Project design document form for CDM project activities

(Version 05.0)

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Guangrun Hydropower Project in Hubei Province, P.R. China
Version number of the PDD	6.0
Completion date of the PDD	04/12/2014
Project participant(s)	Guangrun Hydropower Development Company Ltd. Endesa Generación, S.A. ; Hidroeléctrica del Cantábrico, S.A. ; Kingdom of Spain –Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness; Gas Natural SDG, S.A. ; EDP – Energias de Portugal, S.A. Government of Luxembourg – Ministry of the Environment; Ministry for the Environment, Land and Sea; Netherlands' Ministry of Infrastructure and the Environment (IenM); Schweizerische Rückversicherungsgesellschafts AG (Swiss RE); Kingdom of Belgium – Walloon Region Ministry of the Environment; Bruxelles Environnement – IBGE; BASF SE; KfW; Daiwa Securities Co. Ltd. ; FUJIFILM Corporation; Idemitsu Kosan Co., Ltd.; JX Nippon Oil & Energy Corporation; The Okinawa Electric Power Corporation, Incorporated; Ruukki Metals Oy; Göteborg Energi AB; Statkraft Carbon Invest AS; Statoil ASA; Kommunalkredit Public Consulting GmbH Bilateral and Multilateral Funds: Community Development Carbon Fund Managing Entity: International Bank for Reconstruction and Development (IBRD) as Trustee of the Community Development Fund (CDCF)
Host Party	People's Republic of China
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral Scope: 1 Energy industries Selected methodology: ACM0002 (version 06) – “Consolidated baseline methodology for grid-connected electricity generation from renewable source”
Estimated amount of annual average GHG emission reductions	83,652 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Guangrun Hydropower Project in Hubei Province, P.R. China (GHP), a hydropower project with reservoirs, is located in Jianshi County, Enshi Tujia and Miao Minority Autonomous Prefecture. The GHP includes two small reservoirs with a total flooded area of 0.87 km^2 (0.63km^2 for Zhamushui and 0.24km^2 for Hongwawu, data source: Feasibility Study Report of the project) and reservoir storage capacity of 24.99 million m^3 and four small-sized hydropower stations (Hongwawu I and II stations, Zhamushui station and Kongzishan station) with a total installation capacity of 28.4 MW. The average power density of GHP is 32.6 W/m^2 (defined as installed generation capacity divided by the flooded surface area, see also http://cmd.unfccc.int/meetings/023/eb23_repan5.pdf). The annual generation from the GHP is expected to be 90.4935 GWh. The GHP will be connected to Jianshi electricity network, which is part of the Hubei Provincial Power Grid (HPPG) and Central China Power Grid (CCPG).

Currently the Jianshi network is importing peak power from and sell seasonal surplus power to the HPPG. The GHP will reduce import and increase export of electricity to HPPG and CCPG, and subsequently displace power generation by coal-fired thermal power plants in dry season. The estimated average annual greenhouse gas (GHG) emission reductions during the first crediting period will be 83,652 tCO_2e.

As a renewable energy project, GHP will produce positive environmental and economic benefits and contribute to the local sustainable development. The specific sustainable development benefits of the project include:

- Consistence with China's national energy policy and alleviation of power shortage in local case.
- Supply of zero-emitting renewable energy to the HPPG and CCPG, thus decreased environmental pollution caused by fossil-fuel fired plants.
- Increased income of local government and residents, thus alleviation of poverty in Enshi Tujia and Miao Minority Autonomous Prefecture.
- Improved flood control standard and water supply quality of more than 70,000 people in Jianshi country.
- Job generation (more than 1500 jobs during the construction period and 60 permanent staff positions during operation).
- Improved local transport routes for local villagers and local goods sales.
- Implementation of Community Benefit Development Plan (CBDP) covering construction of transportation system, irrigation and drinking water system, reparation of teaching building for primary school, education training program for local villagers, development of ethnic cultures.

A.2. Location of project activity

A.2.1. Host Party

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P.R. China

A.2.2. Region/State/Province etc.

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Hubei Province

A.2.3. City/Town/Community etc.

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Jianshi County, Enshi Tujia and Miao Minority Autonomous Prefecture

A.2.4. Physical/Geographical location

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The project activity is located in the southwest corner of Hubei Province, Jianshi County, Enshi Tujia and Miao Minority Autonomous Prefecture. The GHP includes two small reservoirs and four small-sized hydropower stations (Hongwawu I and II stations, Zhamushui station and Kongzishan station). Hongwawu hydropower plant is located on the Hongwawu River, a tributary of the Zamushui River in Jianshi county, about 30 km away from the Jianshi county seat. Zhamushui hydropower plant is located on the Zhamushui River (upper reaches of the Guangrun River) in Jianshi county, about 3.5 km away from Jianshi county seat. Kongzishan station is located on the Zhamushui River in northwest of Jianshi county, about 5.5 km away from Jianshi county seat. The map below shows the location of the proposed project.

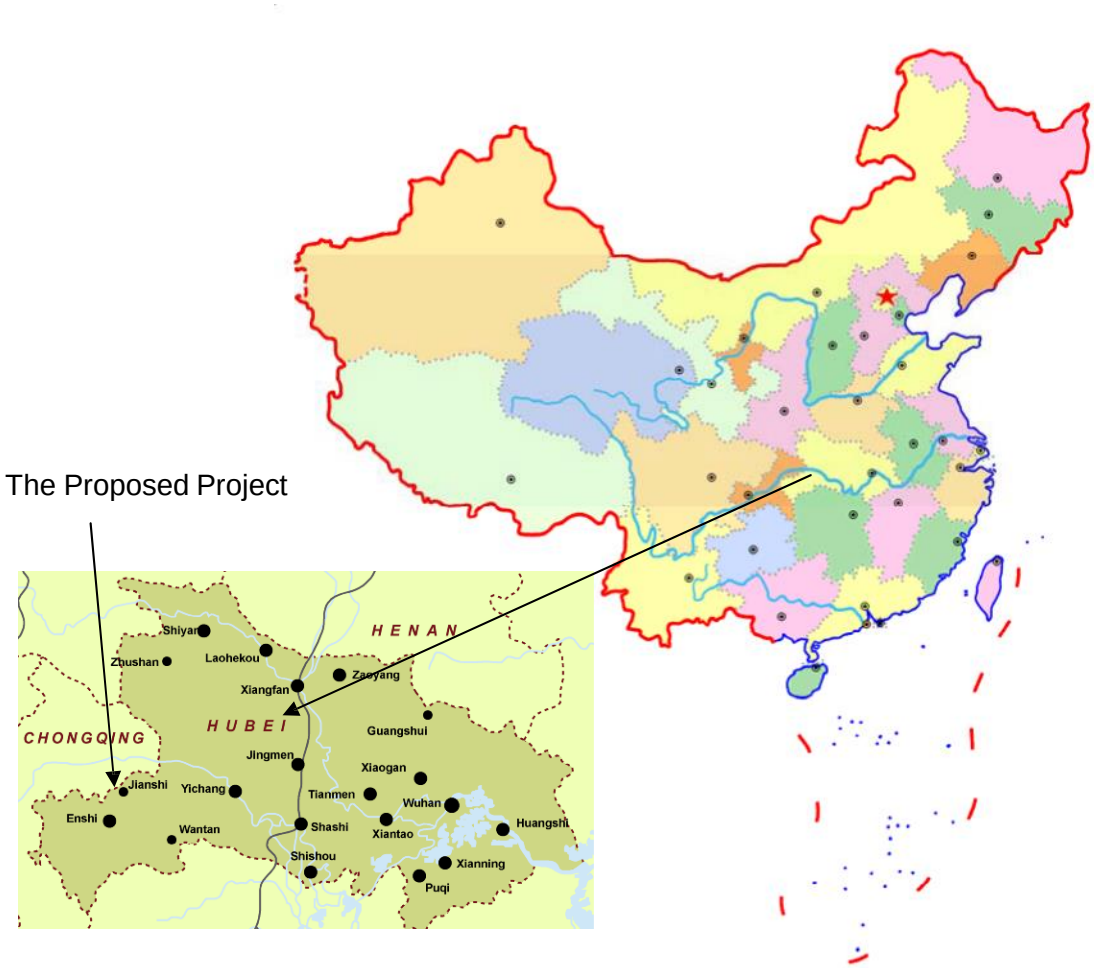

Figure 1. Geographical location of Guangrun Hydropower Project

A.3. Technologies and/or measures

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Category(ies) of project activity: Category 1, energy industries(renewable sources)

The GHP is a 28.4 MW hydropower project with two reservoirs of about 24.99 million m^3 storage. The GHP includes two components: Hongwawu hydropower plant and Zhamushui hydropower plant. Hongwawu hydropower plant includes a concrete slab rock-fill dam with height of 41.5m, a reservoir of 4.98 million m^3, two diversion tunnels, two powerhouses (powerhouse I in 8MW and Powerhouse II in 10MW) and a 4.6 km long 35 kV transmission line to Zhamushui substation.

Kongzishan station includes two 200kW horizontal hydro-generating units, a 0.4/10kV substation and a 10kV transmission line to Zhamushui substation. Zhamushui hydropower plant includes a double-curvature arch dam with height of 77.5 m, a reservoir of 20.01 million m^3, an intake tunnel, a 10MW powerhouse, a 35/110 kV substation and 12 km long 110 kV transmission line to existing Jianshi Substation.

The water head is formed taking advantage of the natural height drop, which then enters into the pressure adjustment well. The hydraulic pressure of the water is increased through high pressure pipeline then the water flows into the power house and drives the generators to produce electricity.

All technologies utilized in the GHP project are domestic technologies without technology transfer from other countries.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Guangrun Hydropower Development Company Ltd.	No
Spain	Endesa Generación, S.A. ; Hidroeléctrica del Cantábrico, S.A. ; Kingdom of Spain – Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness; Gas Natural SDG, S.A. ; EDP – Energias de Portugal, S.A.	Yes
Luxembourg	Government of Luxembourg – Ministry of the Environment	Yes
Italy	Ministry for the Environment, Land and Sea	Yes
Netherlands	Netherlands' Ministry of Infrastructure and the Environment (IenM)	Yes
Switzerland	Schweizerische Rückversicherungsgesellschafts AG (Swiss RE)	No
Belgium	Kingdom of Belgium – Walloon Region Ministry of the Environment; Bruxelles Environnement – IBGE	No
Germany	BASF SE ; KfW	No
Japan	Daiwa Securities Co. Ltd.; FUJIFILM Corporation ; Idemitsu Kosan Co., Ltd. ; JX Nippon Oil & Energy Corporation ; The Okinawa Electric Power Corporation, Incorporated	No

Finland	Ruukki Metals Oy	No
Sweden	Göteborg Energi AB	No
Norway	Statkraft Carbon Invest AS; Statoil ASA	No
Austria	Kommunalkredit Public Consulting GmbH	No

Bilateral and Multilateral Funds: Community Development Carbon Fund Managing Entity: International Bank for Reconstruction and Development (IBRD) as Trustee of the Community Development Fund (CDCF).

A.5. Public funding of project activity

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No public funding from Annex 1 countries is provided to the proposed project. The funding to purchase carbon emission reduction credit is from Community Development Carbon Fund (CDCF) entrusted at the World Bank, which is a special fund set by nine governments including Netherlands Government and 15 corporations/organizations. The CDCF aims to combine community development attributes with emission reductions to create "development plus carbon" credits, and significantly improve the lives of the poor and their local environment. It does not result in a diversion of official development assistance.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

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ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable source” version 06 (referred as The Methodology). More information about The Methodology can be found on the website:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

The approved monitoring methodology ACM0002: “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”. This methodology is available on the following website:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2. Applicability of methodology and standardized baseline

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The Methodology is applicable to the proposed project for the following reasons:

- The proposed project is a grid-connected (connected with Hubei grid, then Central China Power Grid) hydro power project, then a grid-connected generation project from renewable source.
- The power density of the proposed project is 27.56W/m^2 (13.16W/m^2 for Zhamushui station and Kongzishan station and 74.94W/m^2 for Hongwawu station). According to the “Thresholds and criteria for the legibility of hydroelectric power plants with reservoirs as CDM project activities” (http://cdm.unfccc.int/meetings/023/eb23_repan5.pdf), the project emissions from the reservoir may be neglected.
- The proposed project is not an activity that involves switching from fossil fuels to renewable energy at the proposed site.
- The power grid (the Central China Power Grid) which the proposed project is to be connected to is clearly identified and information on the characteristics of this grid is publicly available.

Therefore, the proposed project meets the applicability criteria of The Methodology.

The justifications of applying ACM0002 monitoring methodology to the proposed project are as follows:

- The proposed project is a grid-connected (connected with Hubei grid, then Central China Power Grid) hydro power project, then a grid-connected generation project from renewable source.
- The power density of the proposed project is 27.56W/m^2 (13.16W/m^2 for Zhamushui station and Kongzishan station and 74.94W/m^2 for Hongwawu station). According to the “Thresholds and criteria for the legibility of hydroelectric power plants with reservoirs as CDM project activities” (http://cdm.unfccc.int/meetings/023/eb23_repan5.pdf), the project emissions from the reservoir may be neglected.
- The proposed project is not an activity that involves switching from fossil fuels to renewable energy at the proposed site.
- The power grid (the Central China Power Grid) which the proposed project is to be connected to is clearly identified and information on the characteristics of this grid is publicly available.
- The ACM0002 monitoring methodology shall be applied in conjunction with ACM0002 baseline methodology.

B.3. Project boundary

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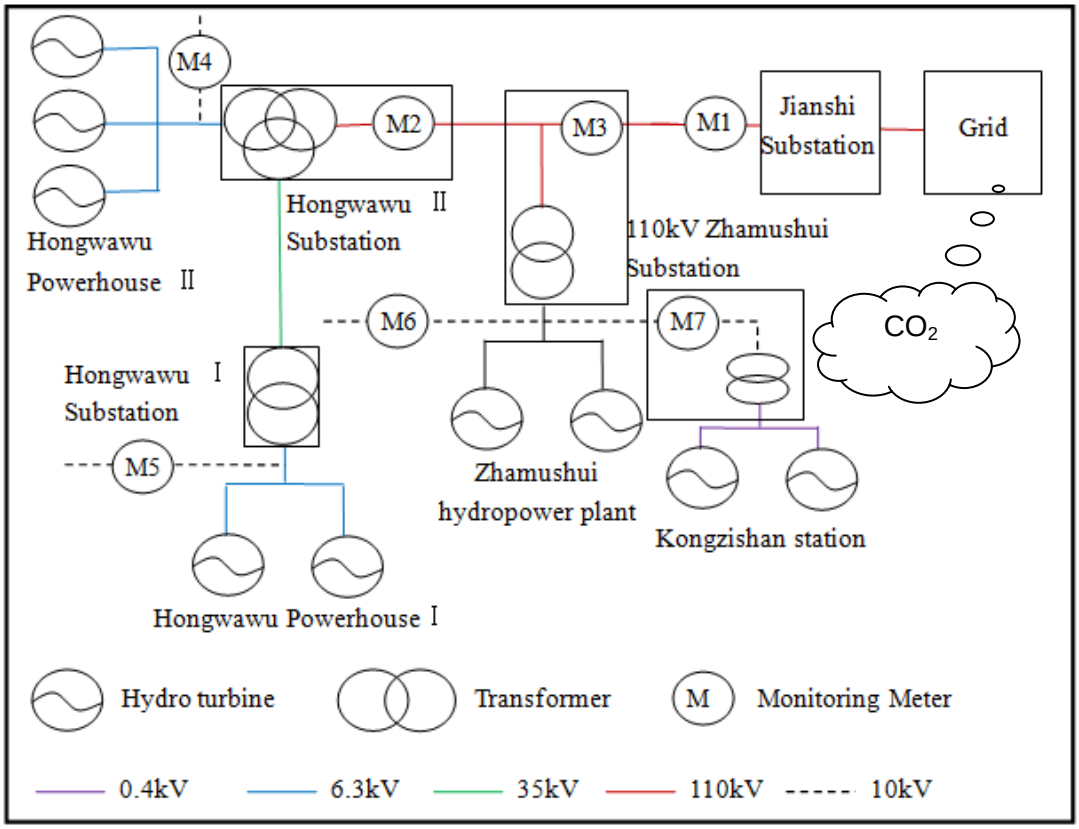
According to the relevant definition of project boundary in ACM0002 ver 06, for the proposed project, the project and other power plant connected to the Central China Power Grid (including Jiangxi Province, Henan Province, Hubei Province, Hunan Province, Sichuan Province and Chongqing) are defined as the project boundary (see http://www.sp.com.cn/zgdl/dlgk/gdq_dwt.html). For the CCPG is a net export grid (see http://www.sp.com.cn/zgdl/spw/12y/kqsdl.htm), the electricity import is not put into consideration when calculating the emission factors. There is no leakage and indirect emission for the project.

The power density of the proposed project is 27.56W/m^2 (13.16W/m^2 for Zhamushui station and Kongzishan station and 74.94W/m^2 for Hongwawu station). According to the "Thresholds and criteria for the legibility of hydroelectric power plants with reservoirs as CDM project activities" (http://cdm.unfccc.int/meetings/023/eb23_repan5.pdf), the project emissions from the reservoir may be neglected.

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	The proposed project	CO_2	No	According to methodology, the proposed project is a hydropower plant, so it does not involve CO_2 emission
		CH_4	No	According to methodology, the proposed project is a hydropower plant, so it does not involve CH_4 emission
		N_2O	No	According to methodology, the proposed project is a hydropower plant, so it does not involve N_2O emission

The flow diagram of the project boundary is illustrated in the following figure.



B.4. Establishment and description of baseline scenario

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The GHP is located in Jianshi county, Enshi Prefecture. It will be connected to Jianshi electricity network, which is part of the Hubei Provincial Power Grid (HPPG). Currently the Jianshi network is importing peak power from and sells seasonal surplus power to the HPPG then Central China Power Grid (CCPG).

CCPG is dominated by thermal plants. In 2004, the total amount of power generation within CCPG was 401510 GWh, of which 270846 GWh came from thermal power plants, about 70% of the total. Such situation will not change in the near future.

Without the CER revenue, the proposed project activity is financially unattractive. Since the project sponsor has no obligation to develop such projects, then the sponsor will not choose to build the project. Therefore, the emission reduction to be achieved by this project is additional.

Therefore, without the project activity, the unmet power demand will be satisfied by newly built coal- fired power plants and existing plants. The proposed project is a renewable energy project to displace part of electricity generated by fossil fuel-fired plants, thus mitigate GHGs emissions from fossil fuel combustion.

B.5. Demonstration of additionality

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The following steps are used to demonstrate the additionality of the project according to "Tools for the demonstration and assessment of additionality" agreed by Executive Board and requested by the baseline methodology (ACM0002, version 06).

Step 0. Preliminary screening based on the starting date of the project activity.

This step is not applicable because the crediting period of the project will start from the date of registration.

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

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

The project sponsor is a small-scale hydro project developer, then the possible alternatives to the project includes:

1) The proposed hydropower plant development not undertaken as a CDM project activity.
2) The CCPG as the provider for the same capacity and electricity output as the proposed project.

Sub-step 1b. Enforcement of applicable laws and regulations.

The applicable legal and regulatory requirement for the proposed project include laws, central government regulations, local regulations, departmental rules and disciplines related to electricity and environment protection.

The related laws and regulations can be found and downloaded on the website of State Electricity Regulatory commission (SERC), Ministry of Water Resource and National Development and Reform Commission (NDRC): http://www.serc.gov.cn/opencms/export/serc/zwgk/jggz/index.html, http://www.shp.com.cn/zcfg/index.asp and http://nyj.ndrc.gov.cn.

There is no forced obligation for the project sponsor therefore these two alternatives are all in compliance with all applicable legal and regulations.

Step 2. Investment analysis.

Sub-step 2a. Determine appropriate analysis method.

In “Tools for the demonstration and assessment of additionality”, three options can be applied for the investment analysis: the simple cost analysis, the investment comparison analysis and the benchmark analysis.

The simple cost analysis is not applicable for the proposed project because the project activity will produce economic benefit (from electricity sale) other than CERs income. The investment comparison analysis 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 to compare with. Then the benchmark analysis will be used to identify whether the financial indicators, Financial Internal Return Rate (FIRR) in this project is better than relevant benchmark value.

Sub-step 2b. Apply benchmark analysis.

According to the “Economical assessment and parameters for construction project, 2nd edition”, a project will be financially acceptable when the Financial Internal Return Rate (FIRR) is better than the sectoral benchmark FIRR.

The sectoral benchmark FIRR on total investment for power projects is 8%.

Sub-step 2c. Calculation and comparison of financial indicators.

Table 1 Main parameters for calculation of financial indicators

Items	Unit	Amount	Source
Capacity	MW	28.4	Preliminary Design Report
Total Investment	Million Yuan	276.2576	Preliminary Design Report
Annual output	GWh/year	90.4935	Preliminary Design Report
Electricity Tariff (Including VAT)	Yuan/kWh	0.358	Power Purchase Agreement
Value Added Tax (VAT)	%	17	Preliminary Design Report
Income tax	%	33	Preliminary Design Report
Expected CERs Price	$/tCO$_2$	11	
Project life time	Year	32 (2 years construction time plus 30 years operational time of the project)	Preliminary Design Report
Depreciation Rate	%	3.96	Financial Analysis prepared by WB
Material cost	Yuan/kW	5.71	Financial Analysis prepared by WB
Reservoir Maintenance	Yuan/kWh	0.001	Financial Analysis prepared by WB
Cost			
Water Resources	Yuan/kWh	0.003	Financial Analysis prepared by WB
Annual Wages	Yuan/Year	20000	Financial Analysis prepared by WB
Staff Number	Number	62(40+22)	Financial Analysis prepared by WB
Welfare	%	14	Financial Analysis prepared by WB
Medical and Retirement	%	35	Financial Analysis prepared by WB
Repair cost	%	1	Financial Analysis prepared by WB
Administration Cost	Yuan/kW	27.41	Financial Analysis prepared by WB
Expected CERs price	$/ton	5.5	Financial Analysis prepared by WB

The financial indicators (FIRR) with and without income from CERs sales are listed below. Without income from CERs sales, the FIRR of the proposed project is lower than the benchmark FIRR then the proposed project is financially unacceptable because of its low profitability. With income from CERs sales, the financial acceptance will be dramatically improved, the FIRR of the proposed project is close to the benchmark than financially acceptable.

Table 2 Comparison of financial indicators with and without income from CERs[1]

Items	Unit	Without income from CERs	Benchmark	With income from CERS
FIRR on total investment	%	5.44	8	6.72

Sub-step 2d. Sensitivity analysis.

Three factors are considered in the following sensitivity analysis:

1) Total investment.
2) Annual operation and maintenance cost.
3) Annual output.

The tariff is not considered in the sensitivity analysis because the tariff of hydro power units is regulated by the regulating entities.

Assuming the above three factors vary in the range of -10%-+10%, the FIRR of the proposed project (without income from CERs sales) varies to different extent, as shown in Figure 1.

The change of annual output is the most important factor affecting the financial attractiveness of the proposed project. The next important factor for financial attractiveness is the total investment. The impact of the annual O&M cost is the slightest. When the annual average output is increased by 26.34%, the FIRR begins exceed the investment benchmark. Considering the average annual electricity output is estimated through a long series hydrology data, the average electricity output cannot change too much. When the investment is decreased by 21.87%, the FIRR begins exceed the investment benchmark. Considering the material cost and fuel cost are all increasing during recent years in China, the total investment cannot decrease so much. Then within the reasonable range of annual output, investment and annual O&M cost, the FIRR of proposed project is always lower than the investment benchmark, then lack of financial attractiveness.

[1] The IRR calculation process in *Final Report of Financial Analysis on New Component of Hubei Province Generation Expansion Strategy Project* could not be acquired due to the lack of the IRR calculation spreadsheet in excel version. Hence, in the investment analysis, a new IRR calculation spreadsheet was developed based on the parameters in Table 1 of the revised PDD and the *Preliminary Design Report*, which was in accordance with the current commonly used approach of IRR calculation.

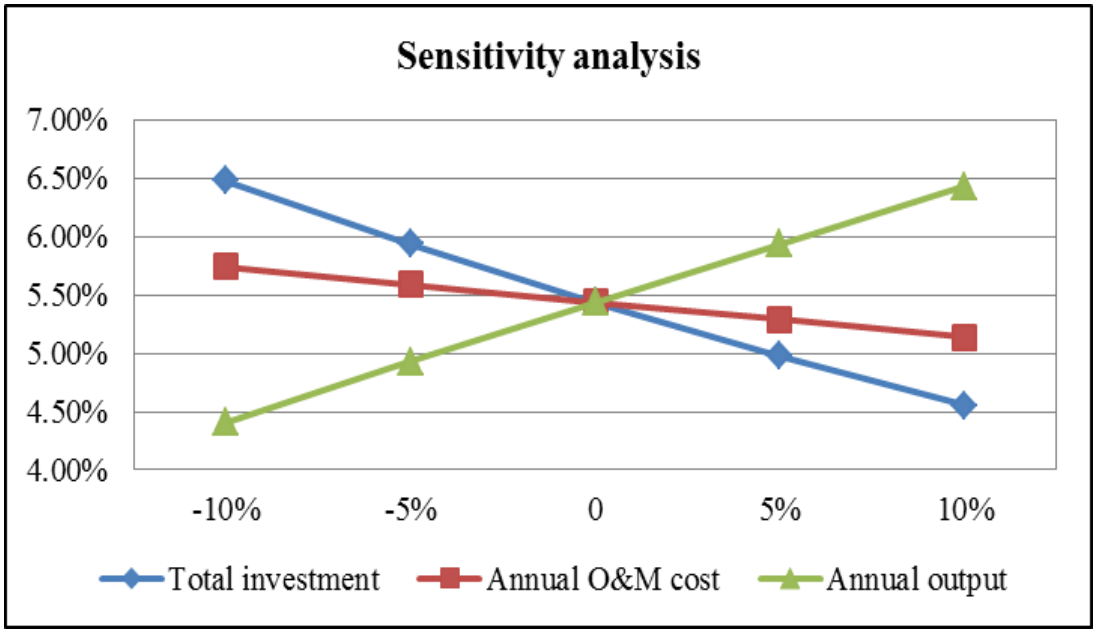

Figure 1 Sensitivity analysis of the Project

To conclude, without the income from CERs sales, the project sponsor would not invest to develop this project because of its poor financial attractiveness.

Step 4. Comment practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity.

The existing hydro power with a capacity under 50MW in Hubei province can be defined as the activities similar to the GHP. The existing hydro power plant is listed in the following table:

Table 3 Hydro power plants installed or under construction since Year 2000

Name of project	Project Sponsor	Installed capacity	Memo
Xiaoxikou (小溪口)	SDIC & Jianshi Xiaoxikou Hydropower Co. Ltd.	30MW	Main Shareholder: State Development Investment Corporation. State level
Fushui (富水)	Hubei Chuangyuan Power	37MW	Listed Company in A Share Market of China. State level
Taohuashan (桃花山)	Hubei Hefeng Taohuashan Hydropower Co.Ltd.	34.4MW	Main Shareholder: State Development Investment Corporation. State level
Zhaolaihe (招徕河)	Changyang Zhaolaihe Hydropower Co. Ltd	36MW	Loan from Japan Bank of International Cooperation (JBIC) with 40 years and 1% interest
Dalongtan (大龙潭)	Qingjiang Dalongtan Hydropower Co. Ltd	36MW	Loan from Japan Bank of International Cooperation (JBIC) with 40 years and 1% interest
Najitan (纳吉滩)	Hubei Laifeng Najitan Hydropower Co. Ltd	36MW	Applying for CDM[2]
Bajiaohe (芭蕉河)	Hubei Bajiaohe Hydropower Co. Ltd	35MW	Main Shareholder: Hubei Electric Power Company.

[2] http://www.lfmzj.cn/ns_detail.php?id=103343&nowmenuid=148750&cpath=&cpath=&catid=0

			Provincial level

Source: China Hydro Statistic Yearbook 2001, China Hydro Statistic Yearbook 2005, Hubei Statistic Yearbook 2004, Hubei Statistic Yearbook 2005.

Sub-step 4b. Discuss any similar options that accruing.

The existing hydro project in Hubei province do not call into question the claim that the proposed project is financially unattractive as discussed in Step 2 because there are essential distinctions between them. Firstly, most of the existing hydro projects listed in table 3 are developed by a state-level or provincial developer, before the Electricity Power sector reform started in 2003. As a county-level developer, the project developer, Guangrun Hydropower Development Ltd. Company lacks proven capacity to access financing, against the project risk and the ability to negotiate with the grid company.

Even the SDIC & Jianshi Xiaoxikou Hydropower Co. Ltd developed by the state-level developer, SDIC, is a lossmaker. In 2004, it produced a 5.76 million yuan loss for the owner. Secondly, some of the listed projects in table 3 are benefit from the JBIC loan which is a long-term ODA loan with low interest.

To conclude, the existence of these projects in table 3 does not contradict the claim that the proposed project activity is financially unattractive.

Step 5. Impact of CDM registration.

If the proposed project could be approved and registered successfully, the following positive benefits can be predicted:

The income from CERs sales would greatly improve the financial indicators of the proposed project and overcome the investment benchmark. The project owner would be more confident in successful implementation of the proposed project.

In conclusion, the proposed project is additional.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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The Methodology will be used to calculate GHGs emission reduction of The Project. Without the proposed project, the actual demand will be met by the continuing operation of the existing and future expansion of grid-connected power plant.

According to the most recent definition of “project boundary” in The Methodology, the Central China Power Grid (CCPG) is selected according to the Chinese DNA guidance. The baseline emission factor (CM) is calculated as the simple average of the Operating Margin emission factor (OM) and the Build Margin emission factor (BM) by utilizing the installed capacity, electricity generation, different types of fuel consumption data for the recent 3-5 years. In accordance with The Methodology, the baseline emission factor can be calculated following the 4 steps described below:

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

According to The Methodology, dispatch data analysis should be the first methodological choice when the dispatch data (the grid system dispatch order, the amount of power that is dispatched from all plants in the system during each hour) is available.

For The Project, the simple Operating Margin emission factor was chosen based on the following two reasons:

1. In China, the State Grid Corporation run the interregional dispatch system, and each regional grid corporation run the intraregional dispatch system. The dispatch information is regarded as business secrets and not available to the public.
2. For the most recent 5 years (2000-2004), the low-cost/must run resources constitute less than 50% of total: 38.0%, 36.8%, 36.0%, 34.2% and 38% for 2000, 2001, 2002, 2003 and 2004.

As a result, the simple OM method can be used.

The Simple OM emission factor is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants:

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i} GEN_{j,y}} \quad (1)$$

Where,

$F_{i,j,y}$ is the amount of fuel *i* consumed (ton for solid and liquid fuel, m^3 for gas fuel) by relevant power sources *j* in years *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.
$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2/t for solid and liquid fuel, tCO_2/m^3 for gas fuel), 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*.
$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source *j*.

In the China Electric Power Year Book and other data resources, only generation data is available. The generation from source *j* can be translated into electricity delivered to the grid by source *j* by the following formulation:

$$GEN_{j,y} = G_{j,y} \times (1 - e_{j,y}) \quad (2)$$

Where,

$G_{j,y}$ is the amount of generation (in MWh) by source *j* in year *y*.
$e_{j,y}$ is the rate of plant self-consumption of source *j* in year *y*.

The CO_2 emission coefficient of fuel type *i* (COEF*i*) is obtained as

$$COEF_i = NCV_i \times EF_{CO_2,i} \times OXID_i \quad (3)$$

Where,

NCV_i is the net calorific value per ton or m^3 of a fuel *i* (GJ/tce).
$OXID_i$ is the oxidation factor of the fuel *i*.
$EF_{CO2,i}$ is the CO_2 emission factor per GJ of fuel type *i* (tCO_2/GJ).

The Simple OM emission factor is calculated as a 3-year average (2002-2004), based on the most recent statistics (See Annex 3 for detail) available at the time of PDD submission.

By using Simple OM approach, equation (1) and data in the above table, we obtain the OM of CCPG from 2002 to 2004:

	Year 2002	Year 2003	Year 2004	OM
OM(tCO_2/MWh)	1.1533	1.2157	1.3315	1.2426

The Simple OM emission factor is calculated as a weighted 3-year average: $EF_{OM,y}$=1.2426 tCO_2/MWh

Step 2. Calculate the Build Margin emission factor ($EF_{BM,y}$)

According to ACM0002, the *BM* is calculated as the generation-weighted average emission factor of a sample of power plants *m*, as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \quad (4)$$

Where,

$F_{i,m,y}$ is the amount of fuel *i* (tce) consumed by plant m in year *y*.
$COEF_{i,m,y}$ is the CO_2 emission coefficient (tCO_2/tce) 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*.

$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by plant *m*, equals to generation minus plant self-consumption:

$$GEN_{m,y} = G_{m,y} \times (1 - e_m) \quad (5)$$

Where,

$G_{m,y}$ is the electricity generation by plant m in year *y*.
e_m is the rate of plant self-consumption.

Because data is not available to identify and quantify the individual power plants comprising the most recently built 20% capacity, this PDD uses an approximation calculation modeled after the Executive Board's approved deviation for Methodologies AM0005 and AMS-I.D dated 7 October 2005. This approach has been used by several recently registered China energy project PDDs. In this PDD *BM* is calculated as follows:

$$EF_{BM,y} = \frac{CAP_{Thermal,new}}{CAP_{new}} \times EF_{Thermal,adv} \quad (6)$$

Where,

$EF_{Thermal,adv}$ is the estimated emission factor of fuel-fired thermal plants using Best Practice Commercial Technology. Compared with the *BM* calculation specified in ACM0002, this method is more conservative as it assumes all recently built plants have the fuel efficiency as that of best practice commercial technology. Another expression in formula (6) is the percentage share of thermal plant capacity within all recently built generation capacity.
$CAP_{Thermal,new}$ is the newly installed generation capacity of recently built fuel-fired thermal plants.
CAP_{new} is the installed generation capacity of all recently built power plants. The proper year should be selected so that it is the closest time when the last 20% of generation capacity was installed.

Following table shows the installed power capacity in CCPG in year 2000, 2001 and 2004. It can be seen that the capacity additions during 2001-2004 represents a value that is closer to 20% of the total additions in 2004 than that during 2002-2004, and it is also obvious that the capacity additions during 2001-2004 are larger than the capacity of five plants, so data in years 2000 and 2004 can be used to calculate the BM emission coefficient of CCPG. Thermal power plants accounted for 69.8% of the total capacity additions in CCPG during 2001-2004.

	Installed capacity in 2000	Installed capacity in2001	Installed capacity in 2004	New capacity addition from 2000 to 2004
	A	B	C	D=C-A
Thermal Plants (MW)	39864.6	42569.2	53744.7	13880.1
Hydro Plants (MW)	28637.8	30397.0	34642.1	6004.3
Wind farm(MW)	0	0	0	0
Total (MW)	68502.4	72966.2	88386.8	19884.4
Capacity as of installed capacity of 2004	77.5%	82.55%	100%	22.5%
The fraction of newly added coal fired				69.8%
See Annex 3 for detail				

99.5% emissions in CCPG come from coal from 2002-2004 (see annex 3 for details), other emissions are mostly due to start up fuels, then it is safe to say that all the thermal power plant within CCPG are coal- fired power plants. The most advanced and commercially available coal power technology in the CCPG is 600MW sub-critical unit with PSCC of 320 gce/kWh. According to above analysis and equation (4), the conservatively estimated emission coefficient of new thermal power plants is 0.8685 $kgCO_2/kWh$.

According to formula (7), the build margin emission coefficient of CCPG $EF_{BM,y}$ is 0.6062 tCO_2/MWh (See Annex 3 for details).

Step 3. Calculate the baseline emission factor EF_y.

The baseline emission factor is the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

$$EF_y = \omega_{OM} \times EF_{OM,y} + \omega_{BM} \times EF_{BM,y} \quad (7)$$

Where, the weight w_{OM} and w_{BM} by default are 50%.

Based on the emission factors in the first 2 steps, the baseline emission factor is $EF_y=EF_{OM,y}/2+ EF_{BM,y}/2= 0.9244\ tCO_2/MWh$

Step 4. Calculte the baseline emission (BE_y) and emission reduction (ER_y).

According to the feasibility study of the project, the amount of electricity delivered to the grid from the project is EG_y=90,493.5 MWh.

Then the baseline emissions (BE_y) are the product of the baseline emissions factor (EF_y) calculated in Step 3, times the electricity supplied by the project activity to the grid:

$BE_y=EG_y \times EF_y$=83,652 tCO_2

There is no project emissions, then PE_y=0.

There is no leakage due to the project activity, then L_y=0.

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

$ER_y=BE_y-PE_y-L_y=EG_y \times EF_y$=83,652 tCO_2

Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

The power density is calculated as follows:

$$Powerdensity = \frac{CAP_{PJ}}{Area} \quad (8)$$

where,

CAP_{PJ} is the capacity (W) of the proposed project, which is equal to 28,400,000 in this PDD.
Area is the surface area of the newly constructed reservoir at full reservoir level which will be monitored at the beginning of the project using map of the reservoir.

If Power density is greater than 10W/m^2, then the project emission PE_y=0.

If Power density is greater than 4W/m^2, but less than or equal to 10W/m^2, the project emission can be calculated as follows:

$$PE_y = \frac{EF_{Res} \times EG_y}{1000} \quad (9)$$

where,

EF_{Res} is the default emission factor for emission from reservoir, the default value is 90kg CO_2e/MWh. EG_y is the electricity delivered by the project to the grid in year y (in MWh).

In this PDD, according to ACM0002 and data from project preliminary design report, the power density is greater than 10W/m^2, then the project emission of the project (PE_y) is estimated as 0.

Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

In this PDD, according to ACM0002 and data from project preliminary design report, the power density is greater than 10W/m^2, then the leakage of the proposed project (L_y) is estimated as 0.

Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)：

The emission reductions of the project (ER_y):

$$ER_y = BE_y - PE_y - L_y \quad (10)$$

Since PE_y and L_y are both zero for the project,

$$ER_y = BE_y \quad (11)$$

B.6.2. Data and parameters fixed ex ante

Data / Parameter	NCV_{Coal}
Unit	GJ/tce
Description	Net caloric value per tce
Source of data	China Energy Statistics Year Book 2004, p535.
Value(s) applied	29.27
Choice of data or Measurement methods and procedures	Official statistical data
Purpose of data	Calculation of baseline emission reductions
Additional comment	-

Data / Parameter	$EF_{CO2,Coal}$
Unit	tCO_2/GJ
Description	Emission factor
Source of data	Revised IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.0946
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Calculation of baseline emission reductions
Additional comment	-

Data / Parameter	$OXID_{Coal}$
Unit	-
Description	Oxidation factor
Source of data	Revised IPCC Guideline for National Greenhouse Gas Inventories: Workbook, v2, p1.8, table 1-4.
Value(s) applied	98%
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Calculation of baseline emission reductions
Additional comment	-

Data / Parameter	$COEF_{Coal}$
Unit	tCO_2/tce
Description	Emission coefficient
Source of data	Calculated
Value(s) applied	2.714

Choice of data or Measurement methods and procedures	Calculated by the parameters of NCV_{Coal}, $EF_{CO2,Coal}$ and $OXID_{Coal}$. The calculation equation is as follows: $COEF_{Coal} = NCV_{Coal} * EF_{CO2,Coal} * OXID_{Coal}$
Purpose of data	Calculation of baseline emission reductions
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

>>

The power density of the proposed project is 27.56W/m^2 (13.16W/m^2 for Zhamushui station and Kongzishan station and 74.94W/m^2 for Hongwawu station). According to the "Thresholds and criteria for the legibility of hydroelectric power plants with reservoirs as CDM project activities" (http://cdm.unfccc.int/meetings/023/eb23_repan5.pdf), the project emissions from the reservoir is zero.

According to the baseline methodology ACM0002, the leakage of the proposed project is not considered, i.e. L_y=0.

The proposed project activity emissions are zero, i.e. PE_y+L_y=0.

According to the descriptions and formulas in section B.6.1, the combined baseline emission factor of CCPG is:

EF_y=0.9244 tCO_2/MWh.

According to the Feasibility Study Report of the proposed project, the estimated annual electricity generation delivered to the power grid will be:

EG_y=90,493.5MWh.

The annual emissions of baseline scenario is:

$BE_y=EG_y \times EF_y$=83,652 tCO_2

The annual emission reductions of the proposed project during the first crediting period are estimated to be:

$ER_y=BE_y-PE_y=EG_y \times EF_y$=83,652 tCO_2

B.6.4. Summary of ex ante estimates of emission reductions

The annual average emission reduction is estimated to be 83,652 tCO_2e during the first crediting period. The total emission reduction of the project will be 585,564 tCO_2e during the first crediting period.

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2008*	41,826	0	0	41,826
2009	83,652	0	0	83,652
2010	83,652	0	0	83,652
2011	83,652	0	0	83,652
2012	83,652	0	0	83,652
2013	83,652	0	0	83,652

2014	83,652	0	0	83,652
2015*	41,826	0	0	41,826
Total	**585,564**	**0**	**0**	**585,564**
Total number of crediting years	7			
Annual average over the crediting period	83,652	0	0	83,652

*The period in 2008 is from 1/7/2008 to 31/12/2008. The period in 2015 is from 1/1/2015 to 30/6/2015.

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	***EG_y***
Unit	MWh
Description	Electricity supplied to the grid by the proposed project
Source of data	Measured (m)
Value(s) applied	-
Measurement methods and procedures	EG_y is determined by electricity exported to the grid by the project, electricity imported from the grid via main line and electricity imported from the grid via backup lines, please refer to Section B.7.3 of this monitoring plan.
Monitoring frequency	Hourly measurement and monthly recording
QA/QC procedures	The data type is electricity quantity, and 100% of data will be monitored. The uncertainty level of the data is low. The data will be archived in the form of electronic, and will be kept during the crediting period and two years after. The data is monitored through the electricity meters, and the electricity exported to the grid by the project and imported from the grid via main line will be rechecked by comparing with the electricity sales receipt from power corporation. As the electricity imported from the grid via the backup are monitored by the local grid company which is unlikely to under estimate the value, thus, QA/QC procedure is not necessary.
Purpose of data	Calculation of baseline emission reductions
Additional comment	-

Data / Parameter	***Area***
Unit	m^2
Description	Surface area at full reservoir level
Source of data	Measured (m)
Value(s) applied	-
Measurement methods and procedures	This variable will be measured through reservoir map.
Monitoring frequency	At the start of the project

QA/QC procedures	The date type is Area, and 100% of the data will be monitored. The uncertainty level of the data is low. The data will be archived in the form of electronic, and will be kept during the crediting period and two years after. The data is calculated through reservoir map, the QA/QC procedure is not necessary because the official or professional map will be used for such calculation.
Purpose of data	Calculation of baseline emission reductions
Additional comment	-

B.7.2. Sampling plan

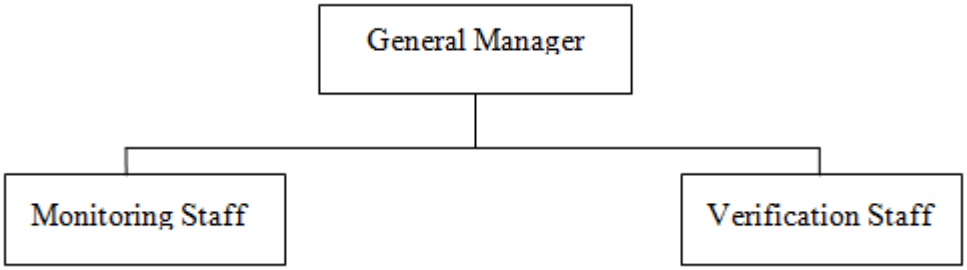
>>
Not applicable.

B.7.3. Other elements of monitoring plan

>>
This monitoring plan includes the management and implementation structures of monitoring activity, parameter to be monitored and quality control process.

Management and implementation structure for monitoring plan

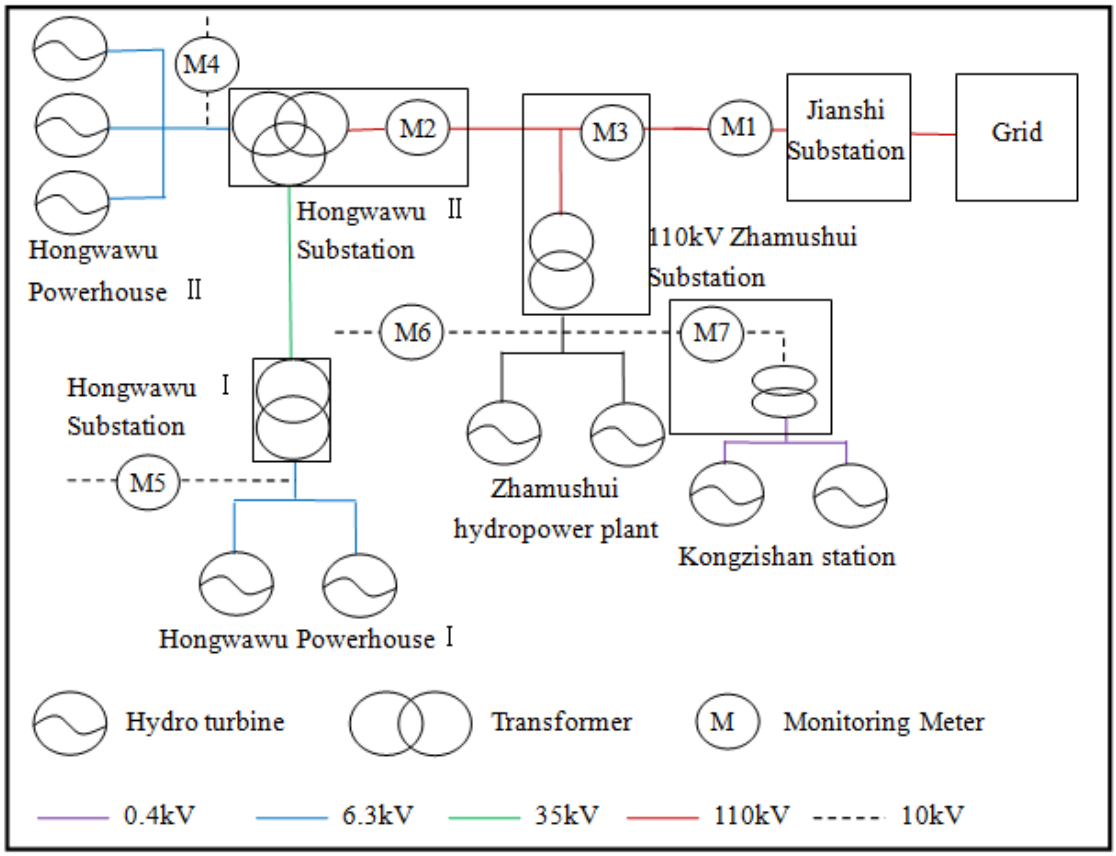
This monitoring plan will be implemented by professional staff authorized by the project sponsor. The management structure is illustrated as follows:



Quality Control

The GHP includes four hydropower plants: Hongwawu I hydropower plant, Hongwawu II hydropower plant, Zhamushui hydropower plant and Kongzishan station. Hongwawu I hydropower plant includes a 8MW powerhouse, a 35kV substation(Hongwawu I Substation) and 35kV transmission line to Hongwawu II Substation; Hongwawu II hydropower plant includes a 10MW powerhouse, a 110kV substation(Hongwawu II Substation) and 110kV transmission line to 110kV Zhamushui Substation; Kongzishan station includes two 200kW horizontal hydro-generating units, a 0.4/10kV substation and a 10kV transmission line to Zhamushui substation; Zhamushui hydropower plant includes a 10MW powerhouse, a 110 kV Zhamushui Substation and 110 kV transmission line to existing Jianshi Substation.

A line diagram of the monitoring system for the project is presented as follows:



Firstly, the project company and Electric Power Company[3] have identified jointly the exact points at which the amount of electricity exported to and imported from the grid will be measured. A meter M1 installed at Jianshi Substation is used to monitor electricity exported to the grid and imported from the grid via main line; The accuracy of the meter (M1) is 0.2s and will be calibrated annually by qualified staff in Jianshi Electric Power Company. A meter M2 is installed at Hongwawu II Substation in the project site to measure the electricity export and import of Hongwawu I and II stations; a meter M7 is installed at 10kV Kongzishan Substation in the project site to measure the electricity export and import of Kongzishan station; a meter M3 is installed at 110 kV Zhamushui Substation in the project site to measure the electricity export and import of the project. The meter readings of M2, M3 and M7 will not be used in emission reduction calculation, but only as internal reference for Project Company, the accuracy and calibration of Meter M2, M3 and M7 is to be in compliance with relative national standard DL/T448-2000.

Secondly, the amount of electricity exported to the grid by the project and imported from the grid via the main line will be recorded every month jointly by designated staff of the Project Company and Electric Power Company[4]. After that, Electric Power Company will pay to the project company certain period and the project company will give corresponding receipt for the electricity exported. The project company will pay the grid company for the electricity imported and the grid company will provide corresponding receipt.

Thirdly, the installation and calibration of related kilowatt-hour meters will be in compliance with the regulations of State Electricity Regulatory Commission and relevant articles in the power purchase agreement.

[3] Before 26/11/2012, the Electric Power Company is Jianshi Electric Power Company. From 26/11/2012 on, the Electric Power Company is changed to Hubei Electric Power Company. The two companies have all identified the exact points at which the amount of electricity exported to and imported from the grid will be measured together with the project company.

[4] Before 26/11/2012, the Electric Power Company is Jianshi Electric Power Company. From 26/11/2012 on, the Electric Power Company is changed to Hubei Electric Power Company.

10 kV backup line at each plant (Hongwawu I hydropower plant, Hongwawu II hydropower plant and Zhamushui hydropower plant) will be used to supply electricity to the plant in emergent case when the main power line fails to supply power. Meter M4, M5 and M6 are installed to measure the electricity imported from the grid via these lines. These meters are owned, maintained, read and monthly recorded by Grid Company. Only Grid Company has access to these meters. Sales receipts of electricity imported from the grid via backup lines will be issued to the project company by Grid Company accordingly in an approach which is agreed by both parties. Accuracy and calibration of meter M4, M5 and M6 are in compliance with relative national standards DL/T448-2000. Calibration reports of these meters will be provided to DOE by Grid Company for verification.

Electricity supplied to the grid by the project (EG_y) will be calculated as electricity exported to the grid by the project minus electricity imported from the grid via main line and electricity imported from the grid via backup lines. Meter readings of electricity exported to the grid by the project and electricity imported from the grid via main line will be cross checked by their own corresponding sales receipts to ensure the conservativeness of emission calculation. Values from the sales receipts of electricity imported from the grid via backup lines will be used for emission calculation as only grid company is accessible to the meters and grid company is not likely to underestimate the electricity sold to project company.

Procedures for ensuring effective monitoring of the project are described in a document “CDM Project Management and Operating Procedures” that the Project Company will utilize. The document contains the following sections:

Chap 1 Introduction
Chap 2 Overall Project Management
Chap 3 CDM Project Management and Calculations
- Sec 3.1 Data to be monitored and recorded
- Sec 3.2 Emissions Reduction Calculation for the Project

Chap 4 Procedures to be followed
- 4.1 Monitoring Procedures
- 4.2 Calibration Procedures
- 4.3 Maintenance Procedures
- 4.4 Procedure for Training of Personnel engaged in the MVP

Chap 5 Records Keeping, Error Handling and Reporting Procedures
- 5.1 Records Keeping and Internal Reporting Procedure
- 5.2 Error Handling Procedure
- 5.3 External Reporting Procedure
- 5.4 Procedure for corrective actions arising
- 5.5 Change of CDM Manager

Chap 6 Confirmation of the adoption of these CDM Operating Procedure.

Note: This monitoring plan is to be applied since the start of crediting period.

B.7.4. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>
The baseline study was completed on 26 March 2006 by:

Carbon Finance Unit
The World Bank
1818 H. Street, NW
Washington, DC 20433
USA

Dr Fei TENG, Global Climate Change Institute,
Tsinghua University.
Address: Room C402, Energy Science Building,
Tsinghua University, 100084, Beijing, China.
Telephone: +8610-62784805
Email: tengfei@tsinghua.edu.cn

Global Climate Change Institute, Tsinghua University is not the project participants listed in Annex 1.

The monitoring methodology of the proposed project was completed on 26 March 2006 by:

Carbon Finance Unit
The World Bank
1818 H. Street, NW
Washington, DC 20433
USA

Dr Fei TENG, Global Climate Change Institute, Tsinghua University.
Address: Room C402, Energy Science Building, Tsinghua University, 100084, Beijing, China.
Telephone: +8610-62784805
Email: tengfei@tsinghua.edu.cn

Global Climate Change Institute, Tsinghua University is not the project participants listed in Annex 1.

The contact information of responsible persons/entities is as followed:

Organization name: Guangrun Hydropower Development Company Ltd.
Adress: No.39 Wenyuan Road, Yezhou Town, Jianshi County, Enshi Tujia and Miao Minority Autonomous Prefecture, Hubei Province
Postcode: 445300

Contact person: Aimin Yao
Title: Vice President
Salutation: Mr.
Mobile: +86 13343558760; +86 13971222716
Direct TEL: +86 718 3234768
Direct FAX: +86 718 3234768
E-Mail: raoaiming999@163.com

Mr. Aimin Yao is the authorised signatory of the organization and the responsible person. Please refer to Appendix 1 for the detailed contact information.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
The project expects commissioning according to the following schedule:

Hongwawu I and II stations: 1/7/2008
Zhamushui station: 1/12/2008

For the purposes of the CDM project, the starting date of the project activity is 01/07/2008.

C.1.2. Expected operational lifetime of project activity

>>
30 years from 7/2008 to 7/2038

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>

Renewable crediting period

C.2.2. Start date of crediting period

>>
1/7/2008

C.2.3. Length of crediting period

>>
7 years

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The environment impact assessment (EIA) for the proposed project was carried out by the Chinese Second Navigation Design Institute (SDNI) a grade A environment assessment consultant certified by the State Environmental Protection Agency (SEPA). SDNI is independent from the project owner, in terms of financial and personnel management. The EIA report has been approved by Hubei Provincial Environmental Protection Bureau (HPEPB).

Conclusions of the EIA report are summarized as follows:

1. Resettlement

The GHP would affect 169 households with a total population of 699, of which 145 need to be relocated and 305 need to be adjusted with production arrangement. Resettlement Action Plan (RAP) has been prepared by the East China Investigation and Design Institute in March 2005. Pertinent Environment Management Plan (EMP) has been prepared for the resettlement program in EIA. Assuming the RAP and EMP are implemented, the project resettlement activities will be in compliance with both the national as well as the World Bank environmental standard. No significant negative environmental impacts are expected. The implementation of the RAP and EMP will be monitored by the Project Environmental Management Office.

2. Ecological Impacts

Terrestrial Plants: Detailed analysis shows that adverse impacts on terrestrial plants are quite limited because there are no any rare and endangered species in reservoir inundation area and construction area. Terrestrial Animals: According to investigation, current ecosystem in or near reservoir areas broadly spreads above the submerge-line. Therefore, the construction of the project would have little adverse impacts on it.

Aquatic creatures: No rare and endangered aquatic species were found in reservoir inundation area and construction area. No adverse impacts on aquatic creatures are expected in Hongwawu river sub-project area and Zhamushui river.

3. Impact of Water Diversion

There are four additional water diversion schemes in GHP to increase reservoir capacity then power generation. Detailed analysis in EIA indicates that the rivers for water diversion are all small mountain streams without any special functions such as water supply and irrigation in the area. No rare and endangered ecological species were found in the areas downstream the water diversion schemes.

4. Water Quality

Because of the fact that there are a number of coalmines in the area upstream of Zhamushui reservoir, a major environmental concern is that whether the quality of the water in the reservoir could meet requirements for domestic water supply. Detailed analysis in EIA shows that the water quality of 2003, 2004, 2005 in Guangrun river meet water quality requirements for domestic water supply souces, Class III of surface water standards, the impact of the pollution on the water quality at Zhamushui dam site is quite limited because most coalmines are 30-40km far away from Zhamushui dam and many other streams join the river flow after the coalmines, which significantly increases the capacity of dlution of the river. Furthermore, several water pollution control measures have been proposed by the Jianshi county government, including reduction of wastewater discharge and closing of some small coalmines.

5. Dam Safety

Three major causes of dam failure are identified: earthquake, flooding, poor quality of dam design and construction. The dams were designed to stand earthquake of intensity VI or above. An earthquake monitoring and pre-warming system will be set up in the reservoir area to work together with the West- Hubei Prefecture Earthquake Station to conduct earthquake monitoring and pre-warming in the reservoir area. When the earthquakes of intensity VI or above occur or to occur, pre-warming will be timely given and the emergency response system prepared in advance will be carried out. Similar analysis was carried out and similar conclusions were obtained for dam failure caused by extraordinary flooding. A flood monitoring and pre-warming system would protect the county seat in similar way. The International Expert Panel on Dam Safety and Environment for the “Hubei Hydropower Development in Poor area Project” organized by the World Bank will visit GHP twice a year to provide dam safety assistance and guidance during project implementation.

6. Soil Erosion

In China, the Law of Water and Soil Conservation requires that a soil conservation plan should be prepared and implemented for all kind of hydropower projects. A such plan was prepared by the Enshi Hydraulic Design Institute in 2002, which was approved by Hubei Provincial Water Resources Bureau in 2004. In the plan, total amount of soil erosion was predicted, detailed protection measures were identified. It is concluded that with implementation of the plan the soil erosion will be under effective control and the soil erosion due to construction of the GHP would be with an acceptable level. The major conclusions of EIA are summarized as follows:

Table 4 Summary EIA Evaluation

Environmental Issues	Sections of EIA report which discuss SEI	Potential for adverse effects if not properly	Adequacy of EPMs	Net adverse environmen t al effects
(A) Significant Environmental				
1.Resettlement	2.2.2, 4.2.2, 5.2.1	***	OK	NNASEEs
2. Ecology	3,3, 4.2.2, 5.2.2	**	OK	NNASEEs
3. Honhwawu water diversion	3.7.2, 4.2.4, 5.2.4	*	OK	NNASEEs
4. Water quality in Zhamushui		**	OK	NNASEEs
(B) General Environmental				
1. Zhamushui dam safety	3.1.3, 3.1.4, 3.4.4	***	OK	NNASEEs
2. Land use	4.2.7	*	OK	NNASEEs
3. Impacts of project	3.5.2, 4.2.8	**	OK	NNASEEs
4. Public health	4.2.9	**	OK	NNASEEs
5. Transmission lines	3.7.3, 4.2.10	*	OK	NNASEEs
6. Soil erosion	4.2.11	***	OK	NNASEEs
7. Basin plan and project	4.2.12	**	OK	NNASEEs
8. Others		*	OK	No adverse

Notes:
NNASEEs = No net adverse significant environmental effects if EPMs specified in EIA are duly applied.

*** = Major, ** = Intermediate, * = lesser impacts

D.2. Environmental impact assessment

>>
The project will have positive impact on the local environment.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>
During the preparation of the project and EIA, several rounds of consultation have been conducted with important stakeholders by the assessment team. 100 questionnaires were distributed. The investigated stakeholders include residents, doctors, teachers, students, governmental officers. The investigation had taken full account into the public advice of different ages, civilizations and occupations. The major investigation issues are listed as follows:

Major investigation issues:

(1) Attitude towards the proposed project.
(2) Contributions of the proposed project to local economic development.
(3) Major impacts on the local environment of the proposed project activity.
(4) Major environmental impacts of resettlement.
(5) Possible solutions for resettlement.
(6) Recommendation on the construction of the project.

E.2. Summary of comments received

>>
Both positive and negative comments for the project were obtained with positive comments taking over
90%. Comments from the questionnaires are summarized as bellows:

1. The proposed project will expand the generation of Jianshi county to meet the increasing electricity demand of industry and agriculture. The proposed project will prompt the development of other industries, the utilization of natural resource within mountain area and the development of local economy.
2. The construction of the proposed project will greatly improve the transportation infrastructure and overcome the major obstacle.
3. The project reservoir will provide a better condition for irrigation system, agriculture infrastructure which will be very helpful for improvement of middle-and-low-yielding fields.
4. During the construction of the project, more than 1500 new employment opportunities will be open for the local people. The operation of the project will attract more tourists and be helpful for the truism development in project area.

Other suggestions from stakeholders include:

1. Due to the population in the affected area will be resettled, more attention should be paid for the resettlement issues. The government should improve the life quality of the resettled population.

2. The environmental impacts, such as soil erosion, during project construction should be carefully treated. Necessary management measures should be implemented to reduce the environmental impacts during the project construction.

The social assessment confirms that the project is widely supported by local people regardless their background.

E.3. Report on consideration of comments received

>>

Most of the comments have been considered in the preparation of the EIA and Environmental Management Plan (EMP) in the coal mines and EMP in construction period. The EMP was prepared in accordance with the Environmental Assessment Guidelines OP 4.01 of the World Bank and with relevant Chinese laws and regulations. An environmental management office (EMO) will be established in Jianshi Project Management Office (PMO) to be responsible for implementation of the EMP. When EMO is established, an environmental management system is to be formed through engagement of environmental supervision engineers, environmental monitoring institutes and environmental consultants. During implementation of the EMP, a semi-annual environmental management report is to be prepared by the EMO, which will describe the progress in implementation of the EMP in the half year.

A Resettlement Action Plan (RAP) has been prepared by the East China Investigation and Design Institute. The resettlement program described in the RAP is designed to not only protect the resettled population from potential adverse project impacts but also to make them a shareholder to the benefits accruing from the project. The implementation of the RAP will be monitored by the Project Environmental Management Office.

A Community Benefit Development Plan (CBDP) has been prepared by the East China Investigation and Design Institute (ECIDI) in order to use the Community Development Carbon Fund (CDCF) effectively. According to the CBDP, 6 kinds of project will be funded within the framework of CBDP including transportation infrastructure, drink water and irrigation facilities, education and public health systems, technical training programs, industry development and local culture exploration.

Table 5 Community Benefit from the CBDP

Main Benefit	Beneficiaries	Locations	Benefited population (person)	Benefit time
(i) Improve condition of infrastructure of community	Community residents in project affected area	Dangyangba village, Shanmu village, Qishuya village, Longmenzi village, Jigongling village, Hongtuping village, Chayuangou village, Qiliping village, Tianjiatping village	11,042	Project construction period
(ii) Promote the development of medical and education of community	Community residents in project affected area	Dangyangba village, Shanmu village, Qishuya village, Longmenzi village, Jigongling village, Hongtuping village, Chayuangou village, Qiliping village, Tianjiatping village	14,007	Project construction period
(iii) Build up productive skill of community residents	Community residents in project affected area	Dangyangba village, Shanmu village, Qishuya village, Longmenzi village, Jigongling village, Hongtuping village, Chayuangou village, Qiliping village, Tianjiatping village	3,000	Project construction period

(iv) Provide short-term employment opportunity of community residents	Community residents in project affected area	Dangyangba village, Shanmu village, Qishuya village, Longmenzi village, Jigongling village, Hongtuping village, Chayuangou village, