



VALIDATION REPORT

Poecho II Hydroelectric Plant Project in Peru

REPORT NO. 2007-1580

REVISION NO. 01



VALIDATION REPORT

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CERTIFICATION AS

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Date of first issue: 27-02-2007	Project No.: 44410021
Approved by:	Organisational unit: International Climate Change Services
Client: SINERSA	Client ref.: Branislav Zdravkovic

Project Name: Poechos II Hydroelectric Plant
Country: Peru
Methodology: ACM0002
Version: 06 dated 23 December 2006
GHG reducing Measure/Technology: Electricity generation using renewable energy source.
ER estimate: 22 771 t CO₂/year over a 7 year renewable crediting period.

Size

- ☒ Large Scale
☐ Small Scale

Validation Phases:

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

Validation Status

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

In summary, it is DNV's opinion that the "Poechos II Hydroelectric Plant" project in Peru as described in the PDD of 10 September 2008 meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0002, version 06. DNV thus requests the registration of the project as a CDM project activity.

Report No.: 2007-1580	Date of this revision: 12-09-2008	Rev. No. 01
Report title: Poechos II Hydroelectric plant project in Peru		
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Key words:

Validation

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Abbreviations

Explain any abbreviations that have been used in the report here.

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
COES	Committee of Economic Operation of the Electric System
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CM	Combined Margin
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
MVP	Monitoring and Verification Plan
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
SEIN	National Electric Grid
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 "Poechos II Hydroelectric Plant" project in Peru. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country 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 host country is Peru and the Annex I country is the Spain. Both countries fulfill the participation criteria and have approved the project and authorized the project participants. The DNA of Peru has confirmed its approval letter that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology ACM0002 version 06 "Consolidated baseline methodology for grid connected electricity generation from renewable sources".

By generating electricity using available hydropower and exporting to the Peruvian national electricity grid (SEIN), the project activity displaces carbon intensive electricity from the grid, thereby resulting 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 a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 22 771 tCO₂e per year over the selected 7 year crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

In summary, it is DNV's opinion that the "Poechos II Hydroelectric Plant" project in Peru, as described in the PDD of 10 September 2008, meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0002 version 06. DNV thus requests the registration of the project as a CDM project activity.



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2 INTRODUCTION

SINERSA has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “Poechos II Hydroelectric Plant” project in the Republic of Peru (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC 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. The validation team has, based on the recommendations in the Validation and Verification Manual 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 consists 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 outlines the documentation reviewed during the validation:

- /1/ CDM PDD of “Poechos II Hydropower plant” version 05 dated 10 September 2008 and its previous versions.
- /2/ Grid emission factor calculation:
Poechos II BM 2005 03-10-07.xls
Poechos II DDA-OM 2005 09-08-2007.xls
- /3/ International Emission Trading Association (IETA) & the World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>
- /4/ ACM0002 version 06 dated 19 May 2006
- /5/ DNA of Peru, Letter of Approval, dated 08 September 2008
- /6/ DNA of Spain, Letter of Approval, dated 27 June 2007
- /7/ CDM Consideration, Minutes of meeting of Board of Directors of SINERSA, dated 4 March 2005.
- /8/ Water use Authorisation. 4 August 2006.
Energy Authorisation. 1 December 2006.
- /9/ Contract with the supplier of equipment and machinery, dated 12 Feb 2007.
- /10/ Project technical report. December 2005.
- /11/ Spreadsheet with IRR calculation: “Modelo IRR para Poechos-CERs 3.xls”
- /12/ Law of Electric Concessions 25844, issued by Peruvian Energy and Mining Ministry in 5 December 1992
- /13/ COES - Peruvian dispatch centre. “Estadística de Operaciones 2006” (operational statistics 2006)
Ministerio de Energía y Minas. “Plan Referencial De Electricidad 2006 – 2015”
- /14/ Technical-Economical Study for determination of Power Prices, May 2006
- /15/ Decree-Law 25844 – Electric Concession Law, issued by the Peruvian Ministry of Mining and Energy, 5 December 1992.



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/16/ Decree 122-94 – Law of the Income Tax.

/17/ EIA of project

3.2 Follow-up Interviews with Project Stakeholders

Issues identified during the desk review of the PDD were clarified with the following personnel through different communications:

	Name	Organization	Topic
/18/	Mr Ted Kennedy/ Mr. Francisco Fernandez-Asin	AHL Carbono Ltd.	• Assessment and demonstration of additionality • Letter of Approvals from DNA of Peru and Spain. • Monitoring methodology and equipments. • Relevant Licenses/approvals and clearances for the establishment and operation of project activity. • Baseline determination and applicability of baseline methodology.

3.3 Resolution of Outstanding Issues

The objective of this phase of the validation is to resolve any outstanding issues which need be clarified prior to DNVs positive conclusion on the project design. In order to ensure transparency a validation protocol is customised for the project. The protocol shows in transparent manner 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 two tables. The different columns in these tables are described in the figure below. The completed validation protocol for the Poechos II Hydroelectric Plant 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



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- 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.

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>	<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.</i>

Validation Protocol Table 2: Requirement checklist				
Checklist Question	Reference	Means of verification (MoV)	Comment	Draft and/or Final Conclusion
<i>The various requirements in Table 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 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	Raman	Venkata Kakaraparthi	India
GHG Auditor	Sharma	Anjana	India
Technical Reviewer	Rescalvo	Miguel	Norway
Sector Expert	Lehmann	Michael	Norway

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 final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation dated 10 September 2008.

4.1 Participation Requirements

The host country for the project activity is the Republic of Peru. The project participant from Peru is Sindicato Energético S.A. The host Party fulfils all the participating requirements of the Kyoto Protocol and ratified the protocol on 12 September 2002. The letter of approval from Peru approving the project activity, authorizing the participation of Sindicato Energético S.A. and confirming the contribution of the project to the sustainable development of the country was granted on 8 September 2008 /5/.

The participating Annex-1 Party in the project activity is Spain and the project participant is AHL Carbono S.L. Spain also fulfills all the participating requirements and ratified the protocol on 31 May 2006. Spain provided a Letter of Approval on 27 June 2007 authorizing the participation of AHL Carbono S.L. /6/

The validation did not revealed any diversion of official development aid towards Peru.

4.2 Project Design

The project activity is a 10 MW hydroelectric power plant located at the base of the existing Poechos dam which was constructed in 1974 for irrigation purposes. The proposed project is the second phase of a registered CDM project (ref. 0086, Poechos I project). The existing Poechos I hydropower plant has an installed capacity of 15.5MW and is located at a distance of 1 Km from the proposed project activity. Though both the projects i.e. Poechos I and Poechos II were conceptualised together, due to the barriers faced (as discussed in additionality section) only one project was initially implemented and that too with the support of CDM revenues. The project developer obtained in 2001 the energy authorization for a total installed capacity of 27MW. In 2002 the authorization was modified for the implementation of only one power station with an installed capacity of 15.5MW. In December 2006 Sinersa obtained the energy authorization for the second generation unit for an installed capacity of 10MW /8/.

The proposed project will make use of the existing Poechos dam. The project envisages the installation of two generating units of 5MW installed capacity each. The water from the Poechos dam will pass through the diversion channel to the penstock which is further bifurcated so that each power generating unit receives 30m³/sec. Both power generating units consists of 5 MW Kaplan turbines coupled to synchronous generators. The project proposes to take advantage of approximately 20 m drop between the reservoir level of Poechos dam and water level of the diversion channel. The proposed project will be connected to Poechos I hydropower plant substation through 1 km long 10 kV transmission line. The power will further be exported to Peruvian National Inter-connected grid through an existing 60 kV transmission line connected to Sullana substation.



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It is expected that the proposed project activity will result in generation of approximately 40 GWh per year at a plant load factor of 45.66 %. The plant load factor is justified on the basis of the Project Technical Report prepared in December 2005 /10/. The turbinated water (60 m³/sec) will be discharged back to the irrigation diversion channel.

The starting date of the project activity is 12 February 2007, date of the contract with the supplier of equipment and machinery /9/. The expected operational lifetime of project activity is 40 years. The project proponent has selected a renewable crediting period of 7 years with the starting date 01 April 2009.

4.3 Baseline Determination

The project applies the approved consolidated baseline methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 06 dated 19 May 2006. The application of the methodology ACM0002 for the project is justified as this project activity complies with all the applicability criteria as stated in the methodology. DNV was able to confirm that:

- the project does not involve any fuel-switch from fossil fuels to renewable energy source;
- the project involves electricity capacity additions to the grid by a hydro power project;
- the electricity grid has been clearly identified to be the SEIN and adequate data is available to estimate the grid emission factor.

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 SEIN grid, as reflected in the combined margin (CM) calculations”.

Though the capacity of the project is 10 MW, the project developer has chosen to apply the baseline and monitoring methodology ACM0002 due to the existence of another CDM project 1 km from the project site.

The project is being implemented at an existing dam and the reservoir capacity does not change. Furthermore, it has been demonstrated that the existing reservoir was constructed in 1974 and thus it is not part of this project activity.

The emissions reduction will be calculated using the combined margin emission factor and the power generated in the project. The operating margin emission factor is calculated using the dispatch data analysis (DDA) method as per the baseline methodology. The build margin emission factor is calculated as per the option 2 of the methodology.

The project boundaries have been clearly identified as being the project activity site and the interconnected Peruvian national electric grid (SEIN).

In conclusion, it is DNV’s opinion that the baseline methodology is correctly applied and the baseline scenario correctly chosen.

4.4 Additionality

The projects additionality has been demonstrated using the “*Tool for the demonstration and assessment of Additionality*” version 3.



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The starting date of the project activity is 12 February 2007, date of the contract with the supplier of equipment and machinery /9/. It is DNV's opinion that this date is correctly chosen as starting date of the project activity and can be considered the earliest among the dates of implementation, construction or real action and it correctly represents the date of final decision proceed with the project. The memo of the Board of Directors of SINERSA of 4 March 2005 /7/ evidences that that the incentive from the CDM was seriously considered in the decision to proceed with the project.

Step 1: Three alternatives to the project activity have been considered (a) implementation of the project activity without CDM benefits (b) implement a fossil fuel fired power plant (c) no action or continuation of the current situation i.e. the generation of an equivalent amount of electricity by the existent generation mix or fossil fuel based new additions to the Peruvian grid.

All three scenarios identified are in compliance with the applicable legal and regulatory requirements for the region. The alternative (b) is not considered a realistic alternative for the project participant of this project or for similar project's developers. COES and MINEM data show that fossil fuel based capacity expansions are mainly natural gas plants with an installed capacity over 120MW developed by large electricity utilities or, in the cases of small natural gas plants, the project developers are the same companies exploiting the gas field. In both cases, the alternative is not a realistic one for Poechos II Hydroelectric Plant project's sponsor.

Step 2: Investment analysis: Option III (Benchmark analysis) from the Additionality Tool is selected.

It has been demonstrated /11/ that the project activity has an IRR of 9.677% without considering CDM revenues, which is below the benchmark IRR of 12%, which is established by the government within the Peruvian Electric Concession Law /12/ to determine electric tariff and evaluate investments in the power generation sector. The project sponsor has provided cost quotes for the mechanical and electric equipment based on quotations from international and local suppliers, and evidences of the main equipment costs were provided /9/. It has been confirmed that the project has two revenues sources, one of them based on an electricity tariff for electricity generated and another based on a payment for capacity. DNV has confirmed that the electricity generation tariff of US\$ 29/MWh was established based on the historical evolution of prices as per COES data /13/ and the price forecast for the period 2006-2015 published by the Ministry of Energy and Mines /13/. The tariff for power capacity was formulated according to the Technical Economic study for price determination of power capacity and energy done by the Peruvian electric regulator, OSINERG /14/. DNV confirmed the project is qualified for the capacity payment on half of its rated capacity because of its low load factor and its limited water availability. The annual M&O costs represent 4% of the total investment what is in DNV's opinion reasonable. DNV could also confirm that the 30% value of the income tax, the IRR timeframe and depreciation values of 3% for civil works and 10% for machinery and equipment were established accordingly to the Peruvian legal requirements /15/ /16/. The Electric Concession Law also determines that the residual value of the company's installation should be zero.

