAR is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
include all relevant costs and revenues such as capital costs, fuel price, lifetimes and discount rate or cost of capital.			
<p>CAR 3</p> <p>The table B.7.1 of the PDD is not mentioning all data to be monitored. If the combined margin emission coefficient for the SIN Bolivian grid will be determined ex-post, the CO₂ emission coefficient of each fuel type, the electricity imported to the project electricity system, CO₂ emission coefficient of fuels used in connected electricity systems (if imports occur), the net calorific value, the oxidation factor of the fuel and the CO₂ emission factor should be monitored. Moreover, some parameters such as the amount of each fossil fuel consumed by each power source/plant and the electricity generation of each power source/plant are mentioned twice. These parameters for the BM calculation are analogous to the variables described for the OM method. In addition, the data unit mentioned in the PDD for the parameter amount of each fossil fuel consumed by each power source/plant is not according to the methodology. This parameter should be presented in mass or volume instead of energy.</p>	<p>B.10.1 B.10.2 B.10.4 B.10.5 B.10.6 B.10.9</p>	<p>Table B.7.1 has been adjusted. The following parameters have been incorporated:</p> <ul style="list-style-type: none"> • CO₂ emission coefficient of each fuel type. • Net calorific value of each fuel type. • Oxidation factor of each fuel. • CO₂ emission factor of each fuel. <p>The spatial extent of the SIN is clear and does not include connections to external electricity systems; hence electricity transfers from external grids (imports) and to external grids (exports) are not required to be monitored.</p> <p>The following parameters have been adjusted to avoid mentioning them twice:</p> <ul style="list-style-type: none"> • Amount of each fossil fuel consumed by each power source/plant. • Electricity generation of each 	<p>The corrections were implemented in the revised PDD.</p> <p>Therefore this CAR is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>power source/plant.</p> <p>Regarding the use of energy units (TJ) for the parameter amount of each fossil fuel consumed by each power source/plant, the following was included in order to justify:</p> <ul style="list-style-type: none"> Fuel consumption is not available at CNDC; hence it is obtained through heat rate values applicable for different power plant loads and energy generation for each power plant in the SIN, forcing to express the amount of fuel in energy units, i.e. TJ. <p>It is noted that energy units are of standard use in the industry to express the amount of fuel.</p>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>CAR 4</p> <p>The project proponent is required to clarify why in the PDD is was used 85.5 GWh of annual generation and in the financial analysis was used 80 GWh.</p>		<p>85.5 GWh is the official estimative from CNDC through the SDDP calculous. However, this value in practice is super-estimated; according to the calculation based on hydrological data from 1979 to 2002, the average energy generation is 80 GWh. Therefore, this value will be considered in the PDD.</p>	<p>The hydrological data provided to DNV confirms the 80 GWh estimative of annual energy generation, and the PDD was revised accordingly.</p> <p>Therefore this CAR is closed.</p>
<p>CL 1</p> <p>The crediting period could not start before the registration of the project.</p>	C.1.2	<p>The corresponding adjustments have been included in the PDD in sections A.4.4, B.6.4 and C.2.1.1 with an expected crediting period to begin on 01/01/2009 or earlier if registration is completed.</p>	<p>The new version of the PDD was assessed and the crediting period was changed.</p> <p>This CL is closed.</p>
<p>CL 2</p> <p>The starting date of a project activity is the earliest of implementation, construction and real action. Please clarify what event corresponds to the chosen date. Moreover, evidence that Compañía Boliviana de Energía Eléctrica seriously considered the CDM in the decision to proceed with the project should be provide.</p>	B.3.4 C.1.1	<p>It has been clarified in section C.1.1 that the starting date of the project corresponds to the Formal Notice to Proceed granted to Contractor under the terms of the EPC Contract.</p> <p>Evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity has been included at the end of section B.5.</p>	<p>Evidences were provided as required.</p> <p>Therefore this CL is closed.</p>
