



VALIDATION REPORT

“Yunnan Province, Tengchong County, XiShanHe Hydropower Station Project” in China

REPORT No. 2008-0131

REVISION No.02



VALIDATION REPORT

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CERTIFICATION AS

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Client: Asja Environment International B.V Mendrisio Branch	Client ref.: Alberto Manzone, Catherine Cui

Project Name: Yunnan Province, Tengchong County, XiShanHe Hydropower Station Project

Country: China

Methodology: AMS-I.D

Version: 13

GHG reducing Measure/Technology: Power generation from hydro sources.

ER estimate: 28 001 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 "Yunnan Province, Tengchong County, XiShanHe Hydropower Station Project" in China, as described in the PDD, version 04 dated 8 December 2010, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AMS-I.D version 13. DNV thus requests the registration of the project as a CDM project.

Report No.: 2008-0131	Date of this revision: 2010-12-23	Rev. No. 02
Report title: Yunnan Province, Tengchong County, XiShanHe Hydropower Station Project		
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Work verified by: Weidong Yang , Miguel Rescalvo (draft report)		

Key words:

Climate Change

Kyoto Protocol

Validation

Clean Development Mechanism

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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH ₄	Methane
CL	Clarification request
CO ₂	Carbon dioxide
CO 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
LoA	Letter of Approval
MP	Monitoring Plan
N ₂ O	Nitrous oxide
NDRC	National Development and Reform Committee
NGO	Non-governmental Organisation
OM	Operating Margin
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 “Yunnan Province, Tengchong County, XiShanHe Hydropower Station Project” in China. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

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

The project participant from the host Party China is Tengchong County Qinghe Hydropower Development Co., Ltd.. International Clean Fund LLC, Lewes, Mendrisio Branch is the project participant from the Annex I Party, Switzerland. Both Parties fulfil the participation criteria and DNA's of China and Switzerland have approved the project and authorized the project participants.

The DNA of China has 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.

With a total rated installed capacity of 6.7 MW (2 3.35 MW rated capacity of each turbine), the project is eligible as type I small-scale CDM project activity. The project correctly applies the simplified baseline and monitoring methodology AMS-I.D, version 13. By generating renewable energy which will partly displace fossil fuel based electricity in the China Southern Power Grid (CSPG), the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not 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 average 28 001t CO₂e per year during the first seven years renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change. The monitoring methodology AMS-I.D, version 13 has been applied correctly. The procedures for monitoring, operating and maintenance have been finalized and will be put in place prior to the start of the crediting period.

Comments by Parties, stakeholders and NGOs have been invited via the UNFCCC web-site. No comments have been received.

In summary, it is DNV's opinion that the project, as described in the project design document (version 04 dated 23 December 2010), meets all relevant UNFCCC requirements for the CDM, is eligible as category I.D small-scale CDM project activity and correctly applies the approved simplified baseline and monitoring methodology AMS-I.D, version 13. Hence, DNV requests the registration of the “Yunnan Province, Tengchong County, XiShanHe Hydropower Station Project” as a CDM project activity.



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2 INTRODUCTION

Asja Environment Internationa B.V Mendrisio Branch has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “Yunnan Province, Tengchong County, XiShanHe Hydropower Station Project” in China. 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, the simplified modalities and procedures for small-scale CDM project activities 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, the simplified modalities and procedures for small-scale CDM project activities and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology. The validation team has, based on the recommendations in the Validation and Verification Manual /7/ conducted the validation.

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 outlines the documentation reviewed during the validation:

- /1/ Asja Ambiente Italia S.p.A., Project Design Document for “Yunnan Province, Tengchong County, XiShanHe Hydropower Station Project”, version 02 of 26 November 2007 and version 03 dated 31 January 2009 and version 04 dated 23 December 2010.
- /2/ Letter of Approval issued by DNA of China dated January 2008.
- /3/ Letter of Approval issued by DNA of Switzerland dated 31 August 2009
- /4/ Feasibility Study Report of “Yunnan province, Tengchong County, XiShanHe Hydropower Station Project” by Yunnan Survey and Design Institute of Water Conservancy and Hydropower dated July 2006, and approval letter by the Development & Reform Committee of Baoshan City dated 5 January 2007
- /5/ Environmental Impact Assessment (EIA) for “Yunnan province, Tengchong County, XiShanHe Hydropower Station Project” by Yunnan Survey and Design Institute of Water Conservancy and Hydropower dated November 2006, and approval letter by Baoshan City Environment Protection Bureau dated 14 November 2006.
- /6/ Ministry of Water Resources. *Economic Evaluation Code for Small Hydropower Projects*, Document No. (SL 16-95)
- /7/ CDM Executive Board: Validation and Verification Manual, version 01.
- /8/ AMS-I.D Approved methodology, “Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories”, version 13, 14 December 2007.
- /9/ The reply letter of grid connection application for the project, issued by Yunnan Baoshan Power Company on 17 April 2006.
- /10/ “Hydroenergy Design Code for Small Hydropower Projects(SL76-94)” published by the Ministry of Water Resources of the People’s Republic of China.
- /11/ The statistics by State Electricity Regulatory Commission (SERC) on newly built thermal plants in 10th “Five-Year Plan” period 2000-2005, and NDRC official website <http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1374.pdf>
- /12/ China Electric Power Yearbook 2000, 2001, 2002, 2003, 2004, 2005 and 2006
- /13/ China Energy Statistical Yearbook 2004, 2005 and 2006
- /14/ China NDRC, the emission factor calculation for each power grid of China, published on 9 August 2007, NDRC official website: <http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf>



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- /15/ CDM Guidebook for Yunnan province, Tengchong County, XiShanHe Hydropower Station Project.
- /16/ The statement for the amount of the supplied electricity to the grid by the project issued by Yunnan Baoshan Electric Company.
- /17/ IPCC: *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories Reference Manual*.
- /18/ The guidance for deviation in use of methodology AM0005 by several project activities in China by EB. <http://cdm.unfccc.int/Projects/Deviations>
- /19/ Project construction permission issued by Hunan Hydro&Power Project Supervision Contract Corporation dated 1 February 2007.
- /20/ Minutes of board meeting to make decision for CDM implement dated 5 January 2007.
- /21/ Construction contract between Tengchong County Qinghe Hydropower Development Co., Ltd. and Baoshan City Construction Company, dated 1 October 2007.
- /22/ Modalities of Communication Form of Yunnan province, Tengchong County, XiShanHe Hydropower Station Project.
- /23/ Consultancy agreement between Asja Ambiente Italia S.p.A. and Kunming Huan Ye Project Development Co., Ltd (agent of Tengchong County Qinghe Hydropower Development Co., Ltd.) dated 16 February 2007.
- /24/ CDM Emission Reductions Purchase Agreement (ERPA) between Asja Ambiente Italia S.p.A. and Tengchong County Qinghe Hydropower Development Co., Ltd. dated 8 March 2007.
- /25/ Purchase contract for water turbines between Tengchong County Qinghe Hydropower Development Co., Ltd. and Chongqing Water Turbine Works Co., Ltd dated 14 January 2007.
- /26/ Chinese Hydraulic Engineering Society (CHES), the confirmation of the “Economic evaluation code for small hydropower projects (SL 16-95)” is still affect. <http://www.ches.org.cn/jishubiaoazhun/001.asp>
- /27/ Financial analysis spreadsheet of Yunnan province, Tengchong County, XiShanHe Hydropower Station Project dated 27 July 2009.
- /28/ National Bureau of Statistics of China, Ex-Factory Price Indices of Industrial Products in 2007.
- /29/ The 11th five-year plan of power industry development in Baoshan City by People's government of Baoshan City dated 26 August 2008 (Baozhengfa[2007]3). http://xxgk.yn.gov.cn/BS_Model/newsview.aspx?id=137068
- /30/ Wei Qi. Brief Discussion on the Existing Problems and Solutions on Hydropower Development of Baoshan City dated 12 April 2007.
- /31/ The General Office of the State Council, *Notice on Strictly Prohibiting the Installation of Fuel-fired Generation with the Capacity of 135MW or below*, Decree No.: 2002.6.
- /32/ Chinese New Energy: The Wind Resource in China <http://www.newenergy.org.cn/html/0039/2003991.html>
- /33/ The development of Solar Power in Yunnan Province relies on the support of the government <http://www.ocn.com.cn/free/200802/nengyuandianli041.htm>
- /34/ The development of biomass plant in Yunnan Province <http://www.china5e.net/www/dev/news/viewinfo-newpower-200805050020.html>
- /35/ The development status of wave power in China http://www.newenergy.org.cn/html/0065/2006511_10000.html



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- /36/ The statistics of China Renewable Energy Ration Station
<http://www.hydrocost.org.cn/price/priceIndex.jsp>
- /37/ 15 copies of questionnaires for stakeholder consultation.
- /38/ The data reported for other similar projects registered or requesting registration as CDM projects in Yunnan Province, <http://cdm.unfccc.int/Projects/projsearch.html>
- /39/ The power purchase agreement between Yunnan Baoshan Electric Co.,Ltd and Tengchong County Menglian Hydropower Station dated 6 April 2003.
- /40/ National City Tax Law, <http://202.108.90.130/chinatax/jibenfa/jibenfa0401.htm>
- /41/ Interim Provision on Education Tax Law,
http://www.law-lib.com/law/law_view1.asp?id=99771
- /42/ The supervision report of Yunnan Province, Tengchong County, XiShanHe Hydropower Station Project issued by Hunan Hydro&Power Project Supervision Contract Corporation dated 18 October 2008.
- /43/ Yunnan Development and Reform Commission: *Notification on issues regarding implementation of rain and dry tariff for new operation hydropower unit*, dated 6 January 2006
- /44/ Yunnan Development and Reform Commission: *Notification on issues regarding implementation of rainy and dry tariff for un-unified regulating power within Yunnan grid*, dated 30 August 2005
- /45/ Yunnan power grid: *Yunnan power grid notification for the tariff non regulated by provincial power grid*, dated 22 December 2009
<http://xxgk.yn.gov.cn/newsview.aspx?id=1194735>
- /46/ China NDRC: *The clarification on Effective Electricity Coefficient*.
<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2134.pdf>
- /47/ Yunnan Baoshan Electric Co.,Ltd and Tengchong County Qinghe Hydropower Development Co., Ltd: The power purchase agreement, dated 19 March 2009.
- /48/ Baidu.com: 2008 per capita GDP ranking in Yunnan Province, dated 26 April 2009
<http://tieba.baidu.com/f?kz=569713088>
- /49/ Yunnan DRC: Inform of Yunnan grid electricity sale tariff, 3 December 2009.
<http://www.yn.cei.gov.cn/fgwnet/bulletin.nsf/deskShow/9A53329CAFF663F548257694002B7A04?opendocument>
- /50/ China State Government: Law of the Peoples Republic of China on Regional National Autonomy, 28 February 2001.
http://www.gov.cn/test/2005-07/29/content_18338.htm
- /51/ CDM Executive Board: *Information note on the highest tariffs applied by the executive board in its decisions on registration of projects in the People's Republic of China*, version 01
- /52/ Baoshan grid company: *The Explanation of Coefficient of Electricity in Baoshan City*, dated 16 December 2010.
- /53/ Baoshan grid company: The amount of the supplied electricity to the grid by the project from April 2009 to March 2010, dated 17 December 2010

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



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- AMS-I.D “Grid connected renewable electricity generation” (version 13) is applied to the project activity.
- Changes related to the CARs and CLs identified in DNV’s draft validation report and related to the latest EB requirements and guidelines on financial analysis, project start date and CDM consideration.
- Inclusion of further clarifications to address issues raised in EB’s request for review.

After reviewing the revised PDD, DNV issued this final validation report and opinion.

3.2 Follow-up Interviews with Project Stakeholders

DNV conducted a follow-up interview on 28 January 2008 with representatives of the project consultant ASJA Renewables (China) Co., Ltd. and the project owner Tengchong County Qinghe Hydropower Development Co., Ltd. to resolve the issues identified during the desk review of the PDD. During the desk review, the relevant documents including FSR /4/, EIA /5/ and the construction contract dated 1 October 2007 /21/ were provided and reviewed. The information about this project stated in PDD could be confirmed from these documents. It was only three months after the construction contract was signed when the follow-up interview was carried out and there is no migration /4//5/. Therefore, the fact that no on site visit for this project was arranged is in DNV’s opinion justified.

The main topics and personnel of the interviews are summarized in the table below.

	Date	Name	Organization	Topic
/54/	2008-01-28	Mr. Yuan Quanyi Consulting Engineer	ASJA Renewables (China) Co., Ltd.	<ul style="list-style-type: none"> ➤ Baseline determination of the project ➤ Applicability of selected methodology, AMS-I.D ➤ Issues related to the additionality ➤ Emission reductions calculation ➤ Emission reduction monitoring plan and project management
/55/	2008-01-28	Mr. Huang Anwen General Manager Mr. Nan Chunhui Assistant for General Manager	Tengchong County Qinghe Hydropower Development Co., Ltd. LinCang Yun Tou Yue Dian Hydropower Development Co., Ltd.	<ul style="list-style-type: none"> ➤ Information of project construction ➤ The development of hydropower project in Yunnan province ➤ The approval status (incl. EIA approval, the feasibility study report approval, CDM project approval) ➤ Project management



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				<ul style="list-style-type: none"> ➤ Emission reduction monitoring plan ➤ Consulting process for stakeholder's comments ➤ Investment risks and barriers
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3.3 Resolution of Outstanding Issues

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

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

The validation protocol consists of two tables. The different columns in these tables are described in the figure below. The completed validation protocol for the "Yunnan province, Tengchong County, XiShanHe Hydropower Station Project" is enclosed in Appendix A to this report.

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

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

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

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

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

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

Figure 1 Validation protocol tables



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3.4 Internal Quality Control

The validation report underwent a technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation Team

<i>Role/Qualification</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>					
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	Expert input
CDM validator / technical team leader	Tang	Zhiang		√	√	√	√		√
GHG auditor	Dong	Nan	China	√		√			
Technical reviewer (draft report and final report)	Yang	Weidong	USA					√	
Technical reviewer (draft report)	Rescalvo	Miguel	USA					√	

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



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4 VALIDATION FINDINGS

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

The final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation of version 04 dated 23 December 2010 /1/.

4.1 Participation Requirements

The project participant from the host Party China is Tengchong County Qinghe Hydropower Development Co., Ltd., and the project participant from the Annex I Party Switzerland is International Clean Fund LLC, Lewes, Mendrisio Branch. Both the participating Parties, i.e. China as the host Party and the Switzerland as the Annex I Party, meet all the participating requirements as per the Kyoto Protocol.

The letter of approval from the DNA of China has been obtained in January 2008 /2/, authorizing Tengchong County Qinghe Hydropower Development Co., Ltd. as project participant and also confirmed that the project assists in achieving sustainable development.

The letter of approval from the DNA of Switzerland has been obtained on 31 August 2009 /3/, authorizing International Clean Fund LLC, Lewes, Mendrisio Branch as project participant..

The validation has not revealed any information indicating that the project can be seen as a diversion of official development assistance (ODA) funding towards China.

4.2 Project Design

The proposed project is a small run-of-river hydropower station located on the XiShanHe river between BangLao Village and XiangYan bridge. The main plant construction includes the dam, water diversion canal, fore-bay, pressured pipe, workshop, water turbine, generator and voltage transformation equipment. The installed capacity of the project is 6.7MW, including 2 sets of turbines and generators with the capacity of 3.35MW for each set. The turbines are HLA671-WJ-95 type and the associated generators are of SF3350-10/1730 type. The operation time per year is 6 220 hours. The expected average electricity supplied to the grid per year is 33 202MWh. The power density of the project is 980.822 W/m² according to the approved FSR /4/.

Being a renewable electricity project, the project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions from electricity generation in the China Southern Power Grid which is dominated by fossil fuel power plants.

The starting date of the project activity is 14 January 2007, which is the date of purchase contract for water turbines /25/. This purchase contract is earlier than the construction contract dated 1 October 2007 /21/ and construction permission dated 1 February 2007 /19/. The FSR was verified to confirm that the operational lifetime is 30 years /4/. The length of the first crediting period is 7 years, starting on 10 March 2010 or registration date whichever is later.

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4.3 Baseline Determination

The project activity applies the approved simplified baseline methodology AMS-I.D of the “Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories” version 13 of 14 December 2007 /8/.

The applicability criteria of AMS-I.D are met since:

- a) This project is a renewable energy project (hydropower plant) with an installed capacity of 6.7 MW, which has been confirmed from the FSR /4/ and purchase contract for water turbines /25/;
- b) According to the FSR /4/ and purchase contract for water turbines between Tengchong County Qinghe Hydropower Development Co., Ltd. and Chongqing Water Turbine Works Co., Ltd dated 14 January 2007 /25/, the aggregated installed capacity is 6.7 MW which is below the threshold of 15 MW for type I small scale project activities;
- c) According to the FSR /4/ and the reply letter of grid connection application for the project, issued by Yunnan Baoshan Power Company on 17 April 2006 /9/, this project is connected with China Southern Power Grid (CSPG), which is dominated by fossil fuel generation.
- d) The project boundary is clearly defined in the PDD, which includes the project power plant and the system boundary for determining the grid emission factor comprising all power plants connected physically to CSPG.

The project is located in the west of Hehua Xiang of Tengchong County of BaoShan city in Yunnan province. Yunnan provincial power grid belongs to CSPG and the electricity from this project will be supplied to CSPG according to the FSR /4/ and the reply letter of grid connection application for the project, issued by Yunnan Baoshan Power Company on 17 April 2006 /9/. The defined geographical and spatial extent project boundary is reasonable and complies with AMS-I.D. DNV can confirm the project boundary is complete and reasonable.

Therefore, the emission source in this project boundary is as following table:

	<i>GHGs involved</i>	<i>Description</i>
Baseline emissions	CO ₂	The China Southern Power Grid
Project emissions	N/A	Project emission is regarded as zero as the project is a renewable energy (Hydro source) project.
Leakage	N/A	There are no leakages that need to be considered in applying this methodology.

The selected sources and gases are justified for the project activity.

The alternative baseline scenarios have been identified as below:

Alternative 1: The specific hydropower activity, without being registered as a CDM project activity;

Alternative 2: A thermal power plant with equivalent annual power generation;

Alternative 3: Other renewable energy power plant with equivalent annual power generation;

Alternative 4: The equivalent annual electricity is supplied by the China Southern Power Grid;

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Alternative 1 complies with all mandatory applicable legislation and regulations; however it is not feasible economically. It is demonstrated (as presented below in the additionality assessment, section 4.4) that without CERs sales revenues the IRR of the project is lower than the benchmark. The project faces significant economic and financial barriers without CDM revenue, so it is deemed not feasible.

Alternative 2 consists of the building of thermal power plant with the same annual electricity generation as the project activity. However, according to Chinese regulations, coal fired power plants of less than 135MW are prohibited for construction in the areas covered by the large grids such as provincial grids /31/. The equivalent amount of annual electricity generation from capacity 6.7 MW hydro plant is less than from the thermal power plant. In other words, the thermal power plant capacity with equivalent power generation is less than 6.7 MW which is much less than 135 MW. Therefore, this alternative can be excluded.

Alternative 3: The effective wind power density in Yunnan is less than 50 W/m². The annual hours with wind speed more than 3 m/s is under 2,000 hours and the annual hours with wind speed more than 6 m/s is under 150 hours /32/. Furthermore, due to the technology development status and the high cost for power generation, solar power, biomass energy and wave power have not been widely used in China /33//34//35/. Hence, alternative 3 is not a feasible baseline scenario.

Based on above discussion, DNV was able to confirm that the only plausible baseline scenario is Alternative 4: The equivalent annual electricity is supplied by the China Southern Power Grid.

In the baseline scenario the electricity delivered from the project activity to the grid would have been generated by fossil fueled grid-connected power plants and by the addition of new generation sources. The baseline for the proposed project is the amount of electricity generated by the proposed project per year (EG_y) multiplied by the emission factor (tCO₂/MWh) of the grid. The grid emission factor has been determined *ex ante* based on the most recent information available at the time of PDD submission and is fixed for the entire first crediting period. This is reflected in the combined margin (CM) - the weighted average of the operating margin (OM) emission factor and the build margin (BM) emission factor. The weighting is set to respectively 50% and 50%.

The baseline scenario boundary of the project is the China Southern Power Grid, so the project boundary for calculation EF_{OM} and EF_{BM} will be limited to the China Southern Power Grid.

The application of the baseline methodology is transparent and conservative.

4.4 Additionality

4.4.1 CDM consideration and continued action to secure CDM status

It has been verified that the purchase contract for water turbines was signed on 14 January 2007 /25/, construction permission was obtained on 1 February 2007 /19/ and the construction contract is dated 1 October 2007 /21/. Hence, the purchase contract for water turbines /25/ dated 14 January 2007 is correctly deemed to be the start date of the project activity.



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The project owner realized the poor financial indicators of the project when the FSR was finalized in July 2006 /4/. As described in the FSR, the IRR of total investment of the project is 8.57% without CER revenues. The project owner held the board meeting on 5 January 2007 and decided to apply for the project as CDM project due to the high investment risk and the low IRR /20/. The project owner signed purchase contract for water turbines with Chongqing Water Turbine Works Co., Ltd on 14 January 2007 /25/ and then got the construction permission in 1 February 2007 /19/. Consultancy agreement was signed between Asja Ambiente Italia S.p.A. and Kunming Huan Ye Project Development Co., Ltd (agent of Tengchong County Qinghe Hydropower Development Co., Ltd.) on 16 February 2007 /23/. Then ERPA was signed between Asja Ambiente Italia S.p.A. and Tengchong County Qinghe Hydropower Development Co., Ltd. on 8 March 2007 /24/. LoA from China DNA was obtained in January 2008 /2/. DNV performed follow-up interviews on 28 January 2008 /54//55/.

All the relevant documents have been verified by DNV and it is in DNV's opinion sufficiently demonstrated that the benefits of the CDM were a decisive factor in the decision to proceed with the project and that continuous and real actions have been undertaken to secure CDM status of the project.

4.4.2 Alternative baseline scenarios

The alternative baseline scenarios for the project activity have been suitably identified as,

Alternative 1: The specific hydropower activity, without being registered as a CDM project activity;

Alternative 2: A thermal power plant with equivalent annual power generation;

Alternative 3: Other renewable energy power plant with equivalent annual power generation;

Alternative 4: The equivalent annual electricity is supplied by the China Southern Power Grid;

As mentioned in Section 4.3 alternatives 2) and 3) are not realistic and credible alternatives and can be exempted from further consideration.

4.4.3 Investment analysis: Choice of approach

Since the proposed project generates financial and economic benefits through the sales of electricity other than CDM-related income and the alternative does not involve any investment, a benchmark analysis is applicable.

4.4.4 Investment analysis: Benchmark selection

According to the "Economic evaluation code for small hydropower projects (SL 16-95)", issued by Ministry of Water Resources of China /6/, projects with installed capacity below 25 MW are defined as small hydropower projects and based on that a project benchmark of 10% (after tax) has been selected. DNV can confirm this is suitable and reasonable as follows:

1. This benchmark was determined by the national administration of this industry in China /6/.
2. This benchmark is applicable for *project and after tax* scenario and the investment analysis for this project will also be for *project and after tax* scenario;
3. This Economic Evaluation Code /6/ refers to the risk premiums of small hydro power project.

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This benchmark of total investment financial internal rate of return (IRR) is widely accepted and applied in the Chinese small hydropower industry. It was also confirmed from publicly available source of the Chinese Hydraulic Engineering Society (CHES) that this benchmark is still in effect /26/.

4.4.5 Investment analysis: Input parameters

The input parameters used in the financial analysis of the “Yunnan province, Tengchong County, XiShanHe Hydropower Station Project” are taken from the Feasibility Study Report (FSR) developed by Yunnan Survey and Design Institute of Water Conservancy and Hydropower in July 2006 and approved by the Development & Reform Committee of Baoshan City on 5 January 2007 /4/. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognized source. DNV compared the input parameters for the financial analysis included in the PDD with the parameters stated in the FSR /4/ and was able to confirm that the values applied are consistent with the values stated in the FSR /4/.

