VALIDATION REPORT

Hedcor Sibulan 42.5 MW Hydroelectric Power Project in the Philippines

REPORT NO. 2007-1127

REVISION NO. 01

VALIDATION REPORT

Date of first issue: 14-12-2007	Project No.: 92071127
Approved by: Michael Lehmann Technical Director	Organisational unit: DNV Certification, International Climate Change Services
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Project Name: Hedcor Sibulan 42.5 MW Hydroelectric Power Project
Country: the Philippines
Methodology: ACM0002
Version: 06
GHG reducing Measure/Technology: Consolidated baseline methodology for grid-connected electricity generation from renewable sources
ER estimate: An average of 95 174 tonnes of CO_2e per year over the 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 "Hedcor Sibulan 42.5 MW Hydroelectric Power Project" in the Philippines, as described in the PDD of 28 December 2007, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0002 version 06. DNV thus requests the registration of the project as a CDM project activity.

Report No.:	Date of this revision:	Rev. No.
2007-1127	05-02-2008	01

Report title:
Hedcor Sibulan 42.5 MW Hydroelectric Power Project in the Philippines

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Key words:
Climate Change
Kyoto Protocol
Validation
Clean Development Mechanism

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Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DENR	Department of Environment and Natural Resources, Philippines
DLPC	Davao Light Power Corporation
DNV	Det Norske Veritas
DNA	Designated National Authority
ECC	Environmental Compliance Certificate
EIS	Environmental Impact Statement
EMB	Environmental Management Bureau
ERA	Ernesto R. Aboitiz
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
Hedcor	Hedcor Inc.
HSI	Hedcor Sibulan Inc.
MP	Monitoring Plan
NCIP	National Commission for Indigenous Peoples
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
NPC	National Power Corporation
ODA	Official Development Assistance
PDD	Project Design Document
PDOE	Philippines Department of Energy
PDOE-EPIMB	Philippines Department of Energy – Energy power Industry Management Bureau
PDOE-EPPB	Philippines Department of Energy – Energy Policy and Planning Bureau
UNFCCC	United Nations Framework Convention on Climate Change

VALIDATION REPORT

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the "Hedcor Sibulan 42.5 MW Hydroelectric Power Project" in the Philippines. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

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

The host Party, the Philippines, fulfils the participation criteria and has approved the project and authorized the project participants. The DNA from the Philippines confirmed that the project assists in achieving sustainable development. The Annex I Party has yet to be identified.

The project correctly applies ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", Version 06.

The project activity involves the cascade development of two hydropower plants, which are the upstream Sibulan Plant A and the downstream Sibulan Plant B with an electricity generating capacity of 16.5 MW and 26 MW, respectively.

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 95 174 tCO_2e per year over the selected renewable 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.

Adequate training and monitoring procedures will be established and implemented prior to the implementation of the project.

In summary, it is DNV's opinion that the "Hedcor Sibulan 42.5 MW Hydroelectric Power Project" in the Philippines, as described in the PDD of 28th December 2007, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0002, version 06. DNV thus requests the registration of the project as a CDM project activity.

2 INTRODUCTION

Mitsubishi UFJ Securities Co., Ltd has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the "Hedcor Sibulan 42.5 MW Hydroelectric Power Project" in the Philippines (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, ACM0002, version 06. 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.

3 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk Review of the Project Design Documentation

The following table outlines the documentation reviewed during the validation:

/1/ Mitsubishi UFJ Securities, 'Hedcor Sibulan 42.5 MW Hydroelectric Power Project', Version 01, 12th September 2007 and version 02 dated 28th December 2007.

/2/ The Department of Environment and Natural Resources (DNA of the Philippines): Letter of Approval, LoA-2007-026-ER009, dated 25th May 2007

/3/
- Stakeholders' consultation – minutes of meeting and attendance list. There were a total of 7 meetings held 4th March, 14th April, 23rd April, 26th May, 6th June, 10th June and 11th June 2005.
- Spreadsheet for the emission reduction calculations
- Spreadsheet for the IRR calculations
- Environmental Compliance Certificate (ECC-11-06-03-03-033-4220) dated 15th March 2006
- Power Supply Agreement (PSA) dated 7 March 2007
- Documented evidence to support parameters and assumptions used in IRR calculations
  - purchase order for the electromechanical work dated 4th April 2007
  - civil work contracts signed with J.V.Angeles Construction Corporation dated 1 Feb 2007.
  - energy generation simulation report of October 2007 to support the load factor
- Correspondence and consulting agreement signed between Hedcor and Mitsubishi UFJ Securities dated 30 August 2006
- Bloomberg, Peso-denominated Philippine government bond as of 16 Aug 2007, expiring in March 2011.

/4/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): *Validation and Verification Manual*. http://www.vvmanual.info

/5/ CDM Executive Board: ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", Version 6 of 19 May 2006

/6/ CDM Executive Board: *'Tool for the demonstration and assessment of additionality'*, Version 03

3.2 Follow-up Interviews with Project Stakeholders

	Date	Name	Organization	Topic
/7/	2007-11-13	Mr. Luis Miguel Osmena Aboitiz Mr. Rene B. Ronquillo, Ms. Darlene C. Arguelles Mr. Jovy P Batiquin, Ms. Kyoko Tochikawa (MUS)	Hedcor, Inc. and Hedcor Sibulan, Inc. and Mitsubishi UFJ Securities (MUS)	➢ Technology applied and operational lifetime ➢ Provisions for training, operation and maintenance ➢ Monitoring and reporting procedures ➢ Existence of financial, technical barriers and barriers due to prevailing practice ➢ Conservativeness of assumptions used ➢ Estimated emission reductions ➢ Stakeholder consultation process.
/8/	2007-11-14	Ms. Joy Goco	DNA of Philippines	➢ Common practice with regards to run-of-river hydropower plants ➢ Incentives in place to invest in run-of-river hydropower plant projects ➢ Process of obtaining host country approval for CDM projects in Indonesia and the status for this project ➢ Sustainable development priorities ➢ Legal compliance, EIA requirements and existing/ emerging requirements ➢ Stakeholder

				consultation process ➢ Official government funding
/9/	2007-11-14	Ms. Lourdes Maria A. Capricho, Mr. Norman V.T. Martirez (PDOE-EPPB), Ms. Lani Cortes, Mr. Michael O ((PDOE – EPPB) Mr. Art Torralba Jr.	Philippines Department of Energy (PDOE)	➢ Availability of dispatch data for Mindanao grid ➢ Common practice with regards to run-of-river hydropower plants ➢ Incentives in place to invest in run-of-river hydropower plant projects ➢ Availability of latest grid data (Mindanao)
/10/	2007-11-13	Mr. Bill D. Haboc, Ms. MA. Elena D. Salita, Mr. Rolando V.C. Vergara Jr., and others	Project site	➢ Brief explanation on the project structures, hydrological, social economical, environmental issues ➢ Progress of project ➢ Common practice with regards to run-of-river hydroelectric plants

3.3 Resolution of Outstanding Issues

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

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

The validation protocol consists of three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the "Hedcor Sibulan 42.5 MW Hydroelectric Power Project" is enclosed in Appendix A to this report.

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

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

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

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

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

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

Figure 1 Validation protocol tables

3.4 Internal Quality Control

The 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	Lai	Chee Keong	Malaysia
GHG auditor (applicant)	Ng	Aik Joe	Malaysia
Sector expert	Lehmann	Michael	Norway
Technical reviewer	Viddal	Mari Grooss	Norway

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

4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A. The final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation dated 28th December 2007.

4.1 Participation Requirements

The project participants are Hedcor, Inc. and Hedcor Sibulan, Inc. of the Philippines. The Party involved, i.e. the Philippines as the host Party, meets the requirements to participate in the CDM. No Annex I Party is identified.

The DNA of the Philippines has issued a Letter of Approval (LoA-2007-026-ER009, dated 25th May 2007), authorizing Hedcor, Inc. and Hedcor Sibulan, Inc as project participants in this proposed CDM project activity and confirming that the project assists in achieving sustainable development.

4.2 Project Design

The project activity involves the cascade development of two hydropower plants, the upstream Sibulan Plant A and the downstream Sibulan Plant B, with the total of 42.5 MW installed capacity. The upstream Sibulan plant A and downstream Sibulan plant B have an electricity generating capacity of 16.5 MW and 26 MW respectively.

The plants will be constructed along the Sibulan and Baroring rivers. The run-of-river type hydropower plants include water intake weir, short tunnel, surface pipeline, desander, headpond, high pressure surface penstock, surface power plant, sub-station, switch yard and transmission line. Plant A has a pondage volume of 70 000 m^3 while Plant B has a pondage volume of 50 000 m^3. It has been confirmed during the site visit that each power plant will have a headpond each. The area of the headponds for Plant A and Plant B are approximately 13 751 m^2 and 14 140 m^2 respectively.

Electricity generated will be connected through a 69 kV transmission line about 34 km long to the Ernesto R. Aboitiz (ERA) main substation of Davao of Light Power Corporation (DLPC).

The combined average annual energy produced by the plants is estimated to be 209 635 MWh. It was reported during the site visit that the combined utilization of both the power plants would be approximately 56%. The technical services department has conducted an energy generation simulation for both the hydro plants to define the plant utilization rate. A copy of the report summary dated October 2007 has been provided for review. The simulation was based on the last 19 years of river water flow data with clear fluctuation of dry and rainy seasons. The calculation was found to be appropriate and the combined utilisation rate of 56% for both the hydro plants was found to be realistic and conservative.

The proposed project is estimated to reduce 95 174 tonnes of CO_2e per year. The expected lifetime of the project is 25 years.

The project starting date is defined as 30 October 2005, which is the date when a consulting agreement from Klima was accepted by Hedcor. This is deemed to be the earliest starting date

of implementation, construction and real action. The construction of the project began 26 June 2007.

The renewable crediting period of 7 years has been selected and is expected to start from 8 January 2009.

4.3 Baseline Determination

The proposed project activity correctly applies the baseline methodology of ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", Version 06./5/

The two alternative scenarios considered by the project participants are: -

Alternative 1:
The proposed project activity undertaken without being registered as a CDM project activity

Alternative 2:
Continuation of the current situation (no project activity or other alternative undertaken), which is the business as usual (BAU)

Alternative 1 was ruled out as a likely scenario as the project is deemed financially unattractive without being registered as a CDM project activity. Therefore, the baseline scenario is the continued generation of grid electricity using fossil fuel combustion from the Mindanao grid.

The project meets all applicability conditions of ACM0002, Version 06, because:

1) The project is a grid-connected renewable power generation project activity which involves electricity capacity addition from run-of-the-river hydro power plants.
2) It does not involve switching from fossil fuels to renewable energy at the site of the project activity. This was confirmed during the site visit as new hydro plants will be constructed.
3) The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available. Information on the characteristics of the grid is available from the Department of Energy (PDOE) and National Power Corporation (NPC).

The system boundary is presented as the following:

	GHGs involved	*Description*
Baseline emissions	CO_2 (included) CH_4 and N_2O are not included.	Only CO_2 has been include in the calculation which is consistent with ACM0002 version 06.
Project emissions	No project emissions	The project only involves the construction of head ponds for the purpose of regulating daily output and power plant construction. The power density of these

		power plants are larger than 10 W/m^2, hence, there are no associated project emissions. This is in accordance to the requirements stipulated in ACM0002. The area of the headponds for Plant A and Plant B are approximately 13 751 m^2 and 14 140 m^2, respectively.
Leakage	No leakage	This is consistent with ACM0002 version 06 where the project proponent does not need to consider emission sources as leakage.

4.4 Additionality

The additionality of the project is assessed through the use of Version 03, 'Tool for demonstration and assessment of additionality' and applied as follows:

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a: Define alternatives to the project activity

The alternative scenarios identified for the project activity are:

1. The proposed project activity undertaken without being registered as a CDM project activity
2. Continuation of the current situation (no project activity or other alternative undertaken), which is the business as usual (BAU)

Sub-step 1b: Enforcement of applicable laws and regulations

Both alternatives are able to meet existing regulations.

Step 2: Investment analysis

Sub-step 2a: Determine appropriate analysis method

As the project activity will generate financial benefits other than CDM related income, the simple cost analysis is not applicable. The alternative for the baseline scenario of the proposed project is not a similar investment project, therefore the investment comparison analysis, option II, is not appropriate either. Also, it is stated in Section B.4 of the revised PDD that Hedcor specializes in hydro power project development and hence the investment comparison analysis is not appropriate. The benchmark analysis method (option III) was chosen by the project proponent.

Sub-step 2b: Option III. Apply Benchmark analysis

For the benchmark analysis (Option III), the Internal Rate of Return (IRR) was chosen by the project proponent as the financial indicator for the benchmark analysis. It was confirmed through the review of the project documentation and interviews with the project developer that the benchmark chosen is representing the standard return for the hydro power generating

industry. Some of the risks considered are the specific risk of the project type, location of power plant and credit worthiness of the off taker (the power purchaser). The benchmark used is not linked to the subjective profitability expectation or risk profile of the project developer.

The resultant benchmark derived by the project proponent for the project activity was 11.0%, which takes into account the following: -

a) Government bond rate of 7.0% (ref. *Bloomberg, Peso-denominated Philippine government bond as of 16 Aug 2007, expiring in March 2011.)*

b) Corporate borrowing risk premium rate of 1.0%

c) Greenfield project risk premium rate of 1.0%

d) Equity risk premium rate of 2.0%

The selected benchmark of 11% has been reviewed and found to be reasonable.

The other data and assumptions used for the calculations of the IRR for the project activity are summarized in Table 4, page 13 of the PDD and also in Annex 5. The electricity tariff used in the IRR calculation was based on the tariff agreed in the power supply agreement (PSA). The breakdown of major investments such as the civil works, turbines and generators has been provided. Evidence to support the assumptions used in the project IRR calculation have been provided and found appropriate, i.e. the power purchase agreement, the electro-mechanical works, operational and maintenance costs, and civil work contracts.

The resultant IRR for the project activity is calculated at 9.68%, which is below the derived benchmark of 11.0%.

Sub-step 2c: Sensitivity analysis

A sensitivity analysis was carried out by introducing four different assumptions to the critical parameters and the results were: -

1) When the net plant utilization factor is increased by 5%, the IRR is 10.39%

2) When the capital cost is decreased by 5%, the IRR is 10.18%

3) When the operations and maintenance cost is decreased by 10%, the IRR is 10.10%,

4) When the electricity tariff is increased by 5%, the IRR is 10.47%

It was reported during the site visit that the total utilisation of both the power plants would be approximately 56%. The technical services department has conducted an energy generation simulation for both the hydro plants A and B. A copy of the report summary dated October 2007 has been provided for review. The simulation was based on the last 19 years of river water flow data with clear fluctuation of dry and rainy seasons. The calculation was found to be satisfactory. The combined utilisation rate of 56% for both the hydro plants was found to be realistic and conservative. It is therefore deemed unlikely that the river water flow will fluctuate significantly from the historical river water flow and that the plant utilisation will increase by more than 5%. It was also verified on site that it is unlikely that the electricity tariff increases to more than 5%. PHP of 4.0856/kWh was the agreed price as per the Power Supply Agreement and an increase at 2% annually is assumed. The same apply for the capital cost, as this is based on the existing purchase orders and signed contracts. The O & M costs could possibly be further reduced as Hedcor has previous experience in maintenance. O&M costs are therefore prone to more fluctuations as compared to other parameters. It is thus

concluded that sensitivity analysis of 5% variation in utilisation rate, tariff price and capital cost respectively and 10% variation in O&M costs are justified and reasonable.

