CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	● The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. ● As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	● The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

>>
Title: Pingwu Renjiaba 12.6 MW Small Hydropower Project, P.R.China
Version: 02
Date: 16/06/2007

A.2. Description of the small-scale project activity:

>>
The purpose of the project activity is to generate electricity using hydro potential available in the upstream of Fujiang River, Sichuan Province, P. R. China. The total installed capacity of the proposed project is 12.6 MW (6.3 MW * 2). With a rated water head of 33.7 m and rated flux of 45.0 m^3/s, the project is expected to generate 81400 MWh of electricity in a year, and 77458 MWh will be exported to the grid. The generated electricity will be exported to the Central China Power Grid (CCPG), a state government owned power utility company. The estimated of emission reduction is 73089 tCO_2e.

The project involves construction of a diversion structure, diversion tunnel, penstocks, powerhouse, power evacuation system, and tailrace canal. The project is a run of the river scheme, where the water from the project will be led back to the river through tailrace canal.

Implementation of the project activity is expected to contributing to sustainable development of the Host Country.

a) The project activity generates additional employments during the construction period. Majority of the additional employment opportunities are for unskilled labor, hence unemployed unskilled labor around the project region will get the benefits directly from the project activity. Besides, the project activity also generates permanent employment for about 30 persons during the lifetime of the project activity. This direct and indirect employment would not take place in the absence of the project activity.

b) Apart from the direct and indirect employment, the project activity results in flow of huge financial resources as investment for the project. Significant part of this investment will go into the rural economy towards construction activities in the project site as wages for unskilled labor, construction material, local construction equipment etc. Further, significant part of the investment will go to the construction equipment and project equipment. This investment flow will have a positive impact on the economy in the region; hence, the project activity contributes to the economic well being.

c) The project activity is generation of electricity using hydro potential available in a river and it does not result in degradation of any resources, or cause any negative impact on bio-diversity, resource sustainability, human health etc. Further the project does not result in environment pollution. Hence, the project activity contributes to the environmental well being.

In view of the above, the project activity contributes to the sustainable development of the host country.

A.3. Project participants:

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Name of Party involved(*) ((host) indicates a host Party)	Privae and/or public entity(ies) project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant(Yes/No)
People's Republic of China (the host)	Pingwu Chuanjiang Hydropower Development Co. Ltd.	No
Netherlands	Carbon Asset Management Sweden AB	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

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A.4.1.1. Host Party(ies):

>>
People's Republic of China

A.4.1.2. Region/State/Province etc.:

>>
Sichuan Province

A.4.1.3. City/Town/Community etc:

>>
Pingwu County

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

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The proposed project is located at Shuijing Town, Pingwu County, Sichuan Province, where is at the upstream of Fujiang River. It's 53 km from Pingwu County, and 353 km from Mianyang City. The nearest airport is Chengdu Shuangliu Airport, where is 453 km from the proposed project site. The geographical coordinate of the powerhouse of the proposed project is: Longitude: 104°33′09″ E, Latitude: 32°24′33″ N. Physical location of the project is marked in the maps below.

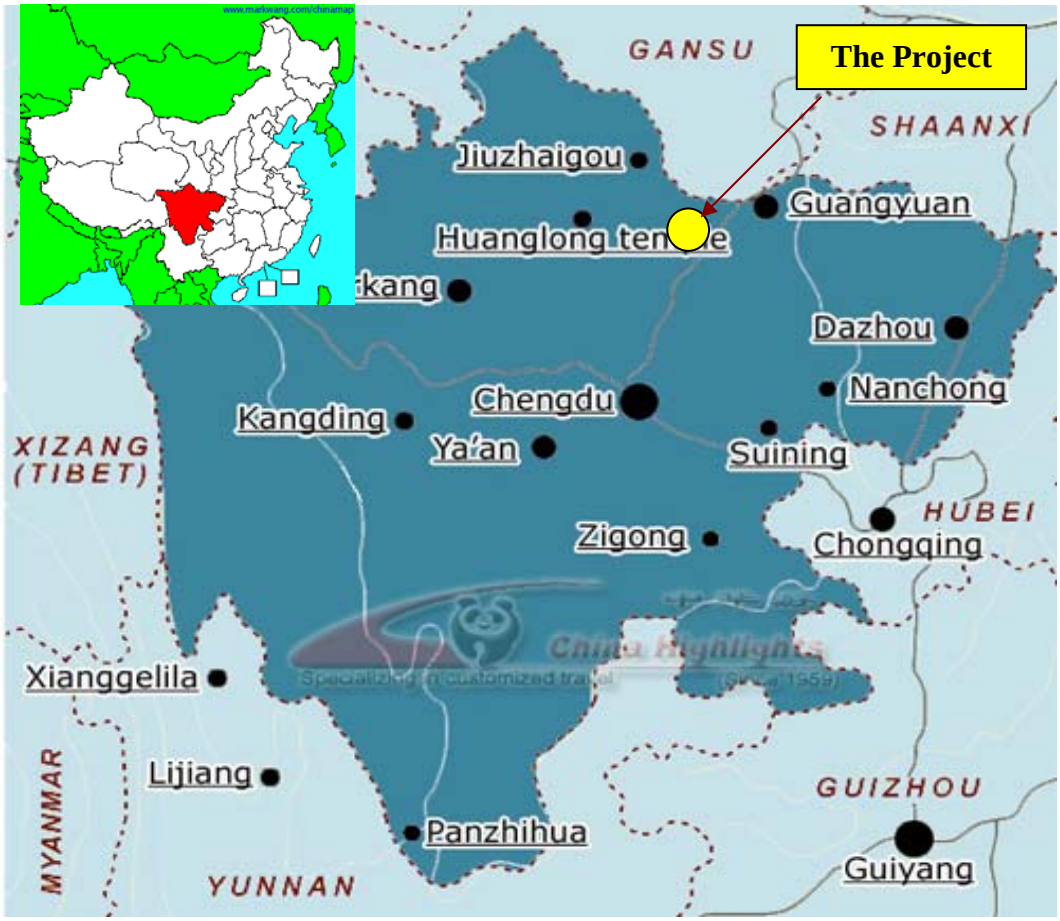

Figure 1 Sketch map of the project site

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

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The proposed project is about generating electricity from renewable energy of hydro and supplying to the nearby grid, and the total installed capacity is 12.6 MW, thus, the methodology of AMS-I.D (version 10). is applicable for the proposed project. The type and category of the proposed project is as following:

Type I: Renewable Energy Project
Category 1.D: Grid connected renewable electricity generation.

Technology of project activity

Pingwu Renjiaba 12.6 MW Small Hydropower Project, P.R.China is a run-of-river power project, where water from Fujiang River is diverted through a tunnel, pressure regulation house, the steel penstock, and then run through the power house to generate renewable power. The tail water returns to Fujiang River. The main design features and characteristics of PRSHP were listed in Table 1.

Table 1 Characteristic of Pingwu Renjiaba 12.6 MW Small Hydropower Project, P.R.China[1]

Turbines	
Turbine Type	HLTF30-LJ-165
Quantity	2
Rated water head (m)	6.3
Rated flow (m^3/s)	33.7
Rated rotation speed (r/min)	45.0
Generators	
Model	SF6300-20/3250
Quantity	2
Rated installed capacity (MW)	6.3*2
Rated voltage (kV)	6.3
Rated rotation speed (r/min)	300
Efficiency factor	0.8

Environmental Safe Technology:

The technology, which has used worldwide, used is safe on environment. Characteristics of the PRSHP and its construction methodology will not permit a negative damage to the ecosystem. Moreover, it will allow the project to conserve the biodiversity of this particular zone on the Fujiang River drainage area.

Technology transfer:

The main equipments, such as the turbines and electricity generators, are made in the host country. No technology transferred from other countries is involved in this project activity.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

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The chosen crediting periods are renewable starting from 01 Jan. 2008. The total estimated emissions reductions due to the project activity will be 511623 tCO_2 e over the first crediting period. Estimated annual emissions reductions are listed in the following table.

Years	Annual estimation of emission reductions in tons of CO_2 e
2008	73089
2009	73089
2010	73089
2011	73089
2012	73089
2013	73089

[1] Data source: the Purchase Agreement for Turbines and Generators between Sichuan Pingwu Renjiaba Hydropower Plant and Tianjing Generator Equipments Plant, 8th October 2003.

