



VALIDATION REPORT

48 MW Duduluo River Hydroelectric Power Plant, in China

REPORT No. 2007-1187

REVISION No. 03



VALIDATION REPORT

DET NORSKE VERITAS
CERTIFICATION AS

Veritasveien 1
N-1322 Høvik
Norway
<http://www.dnv.com>

| | |
|------------------------------------|--|
| Date of first issue: 2007-10-17 | Project No.: 2007-1187 |
| Approved by: Hendrik W. Brinks | Organisational unit: International Climate Change Services |
| Client: First Climate AG | Client ref.: Marcello Balasini |

Project Name: 48 MW Duduluo River Hydroelectric Power Plant

Country: China

Methodology: ACM0002

Version: 06

GHG reducing Measure/Technology: Grid connected renewable electricity generation

ER estimate: 166 393 tCO₂e per annum

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 *48 MW Duduluo River Hydroelectric Power Plant* in China, as described in the PDD version 04 of 30 March 2009 meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology ACM0002, version 6. Hence DNV requests the registration of the project as a CDM project activity.

| | | |
|--|--------------------------------------|----------------|
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| Report title: 48 MW Duduluo River Hydroelectric Power Plant in China | | |
| Work carried out by: Covarrubias, Elfride; Qing Xing, Sequoia A; Zamarron, Francisco; Lehmann, Michael; Gaurav Srivastava | | |
| Work verified by: Kumaraswamy Chandrasekhara | | |

Key words:

Climate Change

Kyoto Protocol

Validation

Clean Development Mechanism

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the Client or responsible organisational unit

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☐ Unrestricted distribution



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Abbreviations

| | |
|-------------------|---|
| CAR | Corrective Action Request |
| CDM | Clean Development Mechanism |
| CEF | Carbon Emission Factor |
| CER | Certified Emission Reduction |
| CL | Clarification request |
| CO ₂ | Carbon dioxide |
| CO ₂ e | Carbon dioxide equivalent |
| CSPG | China Southern Power Grid |
| DNV | Det Norske Veritas |
| DNA | Designated National Authority |
| GHG | Greenhouse gas(es) |
| GWP | Global Warming Potential |
| IPCC | Intergovernmental Panel on Climate Change |
| MP | Monitoring Plan |
| MVP | Monitoring and Verification Plan |
| NGO | Non-governmental Organisation |
| ODA | Official Development Assistance |
| PDD | Project Design Document |
| UNFCCC | United Nations Framework Convention on Climate Change |



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1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the “48 MW Duduluo River Hydroelectric Power Plant” project in China. The validation was conducted on the basis of UNFCCC requirements 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 the stated criteria.

The host Party is China and the Annex I Party is Switzerland. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants. The DNA of China in the LoA issued on the 26 August 2007 /2/ 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 6 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”

By the generation of renewable power using available hydro resources and displacing the thermal dominated grid power, the project results in reduction of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 166 393 tCO₂e per year over the fixed crediting period of 10 years. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

In summary, it is DNV’s opinion that the “48 MW Duduluo River Hydroelectric Power Plant” project in China, as described in the PDD version 04 of the 30 March 2009 meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria, and correctly applies the approved baseline and monitoring methodology ACM0002 version 06. DNV therefore requests the registration of the above indicated project as a CDM project activity.



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2 INTRODUCTION

First Climate AG (formerly known as Factor Consulting + Management AG) has commissioned DNV to perform a validation of the *48 MW Duduluo River Hydroelectric Power Plant* project in China (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

2.1 Objective

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

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0002 version 06 /4/. The validation team has, based on the recommendations in the Validation and Verification Manual /3/ employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

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

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3 METHODOLOGY

The validation consisted of the following three phases:

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

The following sections outline each step in more detail.

3.1 Desk Review of the Project Design Documentation

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

- /1/ 48 MW Duduluo River Hydropower Power Plant PDD, Version 1 of 15 February 2007, Version 03 of 11 July 2008 and Version 04 of 30 March 2009.
- /2/ Letter of Approval issued by DNA of China on 26 August 2007.
- /3/ International Emission Trading Association (IETA) & the World Bank's Prototype Carbon Fund (PCF): Validation and Verification Manual.
- /4/ ACM0002, version 6, Consolidated Baseline and Monitoring Methodology for grid-connected electricity generation from renewable sources.
- /5/ CDM EB, answer to DNV's request for deviation of Chinese project activities from AM0005, received on 1 December 2005.
- /6/ FSR issued by Water & Electric Investigation & Design Institute of Kunming University of Science & Technology in July 2005 and Approval of FSR issued by Yunnan Provincial Development and Reform Committee on the 10 April 2007.
- /7/ The Financial Analysis Excel sheets based on the FSR.
- /9/ Tool for the Demonstration and Assessment of Additionality, version 05.
- /10/ EIA Report of May 2006 and approval letter by Yunnan Provincial Environmental Protection Bureau on 18 September 2006.
- /11/ http://en.chinagate.com.cn/reports/2007-09/13/content_8872839.htm
- /12/ Yunnan Statistical Yearbook 2003-2005 Editions, survey by the project owner and Chinese DNA website.
- /13/ Chinese DNA website: <http://cdm.ccchina.gov.cn>
- /14/ The Construction Permit issued by Nujiang Prefecture Development and Reform Committee on the 11 May 2007.
- /16/ Chinese Economic Evaluation Code for Small Hydropower Projects.
- /18/ 2006 revised IPCC guidelines for National Greenhouse Gas Inventories.
- /19/ China NDRC: China's Regional Grid Baseline Emission Factors, 9 August 2007.
- /20/ China Energy Statistical Yearbook, 2006



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- /21/ China Electricity Power Yearbook 2004, 2005, 2006.
- /22/ Letter of Approval issued by the Federal Office for the Environment (FOEN) on the 21 May 2008.
- /23/ 28 Questionnaires filled by local residents in the Project Public Consultation Process
- /24/ Certification issued by the Commercial Registry of Canton Zurich the 4th of July 2008
- /25/ News on 19 December 2007 from
http://www.xg360.com.cn/hall/sector_archives/sector_news_detail.aspx?id=33830
- /26/ Yunnan Nuijiang Grid Company Agreement dated on 17 February 2008.
- /27/ Approval of Land Use was issued by Department of Land and Resources of Yunnan Province on 26 December 2006.
- /28/ Investment Strategy Report on Electric Power Industry 2005.
- /29/ Grid tariff confirmation endorsement by Yunnan Provincial Development and Reform Committee of 2 September 2005.
- /30/ <http://www.leica-geosystems.com.cn/newsdetail.asp?l3=0&nid=469>
- /31/ <http://www.baoshan.cn/4034/2005/10/25/707@277291.htm>
- /32/ <http://0871.und.cn/small/cpybase.do?companyid=D658A7E06D9B41318F44FBF1B0E6C0E7>
- /33/ <http://0871.und.cn/small/cpybase.do?companyid=D658A7E06D9B41318F44FBF1B0E6C0E7>
- /34/ <http://news.sina.com.cn/c/2004-12-30/09444669685s.shtml>
- /35/ <http://finance.memail.net/050110/129,5,571873,00.shtml>
- /36/ <http://www.ydxw.com/showinfo.asp?id=32571>
- /37/ http://www.7c.gov.cn/color/ContentDisplay_906.aspx?nContentId=21605
- /38/ http://www.bhi.com.cn/info/show/Show_N107.asp?ID=78270&Code=R5IDEH
- /39/ http://www.ynws.gov.cn/docdetail_new.asp?id1=20050321081428
- /40/ http://www.7c.gov.cn/color/DisplayPages/ContentDisplay_455.aspx?contentid=9180
- /41/ http://www.ynfn.gov.cn/zwgk/zwtdt/200605/zwgk_4919.html
- /42/ <http://ynepb1.yn.gov.cn/doc/200503/lqxpzsdz.doc>
- /43/ <http://www.zj71.com/show.php?id=289>

The main changes between the PDD version published for the 30 days stakeholder commenting period and the final version submitted for registration are due to the clarification and corrective action requests raised by DNV (please, refer to Table 3 of the validation protocol in Appendix A of this report).



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3.2 Follow-up Interviews with Project Stakeholders

Representative of DNV performed the site visit on 10 May 2007, DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified during the desk review of project design document. Representatives of Luishui County Quande Hydro electrical Power Development Limited and Factor Consulting + Management AG were interviewed. The main topics of the interviews are summarized below.

| Date | Name | Organization | Topic |
|------------|-----------------------|--|---|
| 2007/05/10 | Mr. Shimao Lai | Luishui County Quande Hydroelectrical Power Development Ltd. | <ul style="list-style-type: none"> ➤ Financials of the project ➤ Environmental compliance ➤ Estimated emission reductions ➤ Project additionality |
| | Mr. Marcello Balasini | Factor Consulting + Management AG | ➤ Stakeholders consultation process |
| | Mr. Richard Mao | | ➤ Technology applied and operational lifetime. |
| | Ms. Elisa Lee | | ➤ Baseline data. |
| | Ms Lilian Sun | | <ul style="list-style-type: none"> ➤ Monitoring and reporting procedures. ➤ Calibration, internal audit and corrective action procedures. ➤ Provisions for training, operation and maintenance |

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 was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

The validation protocol consists of three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the *48 MW Duduluo River Hydroelectric Power Plant* is enclosed in Appendix A to this report.



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

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

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

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

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

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

Figure 1: Validation protocol tables



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3.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical reviews were 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 |
|---------------------------|------------------|-------------------|----------------|
| CDM Validator | Covarrubias | Elfride | Italy |
| GHG Auditor | Zamarron | Francisco | Italy |
| GHG Auditor | Gallucio | Giulia | Italy |
| GHG Auditor | Qing Xing | Sequoia A | China |
| Trainee | Srivastava | Gaurav | India |
| Sector Expert | Lehmann | Michael | Norway |
| Technical Reviewer | Chandrashekara | Kumaraswamy | India |

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



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4 VALIDATION FINDINGS

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

The final validation findings relate to the project design as documented and described in the revised and resubmitted Project Design Document /1/.