A sensitivity analysis considering at which value each parameter touches the benchmark was carried on, and the results were -18.5% in investment, +26% in the tariff and +28% in the load



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factor. Taking into account that evidences related to project costs were provided /9/, and that the values are comparable to other similar project in Peru validated by DNV, it is unlikely that the investment decreases by 18.5%. The documents assessed during the validation /13/ published by COES and the Ministry of Energy and Mines show that it is expected that the tariff will decrease in the future and thus it is unlikely that the electricity tariff will increase. The load factor was confirmed in the Project Technical Report of December 2005 and is based on the analysis of historical data of water availability and thus it is unlikely that it increases as much as 28%, DNV could confirm that the probability for any of the parameters reach those values is very low, and this confirms that the project is not financially attractive.

Step 3: Barrier analysis.

Investment Barriers: Difficulties related to obtaining financing from several banks are stated in the PDD. however, DNV could not have a direct evidence of this barrier.

Barrier due to prevailing practice: It is demonstrated based on several public references stated in the PDD that currently the development of hydroelectric projects is not a common practice in Peru. Earlier, the Peruvian inter-connected power grid was hydro based. Nowadays, due to availability of natural gas in Peru and also the discovery of new gas fields, the current trend is to favour the setting up of natural gas based power generation compared to hydropower generation. Concessions have also been declared by national government of Peru for promotion of natural gas based power plants. References have also been provided to establish that all future plans are also inclined towards natural gas power plants. The references quoted in the PDD have been checked and are found correct

Geological Barriers: The project also faces geographical risks due to its location. Peru is located in circum-Pacific seismic belt where more than two-third of the world's large magnitude earthquakes occur. Under such conditions, investment in hydropower projects in these areas is risky and results in higher insurance premiums. Further, the area surrounding the project is highly prone to social conflicts due to poverty.

Other Barriers: it has been demonstrated that the relatively low load factor and variable flow of water in the canal /10/ poses a barrier to this project that can be alleviated with CDM revenues. Furthermore, the fact that priority will be given to irrigation needs increases the uncertainty of the proper project operation. The supply of hydroelectric power generation turbines is currently limited and subject to upward price pressures due to a rapidly growing demand for equipment, mainly from in China, this increases the uncertainty during the construction process. The additional revenue from CDM will help to alleviate these barriers.

Step 4: Common practice analysis:

It is demonstrated based on several public references stated in the PDD that currently the development of hydroelectric projects is not a common practice in Peru. Earlier, the Peruvian Inter connected power grid was hydro based. Nowadays, due to availability of natural gas in Peru and also the discovery of new gas fields, the current trend is to favour the setting up of natural gas based power generation compared to hydropower generation. Concessions have also been declared by national government of Peru for promotion of natural gas based power plants. References have also been provided to establish that all future plans are also inclined towards natural gas power plants. The references quoted in the PDD have been checked and are found correct.



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DNV was able to confirm that after the first natural gas project (Camesia) was developed in 2004, there were only two hydropower project additions to the SEIN with installed capacity of 7.5 MW and 130 MW. This was confirmed against the COES data. Both these hydro power plants are being developed considering CDM revenues. Among the recently being built hydro power plants or projects under construction during the years 2006 to 2008, 7% of installed capacity under construction is hydroelectric power generation, whereas the remaining 93% is natural gas-fired thermal generation. All of the hydropower projects are seeking CDM registration.

In conclusion, it has been sufficiently demonstrated that the proposed project activity faces investment barriers, technological barriers, geological barriers and barriers due to the prevailing practices in Peru and the existence of national plans that promotes natural gas based power generation. Though some of the other barriers discussed are generic for all hydroelectric projects in Peru, it can be concluded that the project's IRR shows the investment on this project is not attractive and the barriers highlighted prevent the investment in hydroelectric projects of being a business-as-usual scenario in Peru and thus 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 monitoring methodology ACM0002 version 06. The monitoring methodology adopted involves the monitoring of the power supplied to the grid, EG_y by the project activity, in addition to all the parameters required for the estimation of the emission factor, EF_y .

The emission reductions resulting from the project activity will be calculated in accordance with the ERCP (Emission reduction calculation procedure). The latest data related to net generation and other parameters required will be obtained from COES.

The data on the electricity generated and exported to the SEIN network, is monitored by the substation operator Electronoroeste S.A. (ENOSA) and provided to COES. The monitoring equipment will be calibrated as per ENOSA requirements and the manufacturer requirements. An internal monitoring system will be implemented and the electricity generation figures will be crossed checked with the sales receipts.

4.5.1 Parameters determined ex-ante

Following parameters are available *ex ante*:

- Carbon content of each type of fuel - 2006 IPCC default values have been used as local country specific values are not available.
- Oxidation factor of each type of fuel – 2006 IPCC default values have been used as local country specific values are not available.

4.5.2 Parameters monitored ex-post.

Following parameters will be monitored *ex-post*



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- EG_h : Electricity supplied by the project to the SIEN grid. Measured every 15 minutes and hourly recorded.
- EF_y : Grid emission factor. Will be calculated based on the latest information from COES.
- EF_{OM} : Operating margin emission factor. Will be calculated based on the latest information available from COES.
- EF_{BM} : Build Margin emission factor- Will be calculated based on the latest information available from COES. It has been confirmed from COES that individual plant wise fuel consumption data is not available.
- Emission coefficient for each power plant- To be calculated by the project developer based on the efficiency (NEC) figures from COES. It has been confirmed with COES that individual plant wise fuel consumption data is not available.
- Fuel Consumption: calculated based on the efficiency of each plant (NEC, net efficiency conversion), Annual figures per plant will be taken from COES. NEC values have been used as individual plant wise fuel consumption data is not available.
- Hourly generation of all units connected to SIEN – Data to be obtained from COES.
- Merit order.
- Imports from other electricity systems.

4.5.3 Management system and quality assurance

The project proponent SINERSA has considerable experience in the operation of the Poechos I hydropower project (a CDM project) which is located nearby. The PDD includes the QA/QC procedures that will be put in place before the commissioning of the project. Data will be archived until two years after the end of the last crediting period.

4.6 Estimate of GHG Emissions

The GHG emissions have been estimated as the product of the expected electricity generation from the project activity and the grid emission factor.

The expected yearly generation of the electricity is 40,000 MWh based on the installed capacity of 10 MW and a plant load factor of 45.6%. The assumed value of the plant load factor is reasonable as the operating Poechos I project based on the same Poechos dam, has a load factor of 50%.

No projects emissions are accounted for, as the project is being implemented at an existing dam and the reservoir capacity does not change. Furthermore, the existing reservoir was not built for this project.