The investment analysis and the sensitivity analysis have demonstrated that the project will not be financially feasible as business-as-usual.

Step 3: Barrier Analysis

No barrier analysis was applied.

Step 4: Common practice analysis

Sub-step 4a: Analyse other activities similar to the proposed project activity

The Mindanao grid is heavily reliant on hydro resources, where hydro plants make up approximately 60% of the total installed capacity. However, no hydropower plant projects were undertaken since the year 1994. The latest hydro plant of the comparable size was the 2 x 40MW Agus 1 plants which were implemented in 1994. The latest addition was the 200MW coal fired power plant which started its operation in the 4th quarter of 2006. This information has been confirmed with the PDOE.

Sub-step 4b: Discuss any similar options that are occurring

The seven Agus plants, ranging from 40MW to 200 MW and the 255 MW Pulangi plant that were constructed in Mindanao are owned by the National Power Corporation, which is a state-owned power generating company. It was confirmed with the PDOE that, except for the Bubunawan hydro plant, all other hydro power plants in Mindanao were built by government with the assistance of special loan from institutions such as the World Bank. Among the privately-owned projects, the largest capacity of the project is the Bubunawan plant at only 7 MW.

Evidence has been provided to proof that CDM incentives have been considered prior to the implementation of the project. It was verified that the project proponent began discussions with its CDM consultant, Mitsubishi UFJ Securities, in 2005 and a consulting agreement was signed on 30 August 2006. Prior to that, a local consultant has been engaged to undertake similar work. The project starting date is 30 October 2005, which is the date when a consulting agreement from Klima was accepted by Hedcor. A copy of the consultancy proposal dated 30 September 2005 has been provided for review. The request for consultancy services to prepare the PDD has demonstrated that CDM incentives have been considered prior to the implementation of the proposed project.

The expected revenue from the sale of CERs will increase the project's IRR from 9.68% to 11.0%, assuming a price of USD 20 per tCO_2e and an exchange rate of 50 PHP/USD.

In summary, it is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions are hence additional.

4.5 Monitoring

The monitoring plan is in line with the approved consolidated methodology of ACM0002 'Consolidated baseline methodology for grid-connected electricity generation from renewable sources', Version 06. /5/

4.5.1 Parameters determined ex-ante

Some of the parameters determined ex-ante for the emission reduction calculations are:

IPCC default values:

1) Emission factor for bunker (residual oil) = 77.4 tCO_2e/TJ
2) Emission factor for diesel oil = 74.1 tCO_2e/TJ
3) Net calorific value of bunker (residual oil) = 43 TJ/kt (Philippines specific value, provided by PDOE during follow-up interview)
4) Net calorific value of diesel oil = 46 TJ/kt (Philippines specific value, provided by PDOE during follow-up interview)

Assumptions used in the (EF_{OM}) and (EF_{BM}) calculations are: -

1) Density of bunker (residual oil) = 0.94 kg/l
2) Density of diesel oil = 0.84 kg/l

Both values are Philippines specific values which were provided by PDOE during follow-up interviews. These local specific values have been used for the CERs calculation in the revised PDD dated 28th December 2007.

4.5.2 Parameters monitored ex-post

The monitoring plan makes provisions for the monitoring of baseline emission reductions due to the displacement of electricity from the Mindanao Grid.

The parameters to be monitored ex-post are: -

1) Net electricity supplied to the grid by the project, EG_y (MWh)
2) Emission factor of the Mindanao grid, EF_y (tCO_2e/MWh)
3) Emission factor of the operating margin of the plants in the Mindanao grid, $EF_{OM,y}$ (tCO_2e/MWh)
4) Emission factor of the build margin of the Mindanao grid, $EF_{BM,y}$ (tCO_2e/MWh)
5) Amount of each fossil fuel consumed by each power source/plant, $F_{i,y}$ (mass or volume)
6) Emission coefficient of each fossil fuel consumed by each power source/plant, $COEF_j$ (tCO_2e/mass or volume unit of fuel)
7) Electricity generation of each power source/plant *j*, *k* or *n* , $GEN_{j/k/n,y}$ (MWh)
8) Name of power source/plant for constituting the Operating Margin (text)
9) Name of power source/plant for constituting the Build Margin (text)
10) Fraction of time during which low-cost/must-run sources are on margin, λ_y (fraction)
11) Electricity imports to the project electricity systems, $GEN_{j/k/l,y\_IMPORTS}$ (MWh)
12) Emission coefficient of fossil fuel used in connected electricity system (if imports occur), $COEF_{i,,j,y\_IMPORTS}$ (tCO_2e/mass or volume unit)

4.5.3 Management system and quality assurance

An operational and administrative team will be established by Hedcor Sibulan, Inc. for the monitoring and reporting of data used for the project as described in section B.7.2 of the

PDD. The company is an ISO 9001 certified company and it has been confirmed with the developer that various procedures related to the overall management of the project will be established and implemented at the latest prior to the start of the crediting period to enable subsequent verification of emission reductions. These will have to be verified during the first periodic verification.

4.6 Estimate of GHG Emissions

The emission reductions are generated through the displacement of electricity from the Mindanao Electricity Grid.

The project generates electricity by converting kinetic and potential energy from the river into electricity. The power density of the power plants is well above the limit of $10W/m^2$. No GHG emissions are expected from the project activity which is in line with ACM0002 version 06.

The baseline emissions are calculated by multiplying the net electricity exported to the grid by the project (209 635 MWh/year) with the grid emission factor. The grid emission factor was calculated as the weighted average of the operating margin emission factor (EF_{OM}) and the build margin emission factor (EF_{BM}) as per ACM0002 version 06 /5/. IPCC default values and Philippines specific values for the fossil fuel characteristics were used in this calculation.

It was reported that due to data constraints, the first methodological choice of Dispatch Data Analysis OM was not possible. The constraints faced are the lack of (i) the grid system dispatch order of operation for each power plant of the system, and (ii) the amount of power that is dispatched from all plants in the system during each hour. These have been confirmed with the PDOE –EPIMB, i.e. that the dispatch data required is not available.

The Simple OM is not applicable as the composition of low cost-must run resources was more than 60%, which has exceeded 50% of the total grid generation.

The Simple Adjusted Operating Margin method was selected for calculation of EF_{OM}. This method is applicable because the low-cost and must-run electricity sources can be separated from all the generating sources serving the system.

The average OM emission factors can be calculated using either of the two following data vintages for years(s) *y*:

- (*ex-ante*) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission, or,
- the year in which project generation occurs, if $EF_{OM,y}$ is updated based on *ex-post* monitoring.

The choice of *ex-post* vintage has been chosen and specified in the PDD. It is stated in the PDD that this will not be changed through out the crediting period.

The fraction of time (λ_y) which the low-cost and must-run electricity sources are marginal in a year, was calculated to be 0.02 according to step (i) to step (iv) outlined in ACM0002 for the Simple Adjusted Operating Margin.

The fraction of time (λ_y) used in the calculation has been corrected in the revised PDD, version 2 dated 28th December 2007. Relevant calculations affected by the λ_y have also been corrected accordingly. Some of the parameters affected are CO_2 emission factor for sets of plants in the operating margin, the CO_2 emission factor for the grid and the emission reductions estimated for the project.

The calculation of build margin emission factor ($EF_{BM,y}$), for the first crediting period will be updated annually *ex-post* for the year in which actual project generation and associated emission reductions occur. For subsequent crediting periods, $EF_{BM,y}$ will be calculated *ex-ante*.

The IPCC and Philippines specific values used in the (EF_{OM}) and (EF_{BM}) calculations are:

1) Emission factor for bunker (residual oil) = 77.4 tCO2e/TJ (IPCC 2006)
2) Emission factor for diesel oil = 74.1 tCO2e/TJ (IPCC 2006)
3) Net calorific value of bunker (residual oil) = 43 TJ/kt (Philippines specific value, provided by PDOE during follow-up interview)
4) Net calorific value of diesel oil = 46 TJ/kt (Philippines specific value, provided by PDOE during follow-up interview)

The grid data for 2004 from NPC statistics have been used to estimate the operating and build margin emission factors ex-ante. This is appropriate as these data were the most recent data when the PDD was produced and the emission factor will be updated annually ex-post.

The assumptions used in the (EF_{OM}) and (EF_{BM}) calculations are:

1) Density of bunker (residual oil) = 0.894 kg/l
2) Density of diesel oil = 0.84 kg/l

Both values are Philippines specific values which were provided by PDOE during follow-up interview. These local specific values have been used for the CERs calculation in the revised PDD dated 28th December 2007.

Both EF_{OM} and EF_{BM} are multiplied by a weightage of 0.5 each before they are added to obtain the grid emission factor. The estimated combined margin grid emission factor is 0.454 tCO_2 / MWh.

As shown in Annex 7 of the PDD, the average annual energy generated for both plant A and plant B is estimated to be 209 635 MWh. The expected baseline emissions were calculated to be 95 174 tCO_{2e} per year, which is also the expected emission reductions due to the project activity.

4.7 Environmental Impacts

An environmental analysis was carried out in the form of an Environmental Impact Statement (EIS), as mandated by Presidential Decree No. 1586 and Proclamation No. 2146. The EIS concluded that the environment impacts were low for most environmental parameters. A summary of the results were provided in section D.1 of the PDD.

As the project is considered as an environmentally critical project, an Environmental Impact Statement (as in accordance with Presidential Decree No. 1586 and Proclamation No. 2146) was prepared in October 2005. This was then duly submitted to the Department of

Environment and Natural Resources, which issued an Environmental Compliance Certificate (ECC-11-06-03-03-033-4220) on 15th March 2006. The ECC has been provided during the site visit.

4.8 Comments by Local Stakeholders

Seven stakeholder's consultation meetings were carried out by the project proponent to ensure that all relevant stakeholders (such as the local communities and representatives from the NGO) have been consulted. There were a total of 7 meetings held 4th March, 14th April, 23rd April, 26th May, 6th June, 10th June and 11th June 2005.

A Memorandum of Agreement (MoA) was drafted on 26th May 2005 and then signed between the project proponent, National Commission for Indigenous Peoples (NCIP) and the tribal communities on 15th June 2005.

A Certificate of the Free and Prior Informed Consent (FPIC) from the local tribal leaders, as mandated by The Indigenous Peoples Reform Act (IPRA), has also been granted.

A copy each of the MoA and FPIC as mentioned in the PDD have been provided to DNV for review.

It has been explained during the site visit that the representatives from the authority and the village heads have been invited with personal invitation. The general public/villagers in the Barangays were invited through notices posted in public areas such as food stalls within the Barangays. It is in the opinion of DNV that such invitation methods were practical and realistic ways as there is no actual postal address assigned to households.

Comments received from the stakeholders' consultation were regarding the project's impact on the environment, employment opportunities, profitability and financial concerns. A summary of the comments has been included in the PDD in section E.2. As agreed during the follow-up interview, the summary table has been updated with more details Minutes of meetings and attendance lists have been provided during the site visit.

4.9 Comments by Parties, Stakeholders and NGOs

The PDD of 12 September 2007 was made publicly available on DNV's climate change website (www.dnv.com/certification/climatechange) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 6th October 2007 to 4th November 2007. No comments were received.

APPENDIX A

CDM VALIDATION PROTOCOL

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

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	NA. No Annex I Party is yet identified.
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK. Table 2, Section A.4.1
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK. Table 2, Section A.4.1
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK. Table 2, Section A.4.1
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK.
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK.
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK

Requirement	Reference	Conclusion
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	NA. No Annex I Party is yet identified.
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	NA. No Annex I Party is yet identified.
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK. Table 2, Section B.3.1
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK. Table 2, Section B.4 to B.7.
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK. Table 2, Section D.1.1 to D.1.6.
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK. Table 2, Section E.1.1

Requirement	Reference	Conclusion
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK. The PDD of the "Hedcor Sibulan 42.5 MW Hydroelectric Power Project" 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 the period 6th October 2007 to 4th November 2007. No comments were received.
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK. Table 2, Section B.1.1
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK.
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK.
18. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK. The project design document conforms to version 03 of the CDM-PDD of 26 December

Requirement	Reference	Conclusion
		2006.
19. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK. Table 2, Section A.5.

Table 2 Requirements Checklist

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	/1/	DR, I	The project's spatial boundaries are clearly defined. Plant A and plant B of the project are located in cities of Barangay Sibulan, Sta. Cruz and Davao Del Sur in the Davao Region, Mindanao Island of the Philippines. The coordinates of the project location for the turbines, head ponds and water intake points have been provided during the site visit. It has been agreed with the developer that the specific GPS reading would be added in to the map indicating the project location.		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR	The system boundaries for plant A is comprised of: - 1) An intake weir to prevent ingress of stones greater than 16 mm in diameter. The weir will also be equipped with a by-pass sluice. 2) A conveyance structure which will include a low-pressure horse-shoe shaped cross section tunnel (2.1 m wide and 2.5		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			m high) and a steel pipeline of 1.09 diameter 3) A desander which is a twin-channel, settling-basin type 4) A headpond with a surface area of approximately 13 751 m^2 and a capacity of 70 000 m^3 5) A high pressure surface penstock with a mean diameter of 1.27 m and 2.90 km long 6) A surface power plant located at the left bank of the Baroring River with an area of 563 m^2. The power plant will contain two horizontal-shaft twin-jet Pelton turbines with (a rated capacity of 8 MW each) and the generator voltage of 13.8 kV will be stepped to 138 kV through two transformers in a switchyard. 7) A 23 km long transmission line to evacuate power to DLPC's ERA main substation The system boundaries for Plant B is comprised of: - 1) A diversion weir to prevent ingress of stones greater than 16 mm in diameter.		

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			2) A conveyance structure which will include a low-pressure section tunnel of minimum dimensions and a low pressure welded steel pipe 3) A desander 4) A headpond with a surface area of approximately 14 140 m^2 and a capacity of 50 000 m^3 5) A high pressure surface penstock with a mean diameter of 1.67 m and 4.52 km long 6) A surface power plant located at the left bank of the Baracatan and Sibulan Rivers with an area of 575 m^2. The power plant will contain two horizontal-shaft twin-jet Pelton turbines with (a rated capacity of 13 MW each) and the generator voltage of 13.8 kV will be stepped to 138 kV through two transformers in a switchyard. 7) A 23 km long transmission line to evacuate power to DLPC's ERA main substation The system boundary also contains the selected grid electricity system for the Mindanao grid.		
A.2. Participation Requirements					

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.					
A.2.1. Which Parties and project participants are participating in the project?	/1/	DR, I	The Philippines is the participating Non-Annex 1 Party while no Annex 1 Party has been identified yet. Project participants are Hedcor, Inc. and Hedcor Sibulan, Inc. (HSI) of the Philippines.		OK
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party?	/1/	DR, I	The LoA dated 25th May 2007 from the DNA of the Philippines has been obtained, authorizing the project participants.		OK
A.2.3. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1/	DR, I	**Host Party – the Philippines:** - Ratified the Kyoto Protocol on 20 November 2003. - The Letter of Approval from the DNA of the Philippines has been granted on 25th May 2007. - The Department of Environment and Natural Resources (DENR) is the DNA of Philippines		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR, I	The project does not involve any public funding from an Annex I Party, and the validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards the Philippines.		OK
A.3. Technology to be employed *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					
A.3.1. Does the project design engineering reflect current good practices?	/1/	DR	Yes. The project will harness mechanical energy from the run-off water of the Sibulan river, which is of indigenous renewable resources for power generation. As the project is designed to be of the run-of-river hydroelectric type of plant, it will not involve the construction of a large dam. This will then eliminate the need for relocation of communities and residents as well as transfer of waterways.		OK
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR, I	The project will use multi-jet Pelton type turbines, which have few moving parts and high efficiency even at derated part load operation. It was confirmed during the site		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			visit that major components such as the turbines and generators would be imported from Spain.		
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/	DR, I	It has been confirmed with the developers that provisions will be made for meeting training and maintenance needs of the project prior to the implementation of the project. This will need to be verified during first periodic verification.		OK
A.4. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	/1/	DR, I	This was confirmed with the local DNA. LoA has been granted		OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR, I	The project will reduce the country's reliance on imported fuel. It will also improve the economic and social situation of the local residents by creating job opportunities and local businesses for the people in the Bagabo-Tagabawa area. A social development plan will also be implemented.		OK
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the*					

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
selected baseline represents a likely baseline scenario.					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.2. Does the project apply an approved methodology and the correct version thereof?	/1/	DR	Yes, the proposed activity correctly applies the baseline methodology of ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".		OK
B.1.3. Are the applicability criteria in the baseline methodology all fulfilled?	/1/	DR, I	Yes. The project meets all applicability conditions of ACM0002, Version 06, because: - 1) The Project is a grid-connected renewable power generation project activity which involves electricity capacity addition from run-of-the-river hydro power plants. 2) It does not involve switching from fossil fuels to renewable energy at the site of the project activity. This was confirmed during the site visit. 3) The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Information on the characteristics of the grid is available from the Department of Energy (PDOE) and National Power Corporation (NPC).		
B.2. Baseline Scenario Determination *The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.*					
B.2.1. What is the baseline scenario?	/1/	DR, I	The baseline scenario is the continued generation of grid electricity using fossil fuel combustion from the Mindanao grid. Latest addition to the Mindanao grid was a 200MW coal fired power plant which started its operation in the last quarter of 2006.		OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/	DR, I	The two alternative scenarios considered by the project participants were: - <u>Alternative 1:</u> The proposed project activity undertaken without being registered as a CDM project activity <u>Alternative 2:</u> Continuation of the current situation, which is the business as usual (BAU)		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Alternative 1 was ruled out as a likely scenario as the project is deemed financially unattractive without being registered as a CDM project activity.		
B.2.3. Has the baseline scenario been determined according to the methodology?	/1/	DR	Yes, the baseline scenario has been determined according to ACM0002, Version 06.		OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Yes, the baseline scenario has been determined using conservative assumptions where possible.		OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	All alternative scenarios comply with the local laws and regulatory requirements.		OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Yes. The baseline scenario determined is compatible with the available data and all literature and sources are clearly referenced.		OK
B.2.7. Have the major risks to the baseline been identified?	/1/	DR	There are no major risks associated to the baseline.		OK
B.3. Additionality Determination *The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.*					

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.3.1. Is the project additionality assessed according to the methodology?	/1/	DR, I	Alternative baseline scenarios for the project activity considered are: - 1) The proposed project activity undertaken without being registered as a CDM project activity 2) Continuation of the current situation, which is the business as usual (BAU) Additionality is assessed through the use of Version 03, 'Tool for demonstration and assessment of additionality'. **Step 1: Identification of alternatives to the project activity consistent with current laws and regulations** **Sub-step 1a: Define alternatives to the project activity** The alternative scenarios identified for the project activity are: 1. The proposed project activity undertaken without being registered as a CDM project activity 2. Continuation of the current situation (no project activity or other alternative undertaken), which is the	~~CL 1~~ ~~CL 2~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			business as usual (BAU) **Sub-step 1b: Enforcement of applicable laws and regulations** All alternatives are able to meet existing regulations. **Step 2: Investment analysis** **Sub-step 2a: Determine appropriate analysis method** As the project activity will generate financial benefits other than CDM related income, the simple cost analysis will not be applicable. The benchmark analysis method was chosen by the project proponent. **Sub-step 2b: Option III. Apply Benchmark analysis** The project proponent has two options to chose from, namely the investment comparison analysis (Option II) and benchmark analysis (Option III). The Internal Rate of Return (IRR) was chosen by the project proponent as the financial indicator for the benchmark analysis. It was confirmed through the review of project documentation		

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			and interviews with the project developer that the benchmark chosen is to represent the standard returns for the hydro power generating industry. Some of the risks considered are the specific risk of the project type, location of power plant, credit worthiness of the off taker (the power purchaser). The benchmark used is not linked to the subjective profitability expectation or risk profile of the project developer. The resultant benchmark derived by the project proponent for the project activity was 11.0%, which takes into account the following: - a) Government bond rate of 7.0% (*Bloomberg, Peso-denominated Philippine government bond as of 16 Aug 2007, expiring in March 2011.)* b) Corporate borrowing risk premium rate of 1.0% (*Premium for established, operating, highly creditworthy corporate entity.)* c) Greenfield project risk premium rate of 1.0% d) Equity risk premium rate of 2.0% The selected benchmark of 11% has been reviewed and found to be reasonable.		

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			The other data and assumptions used for the calculations of the IRR for the project activity are summarized in Table 4, page 13 of the PDD and also in Annex 5. The electricity tariff used in the IRR calculation was based on the tariff agreed in the power supply agreement (PSA). The breakdown of major investments such as the civil works, turbines and generators has been provided. Evidence to support the assumptions used in the project IRR calculation have been provided, i.e. power purchase agreement, civil work contracts. However, further documented evidence is required to substantiate the breakdown provided for major components of the project such as turbines and generators, operational and maintenance cost. The resultant IRR for the project activity is calculated at 9.68%, which is below the derived benchmark of 11.0%. This has clearly demonstrated that the project will not be financially feasible as business-as-usual. Sub-step 2c: Sensitivity analysis A sensitivity analysis was carried out by		

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			introducing four different assumptions to the critical parameters and the results were: - 1. When the net plant utilization factor is increased by 5%, the IRR is 10.39% 2. When the capital cost is decreased by 5%, the IRR is 10.18% 3. When the operations and maintenance cost is decreased by 10%, the IRR is 10.10% 4. When the electricity tariff is increased by 5%, the IRR is 10.47% The breakdown of major investments such as the civil works, turbines and generators has been provided. Evidence to support the assumptions used in the project IRR calculation have been provided, i.e. power purchase agreement, civil work contracts. However, further documented evidence is required to substantiate the breakdown provided for major components of the project such as turbines and generators, operational and maintenance cost. In addition, further information on the plant utilisation is required. It would be beneficial if the sensitivity analysis could include 10%		

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			increase of plant utilisation. Step 3: Barrier Analysis The project proponent has an option not to apply this step as Step 2 was chosen to demonstrate the additionality of the project. **Step 4: Common practice analysis** **Sub-step 4a: Analyse other activities similar to the proposed project activity** The Mindanao grid is heavily reliant on hydro resources, where hydro plants make up approximately 60% of the installed capacity. No hydropower plant projects were undertaken since the year 1994. The latest hydro plant of the comparable size was the 2 x 40MW Agus 1 plants which were implemented in 1994. This has been confirmed and verified with the PDOE. The latest addition was the 200MW coal fired power plant which started its operation in the 4th quarter of 2006. **Sub-step 4b: Discuss any similar options that are occurring** The seven Agus plants, ranging from 40MW		