4.1 Participation Requirements

The project activity has been proposed by Lushui County Quande Hydroelectrical Power Development Ltd. of the host Party China. Switzerland has been identified as the Annex I Party. First Climate (Switzerland) AG (Formerly know as Factor Consulting + Management AG) /24/ is the project participant from Switzerland. Both, China and Switzerland, meets all the requirements for participating in a CDM project. Both parties have ratified the Kyoto Protocol and have established the DNA as per participation requirement under Kyoto Protocol.

The letter of approval (LoA) from the DNA of China, authorizing Lushui County Quande Hydroelectrical Power Development Ltd. as the project participant and confirming that the project assists in achieving sustainable development in China, was issued on 26 August 2007 /2/

The DNA of Switzerland has issued a LoA on 21 May 2008 /22/, authorizing First Climate (Switzerland) AG (Formerly know as Factor Consulting + Management AG) as the project participant from Switzerland.

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 project activity involves construction and operation of a 48 MW run-of-river hydro electric power station without regulating capacity on the Duduluo River in the Chenggan Town, Lushui County, in China. The project will be connected to the China southern power grid (CSPG). The technology used in the project is available in China and no transfer of technology is envisaged. The hydro-based power plant will generate electricity by utilizing the available hydro potential in the region; the project activity includes construction of small weirs, diversion tunnels, channels and powerhouse. Water at the high up catchment area is channelled by weir #3, and then flows along a diversion tunnel to weir #1, where water pressure is boosted and channelled by another diversion tunnel to the powerhouse. The weir #2 is built at the lower catchment area, which is 400 m away from the powerhouse, nearby the tunnel. The water collected by the weir #2 flows into the tunnel and, ultimately, into the powerhouse. The surface area at full reservoir level in the catchment area is 27 927 m² which represents a power density of 1 718 W/m².

The 48 MW installed nominal capacity is provided by three units consisting of a Francis turbine (Model CJA237-L-165/4x10) of rated capacity 16.58 MW each and a vertical shaft generator (Model SF10-24/4250) of 16 MW each. The proposed technology was approved by

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the Yunnan Provincial Development and Reform Commission on the 10 April 2007 as part of the Feasibility Study Report /6/.

The Feasibility Study Report /6/ contemplates 4 576 hours of project operation at full capacity per year, which corresponds to an average annual generation of 219.65 GWh and a net electricity supply to the grid of 197.29 GWh with zero carbon emissions.

The start date of the project activity has been identified as 11 May 2007, which is the date of permit for starting construction /14/. The project participant has chosen to fix the starting date of the first crediting period as 1 January 2009. The estimated amount of emission reductions over the fixed crediting period of 10 years is 1 663 930 tCO₂e, on average 166 393 tCO₂e per year.

4.3 Baseline Determination

The “48 MW Duduluo River Hydroelectric Power Plant” applies the approved consolidated baseline methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 06 /4/. Its applicability is justified as the project fulfils the following criteria:

- 1) New hydroelectric power projects with reservoirs having power densities (installed power generation capacity divided by the surface area at full reservoir level) greater than 4 W/m².
- 2) It does not involve on-site fuel switch from fossil fuels to a renewable source.
- 3) The geographic and system boundaries of the China Southern Power grid (CSPG) can be clearly identified.

Four possible alternative scenarios to the project activity have been identified:

Scenario 1: The proposed hydropower activity, without support of CDM: An investment analysis has been done to demonstrate that the IRR for the project activity is 7.40 % without CDM revenue which is lower than the 10% benchmark rate for financial evaluation based on the Chinese Economic Evaluation Code for Small Hydropower Projects /16/ as this project is situated in a rural area. Hence, financial barriers prevent this scenario to happen.

Scenario 2: Thermal power generation with equivalent power generation: Chinese regulations prevents establishment of coal-fired power plants with installed capacity lower than 135 MW and also thermal units under 100 MW are strictly controlled by authorities. Therefore considering that the project foreseen a capacity equal to 48 MW, Chinese legal regulations prevents this scenario to happen.

Scenario 3: Other renewable power plant with equivalent power installed capacity: In the project area there are scarcity of wind and solar renewable resources. Geothermal resources are present in the Yunnan Province but the current development status of this technology makes that the Project Participant has to face higher costs to produce similar amount of energy than the project scenario. Biomass plants face barriers such as high investment, low margins and lack technological experience in the area /11/.

Scenario 4: The electricity is supplied by the China Southern Power Grid; this scenario is in compliance with Chinese laws and regulations and the identified barriers do not prevent it



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from happening. Consequently, in absence of the project activity, the equivalent electricity generated by the project would have been produced by the CSPG.

According to methodology ACM0002, Scenario 4 is the baseline scenario. The net electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected fossil fuel based power plants and by the addition of new generation sources to the CSPG leading to respective amount of tCO_{2e} emissions. The project will therefore displace such quantity of emissions.

Baseline emissions: The baseline emissions are calculated as the product of the net electricity supplied by the project and the CO₂ emission factor of the respective grid. As the project activity export the generated power to the Southern China grid; the baseline for this project activity is the function of the generation mix of Northern China grid.

Project emissions: Since the power density for the project activity is more than 10 W/m² no project emissions need to be accounted as per methodology (The surface area at full reservoir level in the catchment area is 27 927 m² which represent a power density of 1 718 W/m²).

Leakage: NA

4.4 Additionality

The project's additionality has been demonstrated using the "Tool for the demonstration and assessment of additionality", version 5 /9/.

Proof of consideration of CDM revenues by the project participant can be tracked from the Feasibility Study Report (FSR) of July 2005 where the project-IRR is calculated. without CDM, giving a 7.20% which is below Chinese benchmark of 10% IRR for the small scale hydro power plants /6/. This low result made the project owner to consider CDM as sources of project financing. The tariff contemplated in the FSR study was 0,1413 CNY/kWh (incl. VAT). On 17 February 2008 the Yunnan Nujiang Grid Company /26/ confirmed that tariff for the life of the project will be 0.1513 CNY/kWh (incl. VAT). The IRR calculation has been updated with the known tariff giving a value of 7,99 % which is still below the Chinese benchmark of 10%.

The validation as a CDM project started at 27 March 2007, which is before the starting date of the project activity on the 11 May 2007 (date of construction permit for the project activity) /14/. Hence the CDM was seriously considered in the decision to proceed with the project activity.

Step 1: Identification of project activity alternatives:

Identification of project activity alternatives: Four alternatives to the project activity have been identified as described in the Section 4.3 of this report. However, the two realistic and credible alternatives that have to be further evaluated are electricity supplied by the grid and the project activity.

Step 2: Investment Analysis:



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The project generates revenues other than CDM-related revenues and the alternative does not include an investment. Benchmark analysis was therefore chosen.

The benchmark of 10% as required by the Chinese Economic Evaluation Code for Small Hydropower Projects /16/ has been selected as the benchmark. This benchmark refers to project-IRR as the financial indicator.

The input parameters used are taken from the FSR developed by Water & Electric Investigation & Design Institute of Kunming University of Science & Technology in July 2005 and approved by the Yunnan Provincial Development and Reform Commission on 10 April 2007 /6/. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognised source.

DNV has validated all the input values in accordance with “*Guidance of EB38 paragraph 54(c)*” resulting in the financial analysis at the moment of the investment decision a project-IRR lower than the benchmark of 10%.

Step 1: Assessment of the sources of the used input parameters: All the input parameters used in the financial analysis at the moment of the investment decision are taken from the project Feasibility Study Report (FSR) developed in July 2005 by the Water & Electricity Investigation & Design Institute of Kunming University of Science & Technology, which is an independent officially accredited entity. The FSR input parameters were verified and approved by Yunnan Provincial Development and Reform Committee on the 10 April 2007 and can thus be considered information provided by independent and recognized source.

Step 2: Confirmation that the values used in the PDD and investment analysis are fully consistent with the FSR: 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 value stated in the FSR.

Step 3: Assessment of the period of time between the finalization of the FSR and the investment decision: The FSR was approved on 10 April 2007, thus only one month prior to the decision to proceed with the project activity (i.e. the project start date) on the 11 May 2007. Given the short period of time between the approval of the FSR and decision to proceed with the project activity, it is unlikely in the context of the project that the input values would have materially changed. Thus it is reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project. The power tariff contemplated in the FSR study was 0.1413 RMB/kWh (incl. VAT) based on the Purchase Agreement signed with Grid Company on the 2nd September 2005 /26/. On 17 February 2008 the Yunnan Nujiang Grid Company confirmed a power tariff for the whole of the project life of 0.1513 CNY/kWh (incl. VAT). The Project Participant has updated the project-IRR calculation with the real tariff resulting a IRR value of 7.99% which is still below the benchmark.

Step 4: Cross check of the main input parameters used in the financial analysis with the parameters used by other similar projects: The input parameters used in the financial analysis were compared with the data reported for other similar proposed CDM projects in China.

Table 1 Comparative Input Parameters used in the Financial Analysis

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| Ref No. | Project Name | Installed Capacity (MW) | Total Investment (RMB) | Annual Electricity Generation (MWh) | Annual Net Electricity Supply (MWh) | Unit Investment (RMB/MW) | Unit Investment (RMB/kWh) | Load Factor (%) | O&M/Total Investment (%) | Power Tariff (RMB/kWh) (incl.VAT) |
|---------|---|-------------------------|------------------------|-------------------------------------|-------------------------------------|--------------------------|---------------------------|-----------------|--------------------------|-----------------------------------|
| 2057 | Shangri-La Langdu River 4th Level Hydropower Station | 24 | 95.622.200 | 113.141,8 | 88.764,5 | 3.984.258 | 1,08 | 53,80% | 2,53% | 0.14 |
| 2059 | Shangri-La Langtayong Hydropower Station | 18 | 84.533.600 | 83.664 | 72.301,9 | 4.696.311 | 1,17 | 53,10% | 2,44% | 0.14 |
| 2055 | Shangri-La Langdu River 3rd Level Hydropower Station | 18 | 93.364.500 | 82.312,5 | 66.537,2 | 5.186.917 | 1,40 | 52,20% | 2,39% | 0.14 |
| 2054 | Shangri-La Langdu River 2nd Level Hydropower Station | 22,5 | 93.409.100 | 94.110 | 81.875,7 | 4.151.516 | 1,14 | 47,80% | 2,28% | 0.14 |
| 1862 | Yunnan Lushui County Laowohe 25MW Hydropower Project | 25 | 120.871.000 | 123.520 | 117.110 | 4.834.840 | 1,03 | 56,40% | 2,50% | 0.14 |
| 1605 | Shaba 24MW Hydropower Project in Yunnan Province, China | 24 | 126.600.000 | 136.420 | 118.510 | 5.275.000 | 1,07 | 64,90% | 2,14% | 0.16 |
| 2199 | The proposed project | 48 | 198.570.000 | 219.650 | 197.288 | 4.136.875 | 1,01 | 52,24% | 2,97% | 0.1513 |

From the financial analysis point of view, a project has been considered similar if situated in the same Province even if having different capacity. The investment cost per MW, the Load Factor, the percentage of operation and maintenance costs relative to total project investment costs and the electricity tariff are aligned or more conservative than the other analyzed projects..

Consequently, DNV confirms that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.



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The spreadsheet for calculation of project-IRR was provided and verified. The project-IRR (calculated for a period of 30 years i.e. equivalent to the lifetime of the project) has been determined to be 7.99% in the absence of CDM revenues which is lower than the applied benchmark of 10%. With CDM revenues, the project IRR improves to 11.31% which is above than the applied benchmark of 10%.

Moreover, a sensitivity analysis was carried out for parameters contributing more than 20% to revenues or costs in order to check the robustness of the financial analysis. Reasonable variations of the total investment, annual operational and maintenance costs, electricity output and on-grid tariff were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation.

Total investment decreases by 15.9%: This possibility is highly unlikely because of the booming Chinese economy that is driving the inflation rate upwards. It has been demonstrated through a recent article in China that the Consumer Price Index (CPI) in China has increased by 4.8% during 2007 /25/.

Expected average electricity tariff increases by 17.5%: A grid price increase is unlikely as it has been fixed for the project life according to the purchase agreement with the Nujiang Grid /26/ and the Southern Grid tariff confirmation endorsement by Yunnan Provincial Development and Reform Committee of 2 September 2005 /29/.

Power output increases by 17.5%: The annual electricity output is based on the annual load hours of the hydropower plant which is estimated from long time series hydrographical data as reported in the FSR /6/. Furthermore, it can not be guaranteed that local grid enterprises purchase all electricity generated by the proposed project because of challenges from large power companies which have advantages in cost and dispatching. The probability that annual output is significantly higher than the estimated value is very small.

O & M costs: The benchmark will be reached when O&M costs decreases by 86,7%, this scenario is highly unlikely taking into consideration typical O&M costs per MW with other hydro power projects and, furthermore, the trend of the Consumer Price Index (CPI) in China during the last years /25/.

Hence, in DNV's opinion, it is sufficiently demonstrated that the proposed project activity is not economically or financially attractive and thus faces investment barriers.

Step 3: Not chosen by the project participants.

Step 4: Common Practice Analysis:

According to *China Hydropower Yearbook 2005*, Hydropower plants with capacity less than 50MW are considered small scale hydropower projects; Hydropower plants with capacity less than 300MW and more than 50MW are considered as middle scale hydropower projects; Hydropower plants with capacity more than 300MW are considered large scale hydropower projects. Small scale hydropower projects have quite different regulatory framework and access to financing from middle scale and large scale hydro projects. On the other hand, projects with installed capacity between 0 MW~15 MW apply a different methodology (AMS-I.D), consequently are not similar to the proposed project with installed capacity of 48MW. For these reasons projects with capacity between 15 MW and 50 MW were



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considered of being of similar capacity and having the same regulatory framework and similar access to financing.

In order to clarify the inconsistency between the number of similar projects reported in the PDD (3) and in the validation report (9) it is reported the complete list of Hydro Projects considered in the Common Practice Analysis:

Table 2 Existing Small Scale Hydropower Stations of Yunnan Province

| Number | Name of hydropower plant | Installed Capacity (MW) | Location | Project owner/largest stockholder |
|--------|--|-------------------------|---|--|
| CDM | Nandihe HydroPower Station | 20 | Yingjiang County of Dehong State | Yingjiang Nandihe Hydropower Co., Ltd |
| CDM | Maguan Daliangzi Hydropower Station | 32 | Maguan county of Wenshan prefecture | Maguan Daliangzi Hydropower Ltd |
| CDM | Yingjiangxian Mangyahe I | 24.9 | Yunnan Province Yingjiang County | Yunnan Province Yingjiang County Mangya River Hydropower Co., Ltd. |
| CDM | Yingjiangxian Mangyahe II | 12 | Yunnan Province Yingjiang County | Yunnan Province Yingjiang County Mangya River Hydropower Co., Ltd. |
| CDM | Supahe Sanjiangkou Hydro expansion | 32 | Tianning Village, Bizhai Town, Longling County, Baoshan City | Yunnan Baoshan Keyuan Silicon Electric Co., Ltd. |
| CDM | Yingjiangxian Mangzhand Langwaihe | 45 | Mangzhang Town, Yingjiang County, Dehong Dai-Jingpo Autonomous Prefecture | Yingjiang County Binglang River Hydroelectric Power Co., Ltd. |
| CDM | Mengjiahe Kachang Muwen | 40 | Kacha ng Town, Yingjiang County, Dehong Dai-Jingpo Autonomous Prefecture | Yingjiang Mingyu Electric-Power Development Co., Ltd. |
| CDM | Malipo Maomaotiao power plant | 40 | Wenshan Prefecture | Malipo County Hongyuan Hydropower Co.,Ltd |
| CDM | Yunnan Lufeng plant | 38 | Lufeng County | Yunnan Lufeng Fengyuan Hydropower development Ltd. |
| CDM | Yunnan Heier plant | 25 | Shizong County | Shizong Heier Hydro Power Development Co.,Ltd |
| CDM | Yunnan Wulanghe plant | 32 | Lingjiang Prefecture | Lijiang Wulanghe Hydropower Development Co.,Ltd |
| CDM | Dali Yanger plant | 49.8 | Dali Prefecture | Dali Yang_er Hydropower Development Co.,Ltd |
| 1 | Jinghong Farm Hydropower Station | 17 | Jinghong County | State owned before 2002 |
| 2 | Luoze River Hydropower Station | 25 | Zhaotong County | State owned before 2002 |
| 3 | Xiaohogou Hydropower Station | 21 | Guangnan County | State owned before 2002 |
| 4 | Jinghong Liusha River Hydropower Station | 18.5 | Jinghong County | State owned before 2002 |

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| | (seventh phase) | | | |
|----|--|------|-------------------------------------|--|
| 5 | Guangnan Xiyangjiang Hydropower Station | 20 | Guangnan County | State owned before 2002 |
| 6 | Supa River Sanjiangkou Hydropower Station | 30 | Baoshan City Tengchong | State owned before 2002 |
| 7 | Yisa River Hydropower Station | 26.6 | Yuxi City Yuanjiang County | State owned before 2002 |
| 8 | Laohushan II Hydropower Station | 25 | Chuxiong Prefecture | State owned before 2002 |
| 9 | Hongshiyuan Hydropower Station | 44 | Yiliang County | State owned before 2002 |
| 10 | Jiren River Hydropower Station | 30 | Diqing Prefecture Shangri-La County | State owned before 2002 |
| 11 | Wuni River Hydropower Station | 30 | Baoshan City Longling County | Yunnan Baoshan Supahe Hydropower Development Co., Ltd. (State Owned) |
| 12 | Houqiao Hydropower Station | 48 | Baoshan City Tengchong County | Yunnan Baoshan Binlangjiang Hydropower Development Co., Ltd. (State Owned) |
| 13 | Xima Xingyun Aluminium Factory Hydropower Station | 26 | Dehong Prefecture Yingjiang County | Yunnan Yingjiang Xingyun Co., Ltd. |
| 14 | Chongjianghe II Phase (Expansion) Hydropower Station | 48 | Diqing Prefecture Yulong County | Guodian Diqing Shangri-la Generating Limited Liability Company |
| 15 | Nanting River Hydropower Station | 34 | Wenshan Prefecture Maguan County | Wenshan Electric Power Co., Ltd. (State owned) |
| 16 | Mengdianhe II Hydropower | 30 | Dehong Prefecture Yingjiang County | Yingjiang Mengdian River Second Level Power Station Co., Ltd. |
| 17 | Xiashilong Hydropower Station | 25 | Wenshan Prefecture Guangnan County | Guangnan Xinangjiang Hydropower Development Co., Ltd. |
| 18 | Laodukou Hydropower Station | 36 | Qujing City Luoping County | Yunnan Luoping Laodukou Power Co., Ltd. (State Owned) |
| 19 | Yanziya Hydropower Station | 25 | Dali Prefecture Heqing County | Heqing Xinyuan Yanggongjiang Power Co., Ltd. (State Owned) |
| 20 | Maomaotiao Hydropower Station | 40 | Wenshan Prefecture Malipo County | Maomaotiao Power Co., Ltd. |
| 21 | Luoshuidong Hydropower Station | 20 | Wenshan Prefecture Xichou County | Wenshan Electric Power Company (State owned) |
| 22 | Gula Tianshengqiao Hydropower Station | 40 | Wenshan Prefecture Gula village | Gula Hydropower Development Company Ltd (State owned) |
| 23 | Xiaopengzu Hydropower Station | 30 | Yunnan province, Luquan County | Kunming Xiaopengzu Hydroelectric Development Co.Ltd. |

Sources: Yearbook of China Water Resources 2006 , Yunnan Statistical Yearbook 2003-2005 Editions and Chinese DNA website.

According to the Tool for the Demonstration and Assessment of Additionally, projects seeking CDM financing should not be considered in the Common Practice Analysis, hence 23 projects

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have been analysed, The first ten projects (1-10) have been developed by the State own companies before the Hydro Power Reform was introduced in February 2002 with the main objective of building a competitive and open market for power generation in China. Therefore these projects cannot be considered similar to the project activity as they have not taken place in a comparable environment with respect the regulatory framework and the investment climate.

The Wuni River Hydropower Station (11) /30/ and Houqiao Hydropower Station (12) /31/ have joined the West-East Electricity Transmission Project, a Government sponsored project offering favourable economic conditions to power suppliers participating in the project with the aim to secure transmission of power from West China to East China. Therefore these two projects do not meet the requirements contemplated in the Tool for the Demonstration and Assessment of Additionality to be considered similar to the Project Activity.

The Xima Xingyun Aluminium Factory Hydro Station (13) /32/ is a captive station of Yunnan Yingjiang Xingyun Co. Ltd and The Chongjianghe Phase II (14) /33/ is an expansion of an already existing power plant. Therefore they cannot be considered similar to the project activity for investment and technological reasons.

Therefore the existing Projects that, according to the *Tool for the Demonstration and Assessment of Additionality*, can be considered similar to the Project Activity are the last nine Projects (15-23) listed in Table 2. The unit costs for these nine projects are:

Table 3 - Unit Cost for Similar Projects to the Project Activity

| Number | Name of hydropower plant | Installed Capacity (MW) | Total Investment (10 ⁴ RMB) | Annual electricity generation (MWh) | Unit cost (RMB/kWh) |
|--------|--|-------------------------|--|-------------------------------------|---------------------|
| 15 | Nanting River Hydropower Station /34/ | 34 | 154,000 | 195,000 | 0.7897 |
| 16 | Mengdianhe II Hydropower /35/ | 33 | 126,000 | 180,000 | 0.7000 |
| 17 | Xiashilong Hydropower Station /36/ | 25 | 101,500 | 100,545 | 1,0095 |
| 18 | Laodukou Hydropower Station /37/ | 36 | 199,700 | 189,000 | 1,057 |
| 19 | Yanziya Hydropower Station /38/ | 25 | 125,000 | 150,000 | 0.8333 |
| 20 | Maomaotiao Hydropower Station /39/ | 40 | 132,000 | 172,280 | 0.7662 |
| 21 | Luoshuidong Hydropower Station /40/ | 20 | 86,000 | 153,600 | 0.5599 |
| 22 | Gula Tianshengqiao Hydropower Station /41/ | 40 | 179,070 | 172,400 | 1.0387 |



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| | | | | | |
|----|------------------------------------|----|---------|---------|--------|
| 23 | Xiaopengzu Hydropower Station /42/ | 30 | 165,053 | 132,000 | 1.2504 |
| | Proposed project activity | 48 | 198,570 | 219,650 | 1.0064 |

The unit costs of Nanting (15), 0.7897 RMB/ kWh, Mengdianhe (16), 0.7RMB/kWh, Yangziya (19), 0.8333RMB/kWh, Maomaotiao (20), 0.766 RMB/kWh and Luosuidong (21), 0.5599 RMB/kWh, are significant lower than the 1.0064 RMB/kWh of the project activity. This is due mainly to the better hydrological resources at the locations of those projects. Therefore, they are not in comparable environment as the proposed project activity. In addition these Projects are owned by State-owned or stock-exchange quoted companies and thus has better access to financing that the private project owner of the project activity.

The Xiashilong Hydropower Station (17), Laodukou Hydropower Station (18) and Gula Tianshengqiao Hydropower Station (22) have similar unit costs that the project activity, but these projects are financed by large state-owned or large private shareholders including Guangnan Xinangjiang Hydropower Development Co., Ltd., Yunan Luoping Laodukou Power Co., Ltd., China Hydroelectric 8th Bureau, Yunnan province hydraulic and hydroelectric engineering Co.Ltd, Yunnan Yuxi hydroelectric group Co.Ltd, Kunming Electrical and Mechanical Service Co., ltd. and Yunnan Wenshan Electricity Co.Ltd. compared to the proposed project, developed by a small-size private company, these projects have better access to financing.

The Xiaopengzu hydropower station has higher unit costs than the project activity. In fact this project is on sale since it faces large financial difficulties and is hard to be implemented by the former project owner /43/. The project is in any case located nearby Kunming City whereas the Project Activity is located in one of the poorest rural areas of the Yunnan Province making it harder to have access to financing.

Based on the above, DNV has accepted the Project Participant claim that the Project Activity is not a common practice.

4.5 Monitoring

The baseline emissions will be calculated, according to the methodology ACM0002 “Consolidated Baseline and Monitoring Methodology for grid-connected electricity generation of renewable sources” version 06 /4/ as this methodology is applicable to the project activity.

The project proponent will monitor the following two parameters:

- Surface area at full reservoir level: According to ACM0002, the data is needed to be monitored only one time before the operation.
- Net electricity supplied to the grid

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The combined margin emission factor is determined I based on the most recent information available at the time of PDD submission.

It has been verified that the power exported to the China southern power grid will be measured hourly and recorded on a monthly basis by the project owner. In addition, the electricity sales receipts are provided for data quality control and cross check.

Details of the data to be collected, frequency of data recording, certainty level and format and the project management responsibilities are clearly defined.

The baseline emissions are calculated as the product of the net electricity supplied to the grid and the grid emission factor of china southern power grid, which is determined ex-ante. All the relevant data necessary for the estimation of the GHG emissions over the entire fixed crediting period has been covered under monitoring plan.

4.5.1 Parameters determined ex-ante

The parameters used for the emission reduction calculations that are available *ex ante* include:

- Data needed to calculate the operating margin emission factor, based on the simple OM in line with the method to determine the operating margin (OM),
- Data needed to recalculate the build margin emission factor (BM)

The parameters determined ex-ante for calculating the emission factor are listed in the PDD and verified by DNV. All data used are in line with “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (ACM0002) version 06/4/;

The combined margin emission factor is determined *ex-ante* at 0.8434 tCO₂/MWh based on the most recent information available and consisting of the weighted average of the operating margin emission factor (EF_{OM}) at 1.0119 tCO₂/MWh and the build margin emission factor (EF_{BM}) at 0.6748 tCO₂/MWh using the 2003-2005 *ex-ante* vintage. These values are coincident with the ones confirmed by the notification on determining baseline emission factor of China’s Grid published on the official web site of the Chinese DNA on 09 August 2007.

4.5.2 Parameters monitored ex-post

As per the methodology ACM0002 following two parameters required to be monitored on the ex-post basis:

$EG_{s,y}$: The total electricity supplied to the Grid in year y by the Project Activity

Area: Surface area at full reservoir level (as per ACM0002, the data is needed to be monitored only one time before the operation).

It has been verified that the power exported to the china southern power grid will be measured hourly and recorded on a monthly basis by the project owner. In addition, the electricity sales receipts are provided for data quality control and cross check. The data will be kept for 2 years following the end of the crediting period.

There are two meters planned in the monitoring plan. The Master Meter at the substation (interconnection facility connecting the Project to the grid) and the Backup Meter at the output side of the transformer of the plant.

In normal conditions the readings of Master Meter will be used for calculating the emission reductions. The value metered by Backup Meter, at the output side of the project plant transformer, will be used as a plausibility check of the value metered by the grid company.

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4.5.3 Management system and quality assurance

The project participant has defined:

- The meters to be installed, their position and the required accuracy in line with the National Electricity Industry Relevant Standards - electricity meter installation technical management code (DL/T448-2000). The accuracy of the meters will be 0.5s and they will be calibrated at least once per year.

The authority and responsibility for monitoring, reviewing, reporting and recording of data rests with the Management or the Board of Directors of Lushui County Quande Hydroelectrical Power Development Ltd. and will ensure:

- The calibration, measurement and recording frequencies
- The operative instructions to be used in case of meters malfunctioning

In addition, the project participant will collect sales invoices for the power delivered to the grid as a crosscheck. At the end of each crediting year, a monitoring report will be compiled detailing the metering results and evidence (i.e. sales invoices). The monitoring report should include: the monitoring of the electricity supplied to the grid, emission reductions calculation report, repair and calibration records of the monitoring equipment

Data will be archived at the end of each month using electronic spreadsheets. The electronic files will be stored on hard disk and CD-ROM. In addition, a hard copy printout will be archived. All data records will be kept at least for a period of 2 years after the end of each crediting period.

4.6 Estimate of GHG Emissions

The grid emission factor of the Southern China Power Grid (SCPG) is determined *ex-ante* for the 10 years crediting period following ACM0002 version 6, based on the most recent information available. It has been calculated as the weighted average (1:1) of the operating margin and the build margin.

For the operating margin (OM) emission factor, simple OM was selected because data are not available for applying the dispatch data analysis and low-cost/must-run resources constitute less than 50% of the total grid generation. Aggregated generation and fuel consumption data are used due to the fact that more specific data for the power plants are not available in the NCPG. Country specific data for net calorific value of each type of fossil fuel, country specific data for emission factors for the fuel, IPCC 2006 default values for the oxidation factor of each type of fossil fuel and the total electricity delivered to the NCPG were selected and deemed reasonable. OM was calculated to be 1.0119 tCO₂e/MWh as a generation weighted average for the years 2003, 2004 and 2005.

Because plant specific fuel consumption and electricity generation data are not publicly available in China, the guidance requested by DNV from the CDM Executive Board for a deviation of the baseline methodology of AM0005 has been applied for calculation of the build margin (BM) emission factor for this project:

- Use of capacity additions from the years 2003 to 2005 is chosen and reaches 21.42% of the total installed capacity.

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- Use of weights estimated using installed capacity in place of annual electricity generation. Thermal power plant accounts for 74.01% of the total installed capacity additions in this period. Since specific data for each technology is not available, the fraction of fuels (coal 89.48%; natural gas 0.28%; oil 10.24%) was estimated from the CO₂ intensity for the fuels used in NCPG.
- Use of 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. This is 35.82% for coal power plants and 47.67% for oil power plants and gas power plants.

Country specific net calorific value of each kind of fuel, country specific emission factor of each fuel and IPCC 2006 default values of oxidization factors are used to calculate the BM. The data applied are considered as the best data available for calculating the BM in the NCPG. The official supporting documentation has been verified. BM is calculated to 0.6748 tCO₂e/MWh.

The resulting combined margin emission factor is 0.8434 tCO₂e/MWh.

The latest data used to calculate OM and BM are derived from China Energy Statistical Yearbooks 2004 to 2006 and from China Electric Power Yearbooks 2004 to 2006. The selection of the parameters is complete and transparent.

The calculation is furthermore in accordance with the calculation of the combined margin emission factor by the DNA of China published on 9 August 2007 /19/.

The project will partly displace fossil fuel-based electricity generation. While the project emissions are zero, baseline emissions are equal to the emission reductions due to the project activity and have been estimated to be 166 393 tCO₂ per year.

4.7 Environmental Impacts

An Environmental Impact Assessment (EIA) was conducted by officially accredited Yunnan Institute of Environmental Science in May 2006 according to Chinese law; the report was approved by Yunnan Provincial Environmental Protection Bureau on 18 September 2006. /10/. The potential environmental impacts have been sufficiently identified and adequate measures to address the issues have been taken up. The most significant environmental impacts were the alteration of the aquatic life because of the water flow interruption. To compensate this impact a minimum flow of 0.22 m³/s throughout the year will be ensured.

4.8 Comments by Local Stakeholders

A stakeholder consultation meeting was organised by the Project Participant on the 14 May 2006 at the City of Mang, Dehong Dai-Jingpo Autonomous prefecture, Yunnan Province in order to obtain the opinions from stakeholders. Twenty eight questionnaires were obtained from residents of the area impacted by the project copy of comments received and questionnaires have been verified by DNV /23/. No resettlement happened due to the project activity.

A summary of the stakeholder comments have been included in the PDD. There were no negative comments. Given the generally positive (or neutral) nature of the comments received, no action has been taken to address the comments received.



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4.9 Comments by Parties, Stakeholders and NGOs

The PDD was made available to the public on DNV's climate change website (<http://www.dnv.com/certification/climatechange/>) on the 27 June 2007. Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 28 March to 26 April 2007. No comments were received during this period.

APPENDIX A

CDM VALIDATION PROTOCOL



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

| Requirement | Reference | Conclusion |
|---|--|------------------------|
| About Parties | | |
| 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 1 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 1 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 | CDM Modalities §30/31a | OK |



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| Requirement | Reference | Conclusion |
|---|---|--------------------------------|
| the Kyoto Protocol. | | |
| 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 | CL2, CL6, CL8 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 |



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| Requirement | Reference | Conclusion |
|---|---|----------------------|
| 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 | CL5 OK |
| 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 | CL5 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 |



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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 <i>The project design is assessed.</i> | | | | | | |
| A.1. Project Boundaries <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i> | | | | | | |
| A.1.1. Are the project's spatial boundaries (geographical) clearly defined? | | /1/ | DR/I | The project activity is located on the Duduluo river, 53 km away from the prefecture capital of Lushui county, in Yunnan province. The geographical coordinates need to be confirmed (latitude seems not correctly reported in the PDD, West instead of North. The geographical coordinates of the project location has now been corrected in the revised PDD. The geographical coordinates of the project location are 98°40'10"- 98°54'36" East and 26°13'36"-26°21'36" North. | CH | OK |
| A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined? | | /1/ | DR/I | Yes, The project system components include a new reservoir, turbo generators, diversion structures, penstock, power-house and | | OK |

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



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| CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|--|--------------------|-------------|--|---------------------|---------------------|
| | | | transmission network to evacuate power through the Yunnan province Grid. Thus the project boundary includes the project activity and the China Southern Power Grid to which the power is dispatched. | | |
| A.2. Participation Requirements <i>Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.</i> | | | | | |
| A.2.1. Which Parties and project participants are participating in the project? | /1/ | DR/I | China and Switzerland are the two Parties participating in the proposed project. China is the host Party and Lushui county Quande Hydroelectrical Power Development Ltd is the project participant from host party. Switzerland is the Annex I Party and Factor Consulting + Management AG is the project participant from Annex I country. | | 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/ /22/ | DR/I | The project developer needs to provide the letter of approval (LoA) from DNA of China and DNA of Switzerland for verification. The Letter of Approval issued by NDRC on 26 August 2007 has been verified. | CAR-1 | OK |
| A.2.3. Do all participating Parties fulfil the participation | /1/ | DR/I | Both parties, China and Switzerland, fulfil the | CAR-1 | OK |

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



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| CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|-------------|-------------|--|-------------------------|-------------------------|
| requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority | /2/ /22/ | | participation requirements. China ratified the Kyoto Protocol on 30 August 2002. The DNA of China is the National Development and Reform Commission. Switzerland ratified Kyoto Protocol on 09 July 2003. The DNA of The Switzerland is Federal Office for the Environment (FOEN). However, confirmation of voluntary participation by the parties in the project activity needs to be provided for verification. | | |
| A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance. | /1/ | DR/I | No public funding is involved in the project. The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance funding towards China | | OK |
| A.3. Technology to be employed <i>Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.</i> | | | | | |
| A.3.1. Does the project design engineering reflect current good practices? | /1/ | DR/I | Yes, the project design engineering reflects current good practices | | OK |



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| CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview | Ref. | MoV* | COMMENTS | Draft Concl. | Final Concl. |
|---|-------------|-------------|--|-------------------------|-------------------------|
| A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country? | /1/ | DR/I | The Project utilizes indigenously manufactured equipments for power generation and is one of the commonly used technologies for power production in China. | | OK |
| A.3.3. Does the project make provisions for meeting training and maintenance needs? | /1/ | DR/I | A person from Lushui county, Quande Hydroelectrical Power Development Ltd. has been already designated for monitoring activities including the training needs. Maintenance needs are envisaged to be covered by a team of about 10 persons. | | OK |
| A.4. Contribution to Sustainable Development <i>The project's contribution to sustainable development is assessed.</i> | | | | | |
| A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development? | /1/ /2/ | DR/I | Letter of Approval from DNA of China dated 26 August 2007 has been verified. | | OK |
| A.4.2. Will the project create other environmental or social benefits than GHG emission reductions? | /1/ | DR/I | Yes, as a renewable energy project, the project may produce positive environmental and economic benefits and contribute to the local sustainable development special on the alleviation of the power shortage in the local areas, creating new job opportunities and infrastructure development such as roads in a remote and poor area. | | OK |

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| B. Project Baseline <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i> | | | | | | |
| B.1. Baseline Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i> | | | | | | |
| B.1.1. Does the project apply an approved methodology and the correct version thereof? | | /1/ /4/ | DR/I | Yes, the project applies the ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, version 6 approved by the EB and valid from 19 May 06 onwards. | | OK |
| B.1.2. Are the applicability criteria in the baseline methodology all fulfilled? | | /1/ /4/ | DR/I | Yes. The baseline methodology is applicable for the project as the project is a capacity addition from a renewable energy source having power density than 4W/m ² and does not involve on-site fuel switch from fossil fuels to renewable source at the site of the project activity. Furthermore, the geographic and system boundaries for the relevant electricity grid (CSPG) can be clearly identified. | | OK |
| B.2. Baseline Scenario Determination <i>The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and</i> | | | | | | |

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| <i>whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.</i> | | | | | |
| B.2.1. What is the baseline scenario? | /1/ | DR/I | The baseline scenario is that in the absence of the project activity, equivalent amount of energy would have been generated from the existing plants or new capacity additions using the fossil fuels in the China Southern Power Grid to which the project activity is connected. | | OK |
| B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one? | /1/ | DR,I | <p>Four plausible scenarios have been identified as credible alternatives to the project activity:</p> <ul style="list-style-type: none"> a. the construction of the proposed hydro power plant not as a CDM project activity, b. The construction of a thermal power plant with same capacity and annual electricity output c. To construct a power plant using other renewable resources with the same installed. capacity as the proposed project d. Not implementing the project and the continuing the operation of the existing power plants to meet the energy demand, <p>The first one is the most likely as the proposed project itself, if not undertaken as a CDM project activity, is unlikely to be the baseline scenario due to the financial barriers, and the installation</p> | CL-6 | OK |



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| | | | <p>of a coal fired power plant is highly restricted in China and thus is not a feasible option.</p> <p>In the project area there are scarcity of wind solar and other renewable resources and is not financially feasible has been discussed.</p> <p>Only the “comparable capacity or electricity generation addition provided by CSPG” is a realistic alternative consistent with current laws and regulations.</p> <p>The PDD does not include an explanation regarding the no feasibility of an alternative scenario to the project activity consisting in the construction of a power plant using other renewable energy, such as wind, biomass, etc with equivalent installed capacity or annual electricity generation.</p> | | |
| B.2.3. Has the baseline scenario been determined according to the methodology? | /1/ | DR/I | Yes, the baseline scenario has been selected in accordance with the baseline methodology ACM0002. The baseline as per the methodology is the electricity generated by the project times the grid emission factor of the connected grid calculated as per the guidelines provided. | | OK |
| B.2.4. Has the baseline scenario been determined using conservative assumptions where possible? | /1/ | DR/I | According to the deduction from the available information, the assumptions are conservative. | | OK |

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| B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations? | /1/ /19/ | DR/I | All relevant national and sectoral policies, regulations and department rules and disciplines are considered, | | OK |
| B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced? | /1/ | DR/I | No, Calculation data need to be updated according to the latest available Energy Statistical Yearbook 2006 including 2005 data. | CAR-2 | OK |
| B.2.7. Have the major risks to the baseline been identified? | /1/ | DR/I | There are no significant risks to the baseline except the enforcement of the Chinese renewable law. However, this law 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 <i>The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.</i> | | | | | |
| B.3.1. Is the project additionality assessed according to the methodology? | /1/ /6/ /9/ /11/ /12/ /13/ | DR/I | Yes, the project additionality has been assessed applying the “Tool for demonstration and assessment of additionality”, version 05, as requested by the ACM0002. Four plausible scenarios have been identified as credible alternatives to the project activity: a. the construction of the proposed hydro power | | OK |



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| | | | <p>plant not as a CDM project activity,</p> <p>b. The construction of a thermal power plant with same capacity and annual electricity output</p> <p>c. To construct a power plant using other renewable resources with the same installed capacity as the proposed project</p> <p>d. Not implementing the project and the continuing the operation of the existing power plants to meet the energy demand,</p> <p>The first one is the most likely as the proposed project itself, if not undertaken as a CDM project activity, is unlikely to be the baseline scenario due to the financial barriers, and the installation of a coal fired power plant is highly restricted in China and thus is not a feasible option.</p> <p>In the project area there are scarcity of wind solar and other renewable resources and is not financially feasible has been discussed.</p> <p>Only the “comparable capacity or electricity generation addition provided by CSPG” is a realistic alternative consistent with current laws and regulations.</p> <p>The PDD does not include an explanation regarding the no feasibility of an alternative</p> | CL-6 | |



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| | | | <p>scenario to the project activity consisting in the construction of a power plant using other renewable energy, such as wind, biomass, etc with equivalent installed capacity or annual electricity generation.</p> <p>Step 2 – Investment analysis: The project developer has selected benchmark analysis to demonstrate the financial barriers faced by the project. Project IRR has been selected as the financial indicator. The benchmark of 10% benchmark evaluation required by Chinese Economic Evaluation Code for Small Hydropower Projects has been selected as the benchmark.</p> <p>The project IRR (calculated for a period of 30 years i.e. equivalent to the lifetime of the project) has been determined to be 7.40% in the absence of CDM revenues which is lower than the applied benchmark of 10% is selected for conducting the investment analysis. Further clarification is required to confirm the benchmark rate and the parameters used in the sensitivity analysis. Please provide evidences on investment costs breakdown (investment costs in IRR spreadsheets is 198.57Mln CNY, while in the PDD is 199.05), reference for interest rate, electricity tariff need to</p> | CL-2 CL-8 | |



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| | | | be provided. The Sensitivity Analysis is not complete. The investment analysis shows that the potential benefit of the CDM will increase the project's IRR from 7.40 % to 11.31% and will thus increase investment returns and reduce investment risks. The identified benchmark value is 10%. Step 3 –Barrier analysis: Not included in the PDD Step 4 – Common practice analysis: The list of the similar projects in the area is incomplete and further evidences should be given in order to illustrate the differences. | CL3 CL7 | |
| B.3.2. Are all assumptions stated in a transparent and conservative manner? | /1/ | DR/I | Refer to B.3.1 | | OK |
| B.3.3. Is sufficient evidence provided to support the relevance of the arguments made? | /1/ /12/ /13/ | DR/I | It has been stated that in the CSPG the share of hydro capacity in the total installed capacity decreased from 27.8% to 22.2 % in the period 2000-2005, this shall be substantiated with evidence (or reference should be made to the source of information). | CL7 | OK |



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| 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/ /6/ /14/ | DR/I | Project proponent needs to specify whether the referred date is Start date of construction, project commissioning date, the implementation date or the date of real action and more evidence should be provided to demonstrate that CDM application a key element in project owner decision to go ahead with the project. | CL-4 | OK |
| B.4. Calculation of GHG Emission Reductions – Project emissions <i>It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i> | | | | | | |
| B.4.1. | Are the calculations documented according to the approved methodology and in a complete and transparent manner? | /1/ | DR/I | Since the power density for the project activity is more than 10 W/m ² no project emissions need to be accounted as per methodology. | | OK |
| B.4.2. | Have conservative assumptions been used when calculating the project emissions? | /1/ | DR/I | NA | | OK |
| B.4.3. | Are uncertainties in the project emission estimates properly addressed? | /1/ | DR/I | NA | | OK |
| B.5. Calculation of GHG Emission Reductions – Baseline | | | | | | |

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| emissions <i>It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i> | | | | | |
| B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner? | /1/ /19/ | DR/I | Baseline emissions are calculated as the net electricity produced by the renewable source (the project activity) times the CEPG emission factor. No, Calculation data need to be updated according to the latest available Energy Statistical Yearbook 2006 including 2005 data. The baseline emission data has now been revised. The electricity baseline emission factor 0.8434 tCO ₂ /MWh is determined ex-ante as a combined margin, consisting of the weight average of the operating margin emission factor 1.0119 tCO ₂ /MWh and the build margin emission factor 0.6748 tCO ₂ /MWh taken from the notification on determining baseline emission factor of China's Grid published on the official web site of the Chinese DNA on August 9 th 2007. | CAR-2 | OK |
| B.5.2. Have conservative assumptions been used when calculating the baseline emissions? | /1/ | DR/I | Yes | | OK |



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| B.5.3. | Are uncertainties in the baseline emission estimates properly addressed? | /1/ | DR/I | Yes | | OK |
| B.6. Calculation of GHG Emission Reductions – Leakage <i>It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i> | | | | | | |
| B.6.1. | Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner? | /1/ | DR/I | No leakage effect needs be accounted under this Methodology ACM0002. | | OK |
| B.6.2. | Have conservative assumptions been used when calculating the leakage emissions? | | DR/I | NA | | OK |
| B.6.3. | Are uncertainties in the leakage emission estimates properly addressed? | | DR/I | NA | | OK |
| B.7. Emission Reductions <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i> | | | | | | |

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| B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change. | /1/ | DR/I | The project activity is expected to result in emission reduction of 166393 tCO ₂ e annually through out the 10 year fixed crediting period. | | OK |
| B.8. Monitoring Methodology <i>It is assessed whether the project applies an appropriate monitoring methodology.</i> | | | | | |
| B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner? | /1/ | DR/I | Yes, the monitoring plan documented according to the approved Consolidated methodology ACM0002 version 06 and is complete and transparent. | | OK |
| B.8.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later? | /1/ | DR/I | Yes, All the relevant data and records will be kept for 2 years after the end of the crediting period. | | OK |
| B.9. Monitoring of Project Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i> | | | | | |
| B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period? | /1/ | DR | Since the power density for the project activity is more than 10 W/m ² no project emissions need to be accounted as per methodology. | | OK |

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| B.9.2. | Are the choices of project GHG indicators reasonable and conservative? | /1/ | DR/I | NA | | | | OK |
| B.9.3. | Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate? | /1/ | DR/I | NA | | | | OK |
| B.9.4. | Is the measurement equipment described and deemed appropriate? | /1/ | DR/I | NA | | | | 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/I | NA | | | | OK |
| B.9.6. | Is the measurement <i>interval</i> identified and deemed appropriate? | /1/ | DR/I | NA | | | | OK |
| B.9.7. | Is the <i>registration, monitoring, measurement and reporting</i> procedure defined? | /1/ | DR/I | NA | | | | OK |
| B.9.8. | Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed? | /1/ | DR/I | NA | | | | OK |

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| 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/I | NA | | OK |
| B.10. Monitoring of Baseline Emissions <i>It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.</i> | | | | | |
| B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period? | /1/ | DR/I | Yes, the monitoring plan provides for the collection and archiving of all the relevant data necessary for the estimation of the GHG emissions over the entire fixed crediting period. | | OK |
| B.10.2. Are the choices of baseline GHG indicators reasonable and conservative? | /1/ /4/ | DR/I | Yes, the choice of baseline GHG indicator of CO ₂ is reasonable. | | OK |
| B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate? | /1/ | DR/I | Yes. The project uses the ex-ante determination of emission factor for grid electricity. Only surface area at full reservoir level after implementation (According to ACM0002, the data is needed to be monitored only one time before the operation) and net electricity supplied to the grid will be measured hourly basis and will be recorded on Monthly basis and this will be | | OK |



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| | | | | double checked against the check meter and can be cross checked against sales invoices. | | |
| B.10.4. Is the measurement <i>equipment</i> described and deemed appropriate? | /1/ | DR/I | | Yes the meters will be calibrated and sealed as per the industry practice. The overall max uncertainty of the metering equipments will be less than 0.5%. | | OK |
| B.10.5. Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements? | /1/ | DR/I | | Yes. The metering equipment will be calibrated and sealed regularly according to the industry practice. The value metered by the grid operator will be used for the ER calculations, while the value metered at the exit of the transformer of the project plant will be used as a consistency check. | | OK |
| B.10.6. Is the measurement <i>interval</i> for baseline data identified and deemed appropriate? | /1/ | DR/I | | The electricity supplied to the grid will be measured hourly and recorded on monthly basis. | | OK |
| B.10.7. Is the registration, <i>monitoring</i> , <i>measurement</i> and <i>reporting</i> procedure defined? | /1/ | DR/I | | Written procedures will be developed under the responsibility of Lushui County Quande Hydroelectrical power Development Ltd. prior the project start. | | OK |
| B.10.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed? | /1/ | DR/I | | Written procedures will be developed under the responsibility of Lushui County Quande Hydroelectrical power Development Ltd. prior the project start. | | OK |
| B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage | /1/ | DR/I | | Written procedures will be developed under the responsibility of Lushui County Quande | | OK |

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| area of records and how to process performance documentation) | | | Hydroelectrical power Development Ltd. prior the project start. | | |
| B.11. Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i> | | | | | |
| B.11.1.Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage? | /1/ /4/ | DR, I | No leakage effect needs be accounted under this Methodology ACM0002. | | OK |
| B.11.2.Are the choices of project leakage indicators reasonable and conservative? | /1/ | DR/I | NA | | OK |
| B.11.3.Is the measurement method clearly stated for each leakage value to be monitored and deemed appropriate? | /1/ | DR/I | NA | | OK |
| B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts <i>It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.</i> | | | | | |

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| B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country? | /1/ /2/ /10/ | DR/I | Monitoring of sustainable development indicators is not required by the Chinese DNA. The environmental impacts are identified in the EIA that was approved in September 2006. The formal LoA from DNA of China need to be provided for verification. | CAR-1 | OK |
| B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts? | /1/ /10/ | DR/I | According to the Yunnan Province Environmental Bureau the water flow throughout the year will be monitored in order to ensure a minimum flow rate of 0.22 cubic meter per sec. | | OK |
| B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country? | /1/ | 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.13. Project Management Planning <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i> | | | | | |
| B.13.1. Is the authority and responsibility of overall project management clearly described? | /1/ /6/ /14/ | DR/I | The Board of Directors of Lushui county, Quande Hydro electrical Power Development Ltd. has the overall authority and responsibility of the project management. | | OK |



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| B.13.2. Are procedures identified for training of monitoring personnel? | /1/ | DR/I | Written procedures will be developed under the responsibility of Quande Hydroelectrical power Development Ltd. prior the project start. | | OK |
| B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions? | /1/ | DR/I | The PDD contemplates a back-up meter in case the Master meter is not functioning in emergency situations. | | OK |
| B.13.4. Are procedures identified for review of reported results/data? | /1/ | DR/I | Yes, monthly reported data will be approved and signed by the appointed person before it will be stored. | | OK |
| B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting? | /1/ | DR/I | An internal GHG auditing system will be implemented under the control of the Board of Directors of Lushui county, Quande Hydroelectrical Power Development Ltd. | | OK |
| C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i> | | | | | |
| C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced? | /1/ | DR/I | Yes, The starting date of the project as per the PDD is 11 May 2007, while its operational lifetime is expected to be 30 years. However project proponent needs to specify whether the referred date is Start date of construction, project commissioning date, the implementation date or the date of real action. | CL-4 | OK |

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| C.1.2. Is the start of the crediting period clearly defined and reasonable? | | /1/ | DR/I | A fixed crediting period of 10 years has been selected starting from 01 January 2009 or date of registration whichever is later. | | OK |
| D. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i> | | | | | | |
| D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described? | | /1/ /10/ | DR/I | Yes, the environmental impacts during construction and operation period are elaborated in the PDD. Impacts on water and fisheries, flora and fauna, air quality, noise and soil erosion were discussed. | | OK |
| D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? | | /1/ /10/ | DR/I | Yes, An Environmental Impact Assessment (EIA) was conducted according to Chinese law on Nov. 2004; the report was approved by Yunnan Provincial Environmental Protection Bureau in September 2006. | | OK |
| D.1.3. Will the project create any adverse environmental effects? | | /1/ /10/ | DR/I | Main environmental impact is related to the reduction of water flow especially during the dry season. A minimum flow rate will be ensured, the small weirs will partially deviate the water flow. | | OK |
| D.1.4. Are transboundary environmental impacts considered in the analysis? | | /1/ /10/ | DR/I | Impact on aquatic life due to the reduction of water flow has been considered | | OK |

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| D.1.5. Have identified environmental impacts been addressed in the project design? | /1/ /10/ | DR/I | Yes | | OK |
| D.1.6. Does the project comply with environmental legislation in the host country? | /1/ /10/ | DR/I | Yes | | OK |
| E. Stakeholder Comments <i>The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i> | | | | | |
| E.1.1. Have relevant stakeholders been consulted? | /1/ | DR/I | Besides the stakeholder consultation process required by Chinese EIA regulations, additional stakeholder consultation process have been performed trough inviting local residents to comment on the project activity. Inhabitants of Cheng Gan town were invited and 28 two pages questionnaires were distributed. The stakeholder’s questionnaires were handed out in Shuangkuidi Village instead of Cheng Gan Town indicated in the PDD. Please insert in the PDD the number of fulfilled questionnaires received. Please provide dates on the held meetings. | CL-5 | OK |
| E.1.2. Have appropriate media been used to invite comments by local stakeholders? | /1/ | DR/I | A public notice in local language was placed in the villages. | | OK |



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| E.1.3. | If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws? | /1/ | DR/I | The stakeholder consultation process is in accordance with Chinese EIA regulations. | | OK |
| E.1.4. | Is a summary of the stakeholder comments received provided? | /1/ | DR/I | A summary of the stakeholder comments are described in the PDD. | CL-5 | OK |
| E.1.5. | Has due account been taken of any stakeholder comments received? | /1/ | DR/I | As a response to local stakeholder suggestions the project proponents ensured the involvement of local people in the construction and operation phase, agreed on the construction of a service road planned in order to serve also the villagers needs and increase their mobility in the future, signed a land claim agreements, the land use certificates by the village committees of Duduluo and Shaung kudi Villages were provided to the DOE. | | OK |

VALIDATION REPORT

Table 3: Resolution of Corrective Action and Clarification Requests

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---|---|---|
| <p>CAR 1</p> <p>The project developer needs to provide the letters of approval (LoA) from DNA of China and DNA of Switzerland for verification.</p> <p>The Letter Of Approval issued by the Chinese DNA refers to the company old name. PP should provide an official English translation of the company's constitutional document evidencing the change of name</p> | <p>A.2.2</p> <p>A.2.3</p> <p>B.12.1</p> | <p>Letter of Approval from China and Switzerland has submitted to DOE.</p> <p>LOA from China and Switzerland indicating voluntary participation by the parties in the project activity has submitted for verification.</p> <p>Copy of official English translation of the company's constitutional document evidencing the change of name has submitted to DOE.</p> | <p>The Letter Of Approval issued by the Chinese DNA refers to the company old name. PP should provide an official English translation of the company's constitutional document evidencing the change of name of company has been verified from commercial registry of Canton Zurich dated 04 July 2008.</p> <p>OK Verified Certification issued by the Commercial Registry of Canton Zurich the 4 July 2008</p> <p>Letter of Approval from DNA of China dated 26 August 2007 has been verified.</p> <p>Letter of Approval from DNA of Switzerland dated 21 May 2008 has been verified.</p> <p>OK</p> <p>CAR 1 Closed.</p> |

VALIDATION REPORT

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---------------------------------------|---|--|
| CAR 2 Calculation data need to be updated according to the latest available Energy Statistical Yearbook 2006 including 2005 data. | B.2.6 B.5.1 | Calculations have been updated with latest available Energy Statistical Data (China Energy Statistical Yearbook 2006 including 2005 data. | Calculation has been revised and 2005 data has now been included. OK. CAR 2 Closed. |
| CL1 The geographical coordinates need to be confirmed (latitude seems not correctly reported in the PDD, West instead of Nord). | A.1.1 | It is corrected as 26°13'36"East - 26°21'36" North in the revised PDD. | This has been corrected in revised PDD Revised PDD reviewed OK CL 1 Closed. |
| CL 2 Investment analysis - Further clarification is required to confirm the benchmark rate and the parameters used in the sensitivity analysis. Please provide evidences on investment costs breakdown (investment costs in IRR spreadsheets is 198.57 Mln CNY, while in the PDD is 199.05), reference for interest rate, electricity tariff need to be provided. Sensitivity analysis is not complete. | B.3.1 | The PDD has been revised | The main technical and financial parameters have been corrected as Feasibility Study Report. Sensitivity analysis has been revised. Revised PDD reviewed. Reference documents have been verified. OK CL 2 Closed. |
| CL 3 Further clarification is required and more cases should be added in the PDD discussion | B.3.1 | The PDD has been revised The factual data of three similar projects is highlighted through adding a | The differences between the project activity and the other three projects that do not enjoy CDM financing |

VALIDATION REPORT

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|--|---------------------------------------|--|---|
| <p>as many other hydro plants exist in the Yunnan province.</p> <p>The differences between the project activity and the other three projects that do not enjoy CDM financing (Luoshuidong power plant, Xiaopengzu power plant, Gula Tianshengqiao power plant) should be highlighted giving factual data and referring the source of information</p> | | <p>new Table 6. The sources of reference are given in the footnote of No. 14-16.</p> | <p>(Luoshuidong power plant, Xiaopengzu power plant, Gula Tianshengqiao power plant) should be highlighted giving factual data and referring the source of information.</p> <p>The revised PDD includes details of the other three projects that do not enjoy CDM financing (Luoshuidong power plant, Xiaopengzu power plant, Gula Tianshengqiao power plant) and reference of details has now been included in the revised PDD.</p> <p>Revised PDD reviewed.</p> <p>OK</p> <p>CL 3 Closed.</p> |
| <p>CL 4</p> <p>Project proponent needs to specify whether the referred date is Start date of construction, project commissioning date, the implementation date or the date of real action and more evidence should be provided to demonstrate that CDM application a key element in project owner decision to go ahead</p> | <p>B.3.4</p> <p>C.1.1</p> | <p>A table was been included that clearly indicates CDM consideration is added in the beginning of Section B.5 of the revised PDD. The starting date of the project activity is after the date of validation and therefore substantially demonstrates the incentive from the CDM was seriously considered prior to</p> | <p>OPEN</p> <p>It has been not included the table with the time scale milestones of CDM consideration by PP.</p> <p>The Construction Permit issued by Nujiang Prefecture Development and Reform Committee dated 11 May 2007 has been verified.</p> |

VALIDATION REPORT

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---------------------------------------|--|---|
| with the project. | | the project start. | Revised PDD reviewed. OK CL 4 Closed. |
| CL 5 The stakeholder's questionnaires were handed out in Shuangkuidi Village instead of Cheng Gan Town indicated in the PDD. Please insert in the PDD the number of fulfilled questionnaires received. Please provide dates on the held meetings. | E.1.1 E.1.4 | The PDD has been revised | Details regarding stakeholder consultation process have now been included in PDD. Copy of questionnaires submitted has been reviewed. Revised PDD reviewed. OK CL 5 Closed. |
| CL 6 The PDD does not include an explanation regarding the non-feasibility of an alternative scenario to the project activity consisting in the construction of a power plant using other renewable energy, such as wind, biomass, etc with equivalent installed capacity or annual electricity generation. | B.2.2 B.3.1 | The sources that prove the lack of wind, biomass and solar energy resources are included in the footnote 5. The unfeasibility of geothermal power plant with the same power capacity is demonstrated by China Electric Power Yearbook: 2006 (see the footnote No.6). | The references provided has been verified and now been included in the revised PDD as foot notes. Revised PDD reviewed. OK CL 6 Closed. |
| CL 7: At page 14 of the PDD it has been stated that | B.3.2 B.3.3 | Reference to the source of data has been included in the PDD. | OK for sources of data relative to capacity decrease has been referenced. |

VALIDATION REPORT

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|--|---------------------------------------|--|--|
| <p>in the CSPG the share of hydro capacity in the total installed capacity decreased from 27.8% to 22.2% in the period 2000-2005, this shall be substantiated with evidence (or reference should be made to the source of information). In addition, the claim of a less convenient location of the project activity should be better demonstrated, for instance, through a Yunnan road map showing the position of the project activity respect the other plants reported in table 5.</p> <p>Factual info supporting common practice analysis (see CL 3).</p> | | <p>The factual information supporting common practice analysis is given by a new table (see the p16 of revised PDD). A transportation map of Yunnan Province is provided as Figure 4 in the revised PDD.</p> | <p>OPEN – Factual info supporting common practice analysis (see CL 3). The PDD has been revised and information and references has now been included in revised PDD.</p> <p>Revised PDD reviewed.</p> <p>OK</p> <p>CL 7 Closed.</p> |
| <p>CL 8</p> <p>Regarding the Financial Analysis:</p> <ol style="list-style-type: none"> 1. The first page of the Official Feasibility Study Report and the approval of the document are missing 2. Cash flows consider erroneously depreciation as a cost 3. The loan is counted twice as investment and a as loan 4. The 10% benchmark is referred to the | B.3.1 | <ol style="list-style-type: none"> 1. The hard copy of official FSR had been checked and its soft copy also was provided in site visit of validation. The first page with stamp of institute who completed the FSR would not be included in the soft copy of FSR. The approval of FSR is provided. 2. The depreciation is deducted in estimating gross profits on which tax is calculated, not considered as a cost. It is | <p>OPEN</p> <p>The IRR now reported in the PDD correspond to guidance given by EB 39. The project IRR (calculated for a period of 30 years i.e. equivalent to the lifetime of the project). The input parameters used are taken from the Feasibility Study Report (FSR) developed by Water & Electric Investigation & Design Institute of Kunming University</p> |

VALIDATION REPORT

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|--|---------------------------------------|--|--|
| <p>project IRR and not to the equity IRR.</p> <p>5. Some costs seem that have not been included in the Financial Analysis (urban and educational taxes)</p> <p>6. The PDD does not motivate why 10% variations in the four parameters considered in the Sensitivity Analysis are unlikely that can happen</p> | | <p>added back to net profits for the purpose of calculating IRR. This fully complies with the requirements of the Guidance on the Assessment of Investment Analysis (Annex 35 of EB39).</p> <p>3. The loan is only counted once as investment. Misunderstanding may be caused by equity IRR calculation. However, any information related to the equity IRR calculation is moved.</p> <p>4. According to “Economic Evaluation Code for Small Hydropower Projects” issued by the Ministry of Water Resources of China (Document No. SL16-95), the hydropower projects whose installed capacity are below or equal to 25MW fall into this code. Moreover, the hydropower projects whose installed capacity are below or equal to 50MW in rural area also fall into this code. The financial benchmark internal rate of return (after tax) of total investment for Chinese small hydropower projects is 10%, which is</p> | <p>of Science & Technology in July 2005 and approved by the Yunnan Provincial Development and Reform Commission on 10 April 2007. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognised source.</p> <p>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 value stated in the FSR.</p> <p>DNV has analyzed the input parameters further to arrive at a point at which the project IRR touches the benchmark. The result of this analysis is has been added in Section 4.4 of Validation report as well as has now been added to revised PDD</p> <p>References provided for sensitivity analysis has been reviewed by DNV.</p> <p>OK</p> |

VALIDATION REPORT

| Draft report clarifications and corrective action requests by validation team | Ref. to checklist question in table 2 | Summary of project owner response | Validation team conclusion |
|---|---------------------------------------|--|----------------------------|
| | | <p>used widely in hydropower projects in China. Therefore, we the 10% benchmark is referred to project IRR and not the Equity IRR. In previous version of PDD, it mistakenly uses equity IRR benchmark as 10%. This is corrected in the revised PDD.</p> <p>The cost incurred by urban and educational taxes has been included in the financial analysis. It is not directly included in the cost, but discounted from electricity tariff. The electricity tariff including VAT is 0.1513 CNY/kWh, and the one used in IRR calculation is $0.1513 * [1 - 6\% - 6\% * (1\% + 4\%)] = 0.1513 * (1 - 6.3\%) = 0.142$ CNY/kWh. This has no impact on IRR calculation.</p> <p>The Scenario at which the project IRR will reach the benchmark (10%) and justification it very unlikely happen has now been included in revised PDD.</p> | CL 8 Closed. |



VALIDATION REPORT

APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Elfride V. Covarrubias

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

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

Høvik, 4 January 2008

Michael Lehmann

Michael Lehmann

Technical Director, International Climate Change Services



CERTIFICATE OF COMPETENCE

Sequoia (Qingxing) A

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, 4 January 2008

Michael Lehmann

Michael Lehmann

Technical Director, International Climate Change Services



CERTIFICATE OF COMPETENCE

Francisco Zamarron

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

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

Høvik, 30 November 2007

Michael Lehmann

Michael Lehmann

Technical Director, International Climate Change Services



CERTIFICATE OF COMPETENCE

Giulia Galluccio

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

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

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Michael Lehmann

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

| | | | |
|--|------------------------|----------------------|-----|
| GHG Auditor: | Yes | | |
| CDM Validator: | Yes | JI Validator: | Yes |
| CDM Verifier: | Yes | JI Verifier: | Yes |
| Industry Sector Expert for Sectoral Scope(s): | Sectoral scope 1, 2, 3 | | |
| Technical Reviewer for (group of) methodologies: | | | |
| ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G | Yes | AM0027 | Yes |
| ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045 | Yes | AM0030 | Yes |
| ACM003, ACM0005, AM0033, AM0040 | Yes | AM0031 | Yes |
| ACM0004, ACM0012 | Yes | AM0032 | Yes |
| ACM0006, AM0007, AM0015, AM0036, AM0042 | Yes | AM0035 | Yes |
| ACM0007 | Yes | AM0038 | Yes |
| ACM0008 | Yes | AM0041 | Yes |
| ACM0009, AM0008, AMS-III.B | Yes | AM0034 | Yes |
| AM0006, AM0016, AMS-III.D, ACM0010 | Yes | AM0043 | |
| AM0009, AM0037 | Yes | AM0046 | |
| AM0013, AM0022, AM0025, AM0039, AMS-III.H, AMS-III.I | Yes | AM0047 | |
| AM0014 | Yes | AMS-II.A-F, AM0044 | Yes |
| AM0017 | Yes | AMS-III.A | Yes |
| AM0018 | Yes | AMS-III.E, AMS-III.F | Yes |
| AM0020 | Yes | | |
| AM0021, AM0028, AM0034, AM0051 | Yes | | |
| AM0023 | Yes | | |
| AM0024 | Yes | | |

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Kumaraswamy Chandrashekara

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

| | | | |
|--|----------------------|----------------------|-----|
| GHG Auditor: | Yes | | |
| CDM Validator: | Yes | JI Validator: | -- |
| CDM Verifier: | Yes | JI Verifier: | -- |
| Industry Sector Expert for Sectoral Scope(s): | Sectoral scope 4 & 5 | | |
| Technical Reviewer for (group of) methodologies: | | | |
| ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G | Yes | AM0027 | Yes |
| ACM002, AMS-IA-D, AM0019, AM0026, AM0029, AM0045 | Yes | AM0030 | Yes |
| ACM003, ACM0005, AM0033, AM0040 | Yes | AM0031 | Yes |
| ACM0004, ACM0012 | Yes | AM0032 | Yes |
| ACM0006, AM0007, AM0015, AM0036, AM0042 | Yes | AM0035 | Yes |
| ACM0007 | Yes | AM0038 | Yes |
| ACM0008 | Yes | AM0041 | Yes |
| ACM0009, AM0008, AMS-III.B | Yes | AM0034 | Yes |
| AM0006, AM0016, AMS-III.D, ACM0010 | Yes | AM0043 | |
| AM0009, AM0037 | Yes | AM0046 | |
| AM0013, AM0022, AM0025, AM0039, AMS-III.H, AMS-III.I | Yes | AM0047 | |
| AM0014 | Yes | AMS-II.A-F, AM0044 | Yes |
| AM0017 | Yes | AMS-III.A | Yes |
| AM0018 | Yes | AMS-III.E, AMS-III.F | Yes |
| AM0020 | Yes | | |
| AM0021, AM0028, AM0034, AM0051 | Yes | | |
| AM0023 | Yes | | |
| AM0024 | Yes | | |

Høvik, 5 February 2007

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director