The grid emission factor for SEIN grid is proposed to be calculated ex-post as per the methodology ACM0002 version 6. 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:



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(i) The “operating margin” emission factor has been estimated to be 0.727563 tCO₂/MWh using the dispatch data analysis method based on 2005 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.

(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 0.41098 tCO₂/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 COES. It has been confirmed with COES that there is not 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 0.56927 tCO₂/MWh.

The project is estimated to result in 22 771 tCO₂ of emission reductions annually through out the 7 year renewable crediting period. 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 Committee of Economic Operation of the Electric System (COES), while the oxidation factor and the carbon content of fuel have been sourced from IPCC default values, since local values are not available. The calculations and assumptions have been verified and found to be correct by DNV.

4.7 Environmental Impacts

An EIA for the project activity was conducted along with the EIA of the Poechos I project activity, which analysed the impacts during construction. A separate EIA was conducted for the transmission line. No major impacts were identified. The environmental management plans to mitigate the impacts during the construction phase are approved by the financing banks. The EIA was also approved by the environmental agency of Peru, MINEM. The potential impacts of the project have been summarised in the PDD.

4.8 Comments by Local Stakeholders

Comments for the stake-holders consultation were invited for the project activity during various workshops with the local communities. The stake-holders consultation for the project activity was conducted in 1997 as a requirement of the EIA, and the consultation for the transmission line was conducted during July 2003 in Sullana. The comments received have been documented in the EIA. No negative comments were received. The PDD also outlines the various pro-active social measures undertaken by the project proponent.

4.9 Comments by Parties, Stakeholders and NGOs

The PDD of 12 September 2006 was made publicly available on DNV’s climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs



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were through the CDM website invited to provide comments during a 30 days period from 27 February 2007 to 28 March 2007.

No comments were received.



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APPENDIX A

CDM VALIDATION PROTOCOL



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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 The project assists Annex-I party Spain in achieving compliance with part of their emission reduction commitment.	OK
The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2. Yes	OK
The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a While the written approval from the host party Peru has been obtained, the same has to be obtained from Annex-I party Spain.	CAR-1 OK
The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a The written confirmation of the project assisting sustainable development has been received from the host country Peru.	OK
In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK



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Requirement	Reference	Conclusion
counted towards the financial obligations of these Parties.	The validation of the project activity did not reveal any information indicating that the project can be seen as diversion of any ODA funding towards Peru.	
Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29 The designate national authority for CDM in host country Peru is Consejo Nacional del Ambiente (CONAM).and DNA of Annex-I Party Spain is Oficina Espanola de Cambio Climatico.	OK
The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a Host country Peru has ratified the Kyoto protocol on the 12 September 2002 and Annex-I Party Spain has ratified the protocol on 31 May 2006.	OK
The participating Annex I Party’s assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK
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	OK
About additionality		
Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	Ok



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Requirement	Reference	Conclusion
anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.		
About forecast emission reductions and environmental impacts		
The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
For large-scale projects only		
Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
About stakeholder involvement		
Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40 The PDD was made publicly available on www.dnv.com/certification/climatechange and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 day period from 27 February 2007 to 28 March 2007. No comments were received.	OK.



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Requirement	Reference	Conclusion
Other		
The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision The project design conforms to the version 03 of UNFCCC CDM-PDD format.	OK
Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK



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Table 2 Requirements Checklist

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
* MoV = Means of Verification, DR= Document Review, I= Interview					
A. General Description of Project Activity <i>The project design is assessed.</i>					
Project Boundaries <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
Are the project’s spatial boundaries (geographical) clearly defined?	/1/	DR	The projects spatial boundaries have been defined. The project is located in the town of Lancones, Sullana Province in the Republic of Peru.		OK
Are the project’s system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR	The project system boundaries used to mitigate are clearly defined and consist of the two sets of Kaplan turbines and the generators, located at the bottom of the Poechos irrigation dam. The project also includes the penstock and the tailrace channel.		OK
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>					

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



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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Which Parties and project participants are participating in the project?	/1/	DR	The host Party for the project is the Republic of Peru and the project participant from Peru is Sindicato Energetico SA (SINERSA). The Annex-I Party involved in the project is Kingdom of Spain and the project participant is AHL Carbono S.L.		OK
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/ /5/ /6/	DR	The letter of approval from the host country Peru has been received. The letter of approval from the Annex-1 country is pending.	CAR-1	OK
Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1/	DR	Host country Peru has ratified the Kyoto protocol on the 12 September 2002 and Annex-I Party Spain has ratified the protocol on 31 May 2006 The designate national authority for CDM in host country Peru is Consejo Nacional del Ambiente (CONAM).and DNA of Annex-I Party Spain is Oficina Espanola de Cambio Climatico		OK
Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR	The validation does not indicate any potential funding from Annex-I Party.		OK
Technology to be employed					

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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<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>					
Does the project design engineering reflect current good practices?	/1/	DR	The project design engineering reflects current good practice.		OK
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	The project activity uses technology that is widely used and is tested. The technology used will result in better performance and is not likely to be replaced during the lifetime of the project.		OK
Does the project make provisions for meeting training and maintenance needs?	/1/	DR/I	This is not mentioned in the PDD. However since the project proponent is already operating the Poechos-I hydropower plant (a CDM project) located at a distance of 1 Km away, extensive training would not be required.		OK
Contribution to Sustainable Development <i>The project's contribution to sustainable development is assessed.</i>					
Has the host country confirmed that the project assists it in	/1/	DR	Yes, the host country, Peru has confirmed		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
achieving sustainable development?	/5/		that the project assisting in achieving sustainable development.		
Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	Yes, the project during the construction and operation stages will create employment to the local population.		OK
B. Project Baseline <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
Baseline Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
Does the project apply an approved methodology and the correct version thereof?	/1/ /4/	DR	The project applies the approved large scale methodology ACM0002 version 06 “consolidated baseline methodology for grid connected electricity generation from renewable sources”		OK
Are the applicability criteria in the baseline methodology all fulfilled?	/1/ /4/	DR	The following applicability criteria in the baseline methodology are fulfilled. - The project is grid connected electricity generation unit from a hydro power source from an existing reservoir, where the		OK

