VALIDATION REPORT

Qi'nan Hydro Power Project In China

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DET NORSKE VERITAS

VALIDATION REPORT

DET NORSKE VERITAS
CERTIFICATION AS

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Client: Carbon Asset management Sweden AB	Client ref.: Susanne Haefeli-Hestvik

Project Name: Qi'nan Hydro Power Project
Country: China
Methodology: ACM0002
Version: 06
GHG reducing Measure/Technology: power generation from hydro resources
ER estimate: 41 020tCO_2/year
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 "Qi'nan Hydro Power Project", as described in the project design document, version 04 dated 7 August 2008, meets all relevant UNFCCC requirements for the CDM and correctly applies the approved baseline and monitoring methodology ACM0002 version 06. Hence, DNV requests the registration of Qi'nan Hydro Power Project as a CDM project activity.

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Qi'nan Hydro Power Project in China

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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EF	Emission Factor
EIA	Environmental Impact Assessment
EPB	Environmental Protection Bureau
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of Approval
MP	Monitoring Plan
NCV	Net Calorific Value
NDRC	National Development and Reform Commission
NGO	Non-governmental Organisation
NPV	Net Present Value
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
SCE	Standard coal equivalent
SCPG	South China Power Grid
SHP	Small Hydro-power
UNFCCC	United Nations Framework Convention on Climate Change

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1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the "Qi'nan Hydro Power Project" in China. 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 is China and the Annex I Party is Sweden. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants. The DNA from China confirmed that the project assists in achieving sustainable development.

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 China.

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

By generating renewable energy which will displace electricity in South China Power Grid, the total emission reductions from the project are estimated to be on the average 41 020 tCO_2/year over the selected 7 year crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change. 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.

Adequate training and monitoring procedures have been developed and will be implemented prior to start of the crediting period.

In summary, it is DNV's opinion that the "Qi'nan Hydro Power Project" in China, as described in the PDD version 04 of 7 August 2008, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0002 version 06. DNV thus requests the registration of the project as a CDM project activity.

2 INTRODUCTION

Carbon Asset management Sweden AB has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the "Qi'nan Hydro Power Project" in China (hereafter called "the project"). This report summarises the findings of the initial stages 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.

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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. The validation team has, based on the recommendations in the Validation and Verification Manual /13/ 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/ PDD of Qi'nan Hydro Power Project Version 01 of 10 February 2007, Version 03 of 20 June 2008 and version 04 dated 7 August 2008 by international Center on Small Hydro Power

/2/ Letter of Approval issued by Chinese DNA in February 2008.

/3/ Letter of Approval issued by the DNA of Sweden is on 24 June 2008.

/4/ Feasibility Study Report of Qi'nan Hydro Power Project by Hunan Provincial Water and Electricity Design and Research Institute in May 2005 and the approval letter by Development and Reform Commission of Hunan Province on 10 March 2006.

/5/ Environment Impact Assessment by Hunan Provincial Environment Protection Science Institute in August 2005 and approved by Hunan Provincial Environment Protection Bureau on 29 August 2005.

/6/ In October 2004, the land acquisition was approved by the local government. The land contract Between Rucheng County Yuzaikou Hydropower Co.Ltd and Tianzhuang Town on 28 November 2004 (including signature of farmers for loss of land and claim receipt)

/7/ Board meeting minutes for CDM consideration by Hunan Rucheng Yuzaikou Hydropower Co. in July 2005

/8/ Contract from Rucheng County Rural Bank on 23 May 2004 for loan to support Yuzaikou and Qi'nan Hydropowers.

/9/ Project construction starting command by Yuzaikou Hydro-power construction Department, 1 April 2006 (construction start permit date)

/10/ The personnel training plan for Yuzaikou Hydropower Project on 23 February 2008

/11/ "Economic Evaluation Code for Small Hydropower Projects SL16-95" issued by the Ministry of Water Resources in 1995 (Document No. SL16-95) (http://www.cws.net.cn/guifan/bz%5CSL16-95)

/12/ The intent power purchase agreement between Hunan Rucheng Yuzaikou Hydropower Co., Ltd and Guangdong Shaoguan Power Co., Ltd signed on 1 March 2005.

/13/ International Emission Trading Association (IETA) & the World Bank's Prototype

Carbon Fund (PCF), Validation and Verification Manual.

/14/ CDM Executive Board ACM0002 Approved methodology, "Consolidated methodology for grid-connected electricity generation from renewable sources", version 06. 19 May 2006.

/15/ CDM Executive Board, Tool for the demonstration and assessment of additionality, version 04 of 30 November 2007

/16/ Chinese DNA's guidance for the determination of grid boundaries and emission factors, http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1053.pdf

/17/ China Electric Power Yearbook 2001,2002,2003,2004, 2005 and 2006

/18/ China Energy Statistical Yearbooks 2004, 2005 and 2006

/19/ China NDRC, the emission factor calculation for each power grid of China, published in 2006, NDRC official website: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf

/20/ China NDRC, the statistics by State Electricity Regulatory Commission (SERC) on newly built thermal plants in 10th "Five-Year Plan" period 2000-2005, and NDRC official website http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2006/20061215144747182.pdf

/21/ IPCC: Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories Reference Manual.

/22/ The announcement about strictly forbid the construction of the thermal power station with the installed capacity lower than 135WM published by the state council office, The General Office of the State Council [2002] No.6

/23/ The reform program for the electricity industry system published by State Department of China on 11 April 2002.

/24/ Stakeholder comment resolution by on-site corresponding meeting on 1 April 2004.

/25/ Historical generation of Mazitan and its service life identified by Rucheng Country Water Bureau on 19 June 2008.

/26/ Meeting of Board Hunan Rucheng Yuzaikou Hydropower Co. for introduction of CDM knowledge on 1 April 2004

/27/ CDM Development Contract between Rucheng County Yuzaikou Hydropower Co.Ltd and International Network on Small Hydro Power in 28 December 2005.

/28/ The economic analysis on hydro projects in Hunan Province http://www.86ne.com/Ocean/200411/Ocean_31554.htm

http://www.shaoyang.gov.cn/other/syagri/market/detail.asp?n_id=604

/29/ Wind resource distribution analysis http://www.china5e.com/www/dev/newsinfo/newsview/viewnews-200712110107.html

/30/ News on 19 December 2007 from http://www.xg360.com.cn/hall/sector_archives/sector_news_detail.aspx?id=33830

/31/ Terms and conditions for the forward sale and pruchase of CERs between PP and

carbon buyer on 15 January 2006

/32/ Investment comparison for wind farm , hydro , and other renewable sources http://search.ce.cn/ced/detail.jsp?channelid=79132&record=170

/33/ Answer sheet for questionnaire for the stakeholder comments by project owner dated 10 April 2005

/34/ Spreadsheet for IRR analysis

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

- Changes related to the CARs and CLs identified in the DNV's draft validation report and related to the latest EB Guidelines on financial analysis, project starting date and CDM consideration (EB38-EB41)..

3.2 Follow-up Interviews with Project Stakeholders

	Date	Name	Organization	Topic
/35/	2008-3-25	Miss. Wang Xianlai Miss.Hu Xiaobo	International Network on Small Hydro Power	➢ Baseline determination of the project ➢ Applicability of selected methodology ACM 0002 ➢ Issues related to the additionality ➢ Common practice analysis ➢ Emission reductions calculation ➢ Emission reduction monitoring plan and project management
/36/	2008-3-25	Mr. Liu Yihou Mr. Yang Shuhua	Manager Qi'nan Hydro Power Project	➢ Information of project construction ➢ The development of hydropower project in Sichuan province ➢ The approval status (incl. EIA approval, the feasibility study report approval, CDM project approval) ➢ Project management ➢ Emission reduction monitoring plan ➢ Consulting process for stakeholder's comments ➢ Investment risks and barriers

3.3 Resolution of Outstanding Issues

The objective of this phase of the validation is to resolve any outstanding issues which need be clarified prior to 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

transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

The validation protocol consists of three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the "Qi'nan Hydro 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.

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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 c**orrective 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	Sun	Shuyong	China
GHG auditor (applicant)	Zhang	Xiaojun Johnsen	China
Technical reviewer (applicant)	Zamarron	Francisco	Italy
Technical reviewer (applicant)	Deng	Cuiping	China
Technical Reviewer	Rescalvo	Miguel	Norway
Technical Reviewer	Viddal	Mari Grooss	Norway
Sector expert	Lehmann	Michael	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 of version 04 of 7 August 2008.

4.1 Participation Requirements

The project participants are Yuzaikou Hydropower Co. Ltd of China and Carbon Asset management Sweden AB of Sweden. The host party China and Annex I Party Sweden meet the requirements to participate in the CDM.

The letter of approval (LoA) from the DNA of China, authorizing Rucheng County Yuzaikou Hydropower Co. Ltd as the project participant and confirming that the project assists Chinese sustainable development, was issued in February 2008 /2/.

The letter of approval (LoA) from the DNA of Sweden, authorizing Carbon Asset Management Seden AB was issued on 24 June 2008/3/.

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 China.

4.2 Project Design

The “Qi’nan Hydro Power Project” is a newly built hydropower project to generate power by renewable sources of energy. The installed capacity of the proposed Station is 18 MW, consisting of two 9 MW /4/ Francis turbines, located on the lower reaches of Qijiang River, two kilometers northeast of the town of Nandong, in Rucheng County, Chenzhou City, Hunan Province. Coordinates: Longitude 133°25′12″; Latitude 25°27′36″.

Based on the information contained in the feasibility study, DNV was able to verify that the power density of the project being 367.3W/m2 at full reservoir area of 49000 m^2 /4/.

The project design engineering reflects current good practice with effective annual electricity supply to the grid predicted to be 56 640 MWh.

Mazitan, an already existing small hydropower project 4km downstream of “Qi’nan Hydro Power Project” will be influenced, as the water flow will be smaller during dry season after the construction of Qi’nan Hydro Power Project. The installed capacity of Mazitan is 4.8MW /4/, which was commissioned in 1999 and expected to continue operating till 2034 /25/. The average annual electricity generation of Mazitan(from 2003-2007) was 18 000MWh /25/. After the commissioning of “Qi’nan Hydro Power Project”, the effective average annual output of Mazitan is expected to 10 000MWh /25/. Mazitan will be connected to Qi’nan Hydro Power Project to deliver electricity to the grid.

The “Qi’nan Hydro Power Project” is located in Rucheng County, which is very close to Goangdong province, the transmission distance is only 8km where there is an

existing primary transmission line directly connected to Guangdong Grid. If unpredictable interruption of the primary transmission line occurs, the project can be connected to Rucheng local grid and then to Guangdong grid as Rucheng local grid is also entirely connected to Guangdong Grid, part of South China Power Grid (SCPG). So the project's net electricity generation (amount above the historical Mazitan electricity generation) will displace part of the electricity generated by the South China Power Grid (SCPG) which is dominated by coal-fired power plants, and thus greenhouse gas (GHG) emissions are expected to be reduced. The estimated annual GHG emission reductions are 41 020tCO2/year during a 7 years renewable crediting period.

The permit to start construction for the Qi'nan Hydro Power Project was 1 April 2006 /9/ and this defines the starting date of the project. The designed operational lifetime of the project is 30 years. The length of the first crediting period is 7 years, starting on 01 November 2008.

4.3 Baseline Determination

The "Qi'nan Hydro Power Project" applies the approved consolidated baseline methodology ACM0002 /14/ "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 06. The chosen methodology is applicable as the project activity fulfils the following criteria:

- The project activity is a grid connected hydro power project;
- It is a renewable energy project with no fuel-switch involved;
- The project activity supplies power to the regional Grid which in turn caters to electricity demand in Guangdong province of SCPG.

The baseline includes the emissions related to the electricity from displaced fossil fuel at power plants connected to the South China Power Grid by "Qi'nan Hydro Power Project".

The grid system boundary /16/ includes the proposed project site and all the power plants connecting to the SCPG, whose geographical range includes the Guangdong Province, Guangxi Province, Guizhou Province, and Yunnan Province.

Emission sources and gases included in the project boundary are:

	GHGs involved	***Description***

Baseline emissions	CO_2	The baseline emission factor for the project is determined ex-ante as a combined margin, consisting of combination of the operating margin (OM) and build margin (BM). The combined margin (CM) of the project is 0.84335tCO_2/MWh. Thus, the baseline emissions are expected to be 41 020tCO2/year.
Project emissions	CO_2	According to ACM0002, being a hydropower renewable energy project with power density larger than 10W/m^2, there are no project emissions.
Leakage	CO_2	According to ACM0002, being a hydropower project, no leakage is accounted for.

Four realistic and credible alternatives to the project activity are considered to investigate the baseline;

Alternative1-The proposed project activity not undertaken as a CDM project activity.

Alternative2- Construction of a thermal power plant with equivalent annual electricity generation.

Alternative3- Construction of a power plant using other sources of renewable resources with equivalent annual power generation.

Alternative 4 - Equivalent annual electricity supplied by CSPG.

Since the construction of the proposed project will influence the electricity generaton of another existing small hydropower project named as Mazitan which is 4km in the downstream of Qi'nan; as the per the methodology, the baseline scenario is:

In the absence of the CDM project activity, the existing facility would continue to provide electricity to the grid ($EG_{baseline}$, in MWh/year) at historical average levels ($EG_{historical}$, in MWh/year), until the time at which the generation facility would likely be replaced or retrofitted in the absence of the CDM project ($DATE_{BaslineRrtrofit}$).

All project electricity generation above baseline levels ($EG_{baseline}$) would have otherwise been generated by other power plants currently operating in the grid (see the OM calculation) and by the addition of new generation sources, as reflected in the combined margin (CM) calculations.

And as analysed below in *Sub-step 1a. and Sub-step 1b. of section 4.4*, practical and feasible baseline scenario is Alternative 2: supply of equivalent annual power output by the grid (SCPG).

In accordance with ACM0002, the electricity baseline emission factor is determined ex-ante as a combined margin, consisting of the weighted average of the operating margin (OM) /16/ emission factor and the build margin (BM) /16/ emission factor. The default weights for hydro power projects of 50% OM and 50% BM have been selected according to ACM0002.

The application of the baseline methodology is transparent and conservative.

4.4 Additionality

The project activity started construction in April 2006 /9/ and the commencement of validation (date of publication of the PDD for stakeholder) was on 19 July 2007. DNV has assessed and verified the evidence and timeline for serious CDM consideration of the project activity as follows:

- The project owner got to know CDM and the CDM concept was discussed on the board meeting in April 2004 /26/.

- The FSR financial analysis /4/ conducted by the Hunan Hydraulic &Hydroelectric Survey & Design Institute in May 2005, shows that the lower 7.10% IRR presented a financial barrier for PP, so the project owner contacted IC-SHP for CDM application and signed CDM consultation contract in December 2005 /27/.

- The project owner then signed letter of intent with buyer on 15 January 2006 /31/.

- A construction permit /9/ was issued 1 April 2006, defining the start date of the project.

Therefore, the CDM incentive was seriously considered before the construction start permit.

The additionality of "Qi'nan Hydro Power Project", as required by ACM0002, is demonstrated by applying the "Tool for demonstration and assessment of additionality" version 04 to show that the project activity would not have occurred anyway due to the existence of an investment barrier, substantiated by a benchmark analysis.

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

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

Four realistic and credible alternatives to the project activity are considered to investigate the baseline

Alternative1-The proposed project activity does not undertaken as a CDM project activity.

Alternative2- Construction of a thermal power plant with equivalent annual electricity generation.

Alternative3- Construction of a power plant using other sources of renewable resources with equivalent annual power generation.

Alternative 4 - Equivalent annual electricity supplied by CSPG.

Construction of a power plant using other sources of renewable resources with equivalent annual power generation (Alternative 3); Hunan is rich in water resources, but lack of other renewable energy resources, such as wind energy /29/. Furthermore, the unit cost from other renewable sources such as wind energy and solar energy is much higher than hydropower/32/. The economic return of other renewable power plants with similar amount of capacity is shown to be unattractive. So scenario 3 is not feasible as a realistic and credible baseline alternative.

Sub-step 1b. Consistency with mandatory laws and regulations

Alternative 1 and Alternative 4 are in line with the current laws and regulations in China. Alternative 2: Chinese regulations prevents establishment of coal-fired power plants with installed capacity lower than 135 MW /22/ in urban districts. Therefore, considering that the project foreseen a capacity equal to 18 MW, Chinese legal regulations prevents this scenario to happen.

Except for the proposed activity not undertaken as a CDM project activity, the only realistic alternative consistent with current laws and regulations is "supply of equivalent annual power output by the grid (SCPG)". It has been adequately demonstrated (see step 2 and 4 below) that the practical and feasible baseline scenario is alternative 4, "Supply of equivalent annual power output by the grid (SCPG)".

Step 2 – Investment analysis:

Sub-step 2a. Determine appropriate analysis method

As the proposed project generates financial and economic benefits other than CDM related income through the sales of electricity, a simple cost analysis (option I) can not be applied. The alternative for the baseline scenario of the proposed project is not a similar investment project, so option II is also not an appropriate choice. Hence, a benchmark analysis (option III) is selected for conducting the investment analysis.

Sub-step 2b. Apply benchmark analysis

A Project IRR of 10% has been selected as the benchmark rate, which is deemed to be reasonable for hydropower projects in China according to the published "*Economic evaluation code for small hydropower projects (SL 16-95)*" /11/ by Ministry of Water Resources.

Without the income from CERs, the IRR of the proposed project is 7.10%, much lower than the benchmark IRR set in China, this indicates that the project would not be financially feasible in the absence of CDM financing. The main parameters used for the IRR calculations are derived from the FSR /4/.

With the income from CERs, the IRR is increased to approximately 9.66%, which increased the financial attractiveness for the project owner but even lower than the financial benchmark of 10%. Therefore, DNV also checked whether the project social discount rate, calculated according the criteria defined in the "Economic Evaluation Code for Small Hydropower

Projects SL16-95" issued by the Ministry of Water Resources in 1995 (Document No. SL16-95) /11/, is higher than the 12% rate in order to demonstrate that the project is viable despite of not being financially attractive. The result of National Economic Evaluation of the project is 15%(FSR) which is higher than the Social Discount Rate of 12%, so the project is viable though not financially attractive.

The spreadsheet /34/and relevant documents for the financial anslysis have been assessed by DNV.
The Feasibility Study Report of "Qi'nan Hydro Power Project" was developed by Hunan Provincial Water and Electricity Design and Research Institute in May 2005 and approved by Development and Reform Commission of Hunan Province on 10 March 2006 /4/. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognized source.

DNV compared the input parameters for the financial analysis included in the PDD with the parameters stated in the FSR and was able to confirm that the values applied are consistent with the values stated in the FSR. The IRR calculations have been verified by DNV.

The FSR was approved on 10 March 2006 /4/ and thus only 1 month prior to the decision to proceed with the project activity (i.e. the start date of the project) which was on 1 April 2006 /9/. Given this relative short period of time between approval of the FSR and the decision to proceed with the project activity it is unlikely in the context of the project that the input values would have materially changed and that it is thus reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project.

Furthermore, the input parameters used in the financial analyses were compared with other hydro power projects developed in Hunan province and Guangdong Province by comparing investment costs per MW, electricity tariff, percentage of O&M costs relative to total investment costs, etc.

In addition, by applying our sectoral competence, DNV was able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.

A sensitivity analysis has been carried out for parameters contributing more than 20% to revenues or costs. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation. The sensitivity analysis has been conducted with regards to the total investment, annual O&M cost, tariff and operating hours. The required variation needed in each parameter in order to reach the benchmark was assessed as below.

NPV results of sensitivity analysis

Key Indicators	***Variation of the indicator needed to reach benchmark***
Total Investment	- 24%
Annual O&M cost	- 40.8%
Operating hours	+ 26%

tariff	+ 26%

-**Total investment**: It is deemed impossible for hydropower project to reduce total investment by 24% to satisfy the benchmark considering the fact that the price of materials has been growing continuously in the recent years /30/and the interests have been increased /30/ several times as well.

-**O&M cost**: the annual O&M cost required to be reduced by 40.8%, however, only the compensation to the Mazitan project amounts to 3.2 million yuan annually. So, it is impossible to reach the benchmark by reducing the O&M costs with 40.8%.

-**Operation hour**: The expected operation hours of the proposed project as per the FSR are deemed realistic, as it was calculated based on 43 years historical statistics /4/of the drainage area of the river. The operation hours are likely to fluctuate only within very small range and 26% of increase in annual operation hour is deemed impossible.

-**Tariff:** the electricity tariff contracted with the grid company is 0.35yuan/kwh (including VAT), which is fixed /12/. As China adopts the policy of "Price Competition for Electricity Supply to Grid", the grid company always offers lower tariff for rural hydropower projects. So, the grid tariff is unlikely to be increased by 26% for the project.

The analysis above shows that very unrealistic favorable circumstances would be needed for the project IRR to reach the benchmark.

The investment analysis and sensitivity assessment have shown that the project activity is unlikely to be the most financially attractive option.

The financial calculations and assumptions have been assessed and are considered correct.

Step 3: Barrier analysis

The proposed project does not adopt this step.

Step 4 – Common practice analysis:

The common practice analysis is limited to the provincial level as the investment environment for each province differs (e.g. with regards to taxes, loan policy and electricity tariffs). 2002 was a landmark year for the power industry in China, and therefore only the capacity addition projects, which were developed after 2002 are considered in the common practice analysis below.

Hydropower projects (between 15-25MW) in Hunan Province

No.	Project	Capacity (MW)	Commission year	IRR	Unit cost (yuan/kw)	Project owner
1	Wannianqiao	15	2004	/	/Public fund	Rucheng country power company
2	Yangmingshan Second Stage	22	2004	IRR 12.4%	4800	Xiangneng Group
3	Yongxing	20	2005	IRR 10.8%	/Public fund	Yongxing

	Second Stage					Hydropower Corp.
4	Jiexikou	20	2005	/	5700	Hunan Xulin Hydropower Co.
5	Chengjiangkou	25	2006	IRR 10.2%	/	Chenjiangkou Group
6	Mulongtan	15	2003	IRR 11.1%	/	Gezhouba Group
7	Ruoshui	15	2006	IRR10.35%	/	Zhejiang SanyiCo.ltd

Data source: China Water Resource Yearbook(2006);
http://www.netinform.net/KE/files/pdf/China%20Shaibeitan%20Hydropower%20project-Version%2003.1-2007.07.25.pdf

There are essential distinctions between this proposed project activity and the other 7 already operating hydropower projects with similar installed capacity (between 15-25MW) constructed since 2002 in Hunan Province. The Wannianqiao project and Yongxing Second Stage were enrolled as demonstration projects and gained the national special fund of the "SHP Replacing Firewood Program". The Yangmingshan Second Stage and Jiexikou project were developed earlier with excellent natural conditions and low construction cost /28/. And the IRR of the Chengjiangkou, Mulongtan and Ruishui projects are all higher than the benchmark.

While the proposed project does not have any governmental fund support, and secondly has technical and economic indicators disadvantages, it can be concluded that this proposed project cannot be considered common practice.

Hence it is DNVs opinion that the proposed project activity would not have been implemented without CDM revenues, and hence is additional.

4.5 Monitoring

The project applies the approved monitoring methodology ACM0002 "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources" version 06. The selected monitoring methodology is applicable to the project.

Monitoring of sustainable development indicators is not required by the Chinese DNA. The environmental impacts are considered minor and will be monitored by the local environmental authority during the project lifetime.

4.5.1 Parameters determined ex-ante

The " Qi'nan Hydro Power Project" is proposed to fully utilize the water resources of the river section. While the original built Mazitan hydro power plant will be influenced during dry season, but operate normally during wet season. The lifetime of Mazitan is 35 years and it was commissioned in 1999. It will likely be replaced in 2034 in the absence of the proposed project. According to ACM0002, the EG of the original built Mazitan hydro will be the baseline until the time Mazitan Power Station would likely be replaced or retrofitted.