The FSR was approved on 5 January 2007 and the purchase contract for water turbines was signed on 14 January 2007 /25/. Given this short period of time between approval of the FSR and the decision to proceed with the project activity, it is unlikely in the context of the project that the input values would have materially changed. It is thus reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project.

The input parameters used in the financial analysis were compared with the data reported for other similar hydropower projects registered or requesting registration as CDM in Yunnan province with capacities ranging between 2 and 10 MW. Parameters compared included the plant load factor, the investment costs per MW, percentage of O&M costs relative to total investment costs as indicated in the table below, which shows the investment costs and O&M costs are in a reasonable range /38/

Compared Data	Proposed Project Value		Compared Value in Yunnan	UNFCCC Reference Number
Investment costs (RMB/kW)	5110	Max	6630	2034
		Min	4030	1978
Annual O&M cost relative to total investment	2.96%	Max	6.31%	1994
		Min	1.96%	1533
Annual operating hours	6220	Max	6167	1994
		Min	4925	1997
Other fee (RMB/kW)	24	Max	24	1779
		Min	3	1743

1) Annual Power Generation

According to the FSR, the project is expected to supply to the grid an annual average electricity of 33 202 MWh, taking into account 6220 working hours per year /4/.

The coefficient of effective electricity of the project is 0.8 as cross checked against the FSR /4/. FSR was verified to confirm that the annual electricity generated by the project is

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calculated based on the hydrological data of the river from 1953 to 2005 /4/. As per the FSR, the calculation of the coefficient of effective electricity is based on the *Economic Evaluation Code for Small Hydropower Projects (SL 16-95)* /6/. The coefficient of effective electricity of 80% is from the FSR and calculated based on the electricity balance in local area, installed capacity, and regulation ability of the project which is specific to the project /4/. The FSR design institute referred to the SL16-95 while writing the FSR for the project based on their experience, and this situation is also consistent with common practice of China. Therefore, the coefficient of effective electricity of the project can be cross checked with SL 16-95 /6/.

Mainly the document SL16-95 provides an overview of applicable coefficient for energy efficiency as follows:

Type of hydropower stations	The coefficient of effective electricity
1. Grid connected, annual/ multi-year regulating hydropower stations	0.95-1.00
2. Grid connected, seasonal regulating hydropower stations	0.90-0.95
3. Grid connected, monthly/weekly/daily/no regulating (run-of-river) hydropower stations	0.80-0.90 0.70-0.80
The grid will take all electricity generated in rainy season and night The grid will only take part of the electricity generated in rainy season and night	
4. Not connected to the grid, Daily/No regulating capacity	0.60-0.70

The dam of the proposed project is relatively low (11 m) and the reservoir shallow giving limited reservoir capacity of 0.009 million m³ /4/. Therefore the proposed project only has daily water regulating capacity and the proposed project is the case that the grid will only take part of electricity generated in rainy season according to FSR (the page 16) /4/.

In accordance with the above table (stated in the document SL 16-95) the coefficient of effective electricity should be 0.70 – 0.80. The Yunnan Survey and Design Institute of Water Conservancy and Hydropower who prepared the FSR selected the value of 80%. Furthermore, DNV has also received the letter from the Baoshan Grid Company who confirm that the coefficient of effective electricity of 80% selected for the project activity is correct and specific to the project activity /52/.

The coefficient of effective electricity is defined as the ratio of actual electricity generated and the theoretical electricity generation potential of a hydropower station. The electricity intake limitation of local grids and the electricity demand in the area covered by the local grid is the most significant factor determining the coefficient of effective electricity /46/. DNV checked the statement of the amount of supplied electricity to the grid issued by Yunnan Baoshan Electric Company /16/, and confirm that the total actual amount of the net power supplied to the grid by the project was 50 990.2 MWh from April 2008 to March 2010. This period covered the rainy, normal and dry seasons. The net power supplied to grid from April 2008 to March 2009 was 30 361.5 MWh and from April 2009 to March 2010 was 20 628.7 MWh. Hence, the average annual value is 25 495.1 MWh /16/ /53/ which is lower than the estimated net electricity in the FSR (33 202 MWh).

Therefore, DNV can confirm that the choice of 0.8 as the coefficient of effective electricity is appropriate.

The choice of 0.4% as the auxiliary power consumption is appropriate according to “*Hydroenergy Design Code for Small Hydropower Projects (SL76-94)*” published by the Ministry of Water Resources of the People’s Republic of China /10/.



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The annual operating hours of the proposed project was compared to be the higher than those of the compared similar projects, which is more conservative /38/

2) Tariff

The tariff of 0.1444 RMB/kWh (excluding VAT) used in PDD is from the FSR, which was prepared by Yunnan Survey and Design Institute of Water Conservancy and Hydropower in July 2006. DNV also cross check with the power purchase agreement for another hydropower project, the PPA /39/ was signed between Yunnan Baoshan Electric Co. Ltd and Tengchong County Menglian Hydropower Station dated 6 April 2003, which was the latest available public information at the time of making the decision to proceed with the project activity. DNV can confirm that the tariff for Tengchong county Menglian hydropower station was 0.135 RMB/kWh (excluding VAT) /39/, so the proposed project tariff of 0.1444 RMB/kWh (excluding VAT) is higher than the tariff for the Tengchong county Menglian hydropower station, hence the tariff for the project activity is reasonable. .

Moreover, the actual tariff for the proposed projects is 0.1495 RMB/kWh (excluding VAT) as verified by DNV against the purchase power agreement (to be renewed every 5 years) signed between the Baoshan Electric Power Company and the project owner in 2009 /47/. When applying this tariff (0.1495 RMB/kWh excluding VAT) through the operational life of the proposed project, the project IRR becomes 9.04% which is below the benchmark of 10%.

The Yunnan provincial grid does not cover the whole province and the remaining area is covered by local grids. Furthermore the economic development in the Yunnan province is unbalanced /48/ there are differences in regards to industry, agriculture and living costs within the province which require a regional difference in electricity tariff of hydropower plant within the province /49/. In this context, three types of tariff were implemented for the Yunnan province as described below:

Type 1: is for hydropower plants which are directly connected to the Yunnan provincial grid in line with Yunfagaijiage [2005] /44/. For such hydropower plants DNV has verified that the tariff is defined according to the *Yunfagaijiage [2006] No. 28 /43/*:

0.19 RMB/kWh (including VAT) in flood seasons (from June to October)

0.215 RMB/kWh (including VAT) in normal seasons (from May to November)

0.24 RMB/kWh (including VAT) in dry seasons (from December to next April)

Type 2: according to Yunfagaijiage [2005] No. 792 /44/ type 2 tariff is for hydropower plants which are not directly connected to the Yunnan provincial grid. The electricity generated by type 2 power plant is transmitted to the Yunnan provincial grid through the local grid. The electricity generation of type 2 power plant is controlled by both the Yunnan provincial grid company and the local grid company, i.e. both Yunnan provincial grid company and the local grid company can send dispatch commands to this type of hydropower stations.

The official tariff document Yunfagaijiage [2005] No. 792 /44/ issued by Yunnan provincial Development and Reform Commission on 30 August 2005 regulates the tariff of un-unified hydropower stations dispatched by the Yunnan Grid. The tariff for type 2 projects is regulated by the province central government /44/ as follow:

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0.13 RMB/kWh (including VAT) in flood seasons (from June to October)
 0.18 RMB/kWh (including VAT) in normal seasons (May and November)
 0.23 RMB/kWh (including VAT) in dry seasons (from December to next April)

The weighted average of this tariff :

$$[(0.13 * 5 \text{ months} + 0.15 * 2 \text{ months} + 0.23 * 5 \text{ months}) / 12 \text{ months}] = 0.18 \text{ RMB/kWh (including VAT)}$$

Type 3: Yunnan Province is a multiracial region. According to the Law of the Peoples Republic of China on Regional National Autonomy /50/, the autonomous prefectures have the power to enact regulations on the exercise of autonomy and separate regulations in the light of the political, economic and cultural characteristics of the nationality or nationalities in the areas concerned. The organs of self-government of national autonomous areas shall independently arrange for and administer local economic development. The tariff of type 3 projects can be regulated by the local government since they are located in self-government of national autonomous areas. Thus the autonomous prefectures in the Yunnan province, i.e. the Dehong Dai-Jingpo Autonomous Prefecture, the Wenshan Zhuang-Miao Autonomous Prefecture, the Diqing Tibetan Autonomous Prefecture and the Nujiang Lisu Autonomous Prefecture, have their own official power tariff documents issued by local government or grid company.

According to the power purchase contract /47/ the project activity is connected to the local grid, the Baoshan power grid, which is then connect to the Yunnan provincial grid. Furthermore, the Baoshan power grid does not fall under one of the prefecture listed for type 3 project. Thus, the project activity is a type 2 project. When the weighted average of type tariff (0.18 RMB/kWh) is used, the IRR is also 9.43% which is still lower than benchmark.

Furthermore DNV has compared the electricity tariff applied to the project activity against CDM and non-CDM un-unified hydropower project (type 2) located in the Yunnan province. The table below lists all the type 2 hydropower projects in the Yunnan province with installed capacity below 50 MW:

Ref.	Installed capacity (MW)	Tariff including VAT (RMB/kWh)
2010	50	0.178
2199	48	0.151
2150	45	0.145
2080	35	0.146
2114	32	0.176
2075	32	0.162
2030	31.5	0.18
1862	25	0.140
2116	24.9	0.161
2164	24	0.180
2688	24	0.180
1605	24	0.160
2057	24	0.140
2054	22.5	0.140
2050	21.6	0.14

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2016	21	0.152
2003	20	0.172
1983	20	0.170
2063	20	0.170
2106	20	0.158
2804	18.9	0.180
2045	18.9	0.180
2059	18	0.140
2055	18	0.140
1511	15	0.177
2905	15	0.180
1775	12.6	0.155
1777	12.6	0.153
2608	12.6	0.155
1769	12.6	0.155
2146	12.6	0.180
1510	12.5	0.180
1978	10	0.180
1504	10	0.180
1430	10	0.180
2167	10	0.160
2429	10	0.180
1439	9.6	0.180
1496	9.6	0.180
1994	9.6	0.180
1489	8	0.180
2940	8	0.170
2033	8	0.165
2044	8	0.160
1408	7.5	0.180
1485	6.4	0.180
1982	5	0.180
Dujiacun Small Hydropower Project	12.6	0.180
Yunnan Zemahe 15MW Small Hydropower Project	15	0.170
Yunnan Maguan Tongguo Hydropower Project	16	0.170
Pihe 9.6MW Small hydropower project	9.6	0.180
Lishiluo Erji 6.4MW Small Hydropower Project	6.4	0.180
Yunnan Dehong Longchuan Bienaihe 1st and 2nd level	10.5	0.170

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Hydropower Project		
Yunnan Longchuan Nanwanhe 2nd level hydropower Project	20	0.170
Aluhe 12.6MW Small Hydropower Project	12.6	0.180
Pushihe Erji 10MW Small Hydropower Project	10	0.180
Maocaoping 8 MW Small hydropower Project	8	0.180
Menglian Hydropower Project	4	0.132
Nanrongtian Hydropower Station	6.4	0.160
Guilanzi Hydropower Project	2.4	0.160

As shown in the above table, the highest tariff for un-unified hydropower projects in the Yunnan province is 0.18 RMB/kWh (including VAT). When applying this highest tariff through the operational life of the proposed project, the project IRR is 9.43% and below the benchmark of 10%.

Although type 1 and type 3 projects in the Yunnan province are not comparable to the project activity, the project participants have nevertheless considered the highest tariff in the Yunnan province as described in the information note /51/ on the highest tariffs applied by the CDM Executive Board in its decisions on registration of projects in the People's Republic of China, i.e. 0.215 RMB/kWh (including VAT). The project participants calculated a reference tariff considering the situation where the proposed project would face the same investment situation as the reference projects with the highest approved tariff of 0.215 RMB/kWh.