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			volume of the reservoir is not increased. - The electricity grid is clearly defined and information on the grid is available.		
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>					
What is the baseline scenario?	/1/	DR	The baseline scenario is that in the absence of the project activity, the electricity generation would have been from operation of the grid connected power plants or by the addition of new generating source (the installation of a thermal power plant) as per the prevailing practice.		OK
What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/	DR	Three alternatives were identified for the project activity. 1. Implementation of the project without CDM revenues. 2. Implementing a thermal power plant in place of the project plant (natural		OK

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			gas) 3. No project at all or continuation of the present scenario. The selected baseline of continuation of the present practice of not having the project and capacity additions in the grid.		
Has the baseline scenario been determined according to the methodology?	/1/	DR	Yes.		OK
Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Yes		OK
Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Yes		OK
Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Yes		OK
Have the major risks to the baseline been identified?	/1/	DR	There are no risks identified for the baseline.		OK
Additionality Determination <i>The assessment of additionality will be validated with</i>					

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<i>focus on whether the project itself is not a likely baseline scenario.</i>					
Is the project additionality assessed according to the methodology?	/1/ /7/ /10/	DR	The project’s additionality has been assessed as per the “Tools for the demonstration and assessment of additionality”, version 03. It is stated that the project is finalising the financing and construction is expected to start in the first semester of 2007. It is also stated that CDM revenues have been considered from the early stages of project. Evidence of the Directors meeting of March 2005 discussing the CDM revenues for the project has been provided. Step 1: Three alternatives have been identified for the project activity. 1. Implementation of the project without CDM revenues. 2. Implementation of a fossil fuel fired thermal power plant. 3. No project activity or continuation of the present scenario. All the identified scenarios are in compliance with the applicable laws and regulations. The	CL-4	OK



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			alternative 2 has been demonstrated not to be a realistic one for the project developer or similar project developers. Step 2: Investment analysis was not selected. Step 3: Barrier analysis: the barriers of investment, technological, prevailing practice and geographical have been projected to establish the additionality of the project. Investment barrier: it has been stated and justified with references that the turnkey cost for a small hydropower project is higher than a thermal power plant, and with the high financial risks it is difficult for hydropower projects to attract finances. It is also stated that the CDM revenues will reduce the turnkey cost by 16% and the project IRR will improve by 1.06% and that the project activity also had difficulty in getting finances. Evidence is to be provided to establish that getting financing for the project was a hurdle. Evidence is also to be provided to establish that the consideration of CDM revenues reduces the turnkey cost by 16% and		



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				improves IRR by 1.06%. Barrier due to the low load factor. Since the dam is constructed for irrigation purpose and water availability for irrigation has a priority over power generation. The river water flow is also highly variable which reflects in the lower load factor of the project. Evidence on the highly variable flow has been provided based on the historic flow data culled from the feasibility report of the project. Prevailing practice barrier: It is stated with references and evidence that the prevailing practice in Peru after the discovery of gas is setting up of natural gas based plants and also conversion of oil fired power plants to natural gas based plants. Statistics have been quoted, which establish this fact. Geographical barrier: to the project activity are the scarcity of hydropower project locations after the cancellation of all concessions, disadvantage due to the project location and in general Peru being located on		



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				the pacific seismic belt and social conflicts in the area. Common practice barrier: It has been established with data from official sources (COES) that in the 6 recent power plant additions to the SEIN grid, 4 are thermal plants and have a share of 83% and that hydroelectric power forms only 7% of the installed capacity under construction, and are seeking CDM aid. The Poechos I power project located 1 Km away from the project site belongs to the project proponent and is a registered CDM project and faced similar barriers. The project proponent is requested to provide clarification as per CL1		
Are all assumptions stated in a transparent and conservative manner?		/1/	DR	Yes.		OK
Is sufficient evidence provided to support the relevance of the		/1/	DR	Sufficient evidence has been provided in the		OK



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arguments made?				PDD.		
If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?		/1/ /9/ /8/	DR/I	The starting date of the project (placing of the contract for the supply of equipment) is stated to be 12 February 2007. Evidence of this is to be provided. The contract with the equipment supplier has been provided. In line with the clarification in EB33 about the starting date of a project activity, the starting date was changed to 12 February 2007, date of the contract with the equipment supplier.	CL-3	OK
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>						
Are the calculations documented according to the approved methodology and in a complete and transparent manner?		/1/	DR	Since the project is being implemented at an existing dam and the reservoir capacity does not change, the project does not have any project emissions.		OK

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Calculation of GHG Emission Reductions – Baseline emissions <i>It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>						
Are the calculations documented according to the approved methodology and in a complete and transparent manner?		/1/	DR	Yes, the calculations are documented according to the methodology ACM002 and in a complete and transparent manner. The baseline emissions are calculated as the product of the electricity generated and exported to the grid and the grid emission factor of the SEIN grid to which the project is connected. The electricity generated is assumed at a load factor of 46% and is reasonable. The Poechos I project operated by the project proponent 1 Km away from the project activity has a load factor of 50%. The grid emission factor has been estimated as the combined margin emission factor and is as per the methodology. The data used is for the year 2005, which is the latest data available at the time of PDD preparation. For	CL-2	OK

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			the calculation of the operating margin (OM), dispatch data analysis with the vintage data of 2005 has been chosen. The OM was initially calculated as 0.74 t CO2/MWh and was recalculated after the clarification requests issued by DNV. The build margin (BM) has been calculated using the option (2) that is the most recently built plants accounting for 20% of all power generation. The value of BM initially arrived at is 0.43 t CO2/MWh, which decreased after the clarifications requested by DNV. The combined margin has been calculated using the default weight-age of 50%. The grid emission factor will be calculated ex-post during every year of the crediting period, sourcing the official data from COES. However, following points need to be clarified: Operating margin: a) As per methodology, imports of electricity to the grid (to the extent they are dispatched) during a particular hour are also to be		



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				considered for OM calculations. It needs to be clarified how the imports have been considered for OM calculations. b) Availability of local value for carbon content of coal need to be confirmed Build Margin: For ex ante BM estimation purpose, the project developer has selected a sample group <i>m</i> that consists of only newly built plants (interconnections and up gradations have been excluded). It needs to be demonstrated how this selection is conservative since as per the data provided, on considering all the capacity additions (newly built, up gradation, interconnection) to the SIEN grid, the share of hydropower is higher compared to thermal power. The project developer has revised the PDD to include all the capacity additions. As per the revised PDD, the baseline emissions have been calculated based on the combined margin emission factor of 0.56927 tCO₂/MWh. This is the weighted average of		