2014	73089
Total estimated reductions (tons of CO_2 e)	511623
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tons of CO_2 e)	73089

A.4.4. Public funding of the small-scale project activity:

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The project activity does not involve any public funding from Annex 1 countries.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

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According to paragraph 2 of Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities, a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

- With the same project participants;
- In the same project category and technology;
- Registered within the previous two years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small scale activity?

The participants of the proposed project will not applied to register another small scale CDM project activity within 1 km of the proposed project boundary. Thus, the proposed project is not a debundled component of a large project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

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Title of the approved baseline methodology applied to the proposed small-scale project activity is AMS-I.D. (Version 10)

For more information regarding the methodology, please refer to the link:
http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

B.2 Justification of the choice of the project category:

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The project activity meets all the applicability conditions of the AMS-I.D., as described below:

Applicability of AMS-I.D.:

The applicability conditions for simplified baseline methodology category AMS-I.D are:
- Capacity is less than 15 MW
- The project should concern renewable energy generation units, such as photovoltaics, **hydro,** tidal/wave, wind, geothermal, and renewable biomass, which supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel or non-

renewable biomass fired generating unit.

For the proposed project:

The proposed project activity is a 12.6 MW hydropower plant delivering electricity to the Central China Power Grid (CCPG). Thus, the proposed project activity satisfies the requirements of (1) the capacity of a project should be less than 15 MW; (2) the project should concern renewable power generation; and (3) the electricity generated from the proposed project supply to a grid (CCPG), which is predominantly coal-fired (see annex 3 for details). Therefore, the methodology AMS.I.D. is applicable to the Project.

B.3. Description of the project boundary:

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As for the guidelines mentioned in paragraph 4 of Type I.D. described in Appendix B of the simplified modalities & procedures for small-scale CDM-project activities, the project boundary is "encompasses the physical, geographical site of the renewable generation source".

Electricity generated from the proposed project will be connected to Renjiaba Transformer Substation which is part of Sichuan provincial power grid, and then the electricity will be connected to the Central China Power Grid (CCPG). According to the Chinese DNA guidance, CCPG is composed of Jiangxi Provincial Power Grid, Henan Provincial Power Grid, Hubei Provincial Power Grid, Hunan Provincial Power Grid, Sichuan Provincial Power Grid and Chongqing Power Grid[2]. CCPG is then defined as the proposed project boundary. The other reasons for the boundary chosen are:

- There is a guidance available from China DNA on project boundary identifying the applicable grid as the project boundary;
- The grid is the regional grid in a country with layered dispatch system like China.

Thus, the project boundary will include the physical and geographical site of the proposed project, and all the facilities and power plants in CCPG which related to the electricity to be replaced by the proposed project activity (Fig.2).

[2] *Notification on Determining Baseline Emission Factors of China Power Grid* issued by China's DNA on Dec 15th, 2006 on http://cdm.ccchina.gov.cn/Website/CDM/UpFile/File 1029.pdf

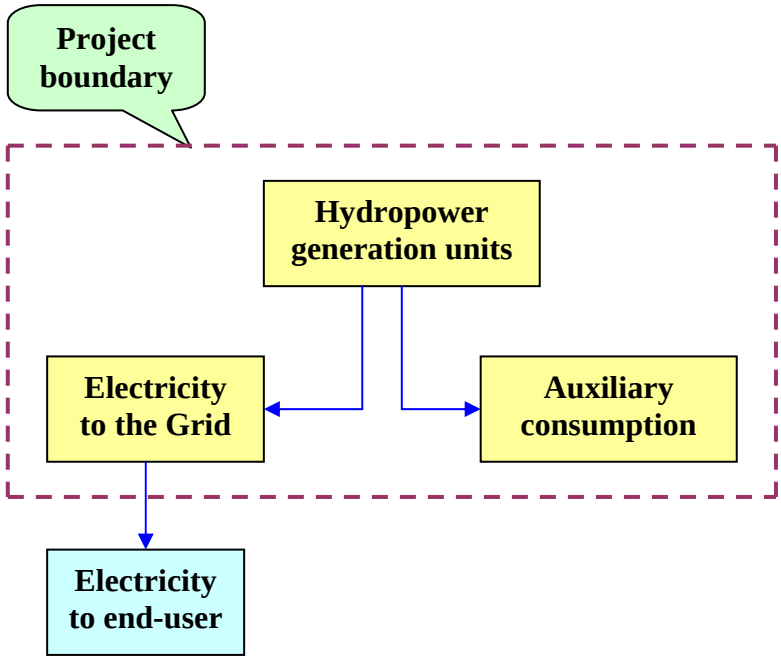

Figure 2 Boundary of the project activity

B.4. Description of baseline and its development:

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The baseline scenario of the proposed project is the continued operation of the existing power plants in the system and the addition of new generation sources to meet increased electricity demand. The project activity involves a construction of a zero-emission power source. Thus, the emission reductions are equal to the baseline emissions.

In accordance with the small scale methodology AMS-I.D, baseline emissions are equal to power generated by the project activity and delivered to the grid, multiplied by the baseline emission factor.

According to the small scale methodology AMS-I.D. the baseline emission factor is calculated as either the "average of the approximate operating margin and the build margin", or the "weighted average emissions (in tCO_2/MWh of the current generation mix)". The first option was chosen to calculate the baseline emissions. The calculation of grid emission factors is provided in B6.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

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UNFCCC simplified modalities seek to establish additionality of the project activity as per Attachment A to Appendix B, which listed various barriers, such as investment barrier, technological barrier, barrier due to prevailing practice, and other barriers, out of which, at least one barrier shall be identified due to which the project would not have occurred any way. The main barrier identified by project participants for the proposed project activity is investment barrier.

(1) Investment barrier

According to "Tool for the demonstration and assessment of additionality (version 03)", three options can be applied to conduct the investment analysis. They are: the simple cost analysis (Option I), the

investment comparison analysis (Option II) and the benchmark analysis (Option III).

Since this project will generate financial/economic benefits other than CDM-related income, through the sale of generated electricity, Option I (Simple Cost Analysis) is not applicable.

The investment comparison analysis (Option II) is also not applicable for the proposed project because the project sponsor make a go-or-no-go decision and the sponsor has no investment options. Then the benchmark analysis will be used to identify whether the financial indicators, Financial Internal Return Rate (IRR) in this project is better than relevant benchmark value.

Thus, benchmark analysis method will be chosen to analyze the investment barrier for the proposed project.

a. Apply benchmark analysis

According to Economic Evaluation Code for Small Hydropower Projects issued by the Ministry of Water Resources in 1995 (Document No: SL16-95), the benchmark IRR of small hydropower project is 10%. Thus, 10% was chosen as the benchmark for the proposed project.

b. Calculation and comparison of financial indicators

Table 3 Main parameters for calculation of financial indicators

No	Parameters	Unit	Value	Data Source
1	Installed capacity	MW	12.6	The Preliminary Design Report[3]
2	Total investment	RMB million Yuan	93.65	Calculated as below [4]
3	Operation and maintenance cost	RMB million Yuan	1.70	The Preliminary Design Report
4	Annual electricity generation	MWh	81400	The Preliminary Design Report
5	Annual electricity export to CCPG	MWh	77458	The Preliminary Design Report
6	Power price (including VAT)	RMB Yuan/kWh	0.18	Combined to the Grid Agreement [5]
7	Value Added Tax	%	6	The Preliminary Design Report

[3] the Preliminary Design Report was approved by Mianyang Development & Reform Commitment and Mianyang Water Conservancy Bureau in 24th September, 2003.

[4] The total investment was calculated by a formula as following:

TI = A+B+C-D

Where:

TI: Total investment in million RMB Yuan;

A. the total investment estimated in page 129 of the Preliminary Design Report: 74.4363 million RMB Yuan;
B. Electricity export facilities estimated in page 125 of the Preliminary Design Report: 0.036 million RMB Yuan;
C. Increased cost in the tunnel construction: 22.568 million RMB Yuan, which certified by Mianyang Yuxing construction supervision company in Dec. 30th , 2005;
D. Basic reserve fund estimated in page 124 of the Preliminary Design Report: 3.39 million RMB Yuan.

[5] Connected to the Grid Agreement signed between Pingwu Chuanjiang Hydropower Development Co. Ltd. and Sichuan Pingxia Electricity (Group) Co. Ltd. on August 15, 2003.

	(VAT)			
8	Income tax	%	33	The Preliminary Design Report
9	Additional tax for city development	%	5	The Preliminary Design Report
10	Additional tax for education	%	3	The Preliminary Design Report
11	Annual emission reduction	tCO_2e/yr	73089	
12	Project life time	years	24 [6]	

The IRRs with and without CDM revenues are listed in Table 4. Without CDM revenues, the PRSHP would not make the investment viable with IRR 5.61% lower than the financial benchmark rate of return (10%). Therefore the proposed project activity is not a financially attractive option. With CDM revenues, the IRR of the proposed project increase greatly, which means that the proposed project is financially acceptable.

Table 4 Comparison of financial indicators with and without income from CERs

Item	IRR	Benchmark
Without income from CERs	5.61%	10%
With revenue from CERs	10.36%	10%

c. Sensitivity analysis

A detailed sensitivity analysis of the project activity was done to test the project feasibility with varying project parameters. The project activity feasibility is mainly dependent on the following parameters.

- Investment cost
- Annual power output
- Operation cost

When the above three financial indicators where fluctuation within the range of -10% to +10%, the IRR of total investment varies to different extent, as shown in Table 5 and Figure 3 below.

From the results in Figure 2, we can find that without revenue from CDM, the IRR of the proposed project are always lower than the benchmark even the three indicators various from -10% to +10%. Thus, the proposed project is financial unacceptable.

Table 5 Sensitive analysis results

	-10%	**0**	**10%**
Total investment	6.61%	5.61%	4.61%
Annual electricity output	3.93%	5.61%	7.29%
O/M cost	5.81%	5.61%	5.41%

[6] Project life time was calculated by the estimated life time in the Preliminary Design Report of 22 years plus the construction time extended for 2 years.

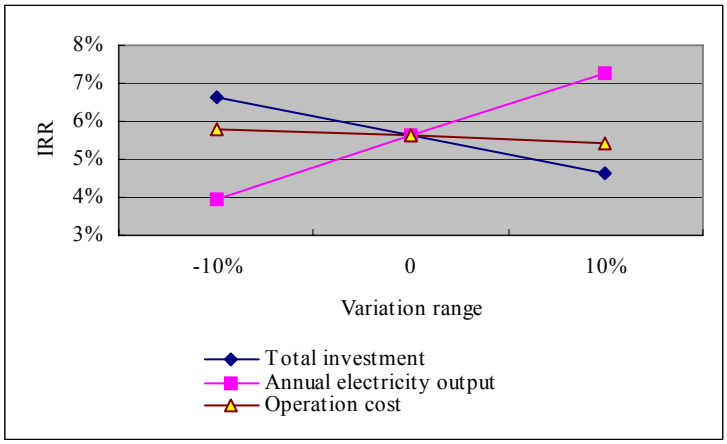

Figure 3 Sensitive analysis results

In addition, during the construction of the proposed project, the geological structure of the project site was found to be far more unstable than that was expected in the Preliminary Design Report. The bed rock was severely weathered, thus, the inner layer of the tunnel need to be supported by reinforced concrete slab which resulted in a great increasing in the investment , the price of the tunnel construction was increased from 13000 to 25000 RMB Yuan per meter (See the supplement agreement for the tunnel construction [7]). And several collapses took place (see the complementary agreements about the treatment works for the collapses at K1+443.7~K1+446.37 and K1+446.37~K1+537 of the tunnel). All of these geological barriers resulted in an increasing in the cost and a delay in the project construction activities.

On the other hand, rainfall was quite high during the rainy season. Some substructures were destroyed due to flood (See the compensation report from Company 207 about the bridge destroyed by flood).

According to the Preliminary Design Report, 70% of the total investment will be loaned from bank. But in the constructing stage of PRSHP, the project entity had confronted difficulty in financing because of the small capacity, low IRR, geological barriers, flood and other reasons; the proposed project has not obtained any loan from bank [8].

The pre-construction work of the proposed project began in the end of 2003, the construction began on 21st June 2004 [9]. But the project activity stopped from December 2004 due to these geological difficulties and funds shortage [10, 11, 12]. Some contractors claimed for the economic losses (see Claim for indemnification during the construction standstill from Sichuan Mianyang Zhuobei Construction Co. Ltd.,

[7] Supplement agreement for the tunnel construction between Pingwu Chuanjiang Hydropower Development Co. Ltd. and the 7th Instruction Company of Sichaun Province, 16th June 2006.

[8] The response for the application for loans from Pingwu Chuanjiang Hydropower Development Co. Ltd. by Pingwu Sub-branch of Industrial and Commercial Bank of China, 28th Dec 2004

[9] Mianyang Development Plan Commission & Mianyang Water Matter Bureau ratified the Application for Pingwu Renjiaba Hydro Plant Starting to be constructed on June 21, 2004. The document number is Mian Shi Ji Jiao Neng [2004]262.

[10] Claim for compensation during the closed days due to funds shortage, Pengxi hydropower Construction & Installation Company, 7th Dec. 2006.

[11] Testify for Renjiaba Hydro Plant construction standstill, Mianyang Yuxing Construction Supervision Co. Ltd.

[12] Claim for indemnifications during the construction standstill from Sichuan Mianyang Zhuobei Construction Co. Ltd.,4th April 2005.

4th April 2005, and Claim for compensation during the closed days due to funds shortage, Pengxi hydropower Construction & Installation Company, 7th Dec 2006).

In February 2005, the participants of the proposed project get some knowledge about CDM project, and an agreement for CDM development was signed between the participants of the project and the CDM experts from Hunan province. The IRR of the proposed project will increase to 10.36% with a price of 10 US$/ CERs. Thus, the proposed project will be investment attractive with revenue from CERs.

The higher IRR of the proposed project with revenue from CDM greatly increased the investment confidence of the stockholders, 6 new stockholders from Sichuan Pingwu County invested the proposed project, and they came into possession of 55% of the total stocks [13]. Thus, the proposed project activities continued [14].

According the analysis above, we can conclude that the proposed project will not carried out due to the investment barriers without CDM revenues. Therefore, the proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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According to the methodology of AMS-I.D.(version 10) and analysis in B.3. above, the Central China Power Grid is selected as the project boundary. The baseline emissions factor (EFy) is calculated according to method (a) provided by the methodology AMS-I.D.(version 10) as: (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002.

Step 1. Calculate the Operating Margin emission factor ($EF_{OM,y}$)

Calculation of the Operating Margin should be based on one of the four following methods according to the instruction of ACM0002:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

Although Dispatch Data Analysis should be considered the first methodology choice as required in the ACM0002, unavailability of detailed information in China, such as the dispatch data make method (c) not feasible for the calculation in China.

In China, specific data from the grid or each power plant is treated as business confidential and thus not publicly available. The data of load curves are not available. Therefore, the Simple adjusted OM (b) cannot be possibly used for the proposed project either.

The low-cost must run resources constitute less than 50% of total grid generation in Central China Power Grid, the percentage of the low cost must run resources are: 38% in 2000, 37% in 2001, 36% in 2002, 34% in 2003

[13] Stockholder's conference decision about agreeing to 6 persons (Mr. Pu Yiquan etc.) from Sichuan Pingwu to join in the construction of Renjiaba project. 28th May 2005.

[14] A notice of return to work was sent out by Mianyang Yuxing Construction Supervision Co. Ltd. on July 1, 2005.

and 38% in 2004 [15], which accords with the defined condition of method (a), but not method (d).

Consequently, Simple OM method is selected to calculate the Operating Margin emission factor of the proposed project.
The Simple OM emission factor ($EF_{OM,simple,y}$) is calculated as the generation-weighted average emissions per electricity unit of all generating sources serving in the system, excluding low operating cost and must-run power plants. The formula is as following:

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}} \qquad (1)$$

Where:
Fi,j,y is the amount of fuel i consumed by relevant power sources j in year y,
j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid.
$COEFi,j$ is the CO_2 emission coefficient of fuel i, taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in years y, and
$GENj,y$ is the electricity delivered to the grid by source j.
The CO_2 emission coefficient of fuel type i ($COEF_i$) is obtained as:

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \qquad (2)$$

Where:
NCV_i is the net calorific value per ton or m^3 of a fuel i (GJ/tce), a country-specific value is used.
$OXID_i$ is the oxidation factor of the fuel i, an IPCC default value is used.
$EF_{CO2,i}$ is the CO_2 emission factor per GJ of fuel type i (tCO_2/GJ), an IPCC default value is used.

$EF_{OM,y}$ = 1.2526 tCO_2e/MWh.
For the detailed information, please see the Annex 3.

Step 2: Calculation of Build Margin Emission Factor ($EF_{BM,y}$)

To calculate the Build Margin (BM), the formulae should be the following according to the methodology:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_{m} GEN_{m,y}} \qquad (3)$$

Where:
$F_{i,m,y}$ is the amount of fuel i consumed by plant m in year y,
$COEFi,m,y$ is the CO_2 emission coefficient of fuel i, taking into account the carbon content of the fuels used by plant m and the percent oxidation of the fuel in year y.
$GENm,y$ is the electricity delivered to the grid by plant m.

ACM0002 provides two options for calculating $EF_{BM,y}$, both options have the same requirement on sample group m: either the five power plants built most recently, or the power plants capacity additions in the electricity system that comprising 20% of the system generation and that have been built most recently.

However, it is very difficult to obtain the data of the five power plants built most recently because these data are considered as confidential information by the company itself and the Grid in China. Therefore, a deviation

[15] Data source: China Electric Power Yearbook 2001-2005.

approved by the EB is applied here in the calculation that is to calculate the new capacity additions and the proportion of each technology of power generation. Then the weighing of capacity additions of different technologies will be worked out. Finally the emission factor will be calculated by employing the efficiency factor representing the best technology commercially available. The project chooses ex-ante $EF_{BM,y}$.

Deviated Calculation of Build Margin (BM):

The total installed capacity in CCPG is 68502.4 MW in year 2000 and 88386.7 MW in year 2004, thus, the power plants capacity addtion from 2000 to 2004 is 19884.3 MW, which equal to 22.5% of the total installed capacity in CCPG in year 2004 (see annex 3 for details). Thus, data in years 2000 and 2004 can be used to calculate the BM emission coefficient of CCPG. Thermal power plants accounted for 69.80% of the total capacity additions in CCPG during 2000-2004.

Sub-step 1. Calculation of weights of CO_2 emissions of solid, liquid and gas fuel in total emissions for power generation

The weights of CO_2 emissions from solid, liquid and gas fuels in the total emissions in CCPG are calculated by the formulae as follows:

$$\lambda_{Coal} = \frac{\sum_{t \in COAL,j} F_{t,j,y} \times COEF_{t,j}}{\sum_{t,j} F_{t,j,y} \times COEF_{t,j}} \quad (4)$$

$$\lambda_{Oil} = \frac{\sum_{t \in OIL,j} F_{t,j,y} \times COEF_{t,j}}{\sum_{t,j} F_{t,j,y} \times COEF_{t,j}} \quad (5)$$

$$\lambda_{Gas} = \frac{\sum_{t \in GAS,j} F_{t,j,y} \times COEF_{t,j}}{\sum_{t,j} F_{t,j,y} \times COEF_{t,j}} \quad (6)$$

Where:

λ_{Coal}, λ_{Oil} and λ_{Oil} respectively refers to weights of CO_2 emissions of solid, liquid and gas fuel in total emissions; *Coal,Oil and Gas* respectively refers to the group of solid, liquid, and gas fuels;

Fi,j,y is the amount of fuel i consumed in province j in year y;

$COEFi,j,y$ is the CO_2 emission coefficient of fuel i, taking into account the carbon content of the fuels i used in province j and the percent oxidation of the fuel in years y.

λ_{Coal} = 99.51%, λ_{Oil} = 0.22%, and λ_{Gas} = 0.27%

For the detailed information, please see the Annex 3.

Sub-step 2: Calculation of Emission Factor of Relevant Thermal Power

The emission factor of thermal is then calculated by using a formula as follows:

$$EF_{Thermal,adv} = \lambda_{Coal} * EF_{Coal.\,Adv} + \lambda_{Oil} * EF_{Oil.Adv} + \lambda_{Gas} * EF_{Gas.\,Adv} \quad (7)$$

Where:

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ respectively refers to the emission factor representing best technology

commercially available for fuel of coal, oil or gas fired power plants.

According to analysis in Sub-step 1, CO_2 emissions from the coal, oil and gas in CCPG accounted for 99.51%, 0.22% and 0.27% in total emissions of the grid in 2004, respectively, (see annex 3 for details). So, most of the CO_2 emissions in CCPG come from coal, and other emissions are mostly due to start up fuels. As a conservative calculation, Formula (7) is revised as:

$$EF_{Thermal,adv} = \lambda_{Coal} * EF_{Coal.\ Adv} \qquad (7')$$

The most advanced and commercially available coal power technology in the CCPG is 600MW sub-critical unit with power supply coal consumption of 336.66 gce/kWh, which is equivalent to a power supply efficiency of 36.53% [16]. Thus, $EF_{Coal,Adv}$ is calculated to be 0.9136 tCO_2/MWh (see Table 10 in annex 3 for details).

According to above analysis and Equation (7'), the conservatively estimated emission coefficient of new thermal power plants ($EF_{Thermal,adv}$) is 99.51% * 0.9136 = 0.9091 $kgCO_2$/kWh.

Sub-step 3: Calculation of BM of the Grid based on the result of Step 2 and the share of thermal power of recent 20% capacity additions.

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \qquad (8)$$

Where:
CAP_{Total} is the total of new capacity additions;
$CAP_{Thermal}$ is the new capacity addition of thermal power.

The share of thermal power of recent 20% capacity addition is 69.80% (See Annex 3 for details), thus, $EF_{MB,y}$ = 69.80% * $EF_{Thermal}$ =69.80%*0.9091 = 0.6346.

Step 3: Calculation of Combined Margin Emission Factor

To calculate EF_y with the combined margin (CM), the following equation is used:

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \qquad \textbf{(9)}$$

Where:

EF: baseline emission factor (tCO_2e / MWh)
w_{OM}: Operation Margin weight, which is 0.5 by default
$EF_{OM,y}$: Operational Margin emission factor (tCO_2e / MWh)
W_{BM}: Build Margin weight, which is 0.5 by default
$EF_{BM,y}$: Build Margin emission factor (tCO_2e / MWh)
y: a given year

Then baseline emissions (BE_y) are obtained as:

$$BE_y = EG_y * EF_y \qquad \textbf{(10)}$$

[16] http://cdm.ccchina.gov.cn/Website/CDM/UpFile/File1051.pdf

Where:

BE_y: the baseline emission of Central China Power Grid in year y,
EG_y: the amount of power generated by the project and supplied to the grid,
EF_y: the ex-ante emission factor in year y.

$$EG_y = EG_{output,y} - EG_{import,y} \quad \textbf{(11)}$$

Wher:

EG_y: the net Electricity supplied to the grid by the project in year y;
$EG_{output,y}$: the Electricity supplied to the grid by the project in year y;
$EG_{import,y}$: the Electricity purchased from the grid by the project in year y;

Emissions from project activity

The proposed project is a run-of-river hydro project, hence, the project emission is zero.

Leakage

As newly built hydropower plants, there is no energy generating equipment be transferred from another activity and no existing equipment be transferred to another activity involved in the project activities. No leakage needs to be considered in the Project.

Emission Reductions

The annual emission reductions ERy for the project activity are calculated as the baseline emissions minus the project emissions. The final GHG emission reductions are calculated as follows:

$$ER_y\ (tCO_2e/yr) = BE_y - PE_y = (GE_y * EF_y) - 0 \quad \textbf{(12)}$$

Where:

PEy: Project emissions in year y in tCO_2e;
GEy: Electricity supplied to the grid by the project each year in MWh/yr;
EFy: GHG emission factor of the Central China Power Grid (ex-ante) in tCO_2e/MWh.

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	***Installed Capacity of the project activity***
Data unit:	MW
Description:	The installed capacity of the project activity
Source of data used:	Preliminary design report
Value applied:	12.6
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data in from the Preliminary design report
Any comment:	

Data / Parameter:	$\boldsymbol{EF_{i,j,y}}$
Data unit:	tons
Description:	The amount of fuel *i* consumed by relevant power source *j* in years y.
Source of data used:	China Energy Statistics Yearbook (2000-2005)
Value applied:	See Annex 3
Justification of the choice of	Official released statistic; publicly accessible and reliable data source.

data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	***Electricity generation in CCPG***
Data unit:	MWh
Description:	The electricity generation by source *j* in year *y* of each province connected to CCPG
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	***Electricity self-consumption ratio***
Data unit:	%
Description:	The internal use rate of power source *j* in each province connected to CCPG
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	NCV_i
Data unit:	kJ/tm^3
Description:	The net calorific value (energy content) per mass or volume unit of fuel *i*.
Source of data used:	China Energy Statistic Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$EF_{CO2,j}$
Data unit:	tC/TJ
Description:	The CO_2 emission factor per unit of energy of the fuel *i*.
Source of data used:	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: workbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and	IPCC default value

procedures actually applied :	
Any comment:	

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	The oxidation factor of the fuel
Source of data used:	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: workbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	

Data / Parameter:	$SCC_{Coal,adv}$
Data unit:	gce/kWh
Description:	Standard coal consumption in a 600MW sub-critical unit with coal consumption in a thermal power plant
Source of data used:	http://cdm.ccchina.gov.cn/Website/CDM/UpFile/File1051.pdf
Value applied:	336.66
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$CAP_{m,y,j}$
Data unit:	MW
Description:	The installed capacity of power source *j* of province *m* in years *y*.
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

As described in B.6, the emission reductions of the proposed project are calculated as follows:

Baseline emissions

According to the Preliminary Design Report of the proposed project, the annual electricity delivered to the grid (GE) is approximately 77458 MWh.

Based on the calculation results in B.6.1. above, the emission factors is as follows:

EF_{OM} =1.2526 tCO_2/ MWh
EF_{BM} =0.6346 tCO_2/ MWh

The combined ex-ante baseline emission factor of the project is 0.9436 tCO_2/ MWh. The calculation equation is as follows:

EF_y = 1.2526 * 0.5 + 0.6346 * 0.5 = 0.9436 tCO_2/ MWh

Thus, the annual baseline emission is 73089 tCO_2e for the proposed project. The calculation equation is as follows:

BE_y = 77458 * 0.9436 = 73089 tCO_2e

Project emissions

According to ACM0002, there are no expected project emissions related to the generation of electricity, as generation is based on a renewable resource. Also, given that there is no flooded area associated with the project activity, consequently it is not necessary to calculate the power density.

Therefore, $PE_y = 0$

Leakage

As described in section B.6.1, the leakage of the Project (L_y) will be 0 tCO_2e.

Therefore, $L_y = 0$

Emission reductions calculation

Based on formula (11) in section B.6.1, the ex-ante annual emission reductions are estimated as 73089 tCO_2e for the proposed project. The proposed project activity is expected to achieve 511623 tCO_2e of net emission reductions during the first 7-year crediting period.

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2008	0	73089	0	73089
2009	0	73089	0	73089
2010	0	73089	0	73089
2011	0	73089	0	73089
2012	0	73089	0	73089
2013	0	73089	0	73089
2014	0	73089	0	73089
Total (tons of CO_2e)	**0**	**511623**	**0**	**511623**

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)	
Data / Parameter:	Electricity quantity
Data unit:	MWh
Description:	Electricity supplied to the grid from the project
Source of data to be used:	Cumulative reading of electricity meters installed at the power plant.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	77458 MWh
Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. The accuracy of electricity meter is 0.5s.
QA/QC procedures to be applied:	According to national standards, meters will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt. The main data source meter is located at Renjiaba Transformer Substation that is owned and managed by the grid company. All calibration and maintenance standards and procedures will follow the industrial codes and regulations of the grid company. Calibration on both the revenue meter and the backup meter will be done by a qualified party every year. In case of a reading of the revenue meter is evidenced to be wrong (or a calibration is not ok), readings from the backup meter which is owned and managed by the project developer would be adopted.
Any comment:	

Data / Parameter:	$EG_{import,y}$
Data unit:	MWh
Description:	Electricity purchased from the Grid by the proposed project during year y
Source of data to be used:	Electricity meter reading at the connection point between the proposed project and the Grid
Value of data applied for the purpose of calculating expected emission reductions in section B.5	According to the actual records
Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. The accuracy of electricity meter is 0.5s.
QA/QC procedures to be applied:	According to national standards, meters will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt. The main data source meter is located at Renjiaba Transformer Substation that is owned and managed by the grid company. All calibration and maintenance standards and procedures will follow the

	industrial codes and regulations of the grid company. Calibration on both the revenue meter and the backup meter will be done by a qualified party every year. In case of a reading of the revenue meter is evidenced to be wrong (or a calibration is not ok), readings from the backup meter which is owned and managed by the project developer would be adopted.
Any comment:	

B.7.2 Description of the monitoring plan:

>>

This section details the steps taken to monitor on a regular basis the GHG emissions reductions from Pingwu Chuanjiang Hydropower Development Co. Ltd. The Monitoring Plan for this project has been developed to ensure that from the start, the project is well organized in terms of the collection and archiving of complete and reliable data.

1. Monitoring organization

Prior to the start of the crediting period, the organization of the monitoring team will be established. Clear roles and responsibilities will be assigned to all staff involved in the CDM project and a single CDM Manager will be nominated. The CDM Manager will have the overall responsibility for the monitoring system on this project.

All other CDM monitoring staff will have clearly defined roles and responsibilities. The CDM Manager will manage the process of training new staff, ensuring trained staff performs the monitoring duties and that where trained monitoring staff is absent; the integrity of the monitoring system is maintained by other trained staff.

A formal set of monitoring procedures will be established prior to the start of the project. These procedures will detail the organization, control and steps required for certain key monitoring system features, including:

- CDM staff training
- CDM data and record keeping arrangements
- Data collection
- CDM data quality control and quality assurance
- Equipment maintenance
- Equipment calibration
- Equipment failure

See Annex 4 for a description and the scope of these procedures.

The CDM Manager will be responsible for ensuring that the procedures are followed on site and for continuously improving the procedures to ensure a reliable monitoring system is established. All staff involved in the CDM project will receive some relevant training from CDM consulters. Records of trained CDM staff will be retained by the Project Developer. The CDM Manager will ensure that only trained staff is involved in the operation of the monitoring system.

2. Monitoring equipment and installation

Given the emission factor is ex-calculated and according to the Methodology AMS.I.D., the only data to

be monitored is electricity supplied to the grid by the project (detailed in B.7.1).

Metering of electricity supplied to the Grid

The main electricity meter for establishing the electricity delivered to the grid (detailed in B.7.1) will be installed at the Renjiaba Booster Station. This electricity meter will be the revenue meter that measures the quantity of electricity that the project will be paid for. As this meter provides the main CDM measurement, it will be the key part of the verification process.

To ensure maximum availability of CDM data and to introduce quality controls of the CDM data, a backup meter will be installed in addition to the revenue meter. This meter will be located at input of transmission line, measuring the electricity exported from the project. Allowing for transmission losses, the meter will provide a useful back up of the grid company's meter.

Electricity meters should meet the relevant local standards at the time of installation. Before the installation of the meters, it should be factory calibrated by the manufacturer. The meters will be installed by either the project developer or the grid company according to the national Chinese standard "electricity meter installation technical management code" (DL/T448-2000). Records of the meter (type, make, model and calibration documentation) will be retained in the quality control system.

QA/QC

The project developer will sign an agreement with the grid company to specify the QA procedure for measurement and calibration to ensure the measurement accuracy of the main meter. Internal auditing, management review, and corrective actions will be set up in the management system of the proposed project.

For further details on the CDM data quality control and quality assurance see the CDM Monitoring System Procedures in Annex 4.

In case the following circumstances occur on the revenue meter:

- any abnormal circumstances identified
- meter failure
- meter is repaired or replaced due to faults of the meter parts.

In this case, the project developer and the grid company will ensure informing the counterparty immediately to jointly appoint a qualified third party conduct appropriate action accordingly. In the mean time, readings from the backup meter that is owned and managed by the project developer will be adopted.

3. Data recording procedure

The process for collecting the electricity meter data will be detailed in a procedure. A summary of this procedure is provided below.

Metering Electricity Delivered to the Grid (the revenue meter)

- At the end of each month, the project developer and the grid company will take a meter reading and record this figure.
- The grid company provides the project developer with the amount of electricity supplied to the grid. This will form the electricity supply figure on the purchase receipt;
- After a cross check with the project developer's own meter, the project developer records the electricity delivered to the grid; Metering of Electricity Output from the Hydro Station (the

Backup Meter). The backup meter will be installed, operated and maintained according to the relevant Chinese standard [JJG597-89] to enable the use of the data as a cross check or back up in the case of a failure of the main meter. Every main meter reading will be crossed checked with the site electricity meter. The actual readings are expected to show a slight variation as a result of transmission losses.

The difference between the readings will be recorded over time to establish the typical transmission losses and to take account of these in any situation where the backup meter data is used in CDM calculation (only where accurate main meter data is unavailable).

Main meter failure – use of backup meter data

If the main electricity meter is found to be faulty during its reading, data from the backup meter will be used in its place. In this circumstance, the electricity delivered to the grid should be calculated as follows:

- The data from backup meter will be used for the period, with a minor adjustment to allow for transmission losses.
- According to the historical transmission loss rate, the electricity delivered to the grid can be calculated.

Backup meter failure

In the event of the backup meter failing, it will be repaired or replaced by an accredited equipment testing organization. Maintenance records and any calibration documents will be retained by the project developer.

Possible fault with either meter

During the process of cross-checking the electricity data from the two meters, a difference may be established that is considerably larger than the historic difference (allowing for transmission losses). In this unlikely case, it could be either electricity meter at fault. The data recording procedures for this circumstance will be specified in a separate procedure.

4. Data and records management

At the end of each month the monitoring data needs to be filed electronically. The electronic files need to have CD back-up or print-out. The project developer needs to keep electricity sale and purchase invoices.

All written documentation such as maps, drawings, the EIA and the Preliminary Design Report, should be stored and should be available to the verifier so that the reliability of the information may be checked.

In order to make it easy for the verifier to retrieve the documentation and information in relation to the project emission reduction verification, the project developer should provide a document register. The document management system will be developed to ensure adequate document control for CDM purposes.

The dedicated CDM Manager of the project developer is responsible for checking the data (according to a formal procedure) and the CDM Manager will be responsible for managing the collection, storage and archive of all data and records. A procedure will be developed to manage the CDM record keeping arrangements. All the data shall be kept until two years after the end of credit period.

For details of the operational and management structure used for the monitoring of the project activity, please see Annex 4.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

>>

Date of completion of baseline and monitoring study
16/06/2007

Name of persons/entityies determining the baseline and monitoring methodology
Dr. Hongyu LIU
Unit: College of Environmental Science and Engineering, Hunan University
Address: Yuelu Mountain, Changsha, Hunan 410082, P.R.China
E-mail: hyliu@hnu.cn

The person of determining baseline is not a project participant.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
01/01/2008

C.1.2. Expected operational lifetime of the project activity:

>>
22 years 0 month

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

>>

C.2.1.1. Starting date of the first crediting period:

>>
01/01/2008

C.2.1.2. Length of the first crediting period:

>>
7 years 0 month

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

An environmental impact assessment (EIA) had been implemented to ensure that the project complied with national, regional and local environmental regulations. The EIA report has been finished in July 2004, and has been approved by Mianyang Environmental Protection Bureau on the 27th July 2004 (document No: Mian Huan Han [2004]127). That following is a brief summary of the EIA report:

(1) Waste water

The waste water will be generated during the construction periods. The waste water quantity was estimated to be 174 m^3/h from the construction activities[17] and about 32 m^3/d from the worker's daily life[18]. All of these waste water will be treated by waste water treatment systems before drained into Fujiang River. Therefore, the project does not have negative effect on quality of water in nearby area.

(2) Solid waste

The solid waste during the construction and maintenance periods have been estimated in the EIA, all these solid waste will be collected and reused as much as possible. The rest will be carried to the waste residue pits. Therefore, the project will not bring negative impacts on local environment.

(3) Noise pollution

Noise will occur due to the explosion, machinery running and materials transportation at the project site. According to the monitoring results, no noticeable changes will happen beyond 300m from the project site. But the local inhabitants will not suffer from noise pollution because they live far from the project site, and the nearest village, Shuijing Town, is about 600m from the powerhouse [11].

(4) Impacts on the wild animals and vegetables

The dam of the proposed project is only 4.5m in height, thus, no area will flooded due to the proposed project activities, and no inhabitants need to be resettled, too [19].

Detailed search shows that there are no any rare and endangered propagation species in the ecosystem around the project site [20].

For the aquatic creatures, no rare and endangered aquatic species were found in construction area. No fish will disappear due to the construction activity of the proposed project. Moreover, a certain amount of ecological water has been put apart in the Engineering Primary Design Report.

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[17] The Environmental Impact Assessment Report for Pingwu Renjiaba Hydropower Plant, Sichuan Water Resource & Hydropower Reconnaissance and Design Institute, Ministry of Water Resource, August 2004, page 35.

[18] The Environmental Impact Assessment Report for Pingwu Renjiaba Hydropower Plant, Sichuan Water Resource & Hydropower Reconnaissance and Design Institute, Ministry of Water Resource, August 2004, page 36.

[19] The Environmental Impact Assessment Report for Pingwu Renjiaba Hydropower Plant, Sichuan Water Resource & Hydropower Reconnaissance and Design Institute, Ministry of Water Resource, August 2004, page 24.

[20] The Environmental Impact Assessment Report for Pingwu Renjiaba Hydropower Plant, Sichuan Water Resource & Hydropower Reconnaissance and Design Institute, Ministry of Water Resource, August 2004, page 41.

(5) Impact on water and soil erosion

A Water & Soil Conservation Plan for Pingwu Renjiaba 12.6 MW Small Hydropower Project, P.R.China has be prepared in July 2003, and the Plan was approved by Mianyang Water Resources Bureau in October 2004 (document No: Mian Shui Tu Bao [2004]17). In the plan, total amount of soil erosion was predicted, detailed protection measures were identified. Re-vegetation of the disturbed area will be the most important means to project the water and soil erosion. And enhanced monitoring system to insure the Soil and Water Maintenance Plan will be implemented completely was also clearly stated in the Water & Soil Conservation Plan.

(6) Impact on the local social economy

With the proposed project construction, the expected annual electricity generation from the project will be 77458 MWh, which will effectively ameliorate the electricity supply shortage in the project site and also accelerate the local economy development. With the construction of the proposed project, other local industry

such as architecture and material industry will be facilitated.

It can be concluded that the proposed project activity does not have obvious negative effect to the environment on the whole, and will reduce both GHG emissions and local environmental pollutants caused by coal combustion. And there are many beneficial effects such as increase in local residents' living standards, improvement in infrastructure level etc. Therefore the project will have positive impact on socioeconomic environment.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Strict environmental monitoring and mitigation measures will be carried out during the construction and operation phase of the project. Through these measures, the negative environmental impacts arising from the project will be reduced to minimum. Therefore, environmental impacts of the project are considered to be insignificant. Taking into account the contribution to sustainable development for the local and national area, the project will have an overall positive impact on the local and global environment. The EIA report for the proposed project indicated that the project would have significant positive impacts on local environment.

The EIA report has been approved by Mianyang Environmental Protection Bureau on the 27th July 2004 (document No: Mian Huan Han [2004]127)..

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

Comments from the local stakeholders about Pingwu Renjiaba 12.6MW Small Hydropower Project, P.R.China were consulted by visiting, symposium, and questionnaire distribution methods during the environmental impact assessment in June 2004 [21]. The project entity took questionnaires to better understand stakeholders' comments again in January, 2007. Investigated stakeholders included

[21] The Environmental Impact Assessment Report for Pingwu Renjiaba Hydropower Plant, Sichuan Water Resource & Hydropower Reconnaissance and Design Institute, Ministry of Water Resource, August 2004, page 69

representatives from several villages influenced by the project activity and related institutions of different age, different gender, different nationality, different metier, and different educational level. The main consulted people were the direct relative employees, specialists and the inhabitants around the proposed project site.

Total 45 questionnaires were distributed, all of the distributed questionnaires had been returned. All of the opinions from the local stakeholders had been collected and considered. A three-page questionnaire was prepared with the following sections:

1. Environmental impacts

(1) Will construction, operation or decommissioning of the Project use or affect natural resources or ecosystems, such as land, water, forests, habitats, and materials or, especially any resources which are non-renewable or in short supply?
(2) Will the Project involve use, storage, transport, handling, production or release of substances or materials (including solid waste) which could be harmful to the environment?
(3) Will the Project release pollutants or any hazardous, toxic or noxious substances to air?
(4) Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?
(5) Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal wasters or the sea?
(6) Are there any areas on or around the location which are protected under international or national or local legislation for their ecological value, which could be affected by the project?
(7) Are there any other areas on or around the location, which are important or sensitive for reasons of their ecology, e.g. wetlands, watercourses or other water bodies, the coastal zone, mountains, forests or woodlands, which could be affected by the project?
(8) Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, over wintering, migration, which could be affected by the project?
(9) Are there any inland, coastal, marine or underground waters on or around the location which could be affected by the project?
(10) Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present environmental problems?

2. Socioeconomic and Health Impacts

(1) Will the Project involve use, storage, transport, handling, production or release of substances or materials (including solid waste) which could be harmful to human health or raise concerns about actual or perceived risks to human health?
(2) Will the Project release pollutants or any hazardous, toxic or noxious substances to air that adversely affect human health?
(3) Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation that could adversely affect human health?
(4) Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters or groundwater that could adversely affect human health?
(5) Will there be any risk of accidents during construction or operation of the Project which could affect human health?
(6) Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?

(7) Are there any areas on or around the location, protected or not under international or national or local legislation, which are important for their landscape, historic, cultural or other value, which could be affected by the project?
(8) Are there any transport routes or facilities on or around the location which are used by the public for access to recreation or other facilities and/or are susceptible to congestion, which could be affected by the project?
(9) Is the project in a location where it is likely to be highly visible to many people?
(10) Are there existing or planned land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?
(11) Are there any areas on or around the location which is densely populated or built-up, or occupied by sensitive uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project?
(12) Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism and minerals, which could be affected by the project?
(13) Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present socioeconomic problems?

E.2. Summary of the comments received:

>>

The survey received 100% participation (45 questionnaires retuned out 45). The survey shows that stakeholders believe that the project will have positive impacts on the local ecological, environmental, employment, and social life. The survey forms are available from the company.

Question	Answer			
	Yes	No	Quit	Comments
Environmental Impacts				
1	0	100%		
2	0	100%		
3	0	100%		
4	60%	40%		The noise impact is not significant because the project site is far from the inhabitants.
5	0	100%		
6	0	100%		No areas on or around the location which are protected under international or national or local legislation
7	0	100%		The project activity is far from the local inhabitants.
8	0	100%		There are not any important or sensitive species of fauna or flora near the project location.
9	0	100%		
10	0	100%		
Socioeconomic and Health Impacts				
1	0	100%		
2	0	100%		
3	50%	50%		Noise impact is not significant because the location is far from villages.
4	0	100%		

5	0	98%	2%	
6	82%	18%		The project will benefit the local inhabitant by providing employments and improving infrastructure level.
7	0	100%		
8	0	100%		
9	0	100%		
10	12%	88%		No significant impact on the land use because the occupied land was quite little and most of them were wasteland.
11	0	100%		The project location is far from villages.
12	0	100%		
13	0	100%		

E.3. Report on how due account was taken of any comments received:

>>

All in all, the local government and inhabitants are support the project activities. According to the comments received, some protect treatments, such as the re-vegetation in the project site, enhancing monitoring; insuring the Soil and Water Maintenance Plan will be implemented completely.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from parties included in Annex I is available to the project activity.

Annex 3

BASELINE INFORMATION

Table A1 Operation Margin Emission Factor of Central China Power Grid in 2002

Fuel type	Unit	Province in the regional grid						Subtotal	NCV (MJ/t, m^3,tce)	Emission Factor (tC/TJ)	OXID	CO_2 emission (tCO_2)
		Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan					
Raw	Mt	10.6263	46.7902	17.1	11.138	3.9857	19.6432	109.2832	20908	25.8	0.98	211827873.7
Clean Coal	Mt	0.0272	0	0	0	0	0	0.0272	26344	25.8	0.98	66430.5
Other washed coal	Mt	0.0366	0.2649	0	0	2.4999	0	2.8014	8363	25.8	0.98	2171973.1
Coke	Mt	0	0.0115	0	0	0	0	0.0115	28435	29.5	0.98	34663.4
Coke oven gas	Mm^3	0	0	111	0	0	0	111	16726	13	0.995	88054.8
Other coal gas	Mm^3	0	216	0	0	0	0	216	5227	13	0.995	53549.1
Crude oil	Mt	0	0.0067	0.117	0	0	0.0081	0.0265	41816	20	0.99	80449.8
Diesel	Mt	0.01	0.0134	0.0108	0.0219	0.0051	0.0051	0.0663	42652	20.2	0.99	207353.3
Fuel oil	Mt	0.0033	0.0016	0.0034	0.0069	0	0.0151	0.0303	41816	21.1	0.99	97045.2
LPG	Mt	0	0.0002	0	0	0	0	0.0002	50179	17.2	0.995	629.8
Refinery gas	Mt	0.0049	0	0	0.0196	0	0	0.0245	46055	18.2	0.995	73087.1
Natural gas	Mm^3	0	0	0	0	0	175	175	38931	15.3	0.995	380294.1
Other energy	Mt-tce	0	0.0338	0	0	0	0	0.0338	0	0	0	0
Total CO_2 emission	tCO_2											215081402.8
Total electricity generation	GWh	18648	84734	34301	20058	14727	27879	200347				
Self consumption	%	7.67	8.03	7.73	7.73	10.21	9.59					
Electricity delivered to grid	GWh	17218	77930	31650	18508	13223	25205	183733				
EF_{OM}	tCO_2e/ MWh											1.17062

Data source: China Energy Statistics Yearbook 2003
China Electric Power Yearbook 2003

Table A2 Operation Margin Emission Factor of Central China Power Grid in 2003

Fuel type	Unit	Province in the regional grid						Subtotal	NCV (MJ/t, m^3,tce)	Emission Factor (tC/TJ)	OXID	CO_2 emission (tCO_2)
		Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan					
Raw	Mt	14.274	55.049	20.72	16.465	7.6947	24.309	138.517	20908	25.8	0.98	268492109.1
Other washed coal	Mt	0.0203	0.3963	0	0	1.0612	0	1.4778	8363	25.8	0.98	1145763.5
Coke	Mt	0	0	0	0.0122	0	0	0.0122	28435	29.5	0.98	36773.3
Other coal gas	Mm^3	0	0	93	0	0	0	93	16726	13	0.995	73775.6
Crude oil	Mt	0	0.005	0.002	0	0	0.012	0.0194	41816	20	0.99	58895.3
Diesel	Mt	0.0052	0.0254	0.007	0.0121	0.0077	0	0.0573	42652	20.2	0.99	179205.8
Fuel oil	Mt	0.0042	0.0025	0.022	0.0054	0.0028	0.012	0.0486	41816	21.1	0.99	155656.7
Refinery gas	Mt	0.0176	0.0653	0	0.0066	0	0	0.0895	46055	18.2	0.995	273694.3
Natural gas	Mm^3	0	0	0	0	4	220	224	38931	15.3	0.995	486776.4
Other energy	Mt-tce	0	0.1104	0	0	0.162	0	0.2724	0	0	0	0
Total CO_2 emission	tCO_2											
Total electricity generation	GWh	27165	95518	39532	29501	16341	32782	240839				
Self consumption	%	6.43	7.68	3.81	4.58	8.97	4.41					
Electricity delivered to grid	GWh	25418	88182	38026	28150	14875	31336	225988				
EF_{OM}	tCO_2e/ MWh											1.19875

Data source: China Energy Statistics Yearbook 2004
China Electric Power Yearbook 2004

Table A3 Operation Margin Emission Factor of Central China Power Grid in 2004

Fuel type	Unit	Province in the regional grid						Sub total	NCV (MJ/t, m^3,tce)	Emission Factor (tC/TJ)	OXID	CO_2 emission (tCO_2)
		Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan					
Raw	Mt	18.638	69.285	25.105	21.979	8.755	27.479	171.441	20908	25.8	0.98	332310753.2
Clean Coal	Mt	0	0.0234	0	0	0	0	0.0234	26344	25.8	0.98	57149.8
Other washed coal	Mt	0.4893	1.0422	0	0	0.8972	0	2.4287	8363	25.8	0.98	1883012.4
Coke	Mt	0	1.0961	0	0	0	0	1.0961	28435	29.5	0.98	3303869.9
Coke oven gas	Mm^3	0	0	168	0	34	0	202	16726	13	0.995	160243.8
Other coal gas	Mm^3	0	0	0	0	261	0	261	5227	13	0.995	64704.0
Crude oil	Mt	0	0.0086	0.0022	0	0	0	0.0108	41816	20	0.99	32787.1
Gasoline		0	0.0006	0	0	0.0001	0	0.0007	42652	20.2	0.99	2068.4
Diesel	Mt	0.0002	0.0386	0.0107	0.0172	0.0114	0	0.0781	41816	21.1	0.99	263961.0
Fuel oil	Mt	0.0109	0.0019	0.0955	0.0138	0.0048	0.0168	0.1437	50179	17.2	0.995	460244.2
Refinery gas	Mt	0.0352	0.0227	0	0	0	0	0.0579	46055	18.2	0.995	0
Natural gas	Mm^3	0	0	0	0	0	227	227	38931	15.3	0.995	177060.3
Other energy	Mt-tce	0	0.1692	0	0.152	0.2095	0	0.5307	0	0	0	0
Total CO_2 emission	tCO_2											339209149.9
Total electricity generation	GWh	30127	109352	43034	37186	16520	34627	270846				
Self consumption	%	7.04	8.19	6.58	7.47	11.06	9.41					
Electricity delivered to grid	GWh	28006	100396	40202	34408	14693	31369	249074				
EF_{OM}	tCO_2e/ MWh											1.36188

Data source: China Energy Statistics Yearbook 2005
China Electric Power Yearbook 2005

Table A4 Operation Margin Emission Factor of Central China Power Grid (Weighted Average)

Item	Unit	2002	2003	2004	Weighted average
Total CO_2 emission	tCO_2e	215081402.8	270902650	339209149.9	
Electricity delivered to the grid	GWh	183733384.7	225987719.2	249074186.3	
Operation margin (OM)	tCO_2e/MWh	1.170616887	1.198749432	1.361879988	1.252579086

Table A5 Share of emission from Coal, Oil and Gas fuel in electricity generation in CCPG

Fuel type	Unit	Province in the regional grid						Sub total	NCV (MJ/t, m^3,tce)	Emission Factor (tC/TJ)	OXID	CO_2 emission (tCO_2)
		Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan					
Raw	Mt	18638.0	69485.0	25105.0	21979.0	8755.0	27479.0	171441	20908	25.8	0.98	332310753.2
Clean Coal	Mt	0	23.4	0	0	0	0	23.4	26344	25.8	0.98	57149.8
Other washed coal	Mt	489.3	1042.2	0	0	897.2	0	2428.7	8363	25.8	0.98	1883012.4
Coke	Mt	0	1096.1	0	0	0	0	1096.1	28435	29.5	0.98	3303869.9
Total coal	Mt											**337554785**
Crude oil	Mt	0	8.6	2.2	0	0	0	10.8	41816	20.00	0.99	32787.1
Gasoline	Mt	0	0.6	0	0	0.1	0	0.7	430701	18.90	0.99	2068.4
Kerosene	Mt	0	0	0	0	0	0	0	43070	19.60	0.99	0
Diesel	Mt	0.2	38.6	17.0	17.2	11.4	0	84.4	42652	20.20	0.99	263961.0
Fuel oil	Mt	10.9	1.9	95.5	13.8	4.8	16.8	143.7	41816	21.10	0.99	460244.2
Other oil products	Mt	0	0	0	0	0	0	0	38369	20.00	0.99	0
Total oil	Mt											**759060**
Natural gas	Mm^3	0	0	0	0	0	227	227	38931	15.30	0.995	493296
Coke oven gas	Mm^3	0	0	168	0	34	0	202	16726	13.00	0.995	160243.8
Other coal gas	Mm^3	0	0	0	0	26.1	0	261	5227	13.00	0.995	64704.0
LPG	Mt	0	0	0	0	0	0	0	50179	17.20	0.995	0
Refinery gas	Mt	35.2	22.7	0	0	0	0	57.9	46055	18.20	0.995	177060.3
Total gas	Mt											**895304**
Total of Coal, Oil and Gas												**339209149**

λ_{Coal} = 99.51%, λ_{Oil} = 0.22%, λ_{Gas} = 0.27%

Data source: Energy statistics Yearbook 2005
China DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf。

Table A6 Installed Capacity of CCPG in 2004

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal plant	MW	5496	21788.5	9509.3	6779.5	3271.1	6900.3	53744.7
Hydropower plant	MW	2549.9	2438	7415.1	7448.2	1407.9	13382.9	34642
Others	MW	0	0	0	0	0	0	0
Total	MW	8045.9	24226.5	16924.4	14227.8	4679	20283.2	88386.8

Table A7 Installed Capacity of CCPG in 2001

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal plant	MW	4869.8	15349	8077.3	4997.8	2898.3	6377	42569.2
Hydropower plant	MW	2067.8	2438	7125.6	5966.1	1268	11531.5	30397
Others	MW	0	0	0	0	0	0	0
Total	MW	6937.6	17787	15202.9	10963.8	4166.3	17908.5	72966.1

Table A8 Installed Capacity of CCPG in 2000

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal plant	MW	4474.3	13789	8038.8	4477.4	2995	6090.1	39864.6
Hydropower plant	MW	1846	1528	7070.5	5858	1327	11008.3	28637.8
Others	MW	0	0	0	0	0	0	0
Total	MW	6320.3	15317	15109.3	10335.4	4322	17098.4	68502.4

Table A9 Building Marge Emission Calculation of CCPG

Item	Installed Capacity (MW)			2000-2004 newly installed capacity (MW)	Percentage to the newly installed capacity
	2000	2001	2004		
	A	B	C	D=C-A	
Thermal plant	39864.6	42569.2	53744.7	13880.1	69.80%
Hydropower plant	28637.8	30397	346420	6004.2	30.20%
Others	0	0	0	0	0%
Total	68502.4	72966.2	88386.7	19884.3	100.00%
Percentage to that in 2004	77.5%	82.55%	100%		

Table A10 Calculation parameter of BM

	Variation	Power supply efficiency	Emission factor (tc/TJ)	OXID	CO_2 emission (TCO_2/MWh)
		A	**B**	**C**	D=3.6/A/1000*B*C*44/12
Coal plant	EFcoal,adv	36.53%	25.8	0.98	0.9136
Gas plant	EFgas,adv	45.87%	15.3	0.995	0.4381
Oil plant	EFoil,adv	45.87%	21.1	0.99	0.6011
CCPG BM					0.6346

Data source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf

Table 11 Baseline emission factor of Central China Power Grid (CCPG, tCO_2/MWh)

Operation Margin Emission Factor	A	1.2526
Build Margin Emission Factor	B	0.6346
Combined Emission Factor	C = 0.5*A + 0.5 *B	0.9436

Annex 4

MONITORING INFORMATION

CDM Monitoring System Procedures

This CDM monitoring System Procedure includes the contents as following:

(1) CDM staff training
(2) CDM data and record keeping arrangements
(3) Data collection
(4) CDM data quality control and quality assurance
(5) Equipment maintenance
(6) Equipment calibration

The contents in each section are described as following:

(1) CDM staff training

This section outlines the steps to ensure that staff receives adequate training to collect and archive complete and accurate data necessary for CDM monitoring. All staff on site should be trained prior to performing any monitoring duties for the CDM project.

(2) CDM data and record keeping arrangements

This section provides details of the sites data and record keeping arrangements. The arrangements ensure that complete and accurate records are retained by the CDM Manager within the quality control system. Data and records will be stored and archived according to this procedure.

All data and records should be managed following this procedure. All staff is responsible for ensuring that any data or records are dealt with according to this procedure.

(3) Data collection

This section will outline the steps to collect the data from the main grid company electricity meter and the back up meter. The data collection of the revenue meter should be agreed on by the grid company and the project developer.

(4) CDM data quality control and quality assurance

Data and records will be checked prior to being stored and archived. Data from the project will be checked to identify possible errors or omissions. The data checks will include cross checks of the two electricity meters, and checks of the electricity figures on the receipts. All records will be checked for completeness.

All staffs are responsible for ensuring the collection and archiving of complete and accurate data and records.

(5) Equipment maintenance

This section outlines the steps to provide regular and preventative maintenance to the main electricity

meter and the backup electricity meter.

This procedure should be followed by all staff involved in checking and maintaining the on site electricity meter. The revenue meter will be sealed by the project developer and the grid company jointly. One party cannot unseal or modify the electricity meter in the absence of the other party.

(6) Equipment calibration

This procedure details the process of organizing and managing the calibration process. The procedure includes details of how a suitable company or organization is commissioned to undertake the calibration to the relevant standards.

The calibration of the electricity meters will be conducted by a suitable company according to the relevant standards. The CDM Manager is responsible for organizing the calibration and ensuring that records are retained.

(7) Equipment failure (both meters)

This procedure details the process of data collection in the case that a problem with both the revenue and the backup meter occur. This procedure should be agreed by the grid company and the project developer.

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