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			to 200 MW and the 255 MW Pulangi plant that were constructed in Mindanao are owned by the National Power Corporation, which is a state-owned power generating company. It was confirmed with the PDOE that, except for the Bubunawan hydro plant, all other hydro power plants in Mindanao were built by government with the assistance of special loan from institutions such as the World Bank. Among the privately-owned projects, the largest capacity of the project is the Bubunawan Pant at only 7 MW. Evidences to proof that CDM incentives have been considered prior to the implementation of the project remained to be provided. The expected revenue from the sale of CERs will increase the project's IRR from 9.68% to 11.0%, assuming a price of USD 20 per tCO_2e and an exchange rate of 50 PHP/USD. In summary, the Benchmark analysis shown in the PDD is in accordance to "*Sub-step 2b-Option III. Apply Benchmark analysis*" of "*The tool for the demonstration and*		

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			assessment of additionality". Provided that all the clarifications related to the argumentation of project additionality are closed, the project is deemed additional.		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	/1/	DR	Yes, the assumptions are stated in a transparent and conservative manner.		OK
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR,I	The breakdown of major investments such as the civil works, turbines and generators has been provided. Evidence to support the assumptions used in the project IRR calculation have been provided, i.e. power purchase agreement, civil work contracts. However, further documented evidence is required to substantiate the breakdown provided for major components of the project such as turbines and generators, operational and maintenance cost. It was reported during the site visit that the total utilisation of both the power plants would be approximately 56%. Further clarification is required to justify that the 56% utilisation rate is reasonable for power plants of similar capacity. In addition, the	~~CL 1~~ ~~CL 2~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			sensitivity analysis should include 10% increase of plant utilisation or there is a need for further clarification why only 5% increase is applied.		
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	/1/	DR, I	The starting date of the project activity was on 26th June 2007. It was mentioned in the PDD that the project proponent has began discussions with its CDM consultant, Mitsubishi UFJ Securities in year 2005 and a consulting agreement was signed 30 August 2006. Evidence should be provided to substantiate that CDM incentives were seriously considered in the decision to proceed with the project activity.	~~CL 3~~	OK
B.4. Calculation of GHG Emission Reductions – Project emissions *It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Electricity is generated from the construction of a run-of-river hydropower plant. Although there will be headponds constructed in the		OK

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			project boundary, the size of these headponds are such that no project emissions will be accounted for. The surface area of the headponds in Plant A and Plant B are 1.5 ha and 2.17 ha respectively, while the installed power generation capacity of the plants are 16.5 MW and 26 MW. The power density of the respective headponds will then be 1200 W/m^2 and 1839 W/m^2. There will be no project emissions from these headponds as the power densities of the plants exceed 10 W/m^2.		
B.4.2. Have conservative assumptions been used when calculating the project emissions?	/1/	DR	Yes, the project emissions were excluded upon consideration of the power densities being well over 10 W/m^2.		OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	/1/	DR	No uncertainties are associated with the project emissions.		OK
B.5. Calculation of GHG Emission Reductions – Baseline emissions *It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.5.1. Are the calculations documented according to the	/1/	DR	Yes. The grid emission factor, EF_y, was	~~CL 4~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
approved methodology and in a complete and transparent manner?			calculated the combined margin, which is the weighted average of the operating margin emission factor (EF_{OM}) and the build margin emission factor (EF_{BM}) as per ACM0002. The grid emission factor will be monitored ex-post. It was reported that due to data constraints, the first methodological choice of Dispatch Data Analysis OM was not possible. It has been confirmed with the PDOE –EPIMB that the dispatch data required is not available. The Simple OM is not relevant as the composition of low cost-must run resources was more than 60%, which has exceeded 50% of the total grid generation. The Simple Adjusted Operating Margin method was selected for calculation EF_{OM}. This method is applicable because the low-cost and must-run electricity sources can be separated from all the generating sources serving the system. The average OM emission factors can be calculated using either of the two following	~~CL 5~~	

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			data vintages for years(s) *y*: ➢ (*ex-ante*) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission, if or, ➢ the year in which project generation occurs, if $EF_{OM,y}$ is updated based on *ex-post* monitoring. The choice of *ex-post* vintage has been chosen and specified in the PDD. It is stated in the PDD that this will not changed through out the crediting period. The fraction of time (λ_y) which the low-cost and must-run electricity sources are marginal in a year, was calculated to be 0.017 according to step (i) to step (iv) outlined in ACM0002 version 06 for the Simple Adjusted Operating Margin. It was found that the fraction of time (λ_y) used in the calculation was slightly different due to some typo error. It has been agreed with the developer that this should be corrected and the relevant calculation		

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			affected by the λ_y will be corrected correspondingly. Some of the parameters affected are the CO_2 emission factor for sets of plants in the operating margin, the CO_2 emission factor for the grid and the emission reductions estimated for the project. For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ will be updated annually *ex-post* for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BM,y}$ will be calculated *ex-ante.* The IPCC values used in the (EF_{OM}) and (EF_{BM}) calculations are: - 1) Emission factor for bunker (residual oil) = 77.4 tCO2e/TJ 2) Emission factor for diesel oil = 74.1 tCO2e/TJ 3) Net calorific value of bunker (residual oil) = 40 TJ/kt 4) Net calorific value of diesel oil = 43 TJ/kt		

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			The assumptions used in the (EF_{OM}) and (EF_{BM}) calculations are: - 1) Density of bunker (residual oil) = 0.85 kg/l 2) Density of diesel oil = 0.89 kg/l The country specific net calorific value and density for both the bunker (residual oil) and diesel were provided by the PDOE (Energy Policy and Planning Bureau) during the site visit. The country specific values should therefore be adopted in the GHG emissions calculation. Both EF_{OM} and EF_{BM} are multiplied by a weightage of 0.5 each before they are added to obtain the grid emission factor.		
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR, I	The IPCC default values used are deemed appropriate. The country specific value for net calorific value and density for both the bunker (residual oil) and diesel were provided by the PDOE (Energy Policy and Planning Bureau) during the site visit. The country specific values should be adopted in	~~CL 5~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the GHG emissions calculation.		
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	Please refer to Section B.5.1 above.	~~CL 5~~	OK
B.6. Calculation of GHG Emission Reductions – Leakage *It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.6.1. Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	No leakage is associated with the project activity, as ACM0002 stipulates that leakage in relation to activities such as power plant construction, fuel handling and land inundation need not be considered by the project participants.		OK
B.7. Emission Reductions *The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.*					
B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	/1/	DR	The project is expected to result in total emission reductions of 666 219 tCO_2e over the 7-year renewable crediting period.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.8. Monitoring Methodology *It is assessed whether the project applies an appropriate monitoring methodology.*					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Yes, the monitoring plan is in accordance with the approved monitoring methodology of ACM0002, Version 06.		OK
B.8.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	All data to be monitored for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever occurs later.		OK
B.9. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/	DR	Electricity is generated from the construction of a run-of-river hydropower plant. No project emissions are expected from the project activity, thus the monitoring of project emissions are not included in the monitoring plan.		OK
B.10. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.*					
B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data	/1/	DR	Yes, the monitoring plan makes provision for		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
necessary for determining baseline emissions during the crediting period?			the monitoring of baseline emission reductions due to the displacement of electricity from the Mindanao Grid. The parameters to be monitored ex-post are: - 1) Net electricity supplied to the grid by the project, EG_y (MWh) 2) Emission factor of the Mindanao grid, EF_y (tCO_2e/MWh) 3) Emission factor of the operating margin of the plants in the Mindanao grid, $EF_{OM,y}$ (tCO_2e/MWh) 4) Emission factor of the build margin of the Mindanao grid, $EF_{BM,y}$ (tCO_2e/MWh) 5) Amount of each fossil fuel consumed by each power source/plant, $F_{i,y}$ (mass or volume) 6) Emission coefficient of each fossil fuel consumed by each power source/plant, $COEF_j$ (tCO_2e/mass or volume unit of fuel) 7) Electricity generation of each power source/plant *j*, *k* or *n* , $GEN_{j/k/n,y}$ (MWh) 8) Name of power source/plant for constituting the Operating Margin (text)		