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			operating margin, 0.72756 t CO ₂ /MWh, and build Margin, 0.41098 t CO ₂ /MWh.		
Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	Yes, the PDD has been revised to reflect the conservative assumptions.		OK
Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	There are no un-certainties in the baseline emission estimates. The only uncertainty would be in the availability of water which will affect the power generation for which a load factor of 46% been considered.		OK
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>					
Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Since the project is a hydropower project, there are no leakages.		OK
Emission Reductions <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i>					

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Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.		/1/	DR	The emission reductions are real, measurable and will give long term benefits.		OK
Monitoring Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>						
Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?		/1/	DR	The monitoring plan is documented according to the methodology in a complete and transparent manner. In line with the monitoring methodology the following parameters will be monitored. - Electricity supplied to grid (SEIN)- measured - Grid emission factor of the grid- calculated yearly - OM of the grid – calculated yearly - Build margin- calculated yearly All the data required for the calculation of the grid emission factor annually (ex-post) will be sourced from the Committee of economic operation of the electric system (COES).due to the following reasons. 1. There is not as good quality data of		OK

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			the SEIN production as what COES registers. 2. The limitation of MINEM’s final annual reports and data availability would not allow good monitoring practice; 3. The generation of these other plants connected to the SEIN but not registered by COES, is irrelevant as it comprised only 2% of total SEIN electricity generation in 2005.		
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/I	This is not mentioned in the section B.7.1 of the PDD and needs to be included in the PDD. The PDD has been revised in address this issue.	CAR-2	OK
Monitoring of Project Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or	/1/	DR	The project does not have any project emissions being a hydropower plant		OK

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CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
measuring the greenhouse gas emissions within the project boundary during the crediting period?			connected to an existing reservoir, whose capacity is not being increased.		
Monitoring of Baseline Emissions <i>It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.</i>					
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	Yes, in line with the monitoring plan, the following data will be monitored. Electricity supplied to grid (SEIN)- measured Grid emission factor of the grid-calculated yearly OM of the grid – calculated yearly Build margin- calculated yearly All the data required for the calculation of the grid emission factor annually (ex-post) will be sourced from the Committee Of Economic operation of the electric System (COES).		OK
Are the choices of baseline GHG indicators reasonable and conservative?	/1/	DR	Yes.		OK
Is the measurement <i>method</i> clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/	DR/I	This is not clearly stated in the section B.7.1	CAR-2	OK

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			of the PDD and needs to be done The PDD has been revised to address this issue.		
Is the measurement <i>equipment</i> described and deemed appropriate?	/1/	DR/I	Same as above	CAR-2	OK
Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR/I	Same as above	CAR-2	OK
Is the measurement <i>interval</i> for baseline data identified and deemed appropriate?	/1/	DR/I	Same as above	CAR-2	OK
Is the <i>registration, monitoring, measurement and reporting</i> procedure defined?	/1/	DR	The emission reduction calculation procedure (ERCP) organisational structure and the QA/QC procedure has been provided in the monitoring plan attached as annexure 4 of the PDD.		OK
Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR/I	These aspects are not clear from the PDD and needs elaboration. The same has been addressed in the revised PDD.	CAR-2	OK
Are procedures identified for day-to-day records handling	/1/	DR/I	This is not very clear from the PDD and		OK

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(including what records to keep, storage area of records and how to process performance documentation)			needs clarification. How ever as the project proponent is operating the Poechos II HPP, a CDM project, procedures would have been identified and in place.		
Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	Since it is a hydropower project connected to an existing dam, and as per the methodology there are no leakage emissions to be accounted for.		OK
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>					
Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR/I	This is not clear from the PDD, but has been clarified that there is no requirement to monitor the sustainable development indicators in Peru.		OK
Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR/I	These aspects are not covered under the monitoring plan and are not required to be monitored as per the DNA of Peru.		OK

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Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR/I	The sustainable development indicators need not be monitored.		OK
Project Management Planning <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
Is the authority and responsibility of overall project management clearly described?	/1/	DR	The organisational structure of the monitoring plan and the emission reduction calculation procedure management are provided in the annex-4 to the PDD.		OK
Are procedures identified for training of monitoring personnel?	/1/	DR	These are not mentioned in the monitoring plan and the PDD and need to be incorporated	CAR-2	OK
Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	Being an hydroelectric power project there will not be any emergencies causing unintended emissions.		OK
Are procedures identified for review of reported results/data?	/1/	DR/I	PDD has been revised to address this issue. The responsibility and steps have been defined to review the reported results/data.	CAR-2	OK
Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR/I	The PDD has been revised to address this	CAR-2	OK

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			issue. It will be the responsibility of the MP steering committee to take necessary corrective actions whenever required.		
C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
Are the project’s starting date and operational lifetime clearly defined and evidenced?	/1/ /9/	DR/I	The project starting date (date of placing the contract for the supply of equipment) is mentioned as 12 February 2007, and the operating lifetime is mentioned as minimum of 40 years and is reasonable. Evidence is to be provided on the starting date of the project.	CL-3	OK
Is the start of the crediting period clearly defined and reasonable?	/1/	DR	The start of the crediting date is mentioned as 1 September 2008 and a renewable crediting period of 7 years has been selected. The project developer has revised the PDD. The starting date of the crediting period has been changed to 01 April 2009 in the revised PDD.		OK
D. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will</i>					

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



VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /11/	DR/I	It is stated that EIA has been conducted for the both the Poechos –I and II activities, and no impacts were identified due to the existence of the dam and reservoir. A separate EIA was also conducted for the transmission line and no major impacts were identified. The EIA report of the project activity has been evidenced.		OK
Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/ /11/	DR/I	The EIA (of MINEM) of the connection line for the project activity was approved by the Environmental Agency on 31 March 2003. The approval and the conditions therein have been evidenced.		OK
Will the project create any adverse environmental effects?	/1/ /11/	DR	Since the project is a hydropower project, depending on the existing reservoir with no change in the reservoir capacity and no requirement to put up new transmission line to the grid, no adverse environmental effects are expected.		OK
Are transboundary environmental impacts considered in the	/1/	DR	Since the project does not have any project		OK

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



VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
analysis?	/1/ /11/		emissions, no trans-boundary environmental impacts are expected.		
Have identified environmental impacts been addressed in the project design?	/1/ /11/	DR	The environmental impacts identified in the EIA study have been discussed in the PDD. No major impacts are observed.		OK
Does the project comply with environmental legislation in the host country?	/1/ /11/	DR	It is stated that the project has all the relevant approvals. These are to be evidenced.	CL-4	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>					
Have relevant stakeholders been consulted?	/1/ /11/	DR	It is stated that as a part of the EIA and government of Peru requirements, the local stakeholders were consulted in 1997 (for the Poechos – I and II projects) and then in 2003 for the EIA of the transmission lines. The necessary documents are to be evidenced	CL-5	OK
Have appropriate media been used to invite comments by local stakeholders?	/1/ /11/	DR	It is stated that the announcements for the consultations were posted in the local newspapers and several workshops were conducted.		OK

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



VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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/ /11/	DR	A stakeholders consultation process is a requirement for the environmental compliance and concessions. The awarding of the concession to the project proponent implies that the process was in accordance.		OK
Is a summary of the stakeholder comments received provided?	/1/ /11/	DR	As per the PDD there were no negative comments.		OK
Has due account been taken of any stakeholder comments received?	/1/ /11/	DR	There were no negative comments received. However the project proponent has identified some social priorities for addressing.		OK

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

VALIDATION REPORT

Table 2 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR.1 The letter of approval from the Annex-1 country Spain is to be provided.		The letter of approval from the Peruvian DNA has been obtained and can be provided during the site visit. The letter from Spain is pending, and will be provided as soon as it becomes available.	Letter of approval from DNA of Peru and Spain have been verified. CAR 1 is closed.
CAR-2 - It is not clear from the PDD whether all the 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? - The measurement <i>method</i> , measurement equipment, accuracy of the measurement, etc in section B.7.1 are to be clearly stated for each baseline indicator to be monitored and also deemed appropriate? - Are procedures identified for <i>maintenance</i> of monitoring equipment and installations?		- The following has been clarified in section IV. A of the Monitoring Plan: <i>“Data Collection and Integration: It is required that the project operator calculate the Project’s ERs based on most recent available information, following The ERs Calculation Procedure (ERCP) presented in this report. The project operator must gather and process information needed to monitor ERs. All data required for calculating the Emission Margin will come from the COES information system¹ and from the Project’s final client, ENOSA. Electricity production by the plant and any</i>	- The PDD has been revised to include the archiving of monitored data. - Metering of electricity generated, maintenance and calibration of monitoring equipments will be done in accordance with the specifications of ENOSA and the manufacturer requirements. The same is acceptable to DNV. - No special training of monitoring personnel is required as the personnel monitoring and collecting the data for Poechos I

¹ As long as the Project Operator is not an active member of COES. When it is, all data will come from COES.

VALIDATION REPORT

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
Are the calibration intervals being observed. - Are procedures identified for training of monitoring personnel? This needs to be addressed in the monitoring plan in annexure 4 - Procedures need to be identified for review of reported results/data, and included in the monitoring plan in the PDD. - Procedures need to be identified for corrective actions in order to provide for more accurate future monitoring and reporting, in the PDD.		<i>internal usage will be metered continuously to account for the net level of electricity sold to the grid, and these records and sales receipts will be cross-referenced with COES data (which will itself contain a record of the plant output, along with all other plants in the SEIN).</i> In section B.6.4, the footnote number 33 already clarifies that “For the Project “the year” will run from April 1 to March 31, the first year of the first crediting period being 1 April 2009 – 31 March 2010 and the last year of the first crediting period being 1 April 2015 – 31 March 2016” In section B of the Monitoring Plan under the title DDA-OM Spreadsheet it is indicated that “The data’s year is the year of project generation (April 1st-March 31st)” To follow your suggestion regarding archiving, we have added the following under EG_h in B.7.1:	hydropower project (registered CDM project) will be deployed for Poechos II project also. The same is acceptable to DNV. - Maintenance of monitoring equipment and installations for generated electricity will be done in accordance with the procedures decided in the agreement between SINERSA and ENOSA. The other equipments of the project will be handled in accordance with the manufacturers specifications and manuals. The same is acceptable to DNV. - PDD has been revised to address the issue of review of reported results and necessary corrective. The responsibility has been defined to review the reported results and to take the necessary corrective actions whenever required. CAR 2 is closed.

VALIDATION REPORT

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
		<i>“All data will be archived electronically, and backed up regularly. Moreover, this information will be kept for the full crediting period, plus two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs late”.</i> - COES, the dispatch center, will be the only data provider for the annual ex-post calculation of the Project’s ERs. All energy from Poechos II will be sold to ENOSA, the distribution company. The offtake arrangement between ENOSA and SINERSA obligates Poechos II to maintain metering equipment – per specifications of ENOSA – to measure the production of energy. During the site visit, the equipment and specifications can be examined, and personnel from both SINERSA and COES can be interviewed. - A summary of the operation and maintenance procedures for the	

VALIDATION REPORT

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
		project can be provided at the time of the site visit. As the sponsors may purchase different equipment for different projects, they use the manufacturer specifications and manuals in maintenance of each component. Training related to collection and presentation of data related to CERs is already detailed in the PDD. Poechos II will be located only 1 kilometer from Poechos 1, and the same personnel currently operating and collecting/presenting data Poechos II will be charged with the same activities for Poechos I. As a result, training and operation procedures are already familiar to the existing staff, and it is believed that operation of the new project will be straightforward.	
CL -1		- DEG, the German bank that is	The project's IRR has been

VALIDATION REPORT

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
- Evidence is to be provided to establish that getting financing for the project was a hurdle. - Evidence is also to be provided to establish that the consideration of CDM revenues reduces the turnkey cost and improves IRR.		financing Poechos II, has incorporated CER income into its analysis from the onset, and indeed, without prospects for CER income, the project would not have been pursued. Poechos II was financed separately from Poechos I; indeed, it was not possible to finance Poechos II at the time that Poechos I financing was being negotiated. - The IRR of the project is presented in an excel file and evidences of all parameters used are attached to our answer. - . In terms of removing barriers, what has been critical for the project are the improvements in the overall financial characteristics of the project offered by carbon revenues – as indicated in the PDD, these include an increase of 10.3% in annual revenues, which facilitates cash flow, and which also improves the debt service	demonstrated to be 9.677%, which is below the benchmark IRR of 12%, which is established by the government within the Peruvian Electric Concession Law. Evidence of DEG bank conditions has not been provided and thus DNV cannot confirm these terms. The affect of CDM revenues on the financial characteristics of the project has been demonstrated in the revised PDD. It has also been stated that the proposed project faces the same barriers as the Poechos I hydroelectric project. Though both projects were conceptualised together but only one project i.e. Poechos I project succeeded and that too with the support of CDM revenues. The discussion seems reasonable and in light of this, CL 1 is closed.