<p>CL 3</p> <p>DNV requests further clarifications about the</p>	B.2.1 B.2.2	<p>Description of the baseline scenario has been expanded in section B.4, and a</p>	<p>DNV could confirm that the operations of the plant was interrupted due to</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>baseline scenario. The PDD does not clearly describe which is the baseline scenario in the absence of project activity. It is not clear if the original Santa Rosa Plant stopped operation completely or not. If COBEE is an electric company that has been granted a concession under Supreme Resolutions 15 to generate electricity for 40 years, further explanations should be provided whether a decision to stop operating due to accident would not hurt any contractual agreement of energy supply assurance. Moreover, DNV requests a copy of these supreme resolutions.</p>	<p>B.2.3 B.2.4 B.2.5 B.2.6 B.2.7</p>	<p>confirmation has been incorporated clarifying that the original Santa Rosa power plant stopped operation when destroyed.</p> <p>Step 1 (identification of alternatives to the project activity consistent with current laws and regulations) in section B.5 has been expanded in order to present evidence that the decision to stop operation due to the accident does not hurt any contractual agreement of energy supply assurance.</p> <p>A copy of Supreme Resolutions No. 207640 and No. 215064 are included as Annex CL 3 to the present Validation Protocol.</p>	<p>equipment destruction, and according the PPA and Bolivian Law the company was not punished because of that.</p> <p>Therefore this CL is closed.</p>
<p>CL 4 Step 1 - <i>Identification of alternatives to the project activity consistent with current laws and regulations</i>: The possible identified scenarios are i) the proposed project not undertaken as a CDM project activity ii) rebuilt the plant with original characteristics iii) no project or other alternative are undertaken, and iv) implementation of a 48 MW generation capacity in the form of natural gas fired thermal plant connected to the same Bolivian grid system.</p>	<p>B.3.2</p>	<p>Sub-step 1a in section B.5 has been expanded to justify that the four alternative scenarios deliver outputs and services, either based on the implementation of new power sources or the dispatch of existing power sources in the SIN, comparable in quality and properties with the proposed CDM project activity, hence those alternatives are plausible.</p>	<p>DNV could confirm with the characteristics of the power infrastructure built in the SIN that all alternative scenarios are plausible.</p> <p>Therefore this CL is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>The provided alternatives are in compliance with the legal and regulatory requirements.</p> <p>The project participants are requested to justify that these alternative scenarios are plausible.</p>			
<p>CL 5</p> <p>DNV requests evidences that support the additionality discussion.</p>	B.3.3	<p>See Annex CL 5 of the present Validation Protocol including reference documentation (references/footnotes 7 to 29) that support the additionality discussion.</p>	<p>Evidences were provided to DNV's satisfaction.</p> <p>Therefore this CL is closed.</p>
<p>CL 6</p> <p>The project participants are requested to clarify if the electricity meters at the plant site will comply with the CNDC standards and will be periodically calibrated.</p>	B.10.3 B.10.4 B.10.5 B.10.8	<p>A footnote has been included in section B.7.2 clarifying that according to COBEE internal procedure P.ST.252 "Maintenance of Energy Metering Equipment" access, monitoring and calibration of grid and plant metering equipment is carried out under the same standards. Operational Standard No. 8 of the CNDC established the operation & maintenance standards for grid metering equipment; therefore it is confirmed that COBEE energy meters at the plant site comply with CNDC standards.</p>	<p>Clarifications were provided to DNV's satisfaction.</p> <p>Therefore this CL is closed.</p>
<p>CL 7</p> <p>According to ACM0002, the CO₂ emission coefficient of each fuel type should be</p>	B.2.6 B.10.3	<p>In section B.6.2 it is justified the use of IPCC default values for the CO₂ emission factor per unit of energy of the</p>	<p>The last version of the PDD was assessed and the changes done in section B.6.2 are corrected.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
monitored instead of specified ex-ante in section B.6.2 of the PDD. Parameters such as the relation between CO ₂ and C molecular masses in a CO ₂ molecule should be specified ex-ante.		fuel due to the unavailability of local industry or country-specific values. Under the same title it is inserted the relation applied between CO ₂ (carbon dioxide content) and C (carbon content), according to the IPCC guidelines.	This CL is closed.
CL 8 The authority and responsibility for registration, monitoring, measurement and reporting project activities has been established. However, the authorities and responsibilities for organising and training of the staff in the appropriate monitoring, measurement and reporting techniques are not clearly defined.	B.10.7 B.13.2	In section B.7.2 and as part of the step-by-step process for the monitoring plan, COBEE Projects Branch has been assigned the task of organizing and training all responsible personnel in the appropriate monitoring, measurement and reporting techniques (see Step 1). The organization chart with responsible staff involved has been updated based on current COBEE organizational structure.	The last version of the PDD was assessed and the monitoring plan was modified. This CL is closed.
CL 9 The project documentation does not report about provisions for meeting training and maintenance needs.	A.3.3 B.10.8	In section B.7.2 and as part of the step-by-step process for the monitoring plan, COBEE Projects Branch has been assigned the task of organizing, training and maintenance (see Step 1).	The last version of the PDD was assessed and the monitoring plan was modified. This CL is closed.
CL 10 There are no procedures identified for project performance reviews and corrective actions.	B.13.4 B.13.5	In section B.7.2 and as part of the step-by-step process for the monitoring plan, the heads of the Comercial Branch and the Engineering & Commercial Department have been assigned the	The last version of the PDD was assessed and the monitoring plan was modified. This CL is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		responsibility to carry out project performance reviews and corrective actions as an extension of the corresponding QA/QC tasks. (see Steps 3 and 5).	
<p>CL 11</p> <p>The combined margin emission coefficient for the SIN Bolivian grid will be determined in accordance with ACM0002 version 06 of 19 May 2006. However, it is not clearly stated in the PDD whether the combined margin emission coefficient for the SIN Bolivian grid will be determined ex-ante or ex-post. According to sections B.4 and B.7.2 of the PDD the grid emission coefficient will be calculated ex-post. However, according to section B.6.1 of the PDD, the grid emission coefficient will be calculated ex-ante.</p>	<p>B.5.1 B.5.2 B.5.3</p>	<p>The combined margin emission coefficient for the SIN (Bolivian grid) shall be determined on ex-post basis. The corresponding corrections have been included in section B.6.1. of the PDD.</p>	<p>The last version of the PDD was assessed and section B.6.1 was corrected to agree with sections B.4 and B.7.2. This CL is closed.</p>
<p>CL 12</p> <p>According to the tables A.4.4 and B.6.4 of the PDD, the calculation of the emission reductions is not according to the starting date of the credit period.</p>	<p>B.7.1</p>	<p>Calculation of the emission reductions in tables A.4.4 and B.6.4 have been adjusted to match the crediting period.</p>	<p>The new version of the PDD was assessed and the calculation of the emission reductions is now according to the starting date of the crediting period. This CL is closed.</p>
<p>CL 13</p> <p>A spreadsheet for the calculation of the emission reductions was not provided to confirm this estimate. DNV requests the data</p>	<p>B.5.1 B.5.2 B.5.3</p>	<p>All calculations related to the OM and BM emission coefficients, grid emission factor and emission reductions were submitted in separate annexes to the</p>	<p>The spreadsheet was provided and all calculations were verified accordingly. Therefore this CL is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
used for the baseline determination, the calculation sheet for the grid emission factor, the calculations of the OM and BM emission coefficient used to estimate emission reductions. Data used for calculation has to be provided along with data sources.		PDD. The corresponding files are again included as Annex CL 13 to the present Validation Protocol.	
<p>CL 14</p> <p>The “Santa Rosa Hydropower Plant Project” has been granted an Environmental Licence issued on 27 August 2004 by the Ministry of Sustainable Development of Bolivia. The project issued an Impact Assessment Study, which was approved by the local authorities. No major environmental impacts were considered to be produced by the implementation of the project activity. DNV requests updated evidences of licenses (for example, operating license) and/or other documents such as construction or water permits and the complete EIA for the plant. Also, according to the Analysis of Environmental Impacts & Public Consultation (Annex 6 of the PDD), COBEE was responsible for providing fair compensation of the affected lands or other productive areas. DNV asks for an updated status of compliance with this requirement.</p>	<p>D.1.1 D.1.2 D.1.3 D.1.4 D.1.5 D.1.6</p>	<p>Evidence of construction/operating and environmental permits for the project are presented as annexes to the present Validation Protocol as follows:</p> <ul style="list-style-type: none"> • Annex CL 14-1: Supreme Resolution RS 226002, Article 4, modifying the original Concession, granting authorisation to add 3.8 MW to the original 12.5 MW Santa Rosa Power Plant (12.5 MW = effective capacity prior to power plant destruction on february 2003). • Annex CL 14-2: Project Environmental License. • Annex CL 14-3: Project EIA. • Annex CL 14-4: Final Agreement with Coscapa Community (stakeholders) clearing all pending issues. 	<p>The required evidences were provided to DNV’s satisfaction. Therefore this CL is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>CL 15</p> <p>DNV requests evidence of the stakeholder invitation for comments, the comments received and the answers provided by the project proponent.</p>	<p>E.1.1 E.1.2 E.1.3 E.1.4 E.1.5</p>	<p>Evidence of public consultation and consequent actions is presented as follows:</p> <ul style="list-style-type: none"> • Annex CL 15-1: Public Consultation documents as included in Annex 12 of the EIA. • Annex CL 15-2: Public Consultation results as formalized within COBEE. • Annex CL 15-3: List of Development projects under the responsibility of COBEE Foundation and concentrated on local community. 	<p>The required evidences were provided to DNV's satisfaction.</p> <p>Therefore this CL is closed.</p>

APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes		
CDM Validator:	Yes	JI Validator:	--
CDM Verifier:	Yes	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 1, 2, 3 & 9		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0027	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0028, AM0034	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0030	Yes
ACM0004	Yes	AM0031	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0032	Yes
ACM0007	Yes	AM0035	Yes
ACM0008	Yes	AM0038	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0041	Yes
AM0006, AM0016, AMS-III.D, ACM0010	Yes	AM0034	Yes
AM0009, AM0037	Yes	AM0043	
AM0013, AM0022, AM0025, AM0039, AMS-III.H, AMS-III.I	Yes	AM0046	
AM0014	Yes	AM0047	
AM0017	Yes	AMS-II.A-F, AM0044	Yes
AM0018	Yes	AMS-III.A	Yes
AM0020	Yes	AMS-III.E, AMS-III.F	Yes
AM0021	Yes		
AM0023	Yes		
AM0024	Yes		

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Anjana Sharma

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	Yes	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--

Industry Sector Expert for Sectoral Scope(s):

Technical Reviewer for (group of) methodologies:

ACM002, AMS-IA-D, AM0019, AM0026, AM0029, AM0045	Yes
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Høvik, 1 June 2008

Michael Lehmann

Michael Lehmann

Technical Director, Climate Change Services



CERTIFICATE OF COMPETENCE

Andrea Leiroz

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	Yes	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	Yes	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	--		

Høvik, 18 July 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Marco Ratton

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	--	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	--		

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Felipe Lacerda Antunes

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	Yes	<i>JI Validator:</i>	No
<i>CDM Verifier:</i>	No	<i>JI Verifier:</i>	No
<i>Industry Sector Expert for Sectoral Scope(s):</i>	--		

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Anjana Sharma

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	Yes	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>			
<i>Technical Reviewer for (group of) methodologies:</i>			
ACM002, AMS-IA-D, AM0019, AM0026, AM0029, AM0045	Yes		

Høvik, 1 June 2008

Michael Lehmann

Michael Lehmann

Technical Director, Climate Change Services