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			9) Name of power source/plant for constituting the Build Margin (text) 10) Fraction of time during which low-cost/must-run sources are on margin, λ_y (fraction) 11) Electricity imports to the project electricity systems, $GEN_{j/k/l,y\_IMPORTS}$ (MWh) 12) Emission coefficient of fossil fuel used in connected electricity system (if imports occur), $COEF_{i,,j,y\_IMPORTS}$ (tCO_2e/mass or volume unit)		
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/	DR	The choices of baseline GHG indicators are deemed reasonable.		OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/	DR, I	It has been agreed with the developer that baseline indicators will be compiled and relevant procedure will be established, implemented at the latest prior to the start of the crediting period to enable subsequent verification of emission reductions.		OK
B.10.4. Is the measurement *equipment* described and deemed appropriate?	/1/	DR,I	It has been agreed with the developer that measurement equipment to be used will be compiled; relevant procedure will be established, implemented at the latest prior to		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the start of the crediting period to enable subsequent verification of emission reductions.		
B.10.5. Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR, I	Procedures on how to deal with erroneous measurements will be established, implemented at the latest prior to the start of the crediting period to enable subsequent verification of emission reductions.		OK
B.10.6. Is the measurement *interval* for baseline data identified and deemed appropriate?	/1/	DR, I	The measurement interval for the baseline data to be monitored ex-post is identified and deemed appropriate.		OK
B.10.7. Is the registration, *monitoring, measurement* and *reporting* procedure defined?	/1/	DR, I	The registration, monitoring, measurement and reporting procedures will be established and implemented at the latest prior to the start of the crediting period to enable subsequent verification of emission reductions.		OK
B.10.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR, I	The meters used to record the electricity supplied to the grid by the project will be calibrated based on existing procedures that are consistent with ISO standards.		OK
B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR, I	The procedures for day-to-day records handling will be established and implemented at the latest prior to the start of the crediting period to enable subsequent verification of		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			emission reductions.		
B.11. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					
B.11.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	No leakage is associated with the project activity.		OK
B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR, I	The monitoring plan for sustainability developed as required by the DNA has been submitted to the local DNA. This has been confirmed during the follow-up interview.		OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR, I	As part of EIS approval criteria, an Environmental Management Program and a Social Development Plan will be implemented by the project proponent.		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR, I	This has been confirmed with the DNA of the Philippines.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.13. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
B.13.1. Is the authority and responsibility of overall project management clearly described?	/1/	DR	An operational and administrative team will be established by Hedcor Sibulan, Inc. for the monitoring and reporting data used for the project.		OK
B.13.2. Are procedures identified for training of monitoring personnel?	/1/	DR, I	The company is an ISO 9001 certified company. It has been agreed by the developer that procedures for training of monitoring personnel will be developed and executed. Internal training will be conducted for the plant engineers and technicians. This will need to be checked during first periodic verification.		OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR, I	No such emergencies were identified in the monitoring plan. It has been confirmed that no emergency situation is anticipated which can cause unintended emissions.		OK
B.13.4. Are procedures identified for review of reported results/data?	/1/	DR, I	It was briefly mentioned in the PDD that the reported results/data will be reviewed by the Operational and Administrative teams and the Corporate Planning Department for internal verification on a monthly basis. It has been confirmed with the developer that		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the procedure for review of reported results/data will be established and implemented prior to the implementation of the project. This will need to be checked during first periodic verification.		
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR, I	The PDD does not include the procedures for corrective actions in order to provide more accurate future monitoring and reporting. This will need to be implemented and checked during the first periodic verification.		OK
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	/1/	DR	The project starting date was on the 26th June 2007, which is the date when construction began and the expected lifetime of the project is 25 years. It was mentioned in the PDD that the project proponent has began discussions with its CDM consultant, Mitsubishi UFJ Securities in year 2005 and a consulting agreement was signed on 30 August 2006. Further clarification is sought regarding the project starting date, to ensure this is the earliest of implementation, construction and real action.	~~CL 6~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
C.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR	The project has selected a renewable crediting period of seven years starting from 8th January 2009.		OK
D. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	An analysis was carried out in the form of an Environmental Impact Statement (EIS), as mandated by Presidential Decree No. 1586 and Proclamation No. 2146. The EIS concluded that the environment impacts were low for most environmental parameters. A summary of the results were provided in Section D.1 of the PDD.		OK
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR, I	An analysis was carried out in the form of an Environmental Impact Statement (EIS), as mandated by Presidential Decree No. 1586 and Proclamation No. 2146. The EIS concluded that the environment impacts were low for most environmental parameters. A summary of the results were provided in section D.1 of the PDD. As the project is considered as an environmentally critical project, an Environmental Impact Statement (as in		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			accordance with Presidential Decree No. 1586 and Proclamation No. 2146) was prepared in October 2005. It was then duly submitted to the Department of Environment and Natural Resources, which issued an Environmental Compliance Certificate (ECC-11-06-03-03-033-4220) on 15th March 2006. The ECC has been provided during the site visit.		
D.1.3. Will the project create any adverse environmental effects?	/1/	DR	The project is not likely to generate adverse environmental impacts. Water flow in the river will be maintained, while water utilized for power generation will be returned to the river.		OK
D.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	There are no adverse transboundary environmental impacts.		OK
D.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	Environmental impacts were analyzed and corresponding mitigating measures are specified in the Environmental Impact Statement.		OK
D.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR, I	Yes. The project complies with existing environmental legislation in the Philippines.		OK
E. Stakeholder Comments					

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.					
E.1.1. Have relevant stakeholders been consulted?	/1/	DR	Seven stakeholder's consultation meeting were carried out by the project proponent to ensure that all relevant stakeholders (such as the local communities and representatives from the NGO) have been consulted. There were a total of 7 meetings held 4th March, 14th April, 23rd April, 26th May, 6th June, 10th June and 11th June 2005. A Memorandum of Agreement (MoA) was drafted on 26th May 2005 and then signed between the project proponent, National Commission for Indigenous Peoples (NCIP) and the tribal communities on 15th June 2005. A Certificate of the Free and Prior Informed Consent (FPIC) from the local tribal leaders, as mandated by The Indigenous Peoples Reform Act (IPRA), has also been granted. A copy each of the MoA and FPIC as mentioned in the PDD have been provided for review.		OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR, I	It has been explained during the site visit that the representatives from the authority and the		OK

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			village heads have been invited with personal invitation. The general public/villagers in the Barangays were invited through notices posted in public areas such as food stalls within the Barangays. It is in the opinion of DNV that such invitation methods were the most logical and realistic ways as there is no actual postal address to respective households.		
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR, I	The stakeholder's consultation process is deemed sufficient. This has been confirmed with the local DNA.		OK
E.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR, I	Comments received from the stakeholders' consultation were regarding the project's impact on the environment, employment opportunities, profitability and financial concerns. A summary of the comments has been included in the PDD in section E.2. However, it has been discussed and agreed with the developer that the person who raise the respective concerns and in which specific meeting should be included. Minutes of meetings and attendance lists have been		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			provided during the site visit.		
E.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR, I	A summary of how due account was taken of the comments received was provided in the PDD. Several Memorandum of Agreements and Certificates where signed as a results of the local stakeholder consultation process.		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 1 The breakdown of major investments such as the civil works, turbines and generators has been provided. Evidence to support the assumptions used in the project IRR calculation have been provided, i.e. power purchase agreement, civil work contracts. However, further documented evidence is required to substantiate the breakdown provided for major components of the project such as turbines and generators, operational and maintenance cost.	B.3.1 B.3.3	It is clarified that the electromechanical contract provided during the site visit includes the cost of turbines and generators. In terms of the O&M cost, the projection was based on actual costs per kilowatt hour generation taken from other projects previously developed by Hedcor (all mini-hydro, as per Section A.3.) in Mindanao. The figure used for the Project is P1.47/kWh. It is noted that the average cost for the mini-hydro plants are P1.97/kWh as of December 2007.	The assumptions used in the IRR calculation have been supported with the following evidence: a. Purchase agreement of electro-mechanical work dated 4th April 2007, b. Agreement for civil work dated 1 Feb 2007, and c. Calculation in section A.3 of the PDD on how the operational and maintenance cost is arrived at. The above evidence has been verified and found to be appropriate. CL is closed.
CL 2 It was reported during the site visit that the total utilisation of both the power plants would be approximately 56%. Further clarification is required to justify that the 56% utilisation rate is reasonable for power plants of similar capacity. In addition, the sensitivity analysis should include 10% increase of plant utilisation or there is a need for further clarification why only 5% increase is applied.	B.3.1 B.3.3	For run-of-river power plants, the utilization factor is not driven by capacity, but rather, the water flow. Hence a comparison with other plants of similar capacity will not return meaningful results. Instead, the project participant wishes to address this as follows: 1. The project's water flow projection is based on daily flow data collected over a period of 19 years. This data is given in the document entitled "Sibulan	The technical services department has conducted an energy generation simulation for both the hydro plants. A copy of the report summary dated October 2007 has been provided for review. The simulation was based on the last 19 years of river water flow data with clear fluctuation of dry and rainy seasons. The calculation was found to be satisfactory. It is unlikely that the river water flow will fluctuate significantly from the historical river

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
		Hydrology Report" which was shown during the site visit. 2. The generators have been sized on the basis of the water flow data, so that the project can take advantage of the rainy season, whereby during three months of the year there will be enough water to run at 100% capacity. Overall, however, taking into account lower water flow during the dry season, the average net utilization factor is projected to be 56%. A summary of the calculation method is provided as a separate attachment. The project's water flow projection and hence generation projection has been based on data collected over a period of 19 years. While it is expected that significant daily fluctuations will occur, hydrologists working on the Hedcor project do not foresee long term fluctuations to the extent that there will be a 10% increase in generation throughout the project's life. In fact, even a 5% fluctuation is unlikely to occur.	water flow. It is also unlikely that the plant utilisation will increase by 10%. It is thus concluded that sensitivity analysis of more than 5% increase in utilisation rate is not realistic. CL is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 3 Evidence to be provided to substantiate that CDM incentives were seriously considered in the decision to proceed with the project activity.	B.3.4	Hedcor considered the CDM since 2005, well before the decision to proceed with the project activity was made in the second quarter of 2007. This can be evidenced in Hedcor: - initiating talks with CDM consultants early in the project development and incorporating CDM revenues in its feasibility assessment; - accepting a proposal from Klima, a local CDM consultant, in 2005, to begin preparatory work for the CDM; - contracting Mitsubishi UFJ Securities (at the time Mitsubishi Securities), its CDM consultant, in 2006 after talks with it began in 2005; and - submitting CDM documentation to the Philippines DNA, including the completed PDD (Version 01) prepared by Mitsubishi UFJ Securities, in January 2006. The 1) accepted Klima proposal and 2) the signed contract between Hedcor and Mitsubishi UFJ Securities are submitted as separate attachments.	The project proponent has provided the chronological events where CDM incentives have been seriously considered before the implementation of the project. The following contracts have been provided for review: a. Proposal from Klima to undertake PDD preparation, dated 30 September 2005, and b. Contract between Mitsubishi UFJ CO., Ltd and HSI dated 30 August 2006. It has been confirmed with the Philippines DNA during the site visit that the project's PDD, version 1 was submitted in January 2006. The above proposal and contract have been reviewed and it is found to be satisfactory that CDM incentives have been considered prior to the implementation of the project. CL is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 4 It was found that the fraction of time (λ_y) used in the calculation was slightly different due to some typo error. It has been agreed with the developer that this should be corrected and the relevant calculation affected by the calculated λ_y will be corrected correspondingly. Some of the parameters affected are the CO_2 emission factor for sets of plants in the operating margin, the CO_2 emission factor for the grid and the emission reductions estimated for the project.	B.5.1	The lambda value has been corrected in the revised PDD.	The calculation of lambda and associated calculations have been reviewed and found to be accurate. Relevant changes in the PDD have been reviewed and were found to be correct. CL is closed.
CL 5 The country specific net calorific value and density for both the bunker (residual oil) and diesel were provided by the PDOE (Energy Policy and Planning Bureau) during the site visit. The country specific values should therefore be adopted in the GHG emissions calculation.	B.5.1 B.5.2 B.5.3	The country specific net calorific and density values obtained during the interview with the PDOE have been used in the revised PDD.	The country specific net calorific and density values have been used in the revised PDD. The values have been reviewed and found to be satisfactory. CL is closed.
CL 6 The starting date of the project activity was on 26th June 2007. It was mentioned in the PDD that the project proponent has began discussions with its CDM consultant, Mitsubishi UFJ Securities in year 2005 and a consulting agreement was signed on 30	C.1.1.	The starting date of the project will be changed to 30/10/2005, which is the date that Hedcor (at the time Hydro Electric Development Corporation) accepted the proposal from Klima to initiate preparatory work for the CDM.	The proposal from Klima was dated 30 September 2005 and the proposal was reported to have been accepted on 30 October 2005. It is reasonable to state that the starting

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
August 2006. Further clarification is sought regarding the project starting date to ensure this is the earliest date of implementation, construction, and real action.			date of the project as the date of the when Klima's proposal has been accepted by Hedcor. CL is closed.

APPENDIX B

CERTIFICATES OF COMPETENCE

CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-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		
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	*AM0030*	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	*AM0031*	Yes
ACM0004, ACM0012	Yes	*AM0032*	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	*AM0035*	Yes
ACM0007	Yes	*AM0038*	Yes
ACM0008	Yes	*AM0041*	Yes
ACM0009, AM0008, AMS-III.B	Yes	*AM0034*	Yes
AM0006, AM0016, AMS-III.D, ACM0010	Yes	*AM0043*	
AM0009, AM0037	Yes	*AM0046*	
AM0013, AM0022, AM0025, AM0039, AMS-III.H, AMS-III.I	Yes	*AM0047*	
AM0014	Yes	*AMS-II.A-F, AM0044*	Yes
AM0017	Yes	*AMS-III.A*	Yes
AM0018	Yes	*AMS-III.E, AMS-III.F*	Yes
AM0020	Yes		
AM0021, AM0028, AM0034, AM0051	Yes		
AM0023	Yes		
AM0024	Yes		

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

CERTIFICATE OF COMPETENCE

Mari Grooss Viddal

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:	--	***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		
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes		

Høvik, 26 September 2007

Michael Lehmann
Technical Director, International Climate Change Services

CERTIFICATE OF COMPETENCE

Chee Keong Lai

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:	--	***JI Verifier:***	--
Industry Sector Expert for Sectoral Scope(s):	--		

Høvik, 30 October 2007

Michael Lehmann
Technical Director, International Climate Change Services