VALIDATION REPORT

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
		coverage ratio by 21%, (this is a critical factor since Poechos II is highly leveraged).	
CL 2: Operating Margin: c) - As per methodology, imports of electricity to the grid (to the extent they are dispatched) during a particular hour are also to be considered for OM calculations. It needs to be clarified how the imports have been considered for OM calculations. d) Availability of local value for carbon content of coal need to be confirmed Build Margin: - However, for ex ante BM estimation purpose, the project developer has selected a sample group <i>m</i> that consists of only newly built plants (interconnections and up gradations have been excluded). It needs to be demonstrated how this selection is		- No imports were registered in COES as of date. If an import were to appear from a connected electricity system located in another country, the emission factor would be zero (0 tCO₂/MWh). For imports from other grids within the same host country, the COEF should be calculated as the methodology indicates. (Note that this case is not applicable in Peru, since there is only one interconnected grid in Peru, which is the SEIN). - Confusion between the specific net Calorific Value for Peru for Coal with the Carbon content of coal resulted in a mistake in the figure for carbon content of coal. The right number is 25.8 and the source is “Revised 2009 IPCC”. All emission reduction calculation has been recalculated with the new figure in the	- OM calculations have been revised and imports have been included in the monitoring plan. As per the revised PDD, the OM is equal to 0.72756 t CO₂/MWh - BM: Taking into account the meaning of the BM emission factor (to see the future grid composition and the associated emissions that would have occurred in the absence of project activity), the BM calculations should reflect all the recent capacity additions. (CL not closed. Refer to CL2 continues below)

VALIDATION REPORT

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
conservative since as per the data provided, on considering all the capacity additions (newly built, up gradation, interconnection) to the SIEN grid, the share of hydropower is higher compared to thermal power.		PDD and in associated spreadsheets. The names of the attached documents are: - The Build Margin was calculated according to the methodology ACM0002. In order to follow this methodology, we have to calculate the build margin based on the most recently built power plants. For this reason, we do not consider upgrades, rehabilitations or interconnections of old units. We interpret this as newly constructed plants (the construction of which would be influenced by the project activity). This does not necessarily include all apparent additional capacity that appears in the system list from COES. First, upgrades or rehabs are required as a matter of plant maintenance, and over time, may result in some additional capacity (because of new technology, turbines, electronics, etc.). While this	

VALIDATION REPORT

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
		may coincidentally add some capacity, it is more a function of good management of existing resources and is very different than the technical and financial challenge of building an entirely new plant. Such marginal additions to capacity should not be interpreted as making the entire plant newly 'built', as the majority of the plant was actually operating before the time period specified in ACM0002. However, we have interpreted additions of wholly new generating units to existing plants as newly built, and we have included interconnections that are less than 5 years old. This approach has been used and accepted previously for 4 registered hydro projects in Peru and in a registered waste-to-energy project, including Quitaracsa, Tarucani, Santa Rosa, Huaycoloro, and Poechos I. Our team wrote these 5 PDDs and we would	

VALIDATION REPORT

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
		like to be consistent with this accepted and proven approach. In terms of units displaced by the project activity, such newly built units are more relevant than any small capacity improvements that might result from optimization of existing systems. As we have explained previously, technical upgrades pose challenges in measuring the particular generation attributable to the upgrade (a problem that does not exist when the upgrade is an entirely new unit. If there are two different data for the same power plant (for example, two different fuels during a same year) we always chose the more conservative in terms of fewer emissions. Besides the four Peruvian hydroelectrics already registered used for the Build Margin calculations only newly build plants in order to be accordingly with the baseline methodology.	

VALIDATION REPORT

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 2 (Continued) Taking into account the meaning of the BM emission factor (to see the future grid composition and the associated emissions that would have occurred in the absence of project activity), the BM calculations should reflect all the capacity additions.		- Based on our internal dialogue and with DNV, the BM calculations will be revised.	- BM calculations have been revised by considering all the recent capacity additions to the SIEN grid. As per the revised PDD, the build margin is equal to 0.41098 t CO₂/MWh and the combined margin emission factor is 0.56927 t CO₂/MWh CL 2 is closed.
CL 3 The starting date of the project (placing of the contract for the supply of equipment) is stated to be 12 February 2007. Evidence of this is to be provided.		The first contract for the supply of equipment was signed on 12 February 2007, which can be considered as a start of the project activities. The starting date will be changed to that date.	The project starting date has been changed to 12 February 2007. CL 3 is closed.
CL 4 Does the project comply with environmental legislation in the host country? All the approvals are to be evidenced.		▪ All the approvals have been obtained. These include: - Water use authorization, - Electric Generation Definitive Concession, - Approval of the EIA.	The complimentary information provided in OK. CL 4 is closed.



VALIDATION REPORT

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
		- Additionally SINERSA signed a contract with Chira-Piura project, for the use of existing Poechos dam structure, including corresponding annual payment (as a percentage of energy production). This information will be provided at the time of the site visit.	
CL 5 It is stated that as a part of the EIA and government of Peru requirements, the local stakeholders were consulted in 1997 (for the Poechos – I and II projects) and then in 2003 for the EIA of the transmission lines. The necessary documents are to be evidenced		Stakeholder consultation is required as part of environmental compliance and concession award, and was performed per regulations in Peru for hydropower plants. Conformance was double checked by authorities and was confirmed by virtue of the award of the concession	EIA conducted for Poechos I and Poechos II project and the subsequent concession awarded to the projects have been verified. The same is acceptable to DNV. CL 5 is closed.

APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Miguel Rescalvo

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:	--	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	--		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes		
ACM0002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes		
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes		

Høvik, 3 July 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJi-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, AM00379, 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

Raman Venkata Kakaraparthi

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:	--	JI Verifier:	--
Industry Sector Expert for Sectoral Scope(s):	Sectoral scope 5		
Technical Reviewer for (group of) methodologies:			
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes		

Høvik, 22 December 2006

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)

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

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director