The baseline grid emission factor will be determined *ex-ante*, based on the most recent information available, and is calculated as a combined margin, consisting of the combination of OM and BM emission coefficient. This combined margin emission coefficient will remain fixed during the first renewable crediting period. For more details, please refer to chapter 4.6.

The historical data of Mazitan is determined Ex-ante.

4.5.2 Parameters monitored ex-post

According to ACM0002, there are no project emissions since the power density are greater than 10 W/m^2, and no leakage is required from the project. Thus, there are three *ex-post* parameters that have to be monitored: ‘

i) the electricity produced by the project activity and delivered to the grid (required by ACM0002) and

ii) the electricity produced by the Mazitan hydropower plant and supplied to the grid.

iii) monitoring of surface area of full reservoir at the start of operation

DNV has verified that revenue meter will be installed at the transformer site to measure the project activity’s $\mathbf{EG}_{y,m}$ and $\mathbf{EG}_{y,pa}$ of Mazitan supplied to SCPG. Back-up meters will be used to cross-check the electricity to the grid and also three meters will be installed at each generator’s exit to measure the electricity generated by each unit.

Electricity generation will be measured on an hourly basis and recorded on a monthly basis. This data will be cross checked against the sales receipts from the grid operator.

The error of revenue meter or other meters exceeding the allowable range was specified by the national standard (JJG596-99).

4.5.3 Management system and quality assurance

The personnel training plan and management and operation manual, including responsibilities and authorities for project management, procedures for monitoring and reporting, QA/QC procedures, measuring meters calibrated at a regular interval by qualified organization according to the related national standards and regulations (JJG596-99)., were verified.

For revenue and backup meters, they are a 2-way recording meters and accuracy is 0.5S. The data will be measured hourly and recorded monthly. The grid company and project owner will read the revenue meter every month.

The project developer will establish a CDM team, the outline of which is shown in the PDD, and a project management and operation manual as described below:

The data collection and filing staff will collect the information and data required by the monitoring plan. The collected information will be recorded and sent to the CDM project manager and the responsible staffs. The CDM project manager will be in charge of the implementation of the monitoring plan and report to the general manager who will verify the calculations and reports.

Problems that occur in the monitoring and measurement process will be recorded and reported to the CDM Manager. Consequently, a corrective action will be adopted to deal with that problem and to avoid it occur again in the future.

The project management and operation manual contain procedures for tracking information. All paper-based information will be stored by the project owner. Detailed procedures are expected to be in place prior to the start of the crediting period to enable subsequent verification of emission reductions. The relevant documents will be kept for at least two years after the end of the crediting period.

4.6 Estimate of GHG Emissions

The project will partly displace fossil fuel-based electricity generation in SCPG. The methodology complies with one of the approaches proposed for category ACM0002.

The emission reduction ER_y, calculations is estimated as:

$$ER_y = BE_y - PE_y - L_y$$

Project emissions PEy, are considered to be zero, given that the power density of the project being 367.3W/m2 at full reservoir area.

According to ACM0002, no leakage effects need to be considered. Hence, $L_y = 0$.

The newly built "Qi'nan Hydro Power Project" will influence the dowmstream Mazitan small hydropower plant as the water flow will be small during dry season for Mazitan after construction of Qi'nan, so emission reductions will only be claimed for electricity production above the average historic electricity generation amount from Mazitan small hydropower plant.

Therefore the total emission reductions achieved by this project, ER_y is equal to BE_y

$$= (EG_y - EG_{historial}) * EF_y \quad (\text{unitl DATE}_{\text{BaselineRe trofit}})$$

And EG_Y =EGy ,pa + EGy,m

Where:

***EGy,pa* :**Net electricity to the grid by Project Activity
***EGy,m* :**Net electricity to the grid by Mazitan

BE_y: Baseline emissions (tCO_2)

EG_y: Total electricity supplied by the project to the grid (MWh)

$EG_{historical}$: Historical electricity production

EF_y: baseline emission factor (tCO_2/MWh)

y: refers to a given year

Estimated total electricity supplied annually to the grid by both power stations (EGy) = 66 640 MWh.

$EG_{historial}$ = 18 000 MWh/year as per electricity production data from the five most recent years as verified by DNV.

The baseline emission factor EF_y, for the project is determined and fixed ex-ante as a combined margin, which is the weighted average of the operating margin (OM) and build margin (BM) in accordance with the guidance provided by approved baseline and monitoring methodology ACM0002 version 6. The project developer has selected the default values of 50:50 as weights of operating margin and build margin. The selection is in accordance with the guidance provided in ACM0002.

The operating margin (OM) is calculated using the "simple OM" method which is justified because low cost and must run power plants constitute less than 50% of the total grid generation (SCPG).

The aggregated generation and fuel consumption data are used due to the more disaggregated data are not available in the SCPG. The IPCC 2006 default value for the carbon content of coal (25.8 tC/TJ) and a carbon oxidization factor of 100% are used to calculate the OM. Vintage data for the years 2003, 2004 and 2005 are used for calculation of the operating margin. The OM is calculated to be 1.0119tCO_2/MWh.

Because plant specific fuel consumption and electricity generation data is not public available in China, DNV requested guidance from the CDM Executive Board for a deviation of the baseline methodology of AM0005 and received the following answers which are deemed to be applicable for this project:

- Use of capacity additions for estimating the build margin emission factor for grid electricity.

- Use of weights estimated using installed capacity in place of annual electricity generation.

- Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

Since AM0005 was replaced by ACM0002, the deviation is deemed to be applicable to this project. Following the EB's guidance the build margin is calculated as follows:

- The capacity additions from the years 2003 to 2005 /20/ is chosen and reached 21.42% of total installed capacity.

- The weight of installed capacity additions for thermal power plant is accounted for 74.01% of total installed capacity additions;

- There are no data available of installed capacity additions for oil and gas power in SCPG.

However China Energy Statistics Yearbook (2006) /18/ shows that the oil and gas used in SCPG are small, accounting for 10.52% of the total CO_2 emissions. The installed capacity addition for coal, oil and gas power plants being regarded as proportional with their CO_2 emissions percentage is deemed reasonable.

- The coal consumption efficiency of 343.33 g SCE/kWh is selected as the best technology commercially available in China. It can be acknowledged as the best available data available for estimating the BM in the China /21/. This best technology corresponds to a 35.82% of power supply efficiency for coal-fired electricity generation. The gas and oil consumption efficiency of 258 g SCE/kWh is selected as the best technology commercially available in China /21/. It can be acknowledged as the best available data available for estimating the BM in the China. This best technology corresponds to a 47.67% of power supply efficiency for gas or oil-fired electricity generation.

- The IPCC 2006 value of 25.8 t C/TJ and a carbon oxidation factor of 100% are used to calculate the BM emission coefficients.

- The BM is calculated to be 0.6748 tCO_2/MWh

The combined margin of 0.84335 tCO_2/MWh is fixed ex-ante for the entire first crediting period.

The selection of the parameters is complete and transparent. The total estimated emission reductions over the first crediting period are estimated to 287 140tCO_2e. The GHG calculations are complete and transparent, and their accuracy has been verified.

4.7 Environmental Impacts

An environmental impact assessment (EIA) /5/ has been conducted according to Chinese laws and regulations. No significant environmental impacts have been identified.
There was no resettlement of people /4/ involved in this project. DNV verified that Compensation against loss of land has been allocated by money claim receipt /6/.

4.8 Comments by Local Stakeholders

The "Qi'nan hydro power project" is one of three hydro power projects along the Qi river; the Qi'nan hydro power project owner collected the opinions from representatives of village groups, local bankers, teachers, hydropower experts, hospital managers, police officers, tax officials, TV station administers and officials from different bureaus of the local government in Rucheng County /24/. Issues such as energy security, business opportunities, impact on eco- system, electricity tariff, etc have been discussed and majority of local residents didn't see any major negative changes to their life and environment. Stakeholder comment resolution by on-site corresponding meeting on 1 April 2004 shows that the proposed project receives strong support from the local people to achieve environmental and social benefits.

For some villagers from Gaoyue Village required the project owner to solve the irrigation problem. DNV verified that the division channel was completed as demonstrated in EIA report page 77 /5/which can guarantee the irrigation of the whole village and compensation was allocated for the village's. The responses of the 50 questionnaires were verified by DNV /33/.

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4.9 Comments by Parties, Stakeholders and NGOs

The PDD of "Qi'nan Hydro Power Project" Version 01 dated 10 February 2007 was made publicly available on DNV's climate change website (http://www.dnv.com/focus/climate_change/Projects/ProjectDetails.asp?ProjectId=1336) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 19 July 2007 to 17 August 2007.

No comment was 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	OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
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	~~**CAR 2**~~ OK
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	~~CAR 2~~ OK
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

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Requirement	Reference	Conclusion
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK
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	OK
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
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
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
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

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
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
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
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 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/ /4/	DR	The Qi'nan SHP station will be located on the lower reaches of Qijiang River, a branch of Oujiang River, two kilometers northeast of the town of Nandong, in Rucheng County, southeast corner of Hunan Province. The largest city near the project site is Guangzhou, in Guangdong Province. Coordinates: Longitude 133°25′12″; Latitude 25°27′36″		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR	The project's system boundary includes the project site and all the power plants that are connected to the South China Power Grid, for the estimation purposes of the emission factor. In FSR /4/ , one original Mazaitan hydro power plant is influenced by the proposed project, so this Mazaitan hydro power plant	~~CAR 1~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			should be included in the boundaries and the emissions reductions calculated according to the methodology.		
A.2. Participation Requirements *Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.*					
A.2.1. Which Parties and project participants are participating in the project?	/1/ /2/ /3/	DR	Rucheng County Yuzaikou Hydropower Co. Ltd from the host country China and Carbon Asset management Sweden AB from Sweden, the annex I Party are project participants for this project activity.		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/ /2/ /3/	DR	The letter of authorisation and the letter of approval for the project and its participants from the DNA of China were issued on 23 January 2008. The letter of authorisation and the letter of approval for the project and its participants from Sweden need to be submitted.	~~CAR 2~~	
A.2.3. Do all participating Parties fulfil the participation requirements as follows:	/1/	DR	The Republic of China has ratified in Kyoto Protocol on 30 August 2002, and established		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
- Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority			a DNA; National Development and Reform Commission of the People's Republic of China. DNA of Sweden: Swedish Energy Agency, Department of Energy system Analysis and Climate Change on ratification of the Kyoto Protocol on 31 May 2002.		
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR	The validation of the project activity does not reveal any information indicating that the project can be seen as diversion of any ODA funding towards China.		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	The project activity uses the widely used technology of turbines for electricity generation, which reflects the current good practice.		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	/1/ /4/	DR	The project uses state of the art technology with all the equipment produced		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
technologies in the host country?			domestically.		
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	The project owner makes provisions for the training and maintenance needs before the operation of the project.		OK
A.4. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	/1/ /2/	DR	The LoA from the DNA of China was issued on 23 January 2008 and confirmed that the project assists it in achieving sustainable development.		OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	As a renewable energy project, it will produce positive environmental and economic benefits and contribute to the local sustainable development special on the alleviation of the strong electricity demand in the local areas, and simulating the economic development in the aspect of construction materials.		OK
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	/1/	DR	Yes. The project applies the approved methodology ACM0002 "Consolidated methodology for grid connected electricity generation from renewable sources" 06th version.		OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/1/	DR	The project does not involve switching from fossil fuels to renewable energy at the site. The project will be connected to the SCPG, the geographic and system boundaries of SCPG can be clearly identified and information on the characteristics of the grid is available.		OK
B.2. Baseline Scenario Determination *The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.*					
B.2.1. What is the baseline scenario?	/1/	DR	The baseline scenario is that in the absence of the project activity, the provision of an equivalent amount of annual electricity would have been supplied by the SCPG, that		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the project will be connected. But as per methodology, it is required for: For project activities that modify or retrofit an existing electricity generation facility, the baseline scenario is the following: In the absence of the CDM project activity, the existing facility would continue to provide electricity to the grid (EGbaseline, in MWh/year) at historical average levels (EGhistorical, in MWh/year), until the time at which the generation facility would be likely be replaced or retrofitted in the absence of the CDM project activity (DATEBaselineRetrofit). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline electricity production (EGbaseline) is assumed to equal project electricity production (EGy, in MWh/year), and no emission reductions are assumed to occur. So, the PP should provide: a) A minimum of 5 years of historical	~~CAR 3~~	

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			generation data for Mazaitan hydro power plant. b) Replacement Schedule for Mazaitan hydro power plant.		
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/ /14/ /15/	DR	In addition, the process of baseline determination and relevant evidence of arguments should be described in PDD.	~~CL 1~~	OK
B.2.3. Has the baseline scenario been determined according to the methodology?	/1/ /14/ /15/	DR	See CAR3	~~CAR 3~~	OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/ /14/ /15/ /16/ /20/	DR	See CAR3	~~CAR 3~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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	Yes. All relevant national and sectoral policies, regulations and department rules and disciplines are considered such as the renewable energy law.		OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /14/ /15/ /16/ /20/	DR	Most recently available OM and BM data for SCPG should be used for baseline scenario data source. .	~~CL 2~~	OK
B.2.7. Have the major risks to the baseline been identified?	/1/	DR	There are no significant risks to the baseline except the enforcement of the Chinese renewable policy. However, this policy does not need to be taken into account as it is being implemented only now i.e. after the entry into force of decision 17.CP 7.		OK
B.3. Additionality Determination *The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.*					
B.3.1. Is the project additionality assessed according to	/1/	DR	Yes. For financial analysis, DNV compared		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
the methodology?	/15/		the input parameters for the financial analysis included in the PDD with the parameters stated in the FSR and was able to confirm that the values applied are consistent with the value stated in the FSR.		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	/1/	DR	All assumptions stated in a transparent and conservative manner.		OK
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	/1/ /4/	DR	The "tool for the demonstration and assessment of additionality" version 04 is applied. *Step 1 – Identification of alternatives to the project activity consistent with current laws and regulations*: Four alternatives to the proposed project are as the follows: Alternative 1: construction of a new hydroelectricity generation plant with installed capacity of 18MW connected to SCPG. Alternative 2: Electricity will continue to be generated by SCPG.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Alternative 3: Construction of a power plant using other sources of renewable energy with equivalent amount of installed capacity. Alternative4: The construction of coal-fired electricity plant, as commonly used in SCPG. In addition, the process of baseline determination and relevant evidence of arguments should be described in PDD. renewable energy, in S *Step 2 – Investment analysis:* As the proposed project generates financial and economic benefits other than CDM related income through the sales of electricity, a simple cost analysis (option I) can not be applied. The alternative for the baseline scenario of the proposed project is not a similar investment project, so option II is also not an appropriate choice. Hence, a benchmark analysis (option III) is selected for conducting the investment analysis.	~~CL 1~~	

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			According to "Economic evaluation code for small hydropower projects" (SL-16-95) issued by the Ministry of Water Resources, the benchmark FIRR on total investment for hydropower projects is 8%. Without the income from CERs, the FIRR of the proposed project is 7.10%, lower than the benchmark FIRR set in SL16-95, so the proposed project is financially unacceptable. With the income from CERs, the FIRR is increased to 9.66%. All input data has been verified by DNV to be consistent with FSR Step 3 –Barrier analysis: Investment barriers, technology barriers and barriers due to prevailing practice have been illustrated. Step 4 – Common practice analysis: Six existing hydropower projects with installed capacity of between 10-30 MW in Hunan Province are listed for common		

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			practice analysis. There are essential distinctions between this project and the other already existing hydropower projects in Hunan Province. First, the listed projects 1-2 are all developed by state-invested organizations which have larger capital reserves and operational capacity to allow them better (more and easier) access to project finance. Second, the unit costs of these projects are less than 6000CNY. And the IRR of the listed projects 3-6 are all higher than the national standard benchmark. In addition, except the revenues from electricity sales, some projects also have the colligated benefits from flood control, irrigation, water supply etc. Therefore, such projects are easier to build, and the benefits are excellent after the operation. But, the clarification about additionality is required for: • In the sensitivity analysis, the value at which the IRR will be equal to the benchmark and then the likelihood of	~~CL 3~~	

