

JACO CDM

Validation Report

Client: Liupanshui Tuoyuan Group Co., Ltd.

Changzhai 15MW Hydro Power Project in Guizhou Province, China

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JACO CDM., LTD

Validation Report

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Approved by: Yasunori Shimoi CEO, President of JACO CDM	
Client: Liupanshui Tuoyuan Group Co., Ltd.	Client ref.: Mr. Wu Chao

Summary:

Liupanshui Tuoyuan Group Co., Ltd. (hereinafter the Client).has commissioned JACO CDM to validate the Changzhai 15MW Hydro Power Project in Guizhou Province, China(hereinafter the Project).

The purpose of the Project is to construct 15MW small-scale hydro power plant with three sets of turbine and generator on the bank of Yueliang River in Zhongzhai town, Liuzhi special district, Liupanshui City in Guizhou Province, P.R. China. The generated electricity is supplied to the China Southern Power Grid (CSPG), thus providing GHG free electricity to meet growing electricity demand of the country. The emission reduction from the Project has been conservatively estimated to be 50,534 tonnes of CO₂ per year.

The validation is the independent third party assessment of the project design, and is the requirement for all CDM projects. The project's compliance with the relevant UNFCCC and host country criteria are validated in order to confirm that the project design is sound and reasonable and meet the stated and identified criteria.

This validation report summarizes the findings of the validation.

The validation consisted of the following three steps: i) desk review of the project design, the baseline and the monitoring plan etc., ii) follow-up interviews with project stakeholders and iii) the resolution of outstanding issues and issuance of the final validation report and the opinion.

The 10 Clarifications(CLs) with 9 sub CLs to the PDDs (original: Ver.3.0, June 06, 2009, revised: Ver.4.0, July 29, 2009) were all resolved by the project participants and the PDDs above were revised.

In summary, it is JACO CDM's opinion that the Project as described in the final PDD (Ver.5.0, December 29, 2009) meets all relevant UNFCCC requirements for the CDM and host country criteria, and correctly applies the simplified baseline and monitoring methodology for category I.D. small-scale CDM project activities, AMS I.D. Version 15.

Hence, JACO CDM requests the registration of the Project as a CDM project.

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Report title: Validation Report Changzhai 15MW Hydro Power Project in Guizhou Province, China		
Work carried out by: Hideki KOBAYASHI Shigekazu OKA		
Work verified by: Osamu KOBAYASHI		
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Abbreviations

BM	Build margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CERs	Certified Emission Reduction
CL	Clarification Request
CM	Combined margin
DNA	Designated National Authority
DOE	Designated Operational Entity
ERs	Emission Reductions
EIA	Environmental Impact Assessment
GHG	Green House Gas (es)
IPCC	Intergovernmental Panel on Climate Change
JACO CDM	JACO CDM Co., Ltd
KP	Kyoto Protocol
LoA	Letter of Approval
NDRC	The National Development and Reform Commission of the People's Republic of China
NGO	Non Governmental Organization
ODA	Official Development Assistance
OM	Operating margin
PDD	Project Design Document
PDR	Preliminary Design Report

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Appendix A: CDM Validation Protocol

1. INTRODUCTION

1.1 . Objective

Liupanshui Tuoyuan Group Co., Ltd.(hereinafter referred to as the “Client”) has commissioned JACO CDM to validate the “Changzhai 15MW Hydro Power Project in Guizhou Province, China” (hereinafter referred to as the “Project”) in the People’s Republic of China. The validation serves as design verification and is a requirement for all CDM projects. The purpose of a validation is to have an independent third party assess the project design. In particular, the project’s baseline, the monitoring plan (MP), and the project’s compliance with relevant UNFCCC and host country criteria are validated in order to confirm that the project design as documented is sound and reasonable and meets the stated requirements and 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).

UNFCCC criteria refer to the Kyoto Protocol criteria and the CDM rules and modalities as agreed in the Bonn Agreement and the Marrakech Accords.

1.2. Scope

The validation scope is defined as an independent and objective review of the project design document (PDD), the project’s baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against Kyoto Protocol requirements, UNFCCC rules and associated interpretations. JACO CDM has, based on the recommendations in the Validation and Verification Manual, employed a risk-based approach in the validation, focusing on the identification of significant risks for project implementation and the generation of CERs.

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

The validation was conducted by the following validation team through the assessment of the original PDD (Ver.3.0; June 06, 2009)/(1/), the revised PDD (Ver.4.0; July 29, 2009)/(1/-2), the final PDD (Ver.5.0; December 29, 2009)/(1/-3) and the additional documents listed in the Chapter 6 “References”, also by the interviews with persons listed in the same Chapter.

The result of validation team activity was reviewed by the internal verifiers.

Validation Team

Hideki KOBAYASHI	JACO CDM	Team Leader
Shigekazu OKA	JACO CDM	Team Member
Tatsuo TANAKA	JACO CDM	Observer

Internal Verifiers

Osamu KOBAYASHI General Manager of JACO CDM

1.3. GHG Project Description

The Project is a 15MW small-scale hydropower project located on the bank of Yueliang River in Zhongzhai town, Liuzhi special district, Liupanshui City in Guizhou Province, P.R. China.

The Project is a diversion type hydropower station. The three sets of hydro turbine and generator (capacity:5MW×3) are set in the power house which takes the water from the reservoir through the free-flowing diversion tunnel with the length of the 3,832m, the forebay and the penstock with the length of 556m. The rated water head and flow rate is 194m and 3.01m³/s respectively.

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The power plant is connected with the China Southern Power Grid (CSPG) through the Guizhou Provincial grid at two substations of Xinyao substation and Laohe substation with the distance from the power station of 15 km and 10 km respectively.

The starting date of the project activity is Feb. 12, 2005 (construction contract was signed), and the expected operational lifetime is 27 years.

The Project is to assist P. R. China in its sustainable development in several ways: by reducing GHG emissions and environmental pollutants emissions compared to a business-as-usual scenario, alleviating power shortage and stimulating economy development in local area and creating employment opportunities for the local people.

The electricity generated by the Project is to displace the grid electricity contributing to GHG reductions of 50,534 tCO₂e (tonnes of carbon dioxide equivalent) per year for the duration of the project activity. In the initial 7-year crediting period, the Project is expected to reduce approximately 353,738 tCO₂e, generating the equivalent amount of Certified Emission Reductions (CERs).

The outline of the project described above was confirmed to be correct by the desk review of the project design documentation as well as the follow-up interviews with the stakeholders described below.

2. METHODOLOGY

The validation may consist of the following three phases:

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

In order to ensure transparency, a validation protocol was customized for the project, according to the Validation and Verification Manual of UNFCCC 01.1 (EB51, Annex3) and the Validation and Verification Manual of IETA. . The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

The validation protocol consists of three tables. The different columns in these tables are described in Figure 1.

The validation protocol is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfillment of validation protocol criteria or where a risk to the fulfillment of project objectives is identified. Corrective Action Requests (CAR) are issued, if one of the followings occurs:

- i) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- ii) The CDM requirements have not been met;
- iii) There is a risk that emission reductions cannot be monitored or calculated.

The validation team may raise a Clarification (CL), if:

- iv) Information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

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The validation team may also raise a Forward Action Request (FAR) to highlight issues related to project implementation that require review during the first verification of the project activity. FARs do not relate to the CDM requirements for registration.

validation Protocol Table 1: Mandatory Requirements

Requirement	Reference	Conclusion	Cross reference
<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), or a Corrective Action Request (CAR) of risk or non-compliance with stated requirements. The corrective action requests are numbered and presented to the client in the Validation report.</i>	<i>Used to refer to the relevant checklist questions in Table 2 to show how the specific requirement is validated. This is to ensure a transparent Validation process.</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 1 are linked to checklist questions the project should meet. The checklist is organized in seven different sections. Each section is then further sub-divided. The lowest level constitutes a checklist question.</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). 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 Corrective Action Request or a Clarification, these should be listed in</i>	<i>Reference to the checklist question number in Table 2 where the Corrective Action Request or Clarification</i>	<i>The responses given by the Client or other project participants during the communications with the validation team should be</i>	<i>This section should summarize the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".</i>

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<i>this section.</i>	<i>Request is explained.</i>	<i>summarized in this section.</i>	
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Figure 1 Validation protocol tables

2.1. Review of Documents

The Project Design Documents submitted by the Client and additional background documents related to the project design and baseline were reviewed.

Documents reviewed are listed in Chapter 6 "References". The validation team confirmed that the PDDs complied with the relevant forms and guidance.

The validation findings stated hereinafter are based on the original PDD (Ver.3.0, June. 06, 2009) (/1/) and the revised PDD (Ver.4.0, July 29, 2009)(/1/-2).

2.2. Follow-up Interviews

In the period of July 15, 2009 to July 18, 2009, JACO CDM performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. Representatives of Local Development and Reform Commission, Liupanshui City Environmental Protection Bureau and the Grid Company including the staffs of the substations as well as the local residents near the site were interviewed. And the members of the Client including the staffs at the power station were also interviewed.

The main topics of the interviews are summarized in Table 1.

Table 1 Interview topics

Interviewed organisation	Interview topics
Project participant	<ul style="list-style-type: none"> ➤ Project as a whole ➤ Feasibility Study ➤ Project design issues incl. additionality ➤ Baseline calculations ➤ Monitoring plan ➤ CDM Management system ➤ Approval by each Party
Local Development and Reform Commission	<ul style="list-style-type: none"> ➤ Roles and Responsibility for CDM ➤ CDM approval procedure and status ➤ Local economic planning and electricity demand
Liupanshui City Environmental Protection Bureau	<ul style="list-style-type: none"> ➤ Approval conditions of EIA ➤ Countermeasures of the environmental impacts ➤ Resettled families and submerged lands ➤ Other hydropower projects and CDM ➤ Natural conditions in the district
Grid Company	<ul style="list-style-type: none"> ➤ Power Purchase Agreement ➤ Meter reading procedure ➤ Interface with the grid (Meters and transmission lines)
Local residents	<ul style="list-style-type: none"> ➤ Benefit of the Project to the local residents ➤ Comments by local residents

2.3. Resolution of Clarification and Corrective Action Request

The objective of this phase of the validation was to resolve the requests for corrective actions and clarifications and any other outstanding issues which needed to be clarified for JACO CDM's positive conclusion on the project design. The Corrective Action Requests and Clarifications raised by JACO CDM were resolved by communications between the Client and JACO CDM as described below.

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To guarantee the transparency of the validation process, the concerns raised and responses given are summarized in chapter 3 below and documented in more detail in the validation protocol in Appendix A.

Since modifications to the PDD were necessary to resolve JACO CDM's concerns, the Client decided to submit the final PDD (Ver.5.0, December 29, 2009) (/1/-3) and the Corrective Action Requests and the Clarifications were resolved.

3. VALIDATION FINDINGS

In the following sections the findings of the validation are stated. The validation findings for each validation subject are presented as follows:

1)The findings from the desk review of the PDDs(original: Ver.3.0, June. 06, 2009, revised: Ver.4.0, July 29, 2009) (/1/) (/1/-2) and the findings from interviews during the follow up visit are summarized. A more detailed record of these findings can be found in the Validation Protocol in Appendix A.

2)Where JACO CDM had identified issues that needed clarification or that represented a risk to the fulfillment of the project objectives, a Clarification or a Corrective Action Request, respectively, has been issued. The Clarifications and Corrective Action Requests are stated, where applicable, in the following sections and are further documented in the Validation Protocol in Appendix A.

The validation of the Project resulted in 10 Clarifications(CLs) with 9 sub CLs.

3) Where Clarifications have been issued, the exchanges between the Client and JACO CDM to resolve these Clarifications are summarised.

4) The conclusions for each validation subject are presented.

The validation findings relate to the project design as documented and described in the original PDD (Ver.3.0, June. 06, 2009) (/1/) and the revised PDD (Ver.4.0, July 29, 2009) (/1/-2).

3.1. Participation Requirements

3.1.1. Discussion

The Letter of Approval from NDRC of the People's Republic of China(/5/) was issued in September, 2008. The validation team has received this letter from the Client and confirmed that the letter described the following points with no conditions; (a)China is a Party to the Kyoto Protocol, (b)The Client voluntarily participates in the Project, (c)The Project assists China in achieving sustainable development, (d)The title of the Project is same as the PDD. And also the Letter of Approval from the Japanese government dated on January 21, 2009 (/6/) was notified to JACO CDM by the Client. The validation team has confirmed that this letter has the description of the following points with no conditions; (a)Japan is a Party to the Kyoto Protocol, (b)Eco Asset Incorporated is authorized to voluntarily participate in the Project, (c)The title of the Project is same as the PDD.

3.1.2. Findings

None

3.1.3. Conclusion

The Project complies with the requirements.

3.2 Project Design

3.2.1 Discussion

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The PDD applies the PDD form CDM-SSC-PDD version 03, the latest version and described in accordance with the guidelines for CDM-SSC-PDD version 05.

The Client has not applied to register any other small CDM projects within 1km of the project boundary and the project is not a debundled component of a large scale project activity.

(1) Boundary

Geographical boundaries are the physical power generation system at the project site including the Intake from the Dam, the underground Diversion tunnel(3,832m), the forebay, the penstock(556m), the Power plant(3 sets of hydro turbine and generator) and the two transmission lines from the switchyard to the Xinyao substation(15km) and to the Laohe substation(10km), etc. In the original PDD(Ver.3.0)/(1/), these components of the project and the location of the grid substations were not clearly illustrated (CL1). However the validation team confirmed these components during the site visit as well as by the document provided later(/29/).

System boundary of the project covers all fossil fuel-fired power plants physically connected into the China Southern Power Grid(CSPG) as well as the Central China Power Grid(CCPG) from which CSPG imports electricity.

(2) Technology

The Project takes the water through the underground diversion tunnel (3,832m) from the dam to the forebay, from where the water is supplied to the power station through the penstock (556m).

The Project was designed based on the extensive feasibility study conducted by Water Conservancy Department, Shanxi Water Conservancy and Hydro Electric Survey and Design Institute to which the Client commissioned the study, and the report "Preliminary Design Report (PDR)" (2004.11)/(11/) was approved by Development and Reform Bureau of Liupanshui City on December 26, 2004. It is indicated in the PDR that the capacity of the Project (15MW), the expected annual electricity generation (61,180MWh) and the annual utilization hours (4,078h) were determined based on the long term hydrological observations. However, as there were no explanations and the evidences how these fundamental values are derived, the validation team requested the clarification.(CL2).

In response to CL2, the Client provided the explanation document by the Design Institute (/14/) explaining briefly the calculation process of (a) flow rate of the dam site, (b) installed capacity, (c) annual operation hours and (d) house consumption rate as described below (3.2.2. Response to CL2).

Further the validation team compared the value of the plant load factor(PLF: annual operating hours/8,760h) of the Project with the ones of small hydropower CDM projects in Guizhou Province in Table 2 below, and confirmed that the PLF value of the Project was similar to the ones of other projects in Guizhou Province reflecting the similar data of the hydrological conditions.

Table 2. Comparison of PLF of recent small hydropower projects in Guizhou Province

	UNFCCC Reference No. (yea ⁺)	Project	Capacity (MW)	Annual electricity generation (MWh)	Annual operating hours (h)	PLF
1	1193(2006)	Yangjiawan	9	38,200	4,244	0.48
2	1452(2005)	Matan	7.5	27,200	3,637	0.41
3	1553(2005)	Mingying	3.75	16,960	4,523	0.52
4	1557(2005)	Lingli	7.5	27,310	3,641	0.42
5	1560(2004)	Jiaping&Pingzhong	9.4	35,570	3,784	0.43
6	1569(2004)	Taohua	9	37,800	4,200	0.48
7	2204(2005)	Longwangtan	15	60,015	4,001	0.46
8	1522(2005)	Bapan	12.7	50,120	3,947	0.45
9	1527(2006)	Hongyan	8	31,400	3,920	0.45
10	1785(2005)	Putian	6.4	35,990	5,537	0.63

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11	1809(2005)	Huangyutan	12.6	56,259	4,465	0.51
12	1799(2004)	Changtan	5	20,100	4,020	0.46
		Average				0.48
	(2005)	Changzhai	15	61,180	4,078	0.47

The validation team confirmed that the flow rate, the capacity of the Project and the annual operating hours were properly concluded based on the documents provided.

The technology used in the Project is environmentally safe and of the state of the art technology in the host country, and all the technology employed is domestic with no technology transfers.

(3) Contribution to sustainable development

The renewable energy (hydropower) project can assist P.R. China in its sustainable development by alleviating power shortage in the local areas and improving the standard of living of the local people, reducing environmental pollutants caused by coal-fired power plants, and creating employment opportunities for local people.

The National Development and Reform Commission has approved the Project to assist P. R. China in achieving sustainable development (/5/). And also the validation team was convinced that the Project was in line with the host country's sustainable development policy during the interviews with the local stakeholders (/52/,/53/, /57/,/58/).

(4) Public funding

There is no public funding from Annex 1 parties for the Project.

3.2.2. Findings

Clarification 1

The project's system (components and facilities used to mitigate GHG) is to be clearly defined in the figure(s). And also the location of the substation with the distance between the project site and the substation is to be clearly defined in the map.

Response

The project's system was properly demonstrated in the Figure 2 and Figure 4 of the revised and final PDDs(Ver.4.0, Ver.5.0).

And the location of the two substations and the distances from the power station (10km to Laohe substation., 15km to Xinyao substation) were indicated by the Map provided(/29/).

Clarification 2

(1)The relationship between the capacity (5MW) of each generator and the rated head and the rated flow in Table 1 is to be clarified by the evidence documents.

(2)It is also to be clarified by the evidence documents how the expected annual electricity generation (61,180MWh) and the electricity delivered to the grid (58,005MWh) was derived.

(3)Back data of the surface area of the reservoir (168,000m²) are to be clarified.

Response

(1)The documents explaining the installed capacity by the Design Institute (2009.8.10)(/13/) was provided.

(2)-1 The values of expected annual electricity generation (61,180MWh) and the on-grid electricity (58,005MWh) as well as the coefficient of effective electricity(0.95) and the rate of power station supply(0.2%) by which 58,005MWh were derived from 61,180MWh were indicated in the 16.2.(Economic evaluation) of PDR provided(/11/).

(2)-2 The explanation document by the Design Institute(/14/) explaining the following calculation was provided.

(a)Flow rate at the dam site:

$$Q_{\text{dam}} = F_{\text{dam}} / F_{\text{station}} \times H_{\text{dam}} / H_{\text{total}} \times Q_{\text{station}}$$

where, Q_{dam} : Flow rate of dam site section (m³/s)

Q_{station} : Flow rate of station (m³/s)

F_{dam} : Drainage area of dam site section (km²)

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F_{station} : Drainage area of station (km²)

H_{dam} : Multi-year average rainfall above the dam site section (mm)

H_{total} : Multi-year average rainfall of the total drainage area (mm)

$$Q_{\text{dam}} = 277/425 \times 1443.8/1307.5 \times 6.2 = 4.46 \text{ m}^3/\text{s}$$

(b) Installed capacity

$$N_y = AQH$$

where, N_y : Installed capacity (KW)

A : Coefficient (adopting 8.5 for this project)

Q : Design flow rate (adopting 9.03 m³/s for this project)

H : Calculated waterhead(194m)

$$N_y = 8.5 \times 9.03 \times 194 = 14,890.47 \text{ KW (15MW)}$$

(c) Annual operation hours

$$Qh = Q_{\text{dam}} 365 \times 24 \times \eta$$

where, Q : Design flow rate (adopting 9.03 m³/s for this project)

Q_{dam} : Flow rate of dam site section (4.46 m³/s)

h : Annual operation hours (hour)

η : Coefficient of hydro energy (adopting 0.9-0.95 for this project)

$$h = Q_{\text{dam}} 365 \times 24 \times \eta / Q = 4.46 \times 365 \times 24 \times (0.9-0.95) / 9.03 = 3,893 \text{ h} - 4,110 \text{ h}$$

(d) house consumption rate

as described in 3.3.1.(1) a) ② below.

(2)-3 The Coefficient of effective electricity generation (A: 95%) and the House consumption rate (C: 0.2%) in the following formula were indicated in Chapter 16.2.(Economic evaluation) of PDR provided(/11/).

On-grid electricity 58,005MWh

$$= [\text{annual power generation}] 61,180 \text{ MWh} \times [\text{coefficient of effective electricity generation}] A\% \times (1 - [\text{Power loss rate}] B\%) \times (1 - [\text{House consumption rate}] C\%)$$

(3) The report about surface areas of the reservoir at the full water level by the Design Institute (2004.4)(/15/) was provided.

3.2.3. Conclusion

CL1: The Figure2 and the Figure4 in the revised PDD(/1/-2) and the final PDD(/1/-3) are satisfactory for the explanation of the project system. The location of the new substation was illustrated in the document provided(/29/). No further actions are required.

CL2: It was confirmed by the evidences provided that the installed capacity was properly designed considering the local hydrological conditions, and also the expected electricity generation was properly derived based on the annual operation hours calculated by balancing the yearly flow at the dam site and the design flow at the power station.

The parameters to be used in the calculation of the electricity supplied to the grid as well as the evidence document of the surface area of the reservoir were also provided. No further actions are required.

3.3. Baseline

3.3.1. Discussion

The project applies the approved methodology for small-scale CDM project "AMS-I.D. Grid connected renewable electricity generation" as follows;

(a) Version 13, EB36 (/2/) for the PDDs(Original: Ver.3.0, June. 06, 2009, Revised: Ver.4.0, July 29, 2009) (/1/) (/1/-2)

(b) Version 15, EB50 (/2/-2) for the final PDD (Ver.5.0, December 11, 2009)(/1/-3).

And also the methodological tool "Tool to calculate the emission factor for an electricity system" was applied as follows;

(a) Version 01.1, EB35 (/3/) for the PDDs(Original: Ver.3.0, June. 06, 2009, Revised: Ver.4.0, July 29, 2009) (/1/) (/1/-2)

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(b) Version 02 (/3/-2) for the final PDD (Ver.5.0, December 11, 2009)(/1/-3).

It has been verified that they are applicable for the Project which has the capacity of 15MW and the generated electricity is transmitted to China Southern Power Grid (CSPG).

(1) Baseline calculation

The baseline emission is the amount of net grid-connected electricity generation (kWh) multiplied by the emission factor of China Southern Power Grid (CSPG) whose data were provided in the PDD (Annex 3) in a transparent manner.

a) Electricity supplied to the grid

Electricity supplied to the grid ($EG_{PJ \text{ to Grid, } y}$) is calculated using coefficient of effective electricity, rate of power station supply and rate of transmission loss as follows.

$$EG_{PJ \text{ to Grid, } y} = EG_{\text{plant}} \times \text{coefficient of effective electricity} \times (1 - f_1) \times (1 - f_2)$$

Where,

EG_{plant} (expected average annual electricity generation): 61,180 MWh (PDR)

Coefficient of effective electricity* = 0.95 (PDR)

f_1 : rate of power station supply = 0.2% (PDR)

f_2 : rate of transmission loss including step up transformer loss = 0% (PDR)

$$\therefore EG_{BL, y} = 61,180 \times 0.95 \times 0.998 \times 1.0 = 58,005 \text{ MWh}$$

All these calculations are derived from the approved PDR.

The validation team evaluates that the electricity supplied to the grid ($EG_{PJ \text{ to Grid, } y}$) above was calculated to be a little bigger amount than the one calculated strictly in accordance with the national codes below by the following reasons.

- ① The coefficient of effective electricity (0.95) adopted was confirmed to be the upper limit of the range of 0.90-0.95 for "Grid-connected hydro power plants adjusted by quarter" stipulated in the table 3.4 of the Economic Evaluation Code for Small Hydropower Projects (SL16-95)(1995.6.2)(/17/).
- ② The power station supply (0.2%) adopted was confirmed to be lower than the range (0.5-1.0%) stipulated in the "Hydroenergy design code for small hydro power projects" (SL76-94)(2007.9)(/18/). The explanation document by the Design Institute (/14/) indicated the following aspects of the diversion type power station as the reason of relatively lower power consumption in the power station; (a) water pumping for shorter time with less water seeping into the power house, (b) cooling pump is rarely used as the cooling water is adopted from steel penstock, (c) less power consumption by the few staffs due to the computerized Changzhai power station.
- ③ The transmission line loss including step up transformer loss of 0% adopted was also confirmed to be lower than the upper limit of line loss rate of 11 % stipulated in SL76-94, however it is considered to be rather reasonable because the interface with the grid was agreed in the PPA (/27/) to be the main meters installed in the Project site and the transmission lines were installed and owned by the grid company (/28/).

b) Emission factor calculation

The Operating margin (OM), Build margin (BM) and Combined margin (CM) were properly calculated in accordance with the steps stipulated in the Tool above (/3/, /3/-2), and the data used and the results are provided in the Annex 3 of the PDDs (/1/, /1/-2, /1/-3). And the figures of OM and BM have been officially published in the "Notification on Determining Baseline Emission Factor of China's Grid" issued by Chinese DNA every year. The PDDs (/1/, /1/-2, /1/-3) used the figures published on December 30, 2008 as the Client

* Coefficient of effective electricity = (effective power generation) / Theoretical power generation

The Economic Evaluation code for small hydropower projects (SL16-95) states that the effective electricity generation is calculated after evaluating several factors as system load factor, electricity balance of the local grid, and the frequency of equipments overhaul and damages that could be provided for clients and system. The coefficient of effective electricity for different type of hydropower stations is available in the table 3.4 of the SL16-95.

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selected the Ex ante option for OM and Option1 for BM and calculated them based on the most recent data or information available at the time of submission of the CDM-PDD to the DOE for validation (Validation contract: February 2009) as stipulated in the Tool above(/3/).

The validation team confirmed that the values between the published data and the descriptions in the PDDs were consistent.

The validation team confirmed that the baseline emissions (50,534 tCO₂) were properly calculated by using the CM (0.8712 tCO₂/MWh) and the net grid-connected electricity generation above (58,005 MWh).

(2) Additionality

a) Investment barrier:

Based on the requirement of the Simplified Modalities and Procedures for Small-scale CDM Project Activities, the Investment Barrier was demonstrated by calculating the IRR(/16/,/16/-2).

In the original PDD(/1/) and the revised PDD(/1/-2), the project IRR without CERs was calculated to be 8.52% and the IRR with CERs to be 12.55%(/16/) in accordance with the Guidance on the Assessment of Investment Analysis (Ver.02, Annex45, EB41). However, in the final PDD(/1/-3), the project IRR without CERs was changed to 8.69% and the IRR with CERs to 12.72% as the result of recalculation of IRR(/16/-2) by taking into account the actual loan interest in the calculation of income tax in accordance with the Guideline on the Assessment of Investment Analysis (Ver.03, Annex58, EB51).

And the PDDs(/1/,/1/-2,/1/-3) conclude that the Project is unlikely to be financially attractive by demonstrating that the project IRR without CERs after the sensitive analysis (within the range of $\pm 10\%$) falls within the range of 7.26-9.75% in the original and revised PDDs(/1/,/1/-2) and 7.26-9.88% in the final PDD(/1/-3) and below the national benchmark of 10% stipulated in Economic Evaluation Code for Small Hydropower Project (SL16-95) (/17/). The validation team confirmed that both calculations were conducted in accordance with the Guidance and the Guideline above, and considers that the conclusions of the PDDs are appropriate.

b) Investment amount and other parameters of IRR calculation:

The original IRR calculation spread sheet(/16/) and the revised one(/16/-2) were provided to the validation team. However the rationales of the major items below were not clear, so the validation team requested relevant evidences.(CL3) Major items are as follows.

b-1) Investment amount

The total static investment amount of 85.96 Million CNY described in the PDDs(/1/,/1/-2,/1/-3) is the same as the one in the Preliminary Design Report(PDR) (/11/) completed by the local expert of Water Conservancy Department, Shanxi Water Conservancy and Hydro Electric Survey and Design Institute and approved by Development and Reform Bureau of Liupanshui City (2004.12.26)(/12/).

[Each item of total investment]

The validation team investigated the amount of each item of total static investment of 85.96 Million CNY in the list of the Chapter 5 of the PDR(/11/), and confirmed that the total amount was consisted of each amount of the following items which were considered to be generally needed in this kind of project.

- ① Construction (43.7%) including Diversion canal(24.0%), Retaining works(9.5%), Power plant(6.1%), etc.,
- ② Electrical equipments and Installation works(18.8%) including Power generation equipments & installation(13.8%), etc.,
- ③ Equipments, Metal Structure and Installation works(9.0%) including penstock(8.1%), etc,
- ④ Temporary works(4.6%) including traffic engineering(1.9%), etc.,
- ⑤ Other cost(19.3%) including feasibility study and design(5.6%), Soil & water conservation and environmental protection(3.7%), etc.

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⑥Preparatory cost(4.6%).

[Comparison with other projects]

The validation team compared the investment amount per capacity of the Project (5.73Million CNY/MW) with the ones of the 20 registered projects in the same Guizhou Province provided in response to the CL4 as shown in the Table 3 below. These values fluctuate in the range of 3.93-7.88 Million CNY/MW (average: 6.14 MCNY/MW) depending on the capacity, natural conditions, etc. The value of the Project is 6.7% lower than the average of these 20 projects.

Table 3. Comparison of investment cost per capacity and Tariff of recent projects in Guizhou Province

	UNFCCC Reference No. (year ⁺)	Project	Capacity (MW)	Investment cost<static> (MCNY)	Cost index (MCNY /MW)	Tariff <with VAT> (CNY/ kWh)
1	1193(2006)	Yangjiawan	9	55.0	6.11	0.213**
2	1452(2005)	Matan	7	46.8368	6.69	0.2184
3	1486(2005)	Luojiache	20	133.32*	6.67	0.218
4	1553(2005)	Mingying	3.75	27.01	7.20	0.215
5	1557(2005)	Lingli	7.5	44.8963	5.99	0.215
6	1560(2004)	Jiaping&Pingzhong	9.4	52.24	5.56	0.2034
7	1569(2004)	Taohua	9	45.39	5.04	0.2034
8	2104(2004)	Baishuiquan	20	107.97	5.40	0.23
9	2136(2005)	Tianshengqiao	22	134.8585	6.13	0.23108
10	2178(2005)	Wengyuan	20	127.71*	6.39	0.218
11	2204(2005)	Longwangtan	15	82.01*	5.47	0.218
12	1953(2005)	Yangzhai	25	141.4343	5.66	0.215**
13	2210(2006)	Xiaba	20	106.45	5.32	0.23
14	1517(2005)	Jinshizi	20	144.3000	7.22	0.2184
15	1875(2005)	Sanchawan	32	211.93	6.62	0.21**
16	1522(2005)	Bapan	12.7	85.57	6.74	0.25
17	1527(2006)	Hongyan	8	31.42	3.93	0.1784
18	1785(2005)	Putian	6.4	50.4035	7.88	0.215
19	1809(2005)	Huangyutan	12.6	74.1004*	5.88	0.18
20	1799(2004)	Changtan	5	34.2353*	6.85	0.24
	(2005)	Changzhai	15	85.96	5.73	0.225

* Total investment

+ Starting year of the project

** Excluding VAT

Then the validation team compared the investment amount per capacity of the Project (5.73Million CNY/MW) with the ones of the small scale hydropower projects in China registered recently (Capacity: less than 15MW, approximately 101 projects). The value of the Project is 13.7% lower than the average (6.64Million CNY/MW) in this capacity range.

Based on these data above, the validation team considers that the investment amount of the Project was properly calculated and the comparatively low investment amount contributes to the conservative IRR calculation.

The PDDs(/1/,/1/-2,/1/-3) describe that in the economic condition in China where the prices of construction materials have been increasing in recent years (2006: 3.5% 2007:2%), it is unlikely for the prices to decrease 12.3%(/1/, /1/-2) or 11%(/1/-3) when the IRR reaches the benchmark of 10.00%.

b-2) O&M cost

The O&M cost of 1.68 Million CNY consisting of the costs for repairs(53.4%), labor(34.7%) and others(11.9%) was confirmed to be the same as described in the PDR and it was also confirmed that the main costs were calculated in accordance with the national Economic Evaluation Code for Small Hydropower Projects(/17/)(ex.[yearly cost] repair: 1% of the total investment, labor: 35 persons × 16,663CNY, others: 13.3 CNY/kW).

Validation Protocol

It was properly shown in the sensitivity analysis of the PDDs(/1/,/1-2/,/1-3) that this cost does not have the significant impact on the IRR by indicating that within the range of $\pm 10\%$ the IRR fluctuates from 8.35% to 8.69%, and if the cost decreased unrealistically by 88%, IRR would reach to the benchmark(10%).

b-3) Depreciation value

For the calculation of the income tax in cash outflow, the annual depreciation value(3.300864 MCNY) was calculated by using the depreciation rate of 3.84% adopted in the PDR based on the local accounting regulation(SL16-95) stipulating the depreciation rate of 3-5% as well as the depreciation period of 25 years. As a result the residual value was calculated to be 3.4384 MCNY(4% of the fixed assets) and was included as a cash inflow in the final year as required by the Guideline above.

b-4) Loan interest

In the final PDD(Ver.5.0, December 29, 2009)(/1-3), as the Project applies the post-tax benchmark, the IRR was recalculated taking into account the actual loan interest in the calculation of income tax of cash outflow in accordance with the Guidance 11 of the Guideline on the Assessment of Investment Analysis (Ver.03, Annex58, EB51, December 4 2009). And the revised spreadsheet(/16-2) as well as the loan contract(/16-3) was provided to the validation team

The validation team confirmed that

- ①the commercial interest rate of 6.12% (as of 23 March, 2006)
- ②the debt- equity ratio of 60%, and
- ③the repayment period of 8 years.

The result indicates that the income tax decreases from 1.199949-2.399898MCNY/year in the original calculation to 0.779199-2.261298MCNY/year during the repayment period, resulting the increase of IRR from 8.52% to 8.69% (without CER) which is below the benchmark of 10 %.

b-3) Electricity tariff

The tariff (0.225 CNY/kWh) used in the IRR calculation of the Project is the one described in the PDR(2004.11)(/11/). Validation team cross-checked this tariff with the ones of other similar 20 projects already registered in Guizhou Province based on the data provided by the Client as shown in the Table 3, most of which were derived from the feasibility study reports by the authorized design institutes.

It was confirmed that the tariffs used in the IRR calculation of these 20 projects with the starting dates in 2004-2006 fall within the range of 0.18-0.25 CNY/kWh, and the average of 0.216 CNY/kWh is very close to (4.0% lower than) the tariff used in the Project. The sensitivity analysis indicates that the IRR fluctuates from 7.26%(-10%) to 9.75%(+10%) and 10.00%(+12.1%). The highest tariff (0.25 CNY/kWh) in the Table3 also derived from the feasibility study report is 11.1% higher than the tariff(0.225 CNY/kWh) used in the IRR calculation. Even if this 0.25 CNY/kWh had been used in the IRR calculation, the IRR would not have exceeded 10% of the benchmark.

There exist 5 projects in the Table 3 which used the tariff (0.2184 CNY/kWh) notified by the Price Bureau at the time of calculation, which is 2.9% lower than the tariff used in the Project and falls within the range of sensitivity analysis(-10%).

Later the tariff to be used in the Project(0.2374 CNY/kWh) was notified by the Price Bureau of Guizhou Province on August 12, 2008(/19/), and the PPA signed between the Client and the Grid company on December 10, 2008(/26/) adopted this notified tariff. This tariff notified is 5.5% higher than the one used in the IRR calculation, and falls within the range of sensitivity analysis(+10%)

So the validation team considers that the tariff used in the IRR calculation of the Project was suitable at the time of decision making of the investment for the Project, although this was not the notified tariff for the Project. And the validation team also considers that the range of $\pm 10\%$ used is reasonable.

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And as for the Annex 32, EB 53, it was confirmed that there had been the notifications of a little increase of the tariffs for the small scale hydropower plants in Guizhou Province issued three times (2005.4.28, 2007.10.30 and 2008.7.11) by the local Price Bureau (a) in order to encourage the small scale hydropower development smoothly, (b) to alleviate the high cost caused by levying the water resource fee and (c) to alleviate the problems of increasing costs (/19/-2, /19/-3, /19/-4). The notified tariff of the Project (0.2374 CNY/kWh) in 2008 was the one reflecting the policy above.

b-4) Electricity delivered to the grid

According to the PDR (/11/) and the explanation document provided by the Design Institute (/14/), the expected annual electricity generation (61,180 MWh) was derived based on the hydrological data for many years (1959-2001). And as this value is optimization through a lot of aspects and parameters, the actual electricity during the operation could hardly exceed this value, unless the regional meteorological conditions are significantly changed, although it is indicated in the sensitivity analysis that if the annual electricity generation increases by 12.1%, IRR will reach 10% of the benchmark.

And as described in 3.3.1.(1) a) above, the electricity supplied to the grid (58,005 MWh) was calculated to be a little bigger amount than the one calculated strictly in accordance with the national codes.

So the validation team considers that the electricity delivered to the grid was estimated to be a little bigger amount than the actual electricity delivered during the operation, resulting the conservative IRR calculation.

c) Investment decision and the start of the project:

The PDR (/11/) was finalized in November, 2004 and approved by Development and Reform Bureau of Liupanshui City on December 26, 2004 (/11/-2). The formal decision of investment with the application for CDM was made at the Board meeting on January 10, 2005 (/20/).

And the Construction Contract (/21/) was signed between Kaili Hongda Hydro & Substation Construction Co., Ltd. and the Client, and the project construction started on February 12, 2005. The Purchase contract of turbines and generators was signed on April 28, 2005 (/22/).

d) Prior and serious consideration of the CDM

[Awareness of the CDM]

In the Board meeting on January 10, 2005 above (/20/), they discussed the following points; (a) the project would not be financially viable under the present circumstances, (b) they got the information on CDM through the communication with the relevant government departments, (c) the financial indicators would be greatly enhanced if the new additional financial channel of CDM is considered. And they came to the conclusion that they should study the CDM and try to develop the Project in accordance with rules of the CDM, and they should make the contract with the professional CDM consultation company as soon as possible.

[Continuing and real actions]

The validation team confirmed by the evidences provided that the Client was also securing the CDM status for the Project by the following actions.

- ① The Client made the CDM Development Contract with Guizhou Zhongshui energy development Co., Ltd. at first on January 17, 2005 (/23/).
- ② And then the Client changed the consultant by making the second consultant contract with Guizhou Zhongshui Hengyuan project management and consulting Co., Ltd. on December 15, 2006 (/24/). The second consultant is the newly established company by Guizhou Zhongshui energy development Co., Ltd. with the purpose of developing CDM projects.
- ③ In parallel with the preparation of the PDD with the consultant, the Client also signed the Letter of Intent (Emission Reduction Purchase Agreement) with Eco Asset Incorporated on April 7, 2008 (/25/).

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- ④ The Client applied for the approval of the CDM to Chinese government in May, 2008, and obtained the approval in September, 2008(/5/).
- ⑤ The Validation Contract was signed between Guizhou Zhongshui Hengyuan project management and consulting Co., Ltd. by proxy of the Client and JACO CDM Co., Ltd. in February, 2009.

The validation team considers that the project activity complies with the requirements of the Guidelines(ver.03) of EB49 (Annex 22) based on the evidences indicated in c) and d) above. Particularly the validation team evaluated the authenticity of the evidences above regarding the continuing and real actions, and also confirmed that the gap between documented evidence was less than 2 years.

3.3.2. Findings

Clarification 3

- (1) Evidences for the major items (total investment, electricity tariff, operation cost) of IRR calculation are to be provided including PDR and other supporting evidences with the English translation of the key parts.
- (2) The rational of the following items is to be prepared;
 - ① Amount of investment by major expense items including the usage fee for the dam, installation cost for the transmission lines, etc.
 - ② O&M costs (ex. by explaining the reasonable bases one by one by showing the standards)
- (3) The tariffs of other similar projects in the same Province including the cases registered as CDM project are to be provided.

Response

- (1)(a) Total investment with the detailed items in the PDR was provided.(/11/)
- (b) The list of the projects registered in Guizhou Province with the investment amount and capacity was provided.
- (c) The OM cost with detailed items in the PDR was provided.(/11/)
- (d) Notification of the tariff from the Price Bureau(2008.8.12) indicating the tariff of 0.237yuan/kWh<incl.VAT> was provided.(/19/)
- IRR calculation used the tariff (0.225 yuan/kWh) in the PDR(2004.12) before the Notification above.
- (2)(a) It was made clear by the PDR that the investment for the dam construction was included in the total amount of investment.(/11/)
- (b) The supplementary PPA(/27/) indicates that the interface was agreed to be set at the main meter(M1,M2) installed in the project site and the maintenance, management and property right was divided at the measuring site.
- (c) And the construction contract of transmission lines between the grid company and the contractor(2007.8.6) was provided (/28/).
- (d) As for the OM cost, refer to (1) (c) above.
- (3)The list of the projects with the tariffs in the Guizhou Province was provided.

3.3.3. Conclusion

CL3: The relevant evidences requested were provided. No further actions are required.

The validation team confirmed that the baseline was properly calculated based on the data of the PDR and the emission factor issued by the Chinese DNA, and also confirmed that the Project was not economically feasible without CER by the result of IRR calculation which was considered to be rather conservative due to (a) the relatively low investment amount, (b) a little bigger amount of the estimated electricity delivered to the grid.

The Project complies with the requirements.

3.4. Monitoring Plan

3.4.1. Discussion

Validation Protocol

The project applies the methodology AMS-I.D., and as the Project adopted the ex-ante calculation of the emission factor of the grid, only the electricity supplied to the grid generated by the plant and the electricity used in the plant supplied by the grid are to be monitored. As the descriptions of the monitoring frequency for the electricity above, the validation team requested the modification of the original PDD (Ver.3.0).**(CL4)**

And also as there were unclear descriptions regarding the responsibilities of the operation and management structure in the original PDD (Ver.3.0), the validation team requested the clarification, and also requested the establishment of the overall CDM Manual including the items required by the Protocol D.5.(Appendix A)**(CL5)**

(1) Project emission

The original and revised PDDs (Ver.3.0, Ver.4.0) proactively calculated the power density (installed capacity/area of reservoir) based on the data($89.3\text{W/m}^2=15,000,000\text{W}/168,000\text{m}^2$) provided (/15/), and demonstrated that the project emission is zero as the power density is greater than 10W/m^2 .

And the final PDD(Ver.5.0, 2009.12.11)(/1/-3) which applies the revised AMS-I.D.(ver.15, effective on 2009.10.16) continues to stipulates this calculation result, and further stipulates clearly that the installed capacity and the area of reservoir will be monitored yearly(B.7.1, B.7.2, 3. (5)(6)), as the revised methodology requires that the project emissions have to be considered following the procedure described in the most recent version of ACM0002. And the final PDD(/1/-3) does not describe the monitoring of TEG_y based on the ACM0002 (ver.10) which does not require it when the power density is more than 10W/m^2 .

(2) Meters and interface with the grid

Figure3 of the original PDD(Ver.3.0) was drastically revised as Figure4 in the revised PDD(Ver.4.0) and in the final PDD(Ver.5.0) reflecting the latest situation. The main meters (M1, M2) for the electricity delivered to the grid and the electricity purchased from the grid have been installed at the Project site. The back-up meters of M1 and M2 will be installed before the Project registration. The Figure4 also illustrates another transmission line installed with M3 meter for the electricity purchased from the grid in emergency cases.

The Supplementary PPA(/27/) provided in response to CL3 clearly stipulates that (a) the electricity exported to the grid is determined by the meters installed at the Project gateway, (b) the maintenance, management and property right are divided at the measuring point in the Project site. (M1 and M2 meters belong to the grid company)

And the construction contract of transmission lines signed between the grid company and the contractor was provided as the evidence document (/28/).

The validation team also confirmed by the evidence document provided (/29/) that the two substations (Laohe and Xinyao substation) connected with the Project were belonging to the grid company (Power Supply Administration of Liupanshui) of China Southern Power Grid(CSPG).

(3) Calibration of the meters

In B.7.1.and B.7.2 of the original PDD (Ver.3.0), there was a description of the calibration frequency of “at least once per five year” with no description about the accuracy level of meters. So the validation team requested the clarification of the proper calibration frequency based on the regulation.**(CL5-4)** After some changes of descriptions in the PDDs as described in the response to CL5-4 below, the final PDD (Ver.5.0) properly stipulates the accuracy level of 0.5 for the M1 and M2 meters and accuracy level of 1 for M3 meter, and that “The meters will be calibrated periodically in accordance with the regulations (JJG596-1999, DL/T448-2000).” Further the Client has properly stipulated in the Monitoring Manual established (/30/) that “The main meters M1 and M2 are calibrated once every three months and M3 once per year.” after investigating the relevant codes.