The reference projects selected for the comparison are s registered hydropower CDM projects with similar scale (below 50 MW) which applied the highest tariff (0.215 RMB/kWh including VAT) of Yunnan Province. Furthermore, considering the proposed project is a small run-of-river hydropower station located in Yunnan Province, only run-of-river were hydropower projects were selected. Hence the selected reference projects are registered run-of-river hydropower CDM projects with an installed capacity below 50 MW which applied a tariff of 0.215 RMB/kWh (including VAT).

The highest reference tariff calculated by the project participants is 0.141 RMB/kWh (using project ref 3672). Applying this tariff in the investment analysis of the proposed project the hypothetical IRR is 8.27%, which is below the benchmark of 10%. DNV verified the calculations made by the project participants and was able to confirm that the values applied and the calculations are correct.

3) Investment costs

The investment used in investment analysis in PDD is from the FSR /4/. DNV compared the investment per kW capacity of the proposed project (5110 RMB/kW) with the similar projects and found it was in the normal range of the similar projects (4030-6630 RMB/kW) /39/. DNV also verified the supervision report of the proposed project issued by Hunan Hydro&Power



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Project Supervision Contract Corporation to confirm that the actual investment of the proposed project was 43.527 million RMB, 27% more than the estimated value in FSR /42/.

DNV has verified the evidence and considers the investment of the proposed project used in investment analysis to be appropriate and conservative.

4) O&M costs

The annual O&M cost relative to the investment cost of the proposed project (2.96 %) was compared with the data reported for other similar hydropower projects registered or requesting registration as CDM in Yunnan province /39/, which was found to be in the range of the compared projects (1.96%-6.31%) /39/. Thus DNV considers the O&M costs used in investment analysis to be appropriate.

5) Taxes

According to Economic Evaluation Code for Small Hydropower Projects, the VAT is 17% and the income tax is 33% /6/. The values of VAT and income tax used in investment analysis of the proposed project were verified to be in line with Economic Evaluation Code for Small Hydropower Projects. According to the Interim Provision on Education Tax Law, the education rate is 3% of VAT, and the education tax rate of 3% used in PDD was in line with that /41/. According to the National City Tax Law, the city building tax rate is 5% of VAT /40/, the 1% of the city tax rate used in PDD is from FSR, which is conservative. Therefore DNV considers the taxes used in PDD to be appropriate.

6) Other fee

According to Notification of Economic Evaluation Code for Small Hydropower Projects /6/, the other fee includes office expense, travel expenses and so on. The other fee of the proposed project (24 RMB/W) was found to be in the range of other similar projects /39/, and it was confirmed that the other fee of 24 RMB/W was also broadly used for hydropower projects (such as the hydropower projects with UNFCCC Ref :1988, 2075, 2063, 2106, all below 20 MW capacity) /39/. Therefore DNV considers the other fee used in PDD to be appropriate.

It should also be noted that even if the other fee was assumed to be zero, the IRR of the proposed project would be 9.07%, lower than the benchmark of 10% /27/.

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

4.4.6 Investment analysis: Calculation and conclusion

The IRR calculations were provided in a spreadsheet and verified by DNV. The IRR was calculated through 31 years, including 1 year of construction period and 30 years of operating /4/. The project IRR without CDM revenues is 8.57% /27/, which confirms that the project in the absence of CDM benefits and compared to the benchmark is not financially attractive. With CER revenues the project IRR increases to 13.68%, which is above the benchmark /27/.

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4.4.7 Investment analysis: Sensitivity analysis

Moreover, a sensitivity analysis has been carried out for parameters contributing more than 20% to revenues or costs to check the robustness of the financial analysis. Reasonable variations of the total investment, annual O&M costs, annual 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	Annual O&M costs	Annual electricity output	On-grid tariff
-11.9%	-51.5%	+10.95%	+10.95%

With a 11.9% decrease in total investments, the benchmark will be reached. However, considering the reliability of the estimates in the FSR, and that the price indices of materials for production has been increasing steadily from 1998 to 2007 /28/, this is deemed unlikely. DNV also verified the supervision report of the proposed project issued by Hunan Hydro & Power Project Supervision Contract Corporation to confirm that the actual investment of the proposed project was 43.527 million RMB, 27% more than the estimated value in FSR /42/. Therefore the total investment is deemed unlikely to decrease that much.

With a 51.5% decrease of annual O&M costs, the benchmark will be reached. According to the statistics of China Renewable Energy Ration Station, the management and labor costs of hydropower stations rose by 8% in 2008 compared to 2007 /36/. Therefore, an annual O&M cost decrease by 51.5% is deemed unlikely.

With a 10.95% increase in annual electricity output, the benchmark will be reached. However, the annual electricity output was estimated by a qualified third party and based on the hydrological condition and hydrological analysis for the period 1953 to 2005 /4/. Thus, it is unlikely to expect the annual electricity output to increase by 10.95%.

With a 10.95% increase in on-grid tariff, the benchmark will be reached. However, due to the instability and uncertainty of hydropower, the grid company is reluctant to purchase electricity from hydropower generation. The tariffs of Baoshan Grid, which the proposed project is connected to, are lower than the tariffs in other area of Yunnan Grid /29/. The tariff of Expansion Project of Sanjiangkou Hydro-electric Power Station in the reach of Supa River, Yunnan province, China (UNFCCC Ref:2075), which is connected to the Baoshan Grid as the proposed project, is 0.1382 RMB/kWh (excluding VAT), lower than the tariff used for the proposed project /38/. And on-grid tariff in Baoshan City hasn't increased for over ten years /30/. Furthermore, it should be noted that if the actual investment of the proposed project was used in the investment analysis, the IRR would reach the benchmark only when the tariff increases to 0.1991 RMB/kWh (increasing 37.9%). Therefore the on-grid tariff is unlikely to increase that much.

The investment analysis with the sensitivity analysis has shown that the proposed project activity is unlikely to be the most financially attractive option. In conclusion, it is sufficiently

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demonstrated that the project is not a likely baseline scenario, and that emission reductions resulting from the project are additional.

4.5 Monitoring

The project activity applies the approved monitoring methodology, AMS-I.D “Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories” version 13 of 14 December 2007. The selected monitoring methodology is applicable for the project.

The project emissions are regarded as zero. As there is no transfer of equipment, leakage is not considered.

The grid emission factor has been fixed *ex-ante*. Therefore, the only parameter that needs to be monitored is the net electricity supplied to the China Southern Power Grid.

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

The monitoring plan is in accordance with the monitoring methodology. The monitoring plan will give opportunity for real measurements of achieved emission reductions.

4.5.1 Parameters determined ex-ante

The combined margin emission factor is determined *ex-ante* based on the most recent information available at the time the PDD was submitted for validation; the detailed calculations of the combined margin emission factor are described in the following section 4.6. The parameters are listed in table below:

<i>Data and Parameters</i>	<i>Unit</i>	<i>Ex-ante determined value</i>
Operating margin of CSPG (OM)	tCO ₂ /MWh	1.0119
Build Margin of CSPG (BM)	tCO ₂ /MWh	0.6748
Emission factor of CSPG	tCO ₂ /MWh	0.84335

4.5.2 Parameters monitored ex-post

The parameter monitored *ex-post* is the net electricity generation from the proposed project activity.

The net electricity generated from the project will be measured hourly and recorded monthly. This data will be cross verified against the sales receipt from the grid.

4.5.3 Management system and quality assurance

The project's CDM Guidebook /15/ includes:

- A description of the responsibilities and authorities for project management;
- A description of the installation of metering equipment;
- Procedures for training;
- Data quality control and management;
- Procedures for emergency;
- Reporting and verification.



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Detailed procedures have been elaborated in the PDD. These will be maintained and implemented to enable subsequent verification of emission reductions.

The application of the monitoring methodology is transparent and DNV considers the project participants able to implement the monitoring plan.

4.6 Estimate of GHG Emissions

The emission reductions ER_y by the project activity during the crediting period is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

- 1) Baseline emissions: Baseline emissions (BE_y in tCO_2) are the product of the grid emission factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh).
- 2) Project emissions: The project emissions are regarded as zero.
- 3) Leakage: No leakage has to be considered for the proposed project activity.

The grid emission factor of the CSPG is determined *ex-ante* for the 7 years crediting period. It has been calculated as 0.5:0.5 as the weights of the operating margin and the build margin respectively.

The PDD was published on 30 November 2007 and the emission factor is calculated based on the latest data available when the project was webhosted. The data used in the emission factor calculation is in accordance with data in the China Electric Power Yearbook from 2000 to 2006 (published annually) /12/ and the China Energy Statistical Yearbook from 2004 to 2006 /13/. The calculation is furthermore in accordance with the calculation of the combined margin emission factor published by the DNA of China /14/.

The aggregated generation and fuel consumption data are used as more disaggregated data are not available in the CSPG. Country specific data for the net calorific value of each type of fossil fuel, which were obtained from the China Energy Statistical Yearbook /13/, the IPCC 2006 default values /17/ for the oxidation factor and emission factor of each type of fossil fuel and the total electricity delivered to the CSPG selected are deemed reasonable /12/.

Operating Margin: Simple OM was chosen since the low cost /must run resources constitute less than 50% of total grid generation /12/.

Vintage data for the years 2003, 2004 and 2005 /12//13/ are used for the OM emission factor calculation, which was the most recent data available at the time of submission of the PDD for validation. The OM is calculated to be $1.0119 tCO_2/MWh$. The sources and calculation has been verified by DNV.

Build Margin: 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 /18/:

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



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fraction of fuels (coal 89.48%; natural gas 0.28%; oil 10.24%) was estimated from the CO₂ intensity for the fuels used in CSPG.

- Efficiencies of 35.82% for coal power plants and 47.67% for oil- or gas power plants are defined as the best technology commercially available in China by the DNA of China /14/.

The BM is calculated as 0.6748 tCO₂e/MWh. The sources and calculation has been verified by DNV.

The resulting combined margin emission factor is 0.84335 tCO₂e/MWh is fixed *ex-ante* for the first crediting period. The annual electricity delivered to the CSPG is expected to be 33 202 MWh /4/. The expected annual baseline emissions of the project is 28 001 tCO₂e.

The baseline emission estimate can be replicated using the data and parameter values provided in the PDD and supporting files submitted for registration. The data sources mentioned have been verified by DNV.

In summary, the GHG calculations are complete and transparent, and the data accuracy has been verified. No other project emission or leakage sources contributing more than 1% and not mentioned by the methodology have been found.

4.7 Environmental Impacts

The EIA for the project was prepared by Yunnan Survey and Design Institute of Water Conservancy and Hydropower in November 2006 and approved by Baoshan City Environment Protection Bureau on 14 November 2006. The conclusion of the report has been described in the PDD /1/. The project will have positive impact on local environment /5/.

4.8 Comments by Local Stakeholders

Besides the stakeholder consultation process stipulated in the Chinese EIA regulation, the project developer has conducted additional stakeholder consultations. Local stakeholders from local residents and local government were invited through a questionnaire to provide comments on the project. A total amount of 15 questionnaires were prepared and distributed among local government, social organizations and local residents. All of them had been answered and returned.

DNV has checked all the questionnaires received /37/. The survey shows that the proposed project receives support from the local people. DNV considers the local stakeholder consultation to have been carried out adequately.

4.9 Comments by Parties, Stakeholders and NGOs

The PDD version 02 of 26 November 2007 /1/ was made publicly available on DNV's climate change website (<http://www.dnv.com/certification/climatechange/Projects/ProjectDetails.asp?ProjectId=1615>) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 30 November 2007 to 29 December 2007.

No comment was received.

APPENDIX A

CDM VALIDATION PROTOCOL

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

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	CAR-1
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	CAR-1
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
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	CDM Modalities and Procedures	OK

Requirement	Reference	Conclusion
GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	§31b	
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
About small-scale project activities		
12. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakech Accords and shall not be a debundled component of a larger project activity.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK
13. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and use the simplified baseline and monitoring methodology for that project category.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	OK
14. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	OK
About stakeholder involvement		
15. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
16. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to	CDM Modalities and Procedures	OK

Requirement	Reference	Conclusion
comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	§40	
Other		
17. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
18. 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
19. 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
20. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK
21. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements Checklist

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity <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	Yes. The project is located in the west of Hehua Xiang of TengChong County, Baoshan City, Yunnan Province. The Hydro-power plant is located on the Xishanhe river between BangLao Village and XiangYan bridge. The geographical coordinate of the project is: Longitude: 98°12' - 98°28'E Latitude: 24°55' - 25°12'N		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?		/1/	DR	Yes. The project system boundaries are clearly defined and consist of the dam, water diversion canal, fore-bay, pressured pipe, workshop, water turbine, generator and voltage transformation equipment. China Southern Power Grid and all the plants connected to it are defined as the project's system boundaries.		OK
A.2. Participation Requirements <i>Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party,</i>						

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<i>Letter of Approval, Authorization and Project Participant.</i>					
A.2.1. Which Parties and project participants are participating in the project?	/1/	DR	The project participant from the host Party China is Tengchong County Qinghe Hydropower Development Co., Ltd., and the project participant from the Annex I Party Italy is Asja Ambiente Italia S.p.A.		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?	/2/ /3/	DR	No. The letters of approval from the DNAs of China and Italy have not been obtained yet.	CAR-1	OK
A.2.3. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1/	DR	<ul style="list-style-type: none"> - China ratified the Kyoto Protocol on 30 August, 2002 and the DNA of China is National Development and Reform Commission. - The participating Annex I Party Italy has ratified the Kyoto Protocol on 31 May 2002 and the DNA of Italy is Ministry for the Environment and Territory, Department for Global Environment, International and Regional Conventions. - The letters of approval from the DNA of China and Italy are required to ensure that both Parties participate in the CDM on a 	CAR-1	OK

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			voluntary basis.		
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR	The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) 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/ /4/	DR I	The technology proposed to be used in the project is well proven in China and all the equipments are locally available. Hence it can be concluded that the project design engineering reflects current good practices.		OK
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/ /4/	DR I	It needs to be provided the evidence that the project uses state of the art technology or the technology would result in a significantly better performance than any commonly used technologies in the host country.	CL1	OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/	DR I	Yes. The project owner will make provisions for training and maintenance before the operation of the project. The requirements will be described in the CDM project operation manual which is		OK

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			under preparation. Training and maintenance provisions should be verified during the first periodic verification.		
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	The letter of approval from the DNA of China has not been obtained. So this should be clarified after getting the letter of approval from the DNA of China.	CAR-1	OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/ /4/ /5/	DR	Yes. The project will increase the job opportunities for the local people and improve local life quality.		OK
A.5. Small scale project activity <i>It is assessed whether the project qualifies as small-scale CDM project activity</i>					
A.5.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?	/1/	DR	Yes. The project qualifies as a renewable energy project with a maximum output capacity equivalent up to 6.7MW, which does not exceed the limitation of 15MW (category- Type I small scale CDM project activity), and is grid connected as per the requirement of AMS I D.		OK
A.5.2. Is the small scale project activity not a debundled component of a larger project activity?	/1/ /4/	DR I	No. According to paragraph 2 of Appendix C to		OK

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			<p>the Simplified Modalities and Procedures for Small-Scale CDM project activities, a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:</p> <ul style="list-style-type: none"> ➤ With the same project participants; ➤ In the same project category and technology; ➤ Registered within the previous two years; and ➤ Whose project boundary is within 1 km of the Project boundary of the proposed small scale activity at the closest point. <p>According to the description above, the project is not a de-bundled component of a larger project as the participants of the proposed project has not applied to register another small scale CDM project activity within 1 km of the proposed project boundary.</p>		
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>					

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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/ /8/	DR	Yes. The project applies AMS I.D. of version 12, 10 August 2007.		OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/1/ /8/	DR	Yes. The applicability criteria of AMS ID is satisfied as the project activity is a grid connected renewable energy generation power plant with an installed capacity of 6.7 MW (less than 15 MW as stipulated in AMS ID).		OK
B.2. Baseline Scenario Determination <i>The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.</i>					
B.2.1. What is the baseline scenario?	/1/	DR	The baseline scenario in the absence of proposed project activity is the supply of an equivalent amount of annual power output by China Southern Power Grid to which the proposed project is connected.		OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/ /15/	DR	According to AMS-I.D (Version 12), this is not required.		OK

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B.2.3. Has the baseline scenario been determined according to the methodology?	/1/	DR	Yes, the baseline scenario is determined according to AMS-I.D (Version 12).		OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Yes.		OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /15/	DR	Yes. All relevant national and sectoral policies, regulations and department rules and disciplines are considered such as the renewable energy law by central government.		OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /12/ /13/	DR	Yes, the baseline determination is compatible with the available data. The China Energy Statistical Yearbooks of the years 2002 to 2006 and China Electric Power Yearbooks of the years 2002 to 2006 are used for the calculation of the baseline.		OK
B.2.7. Have the major risks to the baseline been identified?	/1/	DR	There are no significant risks to the baseline except for the enforcement of the Chinese renewable law. However, as this law is being implemented only now, i.e. after the entry into force of decision 17.CP 7. It does not need to be taken into account.		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>					

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B.3.1. Is the project additionality assessed according to the methodology?	/1/	DR	<p>The additionality of the project was assessed through investment barriers as following.</p> <p>The project has an investment of USD 5.135 million and the project IRR works out to 6.23% without considering the CDM revenues. It has also been demonstrated that the benchmark for small hydro power plants in china according to Economic Evaluation Code for Small Hydropower Projects issued by the Ministry of Water Resources (Document No. SL16-95). However, the IRR benchmark document described in PDD is “Interim Rules on Economic Assessment of China for Small Scale Hydropower Station Construction (SL16-95)”. This needs to clarify.</p> <p>It needs to be clarified what kind of IRR benchmark is used.</p> <p>In sensitivity analysis, the value for each parameter which will make the IRR exceed the benchmark should be calculated and give the reason why it is unlikely to happen.</p> <p>The sensitivity analysis needs to include the fluctuation of annual electricity outputs and electricity tariff.</p>	<p>CL-2</p> <p>CL-4</p> <p>CL-3</p>	OK

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			<p><i>Assess the sources of the input parameters</i></p> <p>Except for the data which sources are not clear in mention in CL-4, the input parameters used in the financial analysis are taken from the feasibility study report (FSR) developed by Yunnan Design Institute of Water Conservancy & Hydro-Electric Power in July 2006 and approved by the Development & Reform Committee of Baoshan City on Jan. 05, 2007 /4/. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognized.</p> <p>Following needs to be clarified:</p> <p>1) For cash flow in IRR spreadsheet, recovery of residue value of the fixed assets and recovery of fluid capital should be considered.</p> <p>2) The VAT and income tax are from data in 2008, which is not reasonable. Explain why not use the VAT and income tax in FSR. The details and the type for tax should be clarified.</p> <p>3) Some of data source should be stated in IRR spreadsheet, such as total investment,</p>	CL-4	

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			<p>residual value, fixed operational costs, variable operational costs, depreciation rate etc.</p> <p>4) The depreciation rate in IRR spreadsheet is not the same as PDD.</p> <p>5) In sensitivity analysis, the value for each parameter which will make the IRR exceed the benchmark should be calculated and give the reason why it is unlikely to happen.</p> <p><i>Confirm that the values used in the PDD are fully consistent with the FSR</i></p> <p>To be confirmed by the response of CL-4</p> <p><i>Assess the period of time between the finalization of the FSR (or PDR) and the investment decision</i></p> <p>The project's starting date should be clarified, with relevant evidences provided.. So DNV can not check whether the input values would have materially changed.</p> <p><i>Cross-check the parameters used in the financial analysis with the parameters used by other similar projects</i></p> <p>Due to lack of some basic value's source in</p>	<p>CL-4</p> <p>CL-9</p>	

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			<p>IRR calculation, DNV can not compare the input parameters used in the financial analyses with the data reported for other similar proposed CDM projects in region.</p> <p>Following needs to be clarified:</p> <p>1) For cash flow in IRR spreadsheet, recovery of residue value of the fixed assets and recovery of fluid capital should be considered.</p> <p>2) The VAT and income tax are from data in 2008, which is not reasonable. Explain why not use the VAT and income tax in FSR. The details and the type for tax should be clarified.</p> <p>3) Some of data source should be stated in IRR spreadsheet, such as total investment, residual value, fixed operational costs, variable operational costs, depreciation rate etc.</p> <p>4) The depreciation rate in IRR spreadsheet is not the same as PDD.</p> <p>5) In sensitivity analysis, the value for each parameter which will make the IRR exceed the benchmark should be calculated and give the reason why it is unlikely to happen.</p>	CL-4	

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B.3.2. Are all assumptions stated in a transparent and conservative manner?	/1/	DR	Same as above.	CL 4	OK
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	/1/ /4/ /6/	DR	Same as above.	CL 4	OK
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	/1/ /4/ /9/ /19/	DR I	The serious consideration of CDM benefit needs to be clarified in the PDD, and relevant evidence should be provided. The relevant specific information in the evidences should be described in the PDD. .	CAR 2	OK
B.4. Calculation of GHG Emission Reductions – Project emissions <i>It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	The project is a run-of-river type hydropower project. Thus, the project does not result in project GHG emissions. The power density needs to be provided with evidence.	CL 5	OK
B.5. Calculation of GHG Emission Reductions – Baseline emissions					

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<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/ /11/ /12/ /13/ /14/ /17/ /18/	DR	<p>The project uses the ex-ante determination approach to calculate the OM and BM. The ex-ante determination of the combined margin is as per the ACM0002 methodology. The OM was calculated as 1.0119t CO₂/MWh by simple OM method using the historic data for 2003-04 and 05 and the BM was calculated as 0.6748 t CO₂/MWh. The combined margin was calculated as 0.84335 t CO₂/MWh by using 50:50 weight for OM and BM.</p> <p>The data source and calculation spreadsheet for the emission factor of China Southern Power Grid need to be provided</p>	CL-6	OK
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/ /11/	DR	Same as above	CL-6	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	No significant uncertainties need to be addressed in the PDD.		OK

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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	According to Appendix B of small scale CDM project activity modalities, leakage calculation is only needed if the renewable energy technology equipment is transferred from another activity. There is no equipment transferring from another activity and therefore no leakage.		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>					
B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	/1/	DR I	Yes. The emission reductions are real, measurable and give long term benefits.		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	/1/	DR	Yes. The documented monitoring plan is in line with the monitoring methodology		OK

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transparent manner?			described in AMS I.D.		
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	In PDD, it only mentions that all the relevant data records will be kept for 2 years after the end of the crediting period. However, it should mention that all the relevant data records will be kept for 2 years after the end of the crediting period or the last issuance of CERs, for the project activity, whichever occurs later.	CL-13	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	The project is stated to be a run-of-river small hydropower project. The power density thus needs to be determined ex-ante and to be provided with evidence.	CL-5	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	The baseline emission of the project activity is calculated as the product of the net electricity exported to the grid and the grid emission factor. The project uses the ex-ante		OK

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			determination approach to calculate the grid emission factor. Only net electricity supplied to the grid will be monitored ex-post.		
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/	DR	Yes, the net electricity supplied by project to China Southern Power Grid is selected as baseline GHG indicators, which is reasonable and conservative.		OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/	DR	Yes, the net electricity delivered to the grid will be monitored directly.		OK
B.10.4. Is the measurement <i>equipment</i> described and deemed appropriate?	/1/	DR I	Yes, the net electricity supplied to the grid will be monitored by electricity meter. The data will be measured hourly and will be aggregated monthly..		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	The accuracy of electricity meter is according to the national standard. And the procedures on how to deal with erroneous measurements are clearly described.		OK
B.10.6. Is the measurement <i>interval</i> for baseline data identified and deemed appropriate?	/1/	DR	The measurement interval for the electricity was hourly measurement and monthly recording; this is appropriate.		OK