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			the parameter having this value to confirm that it is not likely that the IRR will become equal to the benchmark needs to be assessed. • However, for sensitivity analysis, tariff and operating and maintaining costs should be considered as other factors affecting IRR. • For barrier analysis, the evidence should be provided to substantiate those barriers. • For common practice, what is the data source for hydropower projects (between 10-30MW) in Hunan Province? And explain that the area selected for the common practice analysis reasonable or not.		
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/ /4/ /8/ /9/	DR	Please state in PDD how to consider the incentive from CDM prior to the starting date of project activity and provide the relevant evidences.	~~CAR 4~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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/ /14/ /15/	DR	According to ACM002, the project emission is zero if the power density of the project is greater than 10 W/m^2. However, the power density of the project should be given in PDD.	~~CL 4~~	OK
B.4.2. Have conservative assumptions been used when calculating the project emissions?	/1/	DR	Same as above.	~~CL 4~~	OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	/1/	DR	Same as above.	~~CL 4~~	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	According to the methodology, the baseline		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?	/16/ /21/		emission of this upgrade project is calculated as follows: $BE_y = EG_y * EF_y$ $= (EG_y - EG_{historial}) * EF_y$ (unitl DATE $_{Basel}$ Where: BE_y: Baseline emissions (tCO_2) EG_y: Electricity supplied by the project to the grid (MWh) $EG_{historical}$: Historical Electricity Production EF_y: baseline emission factor (tCO_2/MWh) *y*: refers to a given year Clarification is required for: Estimated electricity supplied annually to the grid by both power stations (EGy) and EG baseline .	~~CAR 5~~	
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/ /16/	DR	See B.5.1.	~~CAR 5~~	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/ /16/ /21/	DR	No significant uncertainties need to be addressed for this project.		OK
B.6. Calculation of GHG Emission Reductions –					

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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/ /14/	DR	According to ACM0002, potential leakage effects, such as emissions arising from power plant construction and land inundation do not have to be considered.		OK
B.6.2. Have conservative assumptions been used when calculating the leakage emissions?	/1/ /14/	DR	To see above.		OK
B.6.3. Are uncertainties in the leakage emission estimates properly addressed?	/1/ /14/	DR	There are no uncertainties in the leakage emission estimates.		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 ex-ante emission reduction calculations are as follows: $ER_y = BE_y - PE_y - L_y$	~~CAR 5~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			$PE_y = 0$ According to ACM0002. According to ACM0002, given that the power density of the project being 367.3W/m^2 from the FSR at full reservoir area, no leakage is expected. Therefore, $L_y = 0$. The emission reductions are real, measurable and give long-term benefits related to the mitigation of climate change. According to the methodology, the baseline emission of this upgrade project is calculated as follows: $BE_y = EG_y * EF_y$ $= (EG_y - EG_{historial}) * EF_y$ (unitl DATE $_{Basel}$ Clarification is required for: Estimated electricity supplied annually to the grid by both power stations (EGy) and $EG_{baseline}$.		
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	The monitoring plan is documented according to the approved monitoring methodology ACM0002 *"consolidated*		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			monitoring methodology for zero emissions grid- connected electricity generation from renewable sources" and in a complete and transparent manner.		
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 I	The data will be kept for 2 years after the end of the crediting period.		OK
B.9. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
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/ /4/ /14/	DR I	The project does not result in project GHG emissions as the power density is greater than 10 W/m^2. This is in line with the methodology, ACM0002.		OK
B.9.2. Are the choices of project GHG indicators reasonable and conservative?	/1/	DR	The project does not result in project GHG emissions.		OK
B.9.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	/1/	DR	The project does not result in project GHG emissions.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.9.4. Is the measurement equipment described and deemed appropriate?	/1/	DR	The project does not result in project GHG emissions.		OK
B.9.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR	The project does not result in project GHG emissions.		OK
B.9.6. Is the measurement *interval* identified and deemed appropriate?	/1/	DR	The project does not result in project GHG emissions.		OK
B.9.7. Is the *registration, monitoring, measurement* and *reporting* procedure defined?	/1/	DR I	The project does not result in project GHG emissions.		OK
B.9.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR I	The project does not result in project GHG emissions.		OK
B.9.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	The project does not result in project GHG emissions.		OK
B.10. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for*					

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
reliable and complete baseline emission data over time.					
B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	Yes. The project uses the ex-ante determination approach to calculate the OM and BM. Only electricity generated and sold to the grid will be monitored ex-post. The project developer and the grid company will take a meter reading on a monthly basis. This number is confirmed in the form of an "Electricity Transaction Note" (ETN). The measurements will be archived electronically and by paper and will be stored during the crediting period and two years after that. The measurements will be cross checked with the electricity sales receipts.		OK
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/	DR	Further clarifications are required regarding metering of the original hydro station.	~~CL 5~~	OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/	DR	The electricity generated delivered to the grid will be monitored directly.		OK
B.10.4. Is the measurement *equipment* described and deemed appropriate?	/1/	DR	The electricity generated delivered to the grid will be monitored by main electricity and backup electricity meter at the substation and		OK

VALIDATION REPORT

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			double checked by electricity sales receipts. Further clarifications are required regarding metering of the original hydro station.	~~CL 5~~	
B.10.5. Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR	Further clarifications are required regarding metering accuracy and how to deal with erroneous measurements.	~~CL 6~~	OK
B.10.6. Is the measurement *interval* for baseline data identified and deemed appropriate?	/1/	DR	Yes. It is automation recording by computers on hourly basis.		OK
B.10.7. Is the registration, *monitoring*, *measurement* and *reporting* procedure defined?	/1/	DR	The procedures for records handling are identified in the monitoring plan.		OK
B.10.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR	Yes. The maintenance of monitoring equipment and installations are according to the national industry standard. The calibration interval is according to national 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	The procedures for records handling are identified in the monitoring plan in PDD. The relevant documents will be kept for at least two years after the end of the crediting period.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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/ /14/	DR	According to ACM0002, potential leakage effects, such as emissions arising from power plant construction does not have to be considered.		OK
B.11.2. Are the choices of project leakage indicators reasonable and conservative?	/1/ /14/	DR	Same as above.		OK
B.11.3. Is the measurement method clearly stated for each leakage value to be monitored and deemed appropriate?	/1/ /14/	DR	Same as above.		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/ /5/	DR I	Yes. Monitoring of sustainable development indicators is not required by the Chinese DNA. The environmental impacts are		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			identified in the EIA that was approved.		
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/ /5/	DR I	Chinese DNA, NDRC, does not require collection and archiving of data related to environmental, social and economic impacts. The environmental impacts will be monitored by local environmental authority.		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/ /5/	DR I	Same as above.		OK
B.13. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
B.13.1. Is the authority and responsibility of overall project management clearly described?	/1/	DR I	Only structure for the authority and responsibility of project management is described in the PDD, detailed information should be presented in monitoring plan.	~~CL 7~~	OK
B.13.2. Are procedures identified for training of monitoring personnel?	/1/	DR I	Yes.		OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR I	According to the actual status of the hydropower project, no emergency situation which can cause unintended emissions is		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			expected from the project.		
B.13.4. Are procedures identified for review of reported results/data?	/1/	DR I	Data and records will be checked prior to being stored and archived.		OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR I	Detailed procedures should be in place and maintained and implemented at the latest prior to the start of the crediting period to enable subsequent verification of emission reductions.	~~CL 8~~	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 I	The project's starting date is on 1 April 2006. The lifetime of the project is expected to be 30 years. However, the resettlement contract was signed on 28 November 2004; please clarify why is so large gap with the construction starting date?	~~CL 9~~	OK
C.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR I	The date of registration of the CDM project activity can not be on 01/05/2008. Starting date of the first crediting period should be at least 8 weeks from the date of	~~CL 10~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			requesting the project for registration. Hence, the start date of the project activity needs to be revised.		
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/ /5/	DR I	Yes. The environmental impacts are sufficiently described in EIA and PDD, which includes the impact on water quality, vegetation, air, occupied land and resettlement.		OK
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/ /5/	DR	Environment Impact Assessment by Hunan Provincial Environment Protection Science Institute in August 2005 and approved by Hunan Provincial Environment Protection Bureau on 29 August 2005.		OK
D.1.3. Will the project create any adverse environmental effects?	/1/ /5/	DR I	The project will have environment impact in construction period and can be alleviated through protecting measures.		OK
D.1.4. Are transboundary environmental impacts considered in the analysis?	/1/ /5/	DR I	There is no foreseeable transboundary environmental impact in this project.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
D.1.5. Have identified environmental impacts been addressed in the project design?	/1/ /5/	DR I	Yes.		OK
D.1.6. Does the project comply with environmental legislation in the host country?	/1/ /5/	DR I	The EIA was approved.		OK
E. Stakeholder Comments *The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.*					
E.1.1. Have relevant stakeholders been consulted?	/1/ /24/	DR I	Village administration meetings were held where locals could raise their concerns and give opinions about the project and also to hear from the village representative information on the development of the Qi'nan project. Please clarify why it took so long time the preliminary study and approval of this project in 2003 described in PDD while FSR finished in May 2005?	~~CL 11~~	OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/ /24/	DR I	Representatives of village groups, local bankers, teachers, hydropower experts, hospital managers, police officers, tax officials, TV station administers and officials		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			from different bureaus of the local government in Rucheng County have been consulted.		
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/ /24/	DR I	The stakeholder consultation process is in accordance with Chinese EIA regulations.		OK
E.1.4. Is a summary of the stakeholder comments received provided?	/1/ /24/	DR I	A summary of the stakeholder comments received is described in the PDD. But elaborate how to consult stakeholder and how to do statistics and summary in PDD?	~~CL 12~~	OK
E.1.5. Has due account been taken of any stakeholder comments received?	/1/ /24/	DR I	The due account will be taken according to the requirements from the EIA report and as described in the PDD.		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
CAR1 The project's system boundary includes the project site and all the power plants that are connected to the South China Power Grid, for the estimation purposes of the emission factor. In FSR /4/ , one original Mazaitan hydro power plant is influenced by the proposed project, so this Mazaitan hydro power plant should be included in the boundaries and the emissions reductions calculated according to the methodology.	A.1.2.	Mazitan has been included in the project boundary and emission reduction calculation has been modified as: $BE_y = EG_y * EF_y$ $= (EG_y - EG_{historial}) * EF_y$ (unitl DATE Basel Where: BE_y: Baseline emissions (tCO_2) EG_y: Electricity supplied by the project to the grid (MWh) $EG_{historical}$: Historical Electricity Production EF_y: baseline emission factor (tCO_2/MWh) y: refers to a given year Clarification is required for: Estimated electricity supplied annually to the grid by both power stations (EGy) and EG baseline .	OK Original Mazitan hydro power plant influenced by the proposed project has been considered inside project boundary and emission reductions will only be claimed for electricity production above the average historic electricity generation amount from the original Mazitan. CAR 1 Closed
CAR2 The letter of authorisation and the letter of approval for the project and its participants from Sweden need to be submitted.	A.2.2. A.4.1.	Letter of Approval issued by the DNA of Sweden is on 24 June 2008.	Verified LoA issued on 24 June 2008 by Swedish DNA CAR 2 Closed

VALIDATION REPORT

CAR 3 As per methodology, forproject activities that modify or retrofit an existing electricity generation facility, the baseline scenario is the following: In the absence of the CDM project activity, the existing facility would continue to provide electricity to the grid (EGbaseline, in MWh/year) at historical average levels (EGhistorical, in MWh/year), until the time at which the generation facility would be likely be replaced or retrofitted in the absence of the CDM project activity (DATEBaselineRetrofit). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline electricity production (EGbaseline) is assumed to equal project electricity production (EGy, in MWh/year), and no emission reductions are assumed to occur. So, the PP should provide: a) A minimum of 5 years of historical generation data for Mazaitan hydro power plant. b) Replacement Schedule for Mazaitan hydro power plant.	B.2.1. B.2.3. B.2.4.	a) The recent 5 years of historical generation data for Mazitan is provided. b) Mazitan is commissioned in 1999, its lifetime is 35 years, it might be discarded in 2034 in the absence of Qi'nan project; while Qi'nan is expected to commission in October 2008, its crediting period is till September 2029.	OK Historical generation of Mazitan and its service life from 1999 to 2034 has been substantiated by Rucheng Country Water Bureau on 19 June 2008. CAR 3 Closed

CAR 4 Please state in PDD how to consider the incentive from CDM prior to the starting date of project activity and provide the relevant evidences.	B.3.4.	The IRR calculated by the FSR is only 7.10%, lower than bnechmark of 10%, so revenues of CDM is considered to overcome the financial barrier. And the project owner started to seek CDM financing. Finally, the project owner contracted IC-SHP for CDM consultation in December 2005.	OK The relevant documents such as FSR and contract between project owner and IC-SHP have been verified by DNV. CAR 4 Closed

CAR 5 Corrective action is required for: Estimated electricity supplied annually to the grid by both power stations (EGy) and EG baseline.	B.5.1. B.5.2. B.7.1.	PDD P.22 The Qi'nan project is proposed to fully utilize the water resources of the river section. While,the original built Mazitan hydro power plant will be influenced during dry season, but operate normally during wet season. The effective electricity supplied to grid by Qi'nan will be 56 640 Mwh. The historical average annual output of mazitan is 18 000 Mwh (EGhistorical), and its expected average annual output after the commission of Qi'nan will amount to 10 000Mwh, which will be connected to Qi'nan project after its commission. The lifetime of Mazitan is 35 years and it was commissioned in 1999. It will be likely replaced in 2034 in the absence of the proposed project. Thus the total annual electricity supplied to CSPG by both projects will be 66 640Mwh (EGy).	OK The estimation is based on effective electricity supplied to grid by Qi'nan of 56,640Mwh and the historical average annual output of mazitan being 18,000Mwh(EGhistorical); that realistic emission reductions will only be claimed for electricity production above the average historic electricity generation amount from the original Mazitan. CAR 5 closed

CL1 The process of baseline determination and relevant evidence of arguments should be described in PDD.	B.2.2.	Four realistic and credible alternatives to the project activity are considered to determine the baseline. The proposed project is a newly-built hydropower project, however, one original hydro project Mazitan in downstream will be influenced during dry season. Its annual output will be reduced in some degree. The recent 5 years' historical generation of the original project is available, and its lifetime is 35 years (1999-2034) which will cover the whole crediting period of the proposed project. According to ACM0002, the project boundary includes the proposed project site and all the power plants connected to the grid which the proposed project is also connected to. As the Mazitan is in the project boundary and it need to deduct the influenced amount of generation during the calculation of baseline emission.	OK The sufficient sectoral and local policy and mandatory laws and regulations have been taken into account to determine the baseline scenario. CL 1 closed

CL2 Most recent available OM and BM data for SCPG should be used for baseline scenario data source.	B.2.6.	The latest OM, BM data published by NDRC has adopted.	OK The most recent available data for OM and BM has been verified to be used in in the calculation of ER. CL 2 closed

CL3 The clarification about additionality is required for: • In the sensitivity analysis, the value at which the IRR will be equal to the benchmark and then the likelihood of the parameter having this value to confirm that it is not likely that the IRR will become equal to the benchmark needs to be assessed. • For sensitivity analysis, tariff and operating and maintenance costs should be considered as other factors affecting IRR. • For barrier analysis, the evidence should be provided to substantiate those barriers. • For common practice, what is the data source for hydropower projects (between 10-30MW) in Hunan Province? And explain that the area selected for the common practice analysis reasonable or not.	B.3.3.	1 Sensitivity analysis considered four parameters affecting the value of IRR: total investment, operation and maintenance cost, operation hours and tariff 2 As the investment analysis has already proven that without the CDM revenue the project could not be implemented. The barrier analysis has not adopted. 3 The projects listed in common practice are in the same region (Hunan Province), rely on a broadly similar technology, are of a similar scale(small scale r ural hydropower station with the capacity below 25MW[1], but >15MW belongs to large scale CDM project), and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, which are built after the separate of plant and grid in 2002. As most of the hydropower plants completed before 2002 were all developed by stated-owned enterprises, or constructed with national or local governmental funds, or the government provided the loan guarantee, the developers didn't have any financing difficulties. So we do not consider these projects as common practice activity.	OK The sensitivity analysis has been completed to include all variables and to change to the extent for the IRR to reach the benchmark. Barrier analysis is not selected because investment analysis proves that the proposed project is not viable without the revenues from CDM In the common practice analysis, data source has been identified and verified by DNV. CL 3 closed.

[1] Economic Evaluation Code for Small Hydropower Projects"(SL 16-95)

CL4 According to ACM002, the project emission is zero if the power density of the project is greater than 10 W/m2. However, the power density of the project should be given in PDD.	B.4.1. B.4.2. B.4.3.	The project is a new hydropower plant, its surface area at full reservoir level is 49000m^2,(FSR) the installed capacity is 18MW, so the power density of the project is 367.3w/m^2 which is greater than 10 w/m^2	OK The power density has been clearly stated in the PDD. CL 4 closed.
CL5 Further clarifications are required regarding metering of the original hydro station.	B.10.2. B.10.4.	The original project will connect to Qi'nan through the transformer of which to the grid. The revenue meter will measure the electricity generated by both projects.	OK Metering for the two hydro projects and claiming emission reductions only of electricity generation above historical Mazitan hydro generation, gives conservative and appropriate ER. CL 5 closed

CL6 Further clarifications are required regarding metering accuracy and how to deal with erroneous measurements.	B.10.5.	The revenue meter M5 records the electricity delivered to grid, which is the key part of the monitoring. It is a 2-way recording meter and its accuracy is 0.5S. The data will be measured hourly and recorded monthly. The grid company and project owner will read the revenue meter every month. *Back-up meter & cross-check meter reading:* The back-up meter can be used in failure of the revenue meter, which has the same precision. The project owner will read M1.M2, M3 hourly and recorded in the management system daily as well. These data can be used for cross-check with the revenue meter, taking account of transmission losses. The above meters will meet the related standard. **1. Quality Control** *Meter adjustment* All the meters should be in good status and meet the national electricity industry standards in order to insure the precision of meter. Periodic tests should be carried out by qualified institutions or companies. After the test, the meter should be sealed by the project owner and the power grid company. Any party mustn't dismantle or change independently. When the following circumstances occurred, all the ammeters should be tested in 10 days: —the error of revenue meter or the other meters exceeds the allowable range specified by the national standards(JJG596-99); — the meter is repaired or replaced. When the revenue meter is failed, the project should read and record the back-up meter data in stead. In case of failure of both revenue meter and back-up meter, the data of the cross-check meters can be used, the electricity delivered to grid should be calculated as the follows: a) the data from cross-check meters will be used for the period, with a minor adjustment to allow for transmission losses; b) according to the historical transmission loss rate to calculate the electricity delivered.	OK The CL has been addressed accordingly. CL 6 closed.

CL7 Only the structure for the authority and responsibility of project management is described in the PDD, detailed information should be presented in monitoring plan.	B.13.1.	The general manager of the proposed project Mr. Liu Yihou will responsible for the whole monitoring plan and checkup the data filed and the monitoring report. Mr. Yang Shuhua is designated as CDM manager to take charge of supervising and demonstrating all the measuring and recording tasks, such as collecting data (ammeter reading, sale receipts), calculating emission reduction and preparing monitoring report etc; he will also be responsible for training the relative staffs, such as CDM knowledge, the operational regulations, the data recording requirements and the management rules etc. Engineer He Xiaoping will responsible for the hydraulic equipment (including turbine, generator etc) maintenance; Deng Shengxiao will be responsible for the electronic equipment (including meters, control room etc). Zhu Xiaobin will be responsible for data reading and recording.	OK Staff responsibility is properly assigned and further training for staff is further emphasized. CL 7 closed

CL8 Detailed procedures should be in place and maintained and implemented at the latest prior to the start of the crediting period to enable subsequent verification of emission reductions.	B.13.5.	The data will be measured hourly and recorded monthly. The grid company and project owner will read the revenue meter every month. The grid company will send invoice to the owner with the amount of electricity that the project supplied to grid which can be checked by the project owner with their own readings. The agreed invoice is the significant source for indicating the electricity delivered to grid and emission reduction calculation.	OK The implementation of the detailed monitoring procedures needs to be checked during first periodic verification.
CL9 The project's starting date is on 1 April 2006. The lifetime of the project is expected to be 30 years. However, the resettlement contract was signed on 28 November 2004; please clarify why so large gap is with the construction starting date?	C.1.1.	The project owner established their company in 2003 and started the preparation for Qi'nan project. In October 2004, the land acquisition was approved by the local government. The Hunan Hydraulic &Hydroelectric Survey & Design Institute was trusted to carry out the feasibility study which was finished in May 2005. As the IRR calculated in the FSR wa s only 7.10%, the project owner started to seek CDM fincancing and contracted with IC-SHP for CDM consultation in December 2005. The EIA report was approved in August 2005. After obtained the necessary approvals, the main structure engineering has started in April 2006. There is no resettlement for the project.	OK The documens have been assessed by DNV and explanation are reasonable and accepted. CL 9 closed.

CL10 The date of registration of the CDM project activity can not be on 01/05/2008. Starting date of the first crediting period should be at least 8 weeks from the date of requesting the project for registration. Hence, the start date of the project activity needs to be revised.	C.1.2.	Starting date of the first crediting period moved backward to 01/11/08, or date of registration, whichever is later?	OK The crediting period is updated in the latest version of the PDD. CL 10 closed
CL11 Please clarify why it took so long time from the preliminary study and approval of this project in 2003 described in the PDD while FSR finished in May 2005?	E.1.1.	Wrong expressed in the original PDD. The project owner started primary investigation and phrase work in 2003. The FSR was finished in May 2005 and approved in March 2006.	OK The correct dates of the FSR have been assessed by DNV. CL 11 closed

CL12 A summary of the stakeholder comments received is described in the PDD. But please elaborate on how to consult stakeholder and how to do statistics and summary in PDD?	E.1.4.	On April 10th, 2005, the project owner has taken public questionnaire approach and visited 50 residents to collect the individual opinions, attitude, suggestion and reviews on the proposed project from extensive groups and persons affected in the project area. The investigation had distributed 50 questionnaires, and collected 50 effective questionnaires back, the percentage is 100%.	OK The consultation process of stakeholders affected by the proposed project was verified by DNV as reasonable. CL 12 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:***	Yes
CDM Verifier:	Yes	***JI Verifier:***	Yes
Industry Sector Expert for Sectoral Scope(1):	Sectoral scope 1,2,3 & 9		
Technical Reviewer for (group of) methodologies:			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	*AM0021*	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029	Yes	*AM0023*	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	*AM0024*	Yes
ACM0004	Yes	*AM0027*	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	*AM0028, AM0034*	Yes
ACM0007	Yes	*AM0030*	Yes
ACM0008	Yes	*AM0031*	Yes
ACM0009, AM0008, AMS-III.B	Yes	*AM0032*	Yes
AM0006, AM0016, AMS-III.D	Yes	*AM0035*	Yes
AM0009, AM0037	Yes	*AM0038*	Yes
AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS-III.I	Yes	*AM0041*	Yes
AM0014	Yes	*AM0034*	Yes
AM0017	Yes	*AMS-II.A-F*	Yes
AM0018	Yes	*AMS-III.A*	Yes
AM0020	Yes	*AMS-III.E, AMS-III.F*	Yes

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Servicer

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

Sun Shu Yong

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, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director

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Miguel Rescalvo

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		
ACM0002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes		
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes		

Høvik, 3 July 2007

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Michael Lehmann
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Cui Ping Deng

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, 2 May 2008

Michael Lehmann
Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

Francisco Zamarron

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

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

Høvik, 30 November 2007

Michael Lehmann
Technical Director, International Climate Change Services