(4) Monitoring Manual

The Monitoring Manual (2009.07.28)(/30/) was established in line with CDM monitoring methodology and the requests from the validation team based on the Protocol

Validation Protocol

D.5.(CL5~CL5-10) It was confirmed that the core elements required by the Protocol D.5. were stipulated in the Monitoring Manual, although the procedures should be elaborated in detail step by step from now on.

As for the training, the initial training for the staffs was conducted on April 01 and 06, 2008 and the record was provided with the plan and the examples of the test record(/31/).

The detailed procedure for the training was established later in the Monitoring Manual (4.Training).

3.4.2 Findings

Clarification 4

The descriptions about the frequency of monitoring and recording are not consistent in the original PDD (Ver.3.0);

- (1)EG_{PJ} to Grid and EG_{Grid} to PJ: "Measure every hour, record every today" and "monitored hourly and recorded monthly" in B7.1,
- (2)"measured continuous and recorded monthly" and "recorded monthly and monitored hourly" in B.7.2.

The description should be modified properly.

Response

The descriptions were properly revised in the revised PDD (Ver.4.0) and the final PDD (Ver.5.0) stipulating consistently to be "monitored hourly and recorded monthly in B.7.1 and B.7.2.

Clarification 5

- (1)The relationship between the responsibility of the general manager, plant manager and monitoring officer and the one of the persons described in the Figure 2 of the original PDD(Ver.3.0) is to be clarified.
- (2)The roles and responsibilities of CDM management other than monitoring, measurement and reporting are to be clarified by establishing the CDM Manual including the items required by the Protocol D.5. (Appendix A)

Response

- (1)In the revised PDD (Ver.4.0) and the final PDD (Ver.5.0), the structure of the CDM team was established by revising the original one in the PDD(Ver.3.0). And the roles and responsibilities of each function were defined.
- (2)The Monitoring Manual(Ver.01) was newly established in line with the requirement of CDM monitoring methodology and this Protocol D.5.. And the person in charge of each function was nominated.

The outline of the contents of the Monitoring Manual is as follows;

1. Purpose, 2. Project and developer,
3. Management
 - 3.1. Structure, 3.2. Responsibilities, 3.3. Internal review
4. Training
 - 4.1. Objectives. 4.2. Ways, 4.3. Schedule, 4.4. Assessment
5. Monitoring Plan
 - 5.1. Purpose, 5.2. Execution, 5.3. Calibration and maintenance
 - 5.4. Un expected accidents
6. Flow of settlement

Clarification 5-4

The accuracy class of each meter described in the original PDD(Ver.3.0) is to be clarified and the frequency of the calibration of each meter is to be described appropriately in the PDD and the CDM Manual in accordance with the administrative code.

Response

The precision level of the meters was described to be 0.5 for M1 and M2(main meters), and 1 for M3(imported electricity in emergency) in the revised PDD(Ver.4.0), and stipulates that "The meters will be calibrated periodically at least once per year."

Validation Protocol

However, in the final PDD(Ver.5.0), the stipulation was properly changed as follows; "The meters will be calibrated periodically in accordance with the regulations (JJG596-1999, DL/T448-2000)." And in the Monitoring Manual, the frequency of monitoring was properly described as follows; "The main meters M1 and M2 are calibrated once every three months and M3 once per year."

Clarification 5-2, 5-3, 5-5, 5-6, 5-7, 5-8, 5-9, 5-10

In accordance with the Protocol D.5., the establishment of the following procedure was requested in each CL;

CL5-2 (Training), CL5-3 (Handling of abnormality and emergency), CL5-5 (Maintenance of meters), CL5-6 (Monitoring, measurement and reporting), CL5-7 (Lag of the date of registration), CL5-8 (Internal audit), CL5-9 (Performance review), CL5-10 (Corrective action). Refer to Table 2 and Table 3 of Appendix A.

Response

The procedure requested in each CL above was included in the Monitoring Manual(/30/). Refer to "Summary of project owner response" in Table 3 of Appendix A.

3.4.3 Conclusion

CL4: The descriptions of the monitoring frequency for the electricity in the original PDD(/1/) were properly modified in the revised and the final PDDs(/1/-2,/1/-3)..

No further actions are required.

CL5: The roles and responsibilities of each function of CDM Team were clearly defined in the revised and the final PDDs(/1/-2,/1/-3). And also the Monitoring Manual was established taking into account the requirements in the Protocol D.5.

No further actions are required at the validation stage.

CL5-4: The accuracy class and the frequency of calibration of the meters(M1, M2, M3) were properly described in accordance with the regulations in the revised and the final PDDs(/1/-2,/1/-3) and the Monitoring Manual(/30/).

No further actions are required.

CL5-2, 5-3, 5-5, 5-6, 5-7, 5-8, 5-9, 5-10:

The core elements required by the Protocol D.5. were included in the Monitoring Manual (/30/), although the procedures should be further elaborated in detail from now on.

No further actions are required at the validation stage.

The validation team confirmed that the requirements of the methodology AMS-I.D. are complied after the resolution of the CLs above, and considers that the Client has the enough ability to implement the monitoring plan established.

3.5. Calculation of GHG Emissions

3.5.1. Discussion

The project emission as well as the leakage is considered to be zero based on the methodology AMS-I.D.(Ver.15). As for the project emission, the PDDs describe the power density ($89.3\text{W/m}^2 > 10\text{W/m}^2$) calculated based on the data as described in 3.4.1 (1) above (/15/) and demonstrated that the project emission is zero. As for the leakage, the project is a newly built plant and there are no energy generating equipments transferred from another activity. However, as there were no descriptions of this fact in the original PDD(/1/), validation team requested to clarify the bases why the leakage was considered to be zero.(**CL6**) The validation team has confirmed that the equipments are new ones based on the evidence provided(/22/) and the manufacturing dates(2007.1) identified during the site visit. So the validation team has confirmed that the annual average of estimated emission reduction is equal to the baseline emission of 50,534 tCO₂ confirmed in 3.3.1.(1) b) above, as the project emission and the leakage are zero.

Although the baseline and the emission reduction are correctly calculated in the PDDs, the validation team requested the clarification regarding the way of description of the calculation process of OM and BM in the Annex 3 of the original PDD(Ver.3.0).(**CL7**)

Validation Protocol

3.5.2. Findings

Clarification 6

- (1) The original PDD describes that “ According to the baseline methodology, there is no need for the proposed project to consider leakage.”, and there are no descriptions why it was considered to be zero based on AMS. I .D. The original PDD is to be modified appropriately.
- (2) The evidences are to be provided that the generating equipments installed are not transferred from another activity(ex. purchase contract, date of manufacturing, etc.).

Response

- (1) In the revised and final PDDs(Ver.4.0, Ver.05), it is properly described that all the equipments are directly purchased from the manufacturer and not involved in the equipment transfer from other activity, so the leakage is considered to be zero based on AMS. I .D.
- (2) The purchase contract of turbines and generators(2005.4.28) was provided (/22/). The date of manufacture was confirmed to be 2007.1 on the Name Plate during the site visit.

Clarification 7

- (1) Table 3.4 in Annex 3 should include the total amount of tCO₂ and MWh (CSPG+CCPG) of three years(2004,2005,2006) for the OM(1.0608) to be easily derived.
- (2) The formula to be used to derive EF_{Coal,Adv}, EF_{Oil,Adv}, and EF_{Gas,Adv} which is stipulated in the “Tool to calculate the emission factor for an electricity system” (Option B2) should be clearly described in the Step 5., Sub-step 2 of B.6.1., although it is described in Annex 3 Table 3.5.
- (3) Table 3.3 in Annex 3 should have the column in which the percentage of Coal, Oil and Gas to be used in the calculation of EF_{Thermal} is described. And also Table 3.5 should have the calculation result of each EF multiplied by each percentage above so that the EF_{Therma} (0.8862) may be easily traceable.

Response

- (1) In the revised and final PDDs(Ver.4.0, Ver.5.0), TableA4-3, TableA5-3 and TableA6-3 were newly established to indicate the yearly OM (2004, 2005, 2006). And also the Table A 7 was made to summarize the yearly tables above for calculating the OM(1.0608) instead of Table 3.4 in the original PDD(Ver.3.0).
- (2) The formula was properly moved from the Table 3.5 of the original PDD(Ver.3.0) to the Step 5., Sub-step 2 of B.6.1. of the revised and final PDDs(Ver.4.0, Ver.5.0).
- (3) In the revised PDD(Ver.4.0, Ver.5.0), the percentage of Coal, Oil and Gas was described in the new column in Table 6-1. And the percentage of each fuel was also described in the TableA8 to calculate the EF_{Thermal} (0.8862).

3.5.3. Conclusion

CL6: It was confirmed by the evidences that the leakage was zero.

No further actions are required.

CL7: The description of the process of calculating OM and BM in Annex 3 was improved to be traceable in the revised and final PDDs(Ver.4.0, Ver. 5.0).

No further actions are required.

As the project emission and the leakage are confirmed to be zero, the emission reduction is equal to the baseline emission, which is estimated to be 50,534 tCO₂ per year .

3.6. Environmental Impacts

3.6.1. Discussion

The Environmental Impact Assessment Table (EIA) was conducted by Guizhou Mechanical and Electrical Research and Design Academe in accordance with the Environmental Impact Assessment Law of People's Republic of China(/32/), and approved with no specific conditions by Liupanshui City Environmental Protection Agency on December 22, 2005(/33/).

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And also the Preliminary Design Report(PDR) including the environmental protection design was approved by Development and Reform Bureau of Liupanshui City on December 26, 2004(/12/).

The PDDs(/1/,/1/-2/,/1/-3) summarize the environmental impacts and countermeasures during the construction and operation, and conclude that the impacts are considered insignificant.

However, the description in the original PDD(/1/) and the revised PDD(/1/-2) just focused on the a) Impact on the air environment, b) Noise by the construction, and Solid wastes, so the validation team requested some other specific environmental impacts such as the ones to the fishery, agriculture, etc. to be clarified and described in the PDD.(CL8)

During the interviews with the local government(/52/,/53/) and the local residents(/57/,/58/), the validation team confirmed that the countermeasures described in the PDDs were actually taken, and could not find any comments on the adverse environmental effects.

3.6.2. Findings

Clarification 8

(1)The outlines of the impacts to the fishery and the agriculture caused by submerged land are to be described in the PDD.

(2)Host Party's requirements by laws and regulations for the EIA are to be clarified and described in the PDD.

Response

(1)In the final PDD(Ver.5.0), the following points were added according to the EIA report;

(a)There are rare aquatic organisms and the spawning grounds for economic large fish in the project area of the river, thus the impact to the fish is not significant.

(b)The submerged farmland (9,990m²) accounts for a small portion(0.029%) of the total with no resettled families, thus there are no much impacts on the agricultural economy of the reservoir area.

(2)The Environmental Impact Assessment Law of P.R.C was described as the legal basis of the EIA in the revised and final PDDs(Ver.4.0, Ver.5.0).

3.6.3. Conclusion

CL8 was resolved.

The validation team confirmed that the Client implemented appropriately the environmental impact assessment in accordance with the legal regulation and complied with the requirements by taking the proper countermeasures.

3.7. Comments by Local Stakeholders

3.7.1. Discussion

In order to know the public opinions and suggestions about the Project, the Client conducted the survey in December 2005, instructed by the contracted CDM consultant, and 24 questionnaires were sent to the local people and all of them were responded. Most of them indicated the positive comments that the Project would not have the adverse impacts to the environment but spur the local economic development.

In the interview with the local residents(/57/,/58/), they explained no environmental troubles, rather the benefits of the Project that (a)there became no shortage of electricity after the operation, (b)electrical tools for agriculture became to be used, (c)job opportunities in the site increased, and (d)2 bridges were newly constructed.

The validation team raised some questions(CL9, CL10) below, which were all resolved.

3.7.2. Findings

Clarification 9

(1)The procedures required by laws/regulations for consulting the stakeholder comments are to be clarified and described in the PDD, if any.

(2)The organization which conducted the survey with the project owner is to be described in the PDD, if any.

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(3)The samples of the questionnaires distributed and received are to be provided.

Response

(1)(2)The validation team was informed that there were no legal regulations to take the procedure of consulting the public comments in the case of this small scale project. However the Client carried out the survey, instructed by the contracted CDM consultant in order to know the public opinions and suggestions about the project. And this fact was described in the revised and the final PDD(/1/-2,/1/-3).

(3)A sample of the questionnaire returned was provided.

Clarification 10

The outlines of the measures to be taken based on the comments and suggestions received, even if they are few, are to be clarified and described concretely in the PDD, if any.

Response

The countermeasures to be taken to the noise mostly worried by the local residents were additionally described in a concrete manner in E.3.of the revised and final PDDs(Ver.4.0, Ver.5.0).

3.7.3. Conclusion

CL9 and **CL10** were resolved. No further actions are required.

The validation team concludes that the local stakeholders consultaion was adequately implemented.

4. COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

JACO CDM published the original PDD(Ver.3.0, June 06, 2009) (/1/) on its website on 2009-07-14 and invited comments until 2009-08-12 by Parties, stakeholders and non-governmental organizations. No comments were received.

5. VALIDATION OPINION

JACO CDM has performed a validation of the Changzhai 15MW Hydro Power Project in Guizhou Province, China. The validation was performed on the basis of UNFCCC criteria and host country criteria, as well as the criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and subsequent decisions by the CDM Executive Board.

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

JACO CDM has received a confirmation by the host Party that the project activity assists it in achieving sustainable development.

By displacing fossil fuel-based electricity with electricity generated from a renewable source, the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

Emission reduction has been conservatively estimated to be 50,534 tonnes of CO₂ per year.

An analysis of the investment barrier demonstrates that the proposed project activity 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. Given that the project is implemented as designed, the project is likely to achieve the estimated amount of emission reductions.

In summary, it is JACO CDM's opinion that the Project as described in the final PDD(Ver.05)/(1/-3) meets all relevant UNFCCC requirements for the CDM and host country criteria, and correctly applies the simplified baseline and monitoring methodology for category I.D. small-scale CDM project activities, AMS I.D. Version 15

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6. REFERENCES

Category 1 Documents:

Documents provided by the Client that relate directly to the GHG components of the project,

- /1/ PDD (Ver.3.0) June 06, 2009
- /1/-2 PDD (Ver.4.0) July 29, 2009
- /1/-3 PDD (Ver.5.0) December 29, 2009
- /2/ AMS-I.D. Grid connected renewable electricity generation (Version13, EB36)
- /2/-2 AMS-I.D. Grid connected renewable electricity generation (Version15, EB50)
- /3/ Tool to calculate the emission factor for an electricity system (version01.1, EB35)
- /3/-2 Tool to calculate the emission factor for an electricity system (version02, EB50)
- /4/ "Request for clarification on use of approved methodology AM0005 for several projects in China " (EB's guidance on DNV deviation request on 2005.10.7)
- /5/ Letter of Approval for the Project as a CDM project by NDRC of the People's Republic of China No.1390, September, 2008.
- /6/ Approval of a CDM project and authorization of voluntary participation under the Kyoto Protocol by the Government of Japan (January 21, 2008)

Category 2 Documents:

Background documents related to the design and/or methodologies employed in the design or other reference documents.

- /11/ Preliminary Design Report(PDR):by Water Conservancy Department, Shanxi Water Conservancy and Hydro Electric Survey and Design Institute (2004.11)
- /12/ Approval Letter for PDR by Development and Reform Bureau of Liupanshui City (2004.12.26)
- /13/ The explanation about select install capacity of Changzhai and Wutuhe 1st level project by Water Conservancy Department, Shanxi Water Conservancy and Hydro Electric Survey and Design Institute (2009.8.10)
- /14/ The Explanation about Design Parameters of Chaingzhai Hydro Power Project by Shangxi Province Investigation & Design Institute of Water Conservancy and Hydropower (2010.3.15)
- /15/ The Changzhai project measure report about surface areas of the reservoir at the full water level by Water Conservancy Department Shanxi Water Conservancy and Hydro Electric Survey and Design Institute (2004.4)
- /16/ The Spreadsheet of calculating the IRR
- /16/-2 The Spreadsheet of calculating the IRR (revised)
- /16/-3 Loan contract between Agricultural Bank of China, Renming Road Branch in Liupanshui and Liupanshui Tuoyuan Group Co., Ltd. (23 March, 2006)
- /17/ Economic Evaluation Code for Small Hydropower Projects(SL16-95)(1995.6.2)
- /18/ Hydroenergy Design Code For Small Hydropower Projects(SL76-94)(2007.9)
- /19/ Notification of the tariff of Changzhai Project by Price Bureau of Guizhou Province (2008.8.12)
- /19/-2 The notice about implementing coal-electricity price linkage and dredge prices contradiction in Guizhou Administration for Commodity Prices(2005.4.28)
- /19/-3 Guizhou Price Bureau's notification on increasing grid price of Guizhou power grid. (2007.10.30)
- /19/-4 Guizhou Price Bureau's notification on increasing grid price of Guizhou power grid(2008.7.11)
- /20/ Record of the Board Decision (2005.1.10)
- /21/ Construction Contract with Kaili Hongda Hydro & Substation Construction Co., Ltd. (2005.2.12)
- /22/ Purchase contract of Turbines and Generators with Fujian Nanping Hydropower Equipment Manufacturing Co., Ltd. (2005.4.28)

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- /23/ The first CDM Development Contract with Guizhou Zhongshui energy development Co.,Ltd. (2005.1.17)
- /24/ The second CDM Development Contract with Guizhou Zhongshui Hengyuan project management and consulting Co., Ltd.(2006.12.15)
- /25/ Letter of Intent with Eco Asset Incorporated (2008.4.7)
- /26/ Power Purchase Contract (2008.12.10)
- /27/ Supplementary power purchase agreement of Changzhai Power Plant (2008.12.12)
- /28/ The construction contract of transmission lines between the grid company and the contractor (2007.8.6)
- /29/ Relevant proof of substation, Changzhai Plant connected: Power Supply Administration of Liupanshui (2009.8.20)
- /30/ Monitoring Manual(Ver.01) (2009.7.28)
- /31/ Initial Training Records for the operation staffs(2008.4.1 &4.6)
Changzhai Hydropower Project Monitoring Manual(Ver.01) (2009.7.29)
- /32/ The environmental impact report: Guizhou Mechanical and Electrical Research and Design Academe (2005.8)
- /33/ Letter of approval for the environmental impact report of the Changzhai 15MW Hydro Power project in Liuzhi District: Liupanshui City Environmental Protection Agency (2005.12.22)

Persons interviewed:

Persons interviewed during the validation, or persons contributed with other information that are not included in the documents listed above.

- /41/ Wu Chao: Director, Planning and Developing Department, Liupanshui Touyuan Group Co., Ltd.
- /42/ Dong Jun Wei: Manager, Changzhai Plant, Liupanshui Touyuan Group Co., Ltd.
- /43/ Chu Yi : Vice-manager, Wutu Company , Liupanshui Touyuan Group Co., Ltd.
- /44/ Hu Jun: Chief of Control center, Liupanshui Touyuan Group Co., Ltd.
- /45/ Wang Jia Feng: Project Manager, Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd.
- /46/ Liu Bob: Technical Director, Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd.
- /47/ Tao Fei:Vice-manager, Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd.
- /48/ Xiang Zheng: Project Engineer, Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd.
- /49/ Liu Ge: Project Engineer, Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd.
- /50/ Li Xiao Hui: Project Engineer, Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd.
- /51/ Zhang Jiaji: Project Engineer, Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd.
- /52/ Yang Yong Zhe: Deputy chief, Agricultural Economics Department, Local Development and Reform Commission
- /53/ Yang Zhong: Deputy chief, Liupanshui City Environmental Protection Bureau
- /54/ Lin Lin: Supervisor, Marketing Dept, Liupanshui power supply bureau of CSPG (Grid company)
- /55/ Xiong Wei Huai: Staff, Xinyao Substation, Grid company
- /56/ Wang Cheng Xi: Staff, Laohe Substation, Grid company
- /57/ Ling Xiao Dong: Local resident
- /58/ Luo Ji Zheng: Local resident

APPENDIX A

CDM VALIDATION PROTOCOL

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

Requirement	Reference	Conclusion	Cross Reference / Comment
1. 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	Table 2, Section E.4.1 One project participant Eco Asset Incorporated is from Annex I country. The project assists the Annex I country in achieving compliance with part of their emission reduction commitment under Art. 3.
2. Assist non-Annex I Parties in achieving sustainable development and the project has obtained confirmation by the host country that the project assists in achieving sustainable development	Kyoto Protocol Art. 12.2, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	OK	Table 2, Section A.3.3 (1) The LoA from the Government of China confirms that the project contributes to the SD of China.
3. Assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC?	Kyoto Protocol Art. 12.2.	OK	Table 2, Section E.4.1 (2) The project assists China in contributing to the ultimate objective of the UNFCCC.
4. The project has the written approval of voluntary participation from the designated national authorities of each party involved	Kyoto Protocol Art. 12.5a, Simplified Modalities and Procedures for Small Scale CDM Project Activities §23a	OK	Table 2, Section E.1 to E.4 (3) The written approvals of voluntary participation from the governments of China and Japan have been provided. -LoA from Chinese government:2008.9. -LoA from Japanese government:2009.1.
5. The emission reductions should be real, measurable and give long-term benefits	Kyoto Protocol Art. 12.5b	OK	Table 2, Section B.2.1

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Requirement	Reference	Conclusion	Cross Reference / Comment
related to the mitigation of climate change			
6. Reduction in GHG emissions must be	Kyoto Protocol Art. 12.5.c,	CL3 OK	Table 2, Section B.2.1
additional to any that would occur in 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	Simplified Modalities and Procedures for Small Scale CDM Project Activities §26		CL3 OK Evidences of IRR calculations should be clarified. (ex. Spread sheet, relevant data of FS, etc.)
7. Potential public funding for the project from Parties in Annex I is not a diversion of official development assistance	Marrakech Accords (Decision 17/CP.7)	OK	There are no public fundings.
8. Parties participating in the CDM shall designate a national authority for the CDM	Marrakesh Accords (CDM modalities§ 29)	OK	
9. The host country and participating Annex I Party are a Party to the Kyoto Protocol	Marrakesh Accords (CDM modalities§ 30)	OK	China and Japan are a Party to the Kyoto Protocol.
10. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedure §31b	OK	AAUs have been calculated and recorded.
11. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and	CDM Modalities and Procedure §31b	OK	The participating Annex I Party has in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.

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Requirement	Reference	Conclusion	Cross Reference / Comment
7.			
12. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakesh 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	Table 2, Section A.1
13. The project design document shall conform with the Small Scale CDM Project Design Document format	Simplified Modalities and Procedures for Small Scale CDM Project Activities, Appendix A	OK	
14. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and uses the simplified baseline and monitoring methodology for that project category	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	OK	Table 2, Section A.1.3 and B.1
15. Comments by local stakeholders are invited, and a summary of these provided	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22b	OK	Table 2, Section G
16. 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	Table 2, Section F
17. Parties, stakeholders and UNFCCC accredited NGOs have been invited to comment on the validation requirements and comments have been made publicly available	Simplified Modalities and Procedures for Small Scale CDM Project Activities §23b,c,d	OK	Public comments were invited during July 14, 2009 – August 12, 2009. No comments were received

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Table 2 Requirements Checklist

Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
1 PROJECT DESCRIPTION The project design is assessed.					
A.1. Small scale project activity It is assess whether the project qualifies as small scale CDM project activity.					
A.1.1.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?	A.4.2 (/1/) (/1/-2 (/1/-3)	DR	► Total capacity of the project is 15MW (not exceed the limit of 15MW).	OK	OK
A.1.2.The small scale project activity is not a debundled component of a larger project activity?	A.4.5 (/1/) (/1/-2 (/1/-3)	DR	► Project participant has not applied to register any other small CDM project within 1km of the project boundary, etc. as described in A.4.5.	OK	OK
A.1.3.Does proposed project activity confirm to one of the project categories defined for small scale CDM project activities?	B.2 (/1/) (/1/-2 (/1/-3)	DR	► The project conforms to the category of Type (i) -D (Electricity generation for a system).	OK	OK
A.2. Project Design Validation of project design focuses on the choice of technology and the design documentation of the project.					

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

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
A.2.1. Are the project's spatial (geographical) boundaries clearly defined?	B.3. (/1/) (/1/-2) (/1/-3)	DR	<ul style="list-style-type: none"> ▶ The project's spatial boundary is properly described in the PDD. (project site and all power plants connected physically to the electricity system including the grid from which the electricity is imported) 	OK	OK
A.2.2. Are the project's system (components and facilities used to mitigate GHG's) boundaries clearly defined?	A.4.2 (/1/) (/1/-2) (/1/-3) /29/	DR	<ul style="list-style-type: none"> ▶ CL1 The project's system (components and facilities used to mitigate GHG) is to be clearly defined in the figure(s). And also the location of the substation with the distance between the project site and the substation is to be clearly defined in the map. ▶ The validation team confirmed the locations of the facilities described in the PDDs during the site visit. 	CL1	OK
A.2.3. Does the project design engineering reflect current good practices?	A.4.2 (/1/) (/1/-2) (/1/-3) /11/ /13/ /14/ /15/	DR	<ul style="list-style-type: none"> ▶ CL2 (1)The relationship between the capacity (5MW) of each generator and the rated head and the rated flow in Table 1 is to be clarified by the evidence documents. (2)It is also to be clarified by the evidence documents how the expected annual electricity generation (61,180MWh) and the electricity delivered to the grid(58,005MWh) was derived. (3)Back data of the surface area of the reservoir (168,000m²) are to be clarified. (Validation team needs the English translation of key parts of the evidence documents.) 	CL2	OK
A.2.4. Will the project result in technology transfer to the host country?	A.4.2 (/1/) (/1/-2) (/1/-3) /22/	DR	<ul style="list-style-type: none"> ▶ According to the PDD, the manufacturers of the turbine, generator and the transformer are the domestic ones. ▶ It was confirmed by the purchase contract and the site visit that facilities above were domestic. 	OK	OK

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
A.2.4. Does the project require extensive initial training and maintenance efforts in order to work as presumed during the project period? Does the project make provisions for meeting training and maintenance needs?	B.7.2 (/1/) (/1/-2) (/1/-3) /30/ /31/	DR	<ul style="list-style-type: none"> ▸ CL5-2 The detailed procedures for the training are to be clarified in the CDM manual. The records of the initial training for the personnel is to be clarified at the on-site assessment 	CL5-2	OK
A.3. Contribution to Sustainable Development The project's contribution to sustainable development is assessed					
A.3.1. Will the project create other environmental or social benefits than GHG emission reductions?	A.2 (/1/) (/1/-2) (/1/-3) /52/ /53/ /57/ /58/	DR I	<ul style="list-style-type: none"> ▸ The project can contribute the sustainable development of the local society through the following aspects: (a) to alleviate the local power shortage, as well as to improve the reliability of the grid, (b) to reduce environmental pollutants from coal-fired power generation, (c) to create job opportunities for local people (35 long term jobs, etc.) and increase local incomes as described in the PDD. ▸ The validation team confirmed that the project contributed to the local social benefit in the interview to the local stakeholders.. 	OK	OK
A.3.2. Will the project create any adverse environmental or social effects?	D.1. D.2. (/1/) (/1/-2) (/1/-3) /32/	DR	<ul style="list-style-type: none"> ▸ According to the PDD, the environmental impacts arising from the project are considered insignificant.. ▸ CL8 below. 	CL8	OK
A.3.3. Is the project in line with sustainable	A.2. (/1/)		<ul style="list-style-type: none"> ▸ LoA from Chinese Government confirms that the project contributes to the SD of China. 		

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

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
development policies of the host country?	(/1/-2) (/1/-3) /52/ /53/	DR I	► It was confirmed that the project is in line with the development policies during the interviews with the local governments.	OK	OK
A.3.4. Is the project in line with relevant legislation and plans in the host country?	Ditto	DR	Ditto	Ditto	OK
2 PROJECT BASELINE The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.					
B.1. Baseline Methodology It is assessed whether the project applies an appropriate baseline methodology.					
B.1.1. Is the selected baseline methodology in line with the baseline methodologies provided for the relevant project category?	B.1. B.2. (/1/ (/1/-2) (/1/-3) /2/ /2/-2	DR	► The methodology applied for the project is AMS. I .D.(version 13) for the PDD(/1/,/1/-2) and (version 15) for the PDD(/1/-3). ► The baseline emission is kWh delivered to the grid multiplied by the emission coefficient.	OK	OK
B.1.2. Is the baseline methodology applicable to the project being considered?	Ditto	DR	Ditto	OK	OK

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

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
B.2. Baseline Determination It is assessed whether the project activity itself is not a likely baseline scenario and whether the selected baseline represents a likely baseline scenario.					
B.2.1. Is it demonstrated that the project activity itself is not a likely baseline scenario due to the existence of one or more of the following barriers: investment barriers, technology barriers, barriers due to prevailing practice or other barriers?	B.5. (/1/) (/1/-2) (/1/-3) /11/ /16/ /16/-2 /17/ /19/ /28/	DR	<ul style="list-style-type: none"> ▶ The results of the project IRRs are demonstrated. They show that the IRRs are within the range of 7.26-9.88% in the final PDD(/1/-3), which are below the Chinese bench mark of 10%. And it was concluded that the project is unlikely to be implemented without the CER. ▶ CL3 <ul style="list-style-type: none"> (1) Evidences for the major items (total investment, electricity tariff, operation cost) of IRR calculation are to be provided including PDR and other supporting evidences with the English translation of the key parts. (2) The rational of the following items is to be prepared; <ul style="list-style-type: none"> ① Amount of investment by major expense items including the usage fee for the dam, installation cost for the transmission lines, etc. ② O&M costs (ex. by explaining the reasonable bases one by one by showing the standards) (3) The tariffs of other similar projects in the same Province including the cases registered as CDM project. 	CL3	OK
B.2.2. Is the application of the baseline methodology and the discussion and determination of the chosen	B.6 (/1/)	DR	<ul style="list-style-type: none"> ▶ The methodology applied for the project is AMS. I.D.(version 13) for the PDD(/1/,/1/-2) and 	OK	OK

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

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
baseline transparent and conservative?	(/1/-2) (/1/-3) /2/ /2/-2 /3/ /3/-2		(version 15) for the PDD(/1/-3). ► The baseline emission is kWh delivered to the grid multiplied by the emission coefficient calculated in accordance with the “Tool to calculate the emission factor for an electricity system [ver.01] ” for the PDDs(/1/,/1/-2) and (ver.02) for the PDD(/1/-3).		
B.2.3. Are relevant national and/or sectoral policies and circumstances taken into account?	B.5. (/1/ (/1/-2) (/1/-3)	DR	► The PDD uses the benchmark of 10% based on the relevant national policy for the investment of small hydropower industries.	OK	OK
B.2.4. Is the baseline selection compatible with the available data?	B.6.2 B.6.3 Annex.3 (/1/ (/1/-2) (/1/-3)	DR	► The data for the calculation of a combined margin consisting of operating margin and build margin are provided in Annex.3 based on the published data (China Energy Statistical Yearbook 2005-2007, 2006 IPCC Guidelines for National Greenhouse Gas Inventories).	OK	OK
B.2.5. Does the selected baseline represent the most likely scenario describing what would have occurred in absence of the project activity?	B.5 (/1/ (/1/-2) (/1/-3)	DR	► It is likely that the regional grid will remain dependent on fossil fuel energy for the first 7 years of the crediting period.	OK	OK
B.2.6. Is the starting date of the project prior to the global stakeholder comments? If yes, below questions B.2.7 to B.2.8 are applied.	C.1 (/1/ (/1/-2) (/1/-3)	DR	► The starting date of the project is 12/02/2005(date of construction contract) and prior to the global stakeholder comments(06/06/2009-14/07/2009).	OK	OK
B.2. 7. Is the timeline of the project clearly described in PDD and comply with the requirements of the “Guidance on the demonstration and assessment of prior consideration of the CDM” (EB41 Annex 46)?	B.5 (/1/ (/1/-2) (/1/-3) /20/~ /25/	DR	► The timeline regarding the consideration of CDM was demonstrated in the Table 5. ► The evidence of each milestone described in the Table 5 were provided.	OK	OK
B.2.8. Are there sufficient evidences which demonstrate that the incentive of the CDM was	Ditto	DR	Ditto	Ditto	OK

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

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
seriously considered in the decision to proceed with the project?					

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3 DURATION OF THE PROJECT / CREDITING PERIOD It is assessed whether the temporary boundaries of the project are clearly defined.					
C.1.1. Are the project's starting date and operational lifetime clearly defined?	C.1.1 C.1.2 (/1/) (/1/-2) (/1/-3)	DR	<ul style="list-style-type: none"> ▶ Starting date: 12/02/2005 (date of construction contract) ▶ Operational lifetime: 27 years 	OK	OK
C.1.2. Is the crediting period clearly defined (seven years with two possible renewals or 10 years with no renewal)?	C.2.1.1 & 2 (/1/) (/1/-2) (/1/-3)	DR	7 years with 2 renewals (starting date: 01/12/2009 or registration date whichever is later).	OK	OK
4 MONITORING PLAN The monitoring plan review aims to establish whether all relevant project aspects deemed necessary to monitor and report reliable emission reductions are properly addressed.					
D.1.1. Is the selected monitoring methodology in line with the monitoring methodologies provided for the relevant project category?	B.7.1 B.7.2 (/1/) (/1/-2) (/1/-3) /2/ /2/-2	DR	▶ The monitoring methodology is selected by AMS. I .D.(version 13) for the PDDs(/1/,/1/-2) and (version 15) for the PDD(/1/-3).	OK	OK
D.1.2. Is the monitoring methodology applicable to the project being considered?	Ditto	DR	▶ As the project adopts the ex-ante calculation of emission factor of the grid, the electricity	OK	OK

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	/15/		<p>supplied to the grid and the electricity supplied to the plant by the grid will be monitored.</p> <p>► In addition to above, the installed capacity of the plant as well as the area of the reservoir will be monitored yearly to calculate the power density.</p>		
D.1.3. Is the application of the monitoring methodology transparent?	<p>Ditto</p> <p>/27/</p> <p>/28/</p> <p>/29/</p>	DR	<p>► Figure3 of the original PDD(Ver.3.0) was drastically revised as Figure4 in the revised PDD(Ver.4.0) reflecting the latest situation. The main meters (M1, M2) for the electricity delivered to the grid and the electricity purchased from the grid have been installed at the Project site. The back-up meters of M1 and M2 will be installed before the Project registration. The Figure4 also illustrates another transmission line installed with M3 meter for the electricity purchased from the grid in emergency cases.</p>	OK	OK
D.1.4. Will the monitoring methodology give opportunity for real measurements of achieved emission reductions?	Ditto	DR	<p>► The formula (B.1) for the calculation of emission reduction is established with the baseline emission deducted by the project emission. The leakage is considered to be zero as described in D.3.1 below.</p>	OK	OK
<p>D.2. Monitoring of Project Emissions</p> <p>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</p>					
D.2.1. Are the choices of project emission indicators reasonable	<p>B.6.1</p> <p>B.7.1</p> <p>(/1/)</p> <p>(/1/-2)</p> <p>(/1/-3)</p>	DR	<p>► As the project emission indicators, the power density(PD) with the installed capacity and the area of the reservoir are selected.</p> <p>► The Measurement Report of the surface area by the Design Institute (2004.4) has been provided (/15/), indicating that the surface area of the</p>	OK	OK

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	/15/		reservoir at the full water level is 168,000 m². and demonstrated that the project emission is zero as the power density is greater than 10W/m².		

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D.2.2. Will it be possible to monitor / measure the specified project emission indicators?	Ditto	DR	<ul style="list-style-type: none"> ► The installed capacity and the area of the reservoir are used to calculate the power density and will be monitored and recorded on yearly basis. ► As the PD calculated by the present data is 89.3W/m² and is above 10 W/m², the project emission is considered to be zero in accordance to ACM0002. 	Ditto	OK
D.2.3. Do the measuring technique and frequency comply with good monitoring practices?	Ditto	DR	Ditto	Ditto	OK
D.2.4. Are the provisions made for archiving project emission data sufficient to enable later verification?	Ditto	DR	Ditto	Ditto	OK
D.3 Monitoring of Leakage It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.					
D.3.1. If applicable, are the choices of leakage indicators reasonable?	B.6.1 B.6.3 (/1/) (/1/-2) (/1/-3) /22/	DR	<ul style="list-style-type: none"> ► CL6 (1)The PDD describes that “ According to the baseline methodology, there is no need for the proposed project to consider leakage.”, and there are no descriptions why it was considered to be zero based on AMS. I .D. The PDD is to be modified appropriately. (2)The evidences are to be provided that the generating equipments installed are not transferred from another activity(ex. purchase contract, date of manufacturing, etc.). 	CL6	OK

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D.3.2. If applicable, will it be possible to monitor / measure the specified leakage indicators?	Ditto	DR	Ditto	Ditto	OK
D.3.3. If applicable, do the measuring technique and frequency comply with good monitoring practices?	Ditto	DR	Ditto	Ditto	OK
D.3.4. If applicable, are the provisions made for archiving leakage data sufficient to enable later verification?	Ditto	DR	Ditto	Ditto	OK
D.4. Monitoring of Baseline Emissions It is established whether the monitoring plan provides for reliable and complete project emission data over time.					
D.4.1. Is the choice of baseline indicators, in particular for baseline emissions, reasonable?	B.6.1 (/1/) (/1/-2) (/1/-3) /2/ /2/-2	DR	► The baseline emission is the kWh supplied to the grid (net grid-connected electricity) multiplied by an emission coefficient based on the methodology AMS. I .D. (Version 13, 15).	OK	OK
D.4.2. Will it be possible to monitor / measure the specified baseline emission indicators?	B.7.1 B.7.2 Annex. 3 (/1/) (/1/-2) (/1/-3)	DR	► The net grid connected electricity is calculated based on the monitoring procedure as described in the monitoring plan. And the emission factor of CSPG is available in the published data.	OK	OK
D.4.3. Do the measuring technique and frequency comply with good monitoring practices?	Ditto /3/	DR	► Both electricity supplied to the grid and imported from the grid are measured hourly by the meters calibrated periodically in accordance with the regulations.	CL4	OK

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
	/3/-2		<ul style="list-style-type: none"> ► CL4 The descriptions about the frequency of monitoring and recording are not consistent in the PDD; (1)EG_{PJ to Grid} and EG_{Grid to PJ}: “Measure every hour, record every today” and “monitored hourly and recorded monthly” in B7.1, (2)”measured continuous and recorded monthly” and “recorded monthly and monitored hourly” in B.7.2. The description should be modified properly. ► The emission factor has been calculated ex-ante in accordance with the approved procedures. (Tool to calculate the emission factor for an electricity system<version01, EB 35 for the PDDs(/1/,/1/-2)>, <version02, EB 50> for the PDD(/1/-3)) 		
D.4.4. Are the provisions made for archiving baseline emission data sufficient to enable later verification?	Ditto	DR	<ul style="list-style-type: none"> ► The monitored data of the electricity above will be archived for two years following the end of crediting period by means of electronic and paper backup in according to the description of B.7.1 and B.7.2. 	OK	OK
D.5. Project Management Planning It is checked that project implementation is properly prepared for and that critical arrangements are addressed.					
D.5.1. Is the authority and responsibility of project management clearly described?	B.7.2 (/1/) (/1/-2) (/1/-3)	DR	<ul style="list-style-type: none"> ► The original and the revised PDDs(/1/./1/-2) stipulate the outline of the monitoring plan consisting of; 1.Operational and Management Structure For Monitoring 		

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	/30/		2. Monitoring Plan (1) Responsibility (2) Installation of meters, (3) Reporting, (4) Calibration (5) Data management system ▶ CL5 (1) The relationship between the responsibility of the general manager, plant manager and monitoring officer and the one of the persons described in the Figure 2 is to be clarified. (2) The roles and responsibilities of CDM management other than monitoring, measurement and reporting are to be clarified by establishing the CDM Manual including the items required by this Protocol D.5.	CL5	OK
D.5.2. Is the authority and responsibility for registration, monitoring, measurement and reporting clearly described?	Ditto	DR	Ditto	Ditto	OK
D.5.3. Are procedures identified for training of monitoring personnel?	Ditto /31/	DR	▶ CL5-2 The detailed procedures for the training are to be clarified in the CDM Manual. The records of the initial training for the personnel is to be clarified at the on-site assessment.	CL5-2	OK
D.5.4. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	Ditto	DR	▶ The abnormality handling of the metering systems (main and backup) is stipulated in the PDD (B.7.2. 3. Reporting). ▶ CL5-3 The detailed procedures for handling the abnormality of the meters including the concrete value of "allowable error" are to be established. And also the procedures for the emergency cases other than the abnormality of the meters	CL5-3	OK

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
			are to be established in the CDM Manual above.		
D.5.5. Are procedures identified for calibration of monitoring equipment?	Ditto	DR	<ul style="list-style-type: none"> ▶ It is stipulated in the original PDD(/1/) that “the meters will be calibrated at least once per five years”, and in the revised PDD(/1/-2) “at least once per year”. ▶ CL5-4 The accuracy class of each meter described in the PDDs is to be clarified and the frequency of the calibration of each meter is to be described appropriately in the PDD and the CDM Manual in accordance with the administrative code. 	CL5-4	OK
D.5.6. Are procedures identified for maintenance of monitoring equipment and installations?	Ditto	DR	<ul style="list-style-type: none"> ▶ CL5-5 The detailed procedure for the maintenance of the meters is to be clarified in the CDM Manual. 	CL5-5	OK
D.5.7. Are procedures identified for monitoring, measurements and reporting?	Ditto	DR	<ul style="list-style-type: none"> ▶ The PDD(B.7.2.,3.Reporting) stipulates the procedure. ▶ CL5-6 The detailed procedure of monitoring and measurements and reporting for all the meters is to be stipulated in the CDM Manual. 	CL5-6	OK
D.5.8. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	Ditto	DR	<ul style="list-style-type: none"> ▶ The PDD stipulates that the monitoring data(measured hourly, recorded monthly) will be archived. ▶ CL5-7 The PDD stipulates that the net on-grid electricity is monitored hourly and recorded monthly. The procedure for dealing with the case in which the starting date of the crediting period (the date of registration) does not fall on the first day of the month is to be clarified in the PPA and the CDM Manual. 	CL5-7	
D.5.9. Are procedures identified for dealing with					

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
possible monitoring data adjustments and uncertainties?	Ditto	DR	► Same as D.5.4. above.(CL5-3)	CL5-3	
D.5.10. Are procedures identified for internal audits of GHG project compliance with operational requirements as applicable?	Ditto	DR	► CL5-8 The detailed procedure for internal audit is to be clarified in the CDM Manual.	CL5-8	
D.5.11. Are procedures identified for project performance reviews?	Ditto	DR	► CL5-9 The detailed procedures for the project performance review are to be clarified in the CDM Manual.. The CDM Manual should include the periodic management review for the overall CDM activities by the top management.	CL5-9	
D.5.12.Are procedures identified for corrective actions?	Ditto	DR	► CL5-10 The detailed procedure for corrective actions is to be clarified in the CDM Manual. The CDM Manual should include this kind of procedure to avoid the recurrence by investigating the causes of errors, etc.	CL5-10	
E. Calculation of GHG emission It is assessed whether all material GHG emission sources are addressed and how sensitivities and data uncertainties have been addressed to arrive at conservative estimates of projected emission reductions.					
E.1. Project GHG Emissions The validation of predicted project GHG emissions focuses on transparency and completeness of calculations.					

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
E.1.1. Are all aspects related to direct and indirect project emissions captured in the project design?	B.6.1 B.6.3 B.7.1 (/1/) (/1/-2) (/1/-3)	DR	<ul style="list-style-type: none"> ▶ The power density is calculated based on the data(Cap_{PJ}, A_{PJ}) monitored every year to confirm the project emissions from the reservoir in accordance with ACM0002. ▶ The PDD indicated that the power density($89.3W/m^2$) was presently higher than the threshold value($10 W/m^2$). CH4 emission from the reservoir can be neglected. 	OK	OK
E.1.2. Have all relevant greenhouse gases and sources been evaluated?	Ditto	DR	Ditto	OK	OK
E.1.3. Do the methodologies for calculating project emissions comply with existing good practice?	Ditto	DR	Ditto	OK	OK
E.1.4. Are the calculations documented in a complete and transparent manner?	Ditto	DR	Ditto	OK	OK
E.1.5. Have conservative assumptions been used?	Ditto	DR	Ditto	OK	OK
E.1.6. Are uncertainties in the project emissions estimates properly addressed?	Ditto	DR	Ditto	OK	OK
E.2. Leakage It is assessed whether there leakage effects, i.e. change of emissions which occurs outside the project boundary and which are measurable and attributable to the project, have been properly assessed.					
E.2.1. Are leakage calculation required for the selected	B.6.1				

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project category and if yes, are the relevant leakage effects assessed?	B.6.3 (/1/) (/1/-2) (/1/-3) /22/	DR	► Refer to D.3.1.(CL6)	CL6	OK
E.2.2. Are potential leakage effects properly accounted for in the calculations (if applicable)?	Ditto	DR	Ditto	Ditto	OK
E.2.3. Do the methodologies for calculating leakage comply with existing good practice (if applicable)?	Ditto	DR	Ditto	Ditto	OK
E.2.4. Are the calculations documented in a complete and transparent manner and (if applicable)?	Ditto	DR	Ditto	Ditto	OK
E.2.5. Have conservative assumptions been used (if applicable)?	Ditto	DR	Ditto	Ditto	OK
E.2.6. Are uncertainties in the leakage estimates properly addressed (if applicable)?	Ditto	DR	Ditto	Ditto	OK
E.3. Baseline GHG Emissions The validation of predicted baseline GHG emissions focuses on transparency and completeness of calculations.					
E.3.1. Are the baseline emission boundaries clearly defined and do they sufficiently cover sources for baseline emissions?	B.3 B.6.1 Annex. 3 (/1/) (/1/-2) (/1/-3)	DR	► The baseline emission boundaries are defined as fuel-fired power plants connected into the China Southern Power Grid(CSPG) as well as Central China Power Grid (CCPG) from which CSPG imports the electricity. ► Refer to CL1.	CL1	OK
E.3.2. Are all aspects related to direct and indirect					

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
baseline emissions captured in the project design?	Ditto	DR	Ditto	Ditto	OK
E.3.3. Have all relevant greenhouse gases and sources been evaluated?	Ditto	DR	Ditto	Ditto	OK
E.3.4. Do the methodologies for calculating baseline emissions comply with existing good practice?	Ditto	DR	<ul style="list-style-type: none"> ▶ The baseline emission factor is calculated in accordance with the “Tool to calculate the emission factor for an electricity system(ersion01, EB35) for the PDDs(/1/,/1/-2)>, and (version02, EB 50) for the PDD(/1/-3)). 	OK	OK
E.3.5. Are the calculations documented in a complete and transparent manner?	Ditto	DR	<ul style="list-style-type: none"> ▶ Calculation process and data sources are clearly indicated in the PDDs B.6 and Annex3. ▶ CL7 (1)Table 3.4 in Annex 3 should include the total amount of tCO₂ and MWh (CSPG + CCPG) of three years(2004,2005.2006) for the OM(1.0608) to be easily derived. (2)The formula to be used to derive EF_{Coal,Adv}, EF_{Oil,Adv}, and EF_{Gas,Adv} which is stipulated in the “Tool to calculate the emission factor for an electricity system” (Option B2) should be clearly described in the Step 5., Sub-step 2 of B.6.1., although it is described in Annex 3 Table 3.5. (3)Table 3.3 in Annex 3 should have the column in which the percentage of Coal, Oil and Gas to be used in the calculation of EF_{Thermal} is described. And also Table 3.5 should have the calculation result of each EF multiplied by each percentage above so that the EF_{Therma} (0.8862) may be easily traceable. 	CL7	OK

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E.3.6. Have conservative assumptions been used?	Ditto	DR	► Same as E.3.4.above.	OK	OK
E.3.7. Are uncertainties in the baseline emissions estimates properly addressed?	Ditto	DR	Ditto	OK	OK
E.4. Emission Reductions Validation of baseline GHG emissions will focus on methodology transparency and completeness in emission estimations.					
E.4.1. Will the project result in fewer GHG emissions than the baseline case?	B.6.3 B.6.4 (/1/) (/1/-2) (/1/-3)	DR	► The PDD concludes that the emission reduction is equal to the baseline emission as the project emission and the leakage are considered to be zero. ► Refer to E.2.1 above.	OK	OK
F. Environmental Impacts It is assessed whether environmental impacts of the project are sufficiently addressed.					
F.1.1. Does host country legislation require an analysis of the environmental impacts of the project activity?	D.1 (/1/) (/1/-2) (/1/-3) /32/ /33/ /52/ /53/	DR I	► The Environmental Impact Assessment Table (EIA) was conducted by Guizhou Mechanical and Electrical Research and Design Academe in accordance with the Environmental Impact Assessment Law of People's Republic of China ► The EIA Report was approved by the Environmental Protection Bureau of Guizhou Province Liupanshui City on 22 nd December, 2005.	CL8	OK

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Checklist Question	Ref.	Mo V*	Comments	Draft Concl.	Final Concl.
			CL8 (1)The outlines of the impacts to the fishery and the agriculture caused by submerged land are to be described in the PDD. (2) Host Party's requirements by laws and regulations for the EIA are to be clarified and described in the PDD		
F.1.2. Does the project comply with environmental legislation in the host country?	Ditto	DR I	Ditto ► The validation team confirmed the points above in the interview with the staffs of the local governments. .	OK	OK
F.1.3. Will the project create any adverse environmental effects?	D.1. D.2. (/1/) (/1/-2) (/1/-3) /52/ /53/ /57/ /58/	DR I	► The PDDs summarizes the environmental impacts and countermeasures during construction and operation and concludes that the project has no significant impacts on the local people and environment. ► The validation team confirmed the points above in the interviews with the local governments and residents.	OK	OK
F.1.4. Have environmental impacts been identified and addressed in the PDD?	Ditto	DR I	► CL8	CL8	OK
G. Comments by Local Stakeholder Validation of the local stakeholder consultation process.					
G.1.1. Have relevant stakeholders been consulted?	E.1 (/1/) (/1/-2)	DR	► The Client conducted the survey to know the public opinions and suggestions for the project in December 2005.	CL9	OK

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	(/1/-3)	I	► CL9 (1)The procedures required by laws/regulations for consulting the stakeholder comments are to be clarified and described in the PDD, if any. (2)The organization which conducted the survey with the project owner is to be described in the PDD, if any. (3)The samples of the questionnaires distributed and received are to be provided.		
G.1.2. Have appropriate media been used to invite comments by local stakeholders?	Ditto	DR	► The questionnaires were sent to 24 local people and the response rate was 100%.	OK	OK
G.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?	Ditto	DR	► CL9 above.	CL9	OK
G.1.4. Is a summary of the comments received provided?	E.2. (/1/) (/1/-2) (/1/-3)	DR	► The PDD describes the summary of the response in the form of “yes/no/don’t care, know/don’t know, agree/object” and each number of response. ► CL10 The outlines of the measures to be taken based on the comments and suggestions received, even if they are few, are to be clarified and described concretely in the PDD, if any.	CL10	
G.1.5. Has due account been taken of any comments received?	E.3. (/1/) (/1/-2) (/1/-3)	DR	Ditto	Ditto	OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL1 The project's system (components and facilities used to mitigate GHG) is to be clearly defined in the figure(s). And also the location of the substation with the distance between the project site and the substation is to be clearly defined in the map.	A.2.2	The project's system was properly demonstrated in the Figure 2 and Figure 4 of the revised PDD(Ver.5.0). And the location of the two substations and the distances from the power station (10km to Laohe Sub., 15km to Xinyao Sub.) were indicated by the Map provided. (/29/)	OK The project's system (components and facilities used to mitigate GHG) was clearly defined No further actions are required.
CL2 (1)The relationship between the capacity (5MW) of each generator and the rated head and the rated flow in Table 1 is to be clarified by the evidence documents. (2)It is also to be clarified by the evidence documents how the expected annual electricity generation (61,180MWh) and the electricity delivered to the grid (58,005MWh) was derived. (3)Back data of the surface area of the reservoir (168,000m ²) are to be clarified.	A.2.3	(1)The documents explaining the installed capacity by the Design Institute (2009.8.10) (/13/) was provided. (2)-1 The values of expected annual electricity generation (61,180MWh) and the on-grid electricity (58,005MWh) as well as the coefficient of effective electricity(0.95) and the rate of power station supply(0.2%) by which 58,005MWh were derived from 61,180MWh were indicated in the 16.2.(Economic evaluation) of PDR provided(/11/). (2)-2 The explanation document by the Design Institute(/14/) was provided, explaining the following calculation; (a)Flow rate at the dam site: $Q_{dam} = F_{dam} / F_{station} \times H_{dam} / H_{total} \times Q_{station}$ where, Q_{dam} :Flow rate of dam site section(m ³ /s) $Q_{station}$: Flow rate of station (m ³ /s) F_{dam} : Drainage area of dam site section (km ²) $F_{station}$: Drainage area of station (km ²) H_{dam} : Multi-year average rainfall above	OK It was confirmed that the installed capacity, expected electricity generation and the annual operation hours was properly derived by the evidences provided. No further actions are required.

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>the dam site section (mm)</p> <p>H_{total}: Multi-year average rainfall of the total drainage area (mm)</p> <p>$Q_{\text{dam}} = 277/425 \times 1443.8/1307.5 \times 6.2$ $= 4.46 \text{ m}^3/\text{s}$</p> <p>(b) Installed capacity: $N_y = AQH$ where, N_y: Installed capacity (KW) A: Coefficient (8.5 for this project) Q: Design flow rate ($9.03 \text{ m}^3/\text{s}$) H: Calculated waterhead(194m) $N_y = 8.5 \times 9.03 \times 194$ $= 14,890.47 \text{ KW}(15 \text{ MW})$</p> <p>(c) Annual operation hours: $Qh = Q_{\text{dam}} 365 \times 24 \times \eta$ where, Q: Design flow rate ($9.03 \text{ m}^3/\text{s}$) Q_{dam}: Flow rate of dam site section ($4.46 \text{ m}^3/\text{s}$) h: Annual operation hours (hour) η: Coefficient of hydro energy (0.9-0.95) $h = Q_{\text{dam}} 365 \times 24 \times \eta / Q = 4.46 \times 365 \times 24 \times (0.9-0.95) / 9.03 = 3,893 \text{ h}-4,110 \text{ h}$</p> <p>(d) House consumption rate (2)-3 The Coefficient of effective electricity generation (A: 95%) and the House consumption rate (C: 0.2%) in the following formula were indicated in Chapter 16.2.(Economic evaluation) of PDR provided(/11/). On-grid electricity 58,005MWh = [annual power generation] 61,180MWh</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>× [coefficient of effective electricity generation]A% × (1 – [Power loss rate] B%) × (1 – [House consumption rate] C%)</p> <p>(3)The report about surface areas of the reservoir at the full water level by the Design Institute (2004.4)/(15/) was provided.</p>	
<p>CL3</p> <p>(1) Evidences for the major items (total investment, electricity tariff, operation cost) of IRR calculation are to be provided including PDR and other supporting evidences with the English translation of the key parts.</p> <p>(2) The rational of the following items is to be prepared;</p> <p>① Amount of investment by major expense items including the usage fee for the dam, installation cost for the transmission lines, etc.</p> <p>②O&M costs (ex. by explaining the reasonable bases one by one by showing the standards)</p> <p>(3) The tariffs of other similar projects in the same Province including the cases registered as CDM project.</p>	<p>B.2.1</p>	<p>(1)</p> <p>(a) Total investment with the detailed items in the PDR was provided.(/11/)</p> <p>(b) The list of the projects registered in Guizhou Province with the investment amount and capacity was provided.</p> <p>(c) The OM cost with detailed items in the PDR was provided.(/11/)</p> <p>(d) Notification of the tariff from the Price Bureau(2008.8.12) indicating the tariff of 0.237yuan/kWh<incl.VAT> was provided.(/19/)</p> <p>IRR calculation used the tariff (0.225 yuan/kWh) in the PDR(2004.12) before the Notification above.</p> <p>(2)</p> <p>(a) It was made clear by the PDR that the investment for the dam construction was included in the total amount of investment.(/11/)</p> <p>(b) The supplementary PPA(/27/) indicates that the interface was agreed to be set at the main meter(M1,M2) installed in the project site and the maintenance, management and property right was divided at the measuring site.</p> <p>(c) And the construction contract of</p>	<p>OK</p> <p>The relevant evidences requested were provided.</p> <p>No further actions are required.</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>transmission lines between the grid company and the contractor(2007.8.6) was provided (/28/).</p> <p>(d) As for the OM cost, refer to (1) (c) above.</p> <p>(3)The list of the projects with the tariffs in the Guizhou Province was provided.</p>	
<p>CL4 The descriptions about the frequency of monitoring and recording are not consistent in the original PDD(Ver.3.0);; (1)EG_{PJ to Grid} and EG_{Grid to PJ}: “Measure every hour, record every today” and “monitored hourly and recorded monthly” in B7.1, (2)”measured continuous and recorded monthly” and “recorded monthly and monitored hourly” in B.7.2. The description should be modified properly.</p>	D.4.3.	<p>The descriptions were properly revised in the revised PDD (Ver.4.0) and the final PDD (Ver.5.0) stipulating consistently to be “monitored hourly and recorded monthly in B.7.1 and B.7.2.</p>	<p>OK The descriptions about the frequency of monitoring were properly modified. No further actions are required</p>
<p>CL5 (1)The relationship between the responsibility of the general manager, plant manager and monitoring officer and the one of the persons described in the Figure 2 is to be clarified. (2)The roles and responsibilities of CDM management other than monitoring, measurement and reporting are to be clarified by establishing the CDM Manual including the items required by this Protocol D.5.</p>		<p>(1)In the revised PDD (Ver.4.0) and the final PDD (Ver.5.0), the structure of the CDM team was established by revising the original one in the PDD(Ver.3.0). And the roles and responsibilities of each function were defined. (2)The Monitoring Manual(Ver.01) was newly established in line with the requirements of CDM monitoring methodology and this protocol D.5. And the person in charge of each function was nominated. The outline of the contents of the Monitoring Manual is as follows; 1. Purpose, 2. Project and developer, 3. Management</p>	<p>OK at the validation stage. The responsibilities of each function were clearly defined. And the Monitoring Manual was newly established including the requirements of the Protocol D.5. The procedures in the Monitoring Manual should be elaborated step by step from now on.</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
		3.1. Structure, 3.2. Responsibilities, 3.3. Internal review 4. Training 4.1. Objectives. 4.2. Ways, 4.3. Schedule, 4.4. Assessment 5. Monitoring Plan 5.1. Purpose, 5.2. Execution, 5.3. Calibration and maintenance 5.4. Un expected accidents 6. Flow of settlement	
CL5-2 The detailed procedures for the training are to be clarified in the CDM Manual. The records of the initial training for the personnel is to be clarified at the on-site assessment	D.5.3	The procedure of the training for CDM was established in the Monitoring Manual(Ver.01).<4. Training> And the initial training record (2008.4.1, 4.6) was provided(/31/).	OK
CL5-3 The detailed procedures for handling the abnormality of the meters including the concrete value of “allowable error” are to be established. And also the procedures for the emergency cases other than the abnormality of the meters are to be established in the CDM Manual above.	D.5.4.	(a)The procedure for handling the abnormality of the meters is stipulated in the Monitoring Manual(Ver.01) <5.4.1 The gauge gets into trouble>. And the value of allowable error is also set as $\pm 0.5\%$. (b)Procedures for the emergency cases in the flood and the fire in Chinese version as the documents of the management system were provided. And the Monitoring Manual(Ver.01) refers to the responsibilities defined in these procedures above.	OK
CL5-4 The accuracy class of each meter described in the original PDD(Ver.3.0) is to be clarified and the frequency of the calibration of each meter is to be described appropriately in the	D.5.5.	The precision level of the meters was described to be 0.5 for MI and M2(main meters), and 1 for M3(imported electricity in emergency) in the revised PDD(Ver.4.0). , and stipulates that “The meters will be	OK

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
PDDs and the CDM Manual in accordance with the administrative code.		calibrated periodically at least once per year.” However, in the final PDD(Ver.5.0), the stipulation was properly changed as follows; “The meters will be calibrated periodically in accordance with the regulations (JJG596-1999, DL/T448-2000).” And in the Monitoring Manual, the frequency of monitoring was properly described as follows; “The main meters M1 and M2 are calibrated once every three months and M3 once per year.”	
CL5-5 The detailed procedure for the maintenance of the meters is to be clarified in the CDM Manual.	D.5.6	The procedure for the maintenance of the meters is stipulated in the Monitoring Manual.(5.3 Calibration and maintenance)	OK
CL5-6 The detailed procedure of monitoring and measurements and reporting for all the meters is to be stipulated in the CDM Manual.	D.5.7.	The procedure for monitoring and measurements and reporting is stipulated in the Monitoring Manual.(5.2 Execution of the monitoring plan)	OK
CL5-7 The PDD stipulates that the net on-grid electricity is monitored hourly and recorded monthly. The procedure for dealing with the case in which the starting date of the crediting period (the date of registration) does not fall on the first day of the month is to be clarified in the PPA and the CDM Manual.	D.5.8.	The procedure for collecting the data during the registration date to the settlement date is stipulated in the Monitoring Manual.(5.4.2 Lag of the date of registration)	OK
CL5-8 The detailed procedure for internal audit is to be clarified in the CDM Manual.	D.5.10.	The procedure for the internal check is stipulated in the Monitoring Manual.(3.3 Internal Review for CDM Team). The	OK

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
		responsibility of collecting and checking the data independently for the monitoring officers is also established.	
CL5-9 The detailed procedures for the project performance review are to be clarified in the CDM Manual.. The CDM Manual should include the periodic management review for the overall CDM activities by the top management.	D.5.11.	The following stipulations are confirmed in the Monitoring Manual.(3.2 The responsibilities of the CDM Team); (a)“And the director of general control office will conduct the statistic, analysis and audit of the daily and monthly measurement. Then finally the plant manager will review the internal audit and monitoring reports.” (b)“The plant manager will also hold periodic review for overall CDM activities including.....”	OK
CL5-10 The detailed procedure for corrective actions is to be clarified in the CDM manual. The CDM manual should include this kind of procedure to avoid the recurrence by investigating the causes of errors, etc.	D.5.12	The responsibilities of checking, verification, audit and review of the monitoring results were stipulated in the Monitoring Manual.(3.2 and 3.3) And also the Monitoring Manual stipulates in 5.4.1 as follows; “When any mistakes are caused during monitoring and checking process, the system of corrective actions will start.”	OK

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>CL6</p> <p>(1)The original PDD describes that “ According to the baseline methodology, there is no need for the proposed project to consider leakage.”, and there are no descriptions why it was considered to be zero based on AMS. I .D. The original PDD is to be modified appropriately.</p> <p>(2)The evidences are to be provided that the generating equipments installed are not transferred from another activity(ex. purchase contract, date of manufacturing, etc.).</p>	<p>D.3.1.</p>	<p>(1) In the revised and final PDDs(Ver.4.0, Ver.05), it is properly described that all the equipments are directly purchased from the manufacturer and not involved in the equipment transfer from other activity, so the leakage is considered to be zero based on AMS. I .D.</p> <p>(2)The purchase contract of turbines and generators(2005.4.28) was provided (/22/). The date of manufacture was confirmed to be 2007.1 on the Name Plate during the site visit.</p>	<p>OK</p> <p>It was confirmed that the leakage was considered to be zero by the evidences, and the related description in the PDD was modified properly. No further actions are required.</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>CL7</p> <p>(1) Table 3.4 in Annex 3 should include the total amount of tCO₂ and MWh (CSPG + CCPG) of three years(2004,2005,2006) for the OM(1.0608) to be easily derived.</p> <p>(2)The formula to be used to derive EF_{Coal,Adv}, EF_{Oil,Adv}, and EF_{Gas,Adv} which is stipulated in the “Tool to calculate the emission factor for an electricity system” (Option B2) should be clearly described in the Step 5., Sub-step 2 of B.6.1., although it is described in Annex 3 Table 3.5.</p> <p>(3)Table 3.3 in Annex 3 should have the column in which the percentage of Coal, Oil and Gas to be used in the calculation of EF_{Thermal} is described. And also Table 3.5 should have the calculation result of each EF multiplied by each percentage above so that the EF_{Therma} (0.8862) may be easily traceable.</p>	E.3.5.	<p>(1)In the revised and final PDDs(Ver.4.0, Ver.5.0), TableA4-3,TableA5-3 and TableA6-3 were newly established to indicate the yearly OM (2004, 2005, 2006). And also the Table A 7 was made to summarize the yearly tables above for calculating the OM(1.0608) instead of Table 3.4 in the original PDD(Ver.3.0).</p> <p>(2)The formula was properly moved from the Table 3.5 of the original PDD(Ver.3.0) to the Step 5., Sub-step 2 of B.6.1. of the revised and final PDDs(Ver.4.0, Ver.5.0).</p> <p>(3)In the revised PDD(Ver.4.0, Ver.5.0), the percentage of Coal, Oil and Gas was described in the new column in Table 6-1. And the percentage of each fuel was also described in the TableA8 to calculate the EF_{Thermal} (0.8862).</p>	<p>OK</p> <p>The descriptions indicated were properly modified so that so that the reader could easily understand the process of calculation of OM and BM. No further actions are required.</p>
<p>CL8</p> <p>(1)The outlines of the impacts to the fishery and the agriculture caused by submerged land are to be described in the PDD.</p> <p>(2) Host Party’s requirements by laws and regulations for the EIA are to be clarified and described in the PDD</p>	F.1.1.	<p>(1)In the final PDD(Ver.5.0), the following points were added according to the EIA report(/32/);</p> <p>(a)There are rare aquatic organisms and the spawning grounds for economic large fish in the project area of the river, thus the impact to the fish is not significant.</p> <p>(b)The submerged farmland (9,990m²) accounts for a small portion(0.029%) of the total with no resettled families, thus there are no much impacts on the agricultural economy of the reservoir area.</p>	<p>OK</p> <p>The description of the impacts to the environment in the PDD was enriched to understand as appropriately as possible.</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
		(2)The Environmental Impact Assessment Law of P.R.C was described as the legal basis of the EIA in the revised and final PDDs(Ver.4.0, Ver.5.0).	
CL9 (1)The procedures required by laws/regulations for consulting the stakeholder comments are to be clarified and described in the PDD, if any. (2)The organization which conducted the survey with the project owner is to be described in the PDD, if any. (3)The samples of the questionnaires distributed and received are to be provided.	G.1.1.	(1)(2) The validation team was informed that there were no legal regulations to take the procedure of consulting the public comments in the case of this small scale project. However the Client carried out the survey, instructed by the contracted CDM consultant in order to know the public opinions and suggestions about the project. And this fact was described in the revised and the final PDDs(/1/-2,/1/-3). (3)A sample of the questionnaire returned was provided.	OK The questions raised were clarified, and the description in the PDD was modified properly.
CL10 The outlines of the measures to be taken based on the comments and suggestions received, even if they are few, are to be clarified and described concretely in the PDD, if any.	G.1.4.	The countermeasures to be taken to the noise mostly worried by the local residents were additionally described in a concrete manner in E.3.of the revised and final PDDs(Ver.4.0, Ver.5.0).	OK The description in the PDD was enriched to reflect the actual situation.

**APPOINTMENT CERTIFICATE of Validation team members /
CURRICULUM VITAE for Internal Verifiers**

APPOINTMENT CERTIFICATE

Validation team

Hideki KOBAYASHI

Shigekazu OKA

Tatsuo TANAKA

CURRICULUM VITAE for Internal Verifiers

Osamu KOBAYASHI

APPOINTMENT CERTIFICATE

Mr. Hideki KOBAYASHI

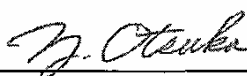
born on 26 August 1942

satisfies the requirements as specified in the JACO CDM Quality
Manual and is hereby appointed as

**JACO CDM CDM Lead Auditor and
Validation Team Leader for**

**Changzhai 15MW Hydro Power Project in Guizhou
Province, China**

Tokyo, 7th July, 2009



Yoshihiro Otsuka
General Manager of the Business Development Division
JACO CDM Co., Ltd.

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

1. Name of Firm: JACO CDM, Ltd.

2. Name of Staff: Hideki KOBAYASHI / Senior Chief Engineer

3. Qualification: CDM lead auditor

4. Employment Record:

2004 - Present: JACO CDM Assessment Division

2002 - 2004: International Certification Center of JACO

1997 - 2002: JACO(Senior Chief Engineer of International Affairs Division)

1975 - 1997: Environmental Control & Energy Dept. of Kawasaki Steel Corporation
(1983-Manager, 1993-General Manager)

1966 – 1975: General Affairs Dept. of Head Office of Kawasaki Steel Corporation

5. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned:

- Verification team member for Fujian Beijin Hydropower Project
- Validation team member for Shaanxi Provincial Yang County Kafang 12 MW Small-scale Hydro Power Project
- Verification team member for Gangwon Wind Park CDM project in the Republic of Korea
- Verification team member for Youngduk Wind Park CDM project in the Republic of Korea
- Validation team member for Zafarana Wind Power CDM project in Egypt
- Determination team member for Kaliakra Windpower Project in Bulgaria
- Verification team leader for domestic GHG emission assessment projects

APPOINTMENT CERTIFICATE

Mr. Shigekazu OKA

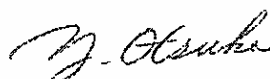
born on January 02, 1945

satisfies the requirements as specified in the JACO CDM Quality
Manual and is hereby appointed as

**JACO CDM CDM Lead Auditor and
Validation Team Member for**

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Province, China**

Tokyo, 7th July, 2009



Yoshihiro Otsuka
General Manager of the Business Development Division
JACO CDM Co., Ltd.

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

- 1. Name of Firm:** JACO CDM, Ltd.
- 2. Name of Staff:** Shigekazu OKA
- 3. Qualification:** CDM lead auditor
- 4. Employment Record:**

2007-	Lead Auditor of Assessment Division of JACO CDM
2004-2007	Lead Auditor / General Manager of Assessment Division of JACO CDM
2000-2004	ISO EMS Lead Auditor of Japan Audit and Certification Organization for Environment and Quality (JACO)
1968-2000	Engineer/ General Manager of Production Technology Department at Tsuchiura Works of Hitachi, Ltd
- 5. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned:**
 - Verification team leader for Fujian Beijin Hydropower Project
 - Validation team leader for Shaanxi Provincial Yang County Kafang12 MW Small-scale Hydro Power Project
 - Verification team leader for Gangwon Wind Park CDM project in the Republic of Korea
 - Verification team leader for Youngduk Wind Park CDMproject in the Republic of Korea
 - Validation team member for Guizhou Small scale Hydropower project in China
 - Verification team member for Xiaogushan Hydropower project in China
 - Verification team leader for domestic GHG emission assessment projects

APPOINTMENT CERTIFICATE

Mr. Tatsuo TANAKA

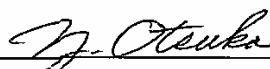
born on 30 September 1952

satisfies the requirements as specified in the JACO CDM Quality
Manual and is hereby appointed as

**JACO CDM CDM Lead Auditor and
Validation Team Member for**

**Changzhai 15MW Hydro Power Project in Guizhou
Province, China**

Tokyo, 7th July, 2009



Yoshihiro Otsuka
General Manager of the Business Development Division
JACO CDM Co., Ltd.

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

1. Name of Firm: JACO CDM Co., Ltd.

2. Name of Staff: Tatsuo TANAKA / General Manager of Business Development Division

3. Qualification: CDM Auditor

4. Employment Record:

2009.10-present: General Manager of Business Development Division of JACO CDM CO., LTD.

2009 – 2009.9: Manager of JACO CDM Co., Ltd.

2005 – 2009: General Manager of Technology Administration Div. of Semiconductor Dept. of Fuji Electric Device Technology Co., Ltd.

2003– 2005: President of Fuji Electric Imaging Device Co., Ltd. and General Manager of Photoconductor Dept. of Fuji Electric Device Technology Co., Ltd.

1992 – 2003: General Manager of Sales and Development Div. of Fuji Electric Imaging Device Co., Ltd.

1975 – 1992: Staff and Manager of Photoconductor Dept. of Fuji Electric Co., Ltd.

5. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned:

- Completion of Validators and Verifiers 5 days course by TECHNOFER in June, 2009.
- Verification team member for Fujian Beijin Hydropower Project
- Verification team member for Fujian Jiangle Gaotang Hydropower Project

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

1. Name of Firm: JACO CDM, Ltd.

2. Name of Staff: Osamu KOBAYASHI / Manager of Assessment Division

3. Qualification: CDM lead auditor

4. Employment Record:

2007 - Present: Manager of Assessment Division of JACO CDM

2004-2007: Assessment Division of JACO CDM

2002 - 2004: Japan Audit and Certification Organization for Environment and Quality

1970 - 2002: Fuji Electric Holdings Co., Ltd.

* Responsible for Research and Development of the technology of de-commissioning of Tokai Nuclear Reactor as the general manager of Nuclear Power Co-ordination Division.

* The general manager of Nuclear Power and Environmental Division

* The general manager of Nuclear Power Design Department Nuclear Power Division

5. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned:

- Determination team leader of Kaliakra Windpower Project in Bulgaria
- Validation team leader of Zafarana Windpower Project
- Validation team member of “e7 Bhutan “ CDM project
- Verification team member of e7 Bhutan project
- Validation team leader of Cao Phong Reforestation Project
- Validation team member of Carbon Sequestration through Reforestation in the Bolivian Tropics by Smallholders of “The Federacion de Comunidades Agropecuaris de Rurrenabaque(FECAR)”
- Validation team member of Uganda Nile Basin AR Reforestation Project