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B.10.7. Is the registration, <i>monitoring, measurement and reporting</i> procedure defined?	/1/	DR	The procedures for records handling are identified in the monitoring plan.		OK
B.10.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR	The maintenance of monitoring equipment and installations are according to the national standard. The calibration intervals of the electricity meters need to be provided.	CL-7	OK
B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	The procedures for records handling are identified.		OK
B.11. Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
B.11.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	As per AMS I.D, there is no leakage from this project.		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>					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by	/1/ /5/	DR	No. The monitoring of sustainable development indicators is not required by the		OK

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legislation in the host country?			DNA of China. The environmental impacts are identified in the approved EIA.		
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Neither AMS-I.D nor the DNA of China requires collection and archiving of relevant data concerning environmental, social and economic impacts. However the environmental impacts will be monitored by local environmental authority.		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/ /2/	DR	This will be verified through the letter of approval from the DNA of China, which has not been provided.	CAR-1	OK
B.13. Project Management Planning <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
B.13.1. Is the authority and responsibility of overall project management clearly described?	/1/	DR	Yes. The authority and responsibility of project management is described.		OK
B.13.2. Are procedures identified for training of monitoring personnel?	/1/	DR I	Yes. Such information is identified in monitoring plan.		OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	According to the actual status of the hydropower project, no emergency situation which can cause unintended emissions is		OK

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			expected from the project.		
B.13.4. Are procedures identified for review of reported results/data?	/1/ /15/	DR	Yes, procedures for review of reported results/data have been identified in PDD.		OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	The procedures for corrective actions in order to provide for more accurate future monitoring and reporting have not been identified.	CL-8	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/ /4/ /19/	DR I	The project's starting date should be clarified, with relevant evidences provided.. The operational lifetime in PDD is different from 30 year described in the Feasibility Study Report.	CL-9	OK
C.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR	The start of the crediting period is 01 Jan. 2008, which is not reasonable.	CL-10	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. Does host country legislation require an analysis of the environmental impacts of the project activity?	/1/ /5/	DR	Yes.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
D.1.2. Does the project comply with environmental legislation in the host country?	/1/ /5/	DR	Yes. The EIA for the project was prepared in Nov. 2006 and was approved by Baoshan City Environment Protection Bureau on 14th of Nov. 2006, which is not in line with the description of “The EIA has been approved by the TengChong County Environment Protection Bureau on 24th of October 2006” in page 24 in PDD.	CL-11	OK
D.1.3. Will the project create any adverse environmental effects?	/1/ /5/	DR I	No, The project will have no adverse impact to the local environment.		OK
D.1.4. Have environmental impacts been identified and addressed in the PDD?	/1/	DR	Yes. The environmental impacts are sufficiently described in PDD, which includes air, water, eco-environment, solid waste and noise.		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	The stakeholder consultation questionnaires need to be provided for verification.	CL-12	OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR I	The survey was carried out on the local stakeholders by distributing questionnaires to invite comments.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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	Yes. The stakeholder consultation process is in accordance with Chinese EIA regulations. The stakeholder consultation questionnaires need to be provided for verification	CL-12	OK
E.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	Yes, a summary of the stakeholder comments received is provided. The stakeholder consultation questionnaires need to be provided for verification	CL-12	OK
E.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	Yes, due account has been taken of any stakeholder comments received. The stakeholder consultation questionnaires need to be provided for verification	CL-12	OK

Table 2b: Additional requirements checklist for VVM version 1 (EB 44)

Checklist Question	Ref.	MoV*	Comments	Draft Concl.	Final Concl.
A.1. Letter of approval					

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

A.1.1 Is the LoA received directly from the DNA or through the project participant.	/1/ /2/	DR	The letter of approval from the DNA of China has been obtained. The LoA was received through the project participant. The letter of approval from the DNV of Switzerland has not been obtained.	CAR-1	OK
A.2. Project design					
A.2.1 Does the PDD describe the CDM project activity with all relevant elements in a transparent and accurate way?	/1/ /4/ /8/ /25/	DR	Yes, the project location, the technology of the project, such as water turbines, the transformer substation, the monitoring system are clearly described in the PDD and in line with the approved FSR. The system boundaries determination in line with AMS-I.D version 13 and the delineation of grid boundaries as provided by the DNA of China.		OK
A.2.2 Has the CDM project activity at the start of the validation been constructed or does the CDM project activity use existing facilities or equipment?	/1/ /4/ /19/ /25/	DR	The project is a new built hydropower project in Yunnan province in China /4//25/. The project construction permission was issued on 1 February 2007 /19/, which was earlier than the project PDD publish date of 30 November 2007.		OK
A.2.3 Is the project a large scale project, a small scale project with average annual emission reductions above 15 000 tonnes or a bundled small scale project? Has on-site visit been carried out?	/1/ /4/ /5/ /25/ /54/	DR	The project is a new built hydropower project; the install capacity is 6.7 MW, lower than 15 MW, so it is a small scale project. According to paragraph 2 of Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities, the		OK

	/55/	<p>project is not a de-bundled component of a larger project as the participants of the proposed project has not applied to register another small scale CDM project activity within 1 km of the proposed project boundary.</p> <p>This project is a new power plant. Representatives of the project owner, Tengchong County Qinghe Hydropower Development Co., Ltd. and the project consultant ASJA Enewables (China) Co. Ltd. were interviewed in DNV Beijing office on 28 January 2008 by Tang Zhiang, DNV, to resolve the issues identified during the desk review of the PDD. During the desk review, the relevant documents including FSR /4/, EIA /5/, and the water turbines purchase contract /25/ were provided and assessed. The information about this project was able to be confirmed from these documents. Through the documents which the project participant provided, including PDD, FSR, EIA and other relevant background documents /1/-/37/, DNV can confirm the project design, construction, operation and monitoring plan and all baseline scenario information. In addition, according to FSR/4/ and EIA /5/, no migration was involved in this project /5/; no further issues can be assessed through on site visit. Thus, DNV</p>	
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			can justify that a physical site visit for this project was not arranged during the validation process.		
A.2.4 Does the project activity involved alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR	No. project is a new build hydropower project.		OK
A.3. Project emissions not addressed by the methodology					
A.3.1 Does the methodology describe all project emission source for the project activity that contributes all 1% of the emission reductions? Sources that the methodology considers not to take into account are not relevant (e.g. cement and iron consumption for building hydropower plants).	/1/	DR	Yes. The project is a new-built hydropower project. Project emission is regarded as zero as the project is a renewable energy.		OK
A.4. Documentation of baseline emissions					
A.4.1 Documentation of the baseline determination: a. All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. b. All documentation is relevant as well as correctly quoted and interpreted. c. Assumptions and data can be deemed reasonable d. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. e. The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity	/1/ /4/ /5/ /8/	DR	Yes, all data in the PDD used to determine the baseline emissions are form the EIA, FSR, revised IPCC 2006, China Electric Power Yearbook, 2000~2006, China Energy Statistical Yearbook, 2004~2006 and other reference document. Yes, according to the reference list, all documents of the baseline determination were correctly quoted and interpreted. The EIA was approved by Baoshan City Environment Protection Bureau dated 14 November 2006, and FSR was approved by the Development and Reform Committee of Baoshan City dated 5 January 2007, and all other document of the baseline determination can be verified, the data can be deemed		

			<p>reasonable.</p> <p>Relevant national include Chinese renewable law and China environment protection law and/or sectoral policies and circumstances such as <i>Economic Evaluation Code for Small Hydropower Projects</i>, Document No. (SL 16-95) are considered and listed in the PDD.</p> <p>The baseline determination is in line with the baseline methodology procedure in AMS-I.D version 13.</p>		
A.5. Documentation of the calculations					
<p>A.5.1 Algorithms and/or formulae used to determine emission reductions</p> <ul style="list-style-type: none"> All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced All documentation is correctly quoted and interpreted. All values used can be deemed reasonable in the context of the project activity The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration. 	<p>/1/ /4/ /5/ /8/</p>	DR	<p>Yes. The EIA was approved by Baoshan City Environment Protection Bureau dated 14 November 2006, and FSR was approved by the Development and Reform Committee of Baoshan City dated 5 January 2007, and all other document used to determine emission reductions can be verified, the data can be deemed reasonable. The data are properly referenced.</p> <p>Yes, according to the reference list, all documents used to determine emission reductions were correctly quoted and interpreted.</p> <p>Yes. All values used can be deemed reasonable in the context of the project activity</p> <p>The calculation of emission reduction is in</p>		OK

			line with the baseline methodology procedure in AMS-I.D version 13.		
A.6. Implementation of the monitoring plan					
A.6.1 How were the plans for implementation of the monitoring plan, data management, QA/QC procedures assessed? To what extent can the emission reductions achieved by the project be monitored ex-post and verified later by a DOE?	/1/	DR	<p>The monitoring plan clearly define the parameter, data management and QA/QC procedures, the monitoring plan deemed feasible, the emission reductions achieved by the project can be monitored continuously and completely.</p> <p>DNV assessed it by checking the monitoring plan and QA/QC procedures in the PDD. DNV was able to confirm that the monitoring plan, the data management and the QA/QC procedures have been properly defined. The parameter needs to be monitored is the net electricity supplied to the grid by the project activity; this parameter is included in the monitoring plan; thus, the emission reductions achieved by the project will be totally monitored and can be verified later by a DOE.</p>		OK
A.7. CDM consideration prior to starting date					
A.7.1 The prior consideration of CDM for the project activity complies with EB41 annex 46	/1/ /4/ /19/ /21/ /24/	DR	<p>From the provided evidence /25/, purchase contract for water turbines was signed on 14 January 2007, so the date was selected as the start date of this project activity which is the earliest date of purchase contract for water turbines, construction permission dated 1 February 2007 /19/ and construction contract</p>		OK

/25/ dated 1 October 2007 /21/.

/26/ DNV was able to confirm that the incentive from CDM was seriously considered in the decision to implement the project activity.

/27/ The timeline of the project development is as follows:

The project owner realized the poor financial indicators of the project when draft FSR was finalized in 2006 /4/. As described in the FSR, the IRR of total investment of the project is only 8.57% without CERs revenues. The project owner held the board meeting on 5 Jan.2007 and decided to apply for the project as CDM project due to the high investment risk and the low IRR /20/.

The project owner signed Purchase contract for water turbines with Chongqing Water Turbine Works Co., Ltd on 14 January 2007 /25/ and then got the construction Permission in 1 February 2007 /19/. Consultancy agreement was signed between Asja Ambiente Italia S.p.A. and Kunming Huan Ye Project Development Co., Ltd (agent of Tengchong County Qinghe Hydropower Development Co., Ltd.) on 16 February 2007 /24/. Then ERPA was signed between Asja Ambiente Italia S.p.A. and Tengchong County Qinghe Hydropower Development Co., Ltd. on 8 March 2007 /24/. LoA from China DNA was obtained in December 2007

/2/. DNV performed follow-up interviews on 28 January 2008 /54//55/.

All the relevant documents have been verified by DNV and it is in DNV's opinion sufficiently demonstrated that the benefits of the CDM were a decisive factor in the decision to proceed with the project and that continuous and real actions have been undertaken to secure CDM status of the project.

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 letters of approval from the DNAs of China and Italy have not been obtained yet.</p>	<p>A.2.2. A.2.3 A.4.1 B.12.3</p>	<p>We already had the Chinese LoA which was issued by NDRC in January 2008.</p> <p>The original buyer in PDD has changed into "International Clean Fund Llc Lewes Mendrisio Branch" which means we will obtain the Swiss LoA instead of Italian LoA to complete the LoAs issued from PP's Parties.</p>	<p>LoA from DNA of China has been provided /2/.</p> <p>The Asja Ambiente Italia S.p.A which was buyer of CERs of this CDM project, confirmed its voluntary consent to being removed from the project by the claim in MoC /22/.</p> <p>The LoA from DNA of Switzerland dated 31 August 2009 is provided /3/.</p> <p>This CAR is closed.</p>
<p>CAR 2</p> <p>The serious consideration of CDM benefit needs to be clarified in the PDD, and relevant evidence should be provided. The relevant specific information in the evidences should be described in the PDD.</p>	<p>B.3.4</p>	<p>Clarifications on serious consideration of CDM benefits since the very first beginning of the PA has been added in first part of section B5.</p> <p>The project owner has realized the poor financial indicators of the project when draft FSR was finalized in 2006. As described in the FSR, the IRR of total investment of the project is only 8.57% without CERs revenues. Therefore, the project faced high investment risk. Through serious consideration and discussion, the project owner held the board meeting in Jan.2007 and decided to apply for the project as CDM project due to the high investment risk and the</p>	<p>From the provided evidence /25/, purchase contract for water turbines was signed on 14 January 2007, so the date was selected as the start date of this project activity which is the earliest date of purchase contract for water turbines ,construction permission dated 1 February 2007 /19/ and construction contract dated 1 October 2007 /21/.</p> <p>DNV was able to confirm that the incentive from CDM was seriously considered in the decision to implement the project activity. The timeline of the project development is as follows:</p> <p>The project owner realized the poor financial indicators of the project when</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>low IRR. Since then, the project owner began to seek the CER buyer for the project. Only after considering the CDM revenue seriously, the project owner signed Hydro Turbine and Affiliated Equipments purchase contract in January, 2007 and then got the Construction Permission in February, 2007. Afterwards, CDM consultancy contract was signed in February, 2007. Then ERPA was signed in March, 2007 and Construction Contract was signed in October, 2007. Soon LoA of China DNA was acquired in December, 2007. One month later, DOE performed interviews on-site in January, 2008.</p>	<p>the FSR was finalized in 2006 /4/. As described in the FSR, the IRR of total investment of the project is only 8.57% without CERs revenues. The project owner held the board meeting on 5 Jan.2007 and decided to apply for the project as CDM project due to the high investment risk and the low IRR /20/. The project owner signed Purchase contract for water turbines with Chongqing Water Turbine Works Co., Ltd on 14 January 2007 /25/ and then got the construction Permission in 1 February 2007 /19/. Consultancy agreement was signed between Asja Ambiente Italia S.p.A. and Kunming Huan Ye Project Development Co., Ltd (agent of Tengchong County Qinghe Hydropower Development Co., Ltd.) on 16 February 2007 /23/. Then ERPA was signed between Asja Ambiente Italia S.p.A. and Tengchong County Qinghe Hydropower Development Co., Ltd. on 8 March 2007 /24/. LoA from China DNA was obtained in December 2007 /2/. DNV performed follow-up interviews on 28 January 2008 /54//55/. All the relevant documents have been</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			verified by DNV and it is in DNV's opinion sufficiently demonstrated that the benefits of the CDM were a decisive factor in the decision to proceed with the project and that continuous and real actions have been undertaken to secure CDM status of the project. CAR 2 is closed.
<p>CL-1</p> <p>It needs to be provided the evidence that the project uses state of the art technology or the technology would result in a significantly better performance than any commonly used technologies in the host country.</p>	A.3.2	<p>After selecting both domestically and internationally, the following alternatives came out, such as HLA696, HLA671 HLA606, HLA576. Then the further comparison among those alternatives was carried out. Finally the Xishanhe hydropower plant adopt the HLA671-WJ-95 water turbine which not only has the optimized function of cavitations erosion prevention to meet the particular duration requirements, but also own the high efficiency and high quality to meet the production requirements , as well as the cost's advantage to meet the economic requirements. (FSR page1-24)</p>	<p>Evidences have been provided.</p> <p>This CL is closed.</p>
<p>CL-2</p> <p>The document title for document number SL16-95 is not Interim Rules on Economic</p>	B.3.1	<p>There is a mistake with the translation for the title of document number SL16-95, which should be "Economic Evaluation Code for Small Hydropower</p>	<p>The evidence is verified and the PDD is revised.</p> <p>This CL is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>Assessment of China for Small Scale Hydropower Station Construction as referred in the PDD. This needs to clarify.</p> <p>It needs to be clarified what kind of IRR benchmark is used.</p>		<p>Projects” issued by Ministry of Water Resources.</p> <p>We already made the amendment accordingly in section B5 of PDD</p> <p>And it is regarded as the final source for IRR benchmark value adopted</p>	
<p>CL-3</p> <p>The sensitivity analysis needs to include the fluctuation of annual electricity outputs and electricity tariff.</p>	B.3.1	<p>The PDD and Financial Analysis have been revised accordingly, please refer to the section B.5 of revised PDD and updated Financial Analysis.</p> <p>As for tariff, when the tariff increases by 10.95%, the IRR can reach the benchmark of 10%. But due to the instability and uncertainty of hydropower, the Grid Company is reluctant to purchase electricity from hydropower generation. Moreover, the Station is connected the Baoshan Grid which leads to the on-grid tariff relatively lower than other stations connected the Southern Grid and on-grid tariff in Baoshan City hasn’t been adjusted for over ten years, And the actual tariff in future may be lower than it due to the increasing competition from large power grid companies. For example, the on-grid tariff (including</p>	<p>Tariff and annual electricity output are included in sensitivity analysis.</p> <p>Related evidences are provided and verified.</p> <p>This CL is closed.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>VAT) is 0.155RMB/kWh for the Yunan Weixi Gedeng Hydropower Project in Yunan Province(ref.1775). The expected on-grid tariff is 0.1382RMB/kWh(without VAT) for Expansion Project of Sanjiangkou Hydro-electric Power Station in the reach of Supa River, Yunan province, China (ref.2075). So small-scale hydropower projects have obviously in inferior position in competition with large-scale ones. These facts further prove that the increase of more than 10% unlikely occurs on the project. Therefore, it is unlikely that tariff will be increased and as a result, it is not possible to improve the economic revenue through an increase in tariff.</p> <p>As for annual electricity output, the electricity must be increased by 10.95%, the IRR can reach the benchmark of 10%. The annual electricity was calculated by a qualified third unit and based on long series of hydrology data, the hydrological condition and hydrological analysis from the year 1953 to 2005. As if the electricity of the project increases more</p>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		than 10%, then it means that the site has experienced a great climate change,. So it is impossible for the electricity to increase by 10.95%.	
<p>CL-4</p> <p>Following needs to be clarified:</p> <p>1) For cash flow in IRR spreadsheet, recovery of residue value of the fixed assets and recovery of fluid capital should be considered.</p> <p>2) The VAT and income tax are from data in 2008, which is not reasonable. Explain why not use the VAT and income tax in FSR. The details and the type for tax should be clarified.</p> <p>3) Some of data source should be stated in IRR spreadsheet, such as total investment, residual value, fixed operational costs, variable operational costs, depreciation rate etc.</p> <p>4) The depreciation rate in IRR spreadsheet is not the same as PDD.</p> <p>5) In sensitivity analysis, the value for each parameter which will make the IRR exceed the benchmark should be calculated and give the reason why it is unlikely to happen.</p> <p>6) The difference between the electricity generated by the project and the electricity supplied to the grid should be justified.</p>	<p>B.3.1</p> <p>B.3.2</p> <p>B.3.3</p>	<p>The PDD has been revised in section B.5. The clarifications requested have been made as follows</p> <p>1) Recovery of residue value of the fixed assets and recovery of fluid capital has been considered in IRR spread sheet.</p> <p>2) The income tax and VAT in PDD has been revised according to FSR instead of the data in 2008. (FSR page 1-35)</p> <p>3) The related data sources have been stated in IRR spreadsheet.</p> <p>4) The depreciation rate in IRR spreadsheet has been revised to be same as PDD which is 3.3%</p> <p>5) In sensitivity analysis, the value for each parameter which will make the IRR exceed the benchmark have been calculated and given the reason why it is unlikely to happen both in revised Financial Analysis and in revised PDD Section 5.</p>	<p>1) Recovery of fixed assets and fluid capital are included in IRR calculation.</p> <p>2) The VAT and income tax are revised to be consistent with those in FSR.</p> <p>3) IRR calculation is updated, the data sources of the values are addressed.</p> <p>4) The depreciation rate in IRR calculation and PDD is updated to be 3.3%, which is consistent with FSR.</p> <p>5) for the sensitivity analysis, the total investment, annual O&M costs, annual 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.</p> <p>For a 11.9% decrease in total investments, the benchmark will be reached. However, considering the reliability of the estimate of the FSR, the material cost for production was increasing from 1998 to 2007 /28/, the total investment is unlikely to decrease</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>6) According to FSR, annual electricity generation is 4167 MWh, the coefficient of effective electricity is 0.8, auxiliary power consumption is 0.4% and the line losses is zero.</p> <p>The annual power supplied to the grid of 33202 MWh is calculated based on coefficient of effective electricity (0.8), auxiliary power consumption(0.4%) and the line losses(zero);</p> <p>Annual power supplied to the grid (Esupl) was calculated based on the equation as following:</p> <p>The annual power supplied to the grid = the annual electricity generation*coefficient of effective electricity *(1- auxiliary power consumption) *(1- the line losses)</p> <p>The calculation values come from FSR which was completed by the Institute based on the “the Economic Evaluation Code for Small Hydropower Projects(SL16-95)”. Therefore, the annual power supplied to the grid employed in the IRR</p>	<p>that much.</p> <p>For a 51.5% decrease of annual O&M costs, the benchmark will be reached. According to the statistics of China Renewable Energy Ration Station, the management and labor costs of hydropower stations rose by 8% in 2008 compared to 2007 /36/. so the annual O& M cost decreased by 51.5% is unlikely.</p> <p>For a 10.95% increase in annual electricity output, the benchmark will be reached. However, the annual electricity output was calculated by a qualified third unit and based on the hydrological condition and hydrological analysis from the year 1953 to 2005 /4/. As if the electricity of the project increases by 10.95%, then it means that the site has experienced a great climate change. So it is unlikely for the annual electricity output increases by 10.95%.</p> <p>For a 10.95% increase in on-grid tariff, the benchmark will be reached. However, due to the instability and uncertainty of hydropower, the Grid Company is reluctant to purchase electricity from hydropower generation.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion				
		<p>calculation is reasonable.</p> <p>In Section 3.2.1,3.2.2 of SL 16-95, and stated that the power supply to the grid by a project is calculated as the annual electricity generation * coefficient of effective electricity *(1- auxiliary power consumption) *(1- the line losses). The annual electricity generation * coefficient of effective electricity is the effective electricity generation (which are based on among others the load factor, electricity balance of the local grid, and frequency of equipments overhaul and damages.) Section 3.4 of SL 16-95 further specifically states that for simplification purpose, the coefficient of effective electricity can be chosen from the Table 3.4 in the SL 16-95 document.</p> <p>Table 3.4 The coefficient of effective electricity for different type of hydropower stations:</p> <table><tr><td>Type of hydropower stations</td><td>The coefficient of effective electricity</td></tr><tr><td>1.Grid connected, annual/multi-year regulating hydropower</td><td>0.95-1.00</td></tr></table>	Type of hydropower stations	The coefficient of effective electricity	1.Grid connected, annual/multi-year regulating hydropower	0.95-1.00	<p>Moreover, the project is connected the Baoshan Grid which leads to the on-grid tariff relatively lower than other stations connected to the Southern Grid /29/ and on-grid tariff in Baoshan City hasn't been adjusted for over ten years /30/. Therefore the on-grid tariff is unlikely to increase that much.</p> <p>6)</p> <p>FSR was verified to confirm that the annual electricity generated by the project is calculated based on the hydrological data of the river from 1953 to 2005 /4/.</p> <p>The project is a run-of-river hydropower station without regulation capacity and the grid will only take part of electricity generated in rainy season /4/, therefore the choice of 0.8 as the coefficient of effective electricity is appropriate according to SL 16-95/6/. the choice of 0.4% as the auxiliary power consumption is appropriate according to “Hydroenergy Design Code for Small Hydropower Projects(SL76-94)” published by the Ministry of Water Resources of the People’s Republic of China /10/.</p>
Type of hydropower stations	The coefficient of effective electricity						
1.Grid connected, annual/multi-year regulating hydropower	0.95-1.00						

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
		stations		Furthermore, the statement of the amount of supplied electricity to the grid issued by Yunnan Baoshan Electric Company was verified to confirm that the amount of the power supplied to the grid by the project was 31981 MWh from May, 2008 to April, 2009, which is less than 33 202 MWh /16/. This CL is closed.
		2.Grid connected, seasonal regulating hydripower stations	0.90-0.95	
		3.Grid connected, monthly/weekly/daily no regulating (run-of-river) regulating hydropower stations The grid will take all electricity generated in rainy season and night The grid will only take part of electricity generated in rainy season and night	0.80-0.90	
			0.70-0.80	
			4. Not connected to the grid, Daily/No regulating capacity	
		a) For annual electricity generation(4167): The data was based on 53 years(1953 to 2005) hydrological data of the river. Hence, it is impossible to change the annual power supplied to the grid greatly. b) For coefficient of effective electricity(0.8): The installed capacity of the project is 6.7MW and the project is a run-of-river hydropower station without regulation capacity. Moreover, the project is the case that the grid will only take part of electricity generated		

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 rainy season according to FSR (the page 16).</p> <p>In additional, the amount of the power supplied to the grid by the project is only 31981 MWh from May,2008 to April,2009. The data is less than 33202 MWh.</p> <p>As soon as receipt of the power grid's advice, the project owner will reduce a voltage(Log can be submitted.)</p> <p>In accordance with the Table 3.4 in the SL16-95 as listed, the coefficient of effective electricity should choose 0.7-0.8. However, the much more conservative coefficient 0.8 was selected for this project.</p> <p>c) For auxiliary power consumption(0.4%):</p> <p>Based on "Hydroenergy Design Code for Small Hydropower Projects(SL76-94)" published by the Ministry of Water Resources of the People's Republic of China. Section 4.7 of SL76-94 states that for small scale hydropower, auxiliary power consumption of 0.5%-1.0% is reasonable. Therefore, auxiliary</p>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>power consumption of 0.4% is conservative value.</p> <p>d) For line losses(zero) The line losses of zero was omitted by the certified Insistute. The Design Insistute has chosen to employ the value zero as the line losses. This is a conservative choice as zero line losses leads to higher power supply and therefore an overestimation of the IRR compared to employing a higher values as line losses</p>	
<p>CL-5 The power density thus needs to be determined ex-ante and to be provided with evidence</p>	<p>B.4.1 B.9.1</p>	<p>We added the power density in PDD which is 980.822W/m^2 (refer to section A.2, Page 2) , and which is written in page 2 of FSR.</p>	<p>The FSR was verified to confirm that the power density of the project is $980.822\text{ W/m}^2/4/$. This CL is closed.</p>
<p>CL-6 The data source and calculation spreadsheet for the emission factor of China Southern Power Grid need to be provided.</p>	<p>B.5.1 B.10.1</p>	<p>The calculation spreadsheet is in Annex 3 of PDD. As to the data source, pls refer to China Energy Statistical Yearbook (2004-2006), China Electric Power Yearbook (2002-2006) ,2006 IPCC Guidelines for National Greenhouse Gas Inventories</p>	<p>The data sources were addressed. The calculation of emission factor has been verified and cross-checked with the emission factor published by NDRC /14/. This CL is closed.</p>
<p>CL-7 The calibration intervals of the electricity meters needs to be provided.</p>	<p>B.10.8</p>	<p>The electricity meters will be calibrated annually by the qualified metrical organization according to relevant</p>	<p>The electricity meters will be calibrated annually by the qualified metrical</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		national electricity measurement standards and will be provided as the Project Activity will start operations.	organization as stated in monitoring plan. This CL is closed.
<p>CL-8</p> <p>The procedures for corrective actions in order to provide for more accurate future monitoring and reporting have not been identified.</p>	B.13.5	<p>The following corrective actions will be taken by the project owner when erroneous measurements and deviations occur:</p> <p>a. Actions to correct deviations from the monitoring plan and guidebook for the hydropower plant operation and monitoring will be implemented as these deviations are observed by the operator;</p> <p>b. The project owner will perfect the whole monitoring procedure by developing the CDM guidebook: tracking information from the primary source to the end data calculations in paper document format.</p> <p>c. Corrective actions are also set down in case of equipment or systems malfunction.</p>	<p>Monitoring plan was revised and CDM guidebook for monitoring was provided /28/ to address the procedures for corrective actions.</p> <p>This CL is closed.</p>
<p>CL-9</p> <p>The project's starting date should be clarified, with relevant evidences provided..</p> <p>The operational lifetime in PDD is different from 30 year described in the Feasibility</p>	C.1.1	According to the Hydro Turbine Affiliated Equipments purchase contract of the project, the project's starting date is Jan.14, 2007. Section C.1.1 in PDD has been updated	According to EB 33 para 76, the starting date of a CDM project activity is 14 January 2007, the earliest date of purchase contract for water turbines /25/, construction contract /21/ and

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
Study Report.		accordingly. The PDD, has been updated and the operational lifetime is 30 years as from FSR, The PDD has been revised in section C.1.2	construction permission /19/ FSR was verified to confirm that the operational lifetime is 30 years /4/. This CL is closed.
CL-10 The start of the crediting period is 01 Jan. 2008, which is not reasonable.	C.1.2	According to the development of validation process, the reasonable start of crediting period has been revised to 1 September 2009 or the registration date whichever is later in PDD.	The starting date of the crediting period is updated to be 10 March 2010 or the registration date whichever is later. This CL is closed.
CL-11 The EIA for the project was prepared in Nov. 2006 and was approved by Baoshan City Environment Protection Bureau on 14 th of Nov. 2006, which is not in line with the description of “The EIA has been approved by the TengChong County Environment Protection Bureau on 24th of October 2006” in page 24 in PDD.	D.1.2	There is a mistake with the description in PDD about the EIA approved letter, we clarified that the EIA was approved by Baoshan City Environment Protection Bureau on 14th Nov. 2006 and made the related correction in section D.1 of PDD.	The evidence was verified /5/. This CL is closed.
CL-12 The stakeholder consultation questionnaires need to be provided for verification.	E.1.1 E.1.3 E.1.4 E.1.5	15 consultation questionnaires as described in PDD were provided for verifying.	15 copies of questionnaires have been provided for verifying /37/, and the conclusion is consistent with that in PDD. This CL is closed.
CL-13 In PDD,it only mentions that all the relevant data records will be kept for 2 years after the	B.8.2	We have amended the PDD mentioning that all the relevant data records will be kept for 2 years after the end of the	OK. This CL is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
end of the crediting period. However, it should mention that all the relevant data records will be kept for 2 years after the end of the crediting period or the last issuance of CERs, for the project activity, whichever occurs later.		crediting period or the last issuance of CERs for the project activity, whichever occurs later.	

APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Nan Donald Dong

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJ1-i1)

GHG Auditor:	Yes				
Technical Area	CDM Validator	CDM Verifier	Sector Expert	Methodology Expert	Technical Reviewer
Landfill gas					
Hydro power					
Renewables Wind power	Sept 2009				
Other renewable					
Biomass					
Grid connection of isolated system					
Cement					
Waste-heat / waste-gas recovery					
Efficiency of thermal power plants					
Coal mine methane					
Fuel switch					
Manure management					
Waste / wastewater treatment					
Energy efficiency					
N ₂ O					
HFCs					
Flare reduction					
PFCs					
Charcoal					
CO ₂ recovery					
Transport					
Non-renewable biomass					
Biofuel					
Pipeline leakage reduction					
SF ₆					

Høvik, 8 September 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services



CERTIFICATE OF COMPETENCE

zhi Ang (Walter) Tang

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJ1-i1)

GHG Auditor:	Yes				
Technical Area	CDM Validator	CDM Verifier	Sector Expert	Methodology Expert	Technical Reviewer
<i>Landfill gas</i>					
<i>Hydro power</i>	Jan 2009				
<i>Renewables</i>	Jan 2009			Apr 2009	Apr 2009
<i>Wind power</i>					
<i>Other renewable</i>					
<i>Biomass</i>					
<i>Grid connection of isolated system</i>					
<i>Cement</i>					
<i>Waste-heat / waste-gas recovery</i>					
<i>Efficiency of thermal power plants</i>					
<i>Coal mine methane</i>					
<i>Fuel switch</i>					
<i>Manure management</i>					
<i>Waste / wastewater treatment</i>					
<i>Energy efficiency</i>					
<i>N₂O</i>					
<i>HFCs</i>					
<i>Flare reduction</i>					
<i>PFCs</i>					
<i>Charcoal</i>					
<i>CO₂ recovery</i>					
<i>Transport</i>					
<i>Non-renewable biomass</i>					
<i>Biofuel</i>					
<i>Pipeline leakage reduction</i>					
<i>SF₆</i>					

Høvik, 3 April 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services



CERTIFICATE OF COMPETENCE

Weidong Yang

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJ1-i1)

GHG Auditor:	Yes				
Technical Area	CDM Validator	CDM Verifier	Sector Expert	Methodology Expert	Technical Reviewer
Landfill gas					
Hydro power					
Renewables Wind power				Jan 2009	Jan 2009
Other renewable					
Biomass					
Grid connection of isolated system					
Cement					
Waste-heat / waste-gas recovery					
Efficiency of thermal power plants					
Coal mine methane					
Fuel switch					
Manure management					
Waste / wastewater treatment					
Energy efficiency					
N ₂ O					
HFCs					
Flare reduction					
PFCs					
Charcoal					
CO ₂ recovery					
Transport					
Non-renewable biomass					
Biofuel					
Pipeline leakage reduction					
SF ₆					

Høvik, 9 January 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services



CERTIFICATE OF COMPETENCE

Miguel Rescalvo

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJ1-i1)

GHG Auditor:	Yes				
Technical Area	CDM Validator	CDM Verifier	Sector Expert	Methodology Expert	Technical Reviewer
Landfill gas					
Hydro power					
Renewables Wind power				Jan 2009	Jan 2009
Other renewable					
Biomass				Jan 2009	Jan 2009
Grid connection of isolated system					
Cement					
Waste-heat / waste-gas recovery					
Efficiency of thermal power plants					
Coal mine methane					
Fuel switch					
Manure management					
Waste / wastewater treatment					
Energy efficiency					
N ₂ O					
HFCs					
Flare reduction					
PFCs					
Charcoal					
CO ₂ recovery					
Transport					
Non-renewable biomass					
Biofuel					
Pipeline leakage reduction					
SF ₆					

Høvik, 9 January 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services



CERTIFICATE OF COMPETENCE

Kumaraswamy Chandrashekara

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJ1-i1)

GHG Auditor:	yes				
Technical Area	CDM Validator	CDM Verifier	Sector Expert	Methodology Expert	Technical Reviewer
Landfill gas	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Hydro power	Jan 2009	Jan 2009			
Renewables	Jan 2009	Jan 2009		Jan 2009	
Wind power	Jan 2009	Jan 2009			
Other renewable	Jan 2009	Jan 2009			
Biomass	Jan 2009	Jan 2009		Jan 2009	
Grid connection of isolated system	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Cement	Jan 2009	Jan 2009		Jan 2009	
Waste-heat / waste-gas recovery	Jan 2009	Jan 2009	Jan 2009	Jan 2009	
Efficiency of thermal power plants	Jan 2009	Jan 2009		Jan 2009	
Coal mine methane	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Fuel switch	Jan 2009	Jan 2009		Jan 2009	
Manure management	Jan 2009	Jan 2009		Jan 2009	
Waste / wastewater treatment	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Energy efficiency	Jan 2009	Jan 2009	Jan 2009	Jan 2009	
N ₂ O	Jan 2009	Jan 2009		Jan 2009	
HFCs	Jan 2009	Jan 2009	Jan 2009	Jan 2009	
Flare reduction	Jan 2009	Jan 2009		Jan 2009	
PFCs	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Charcoal	Jan 2009	Jan 2009	Jan 2009	Jan 2009	
CO ₂ recovery	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
Transport	Jan 2009	Jan 2009		Jan 2009	
Non-renewable biomass	Jan 2009	Jan 2009		Jan 2009	
Biofuel	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Pipeline leakage reduction	Jan 2009	Jan 2009		Jan 2009	
SF ₆	Jan 2009	Jan 2009		Jan 2009	Jan 2009

Høvik, 9 January 2009

Michael Lehmann

Michael Lehmann

Technical Director, Climate Change Services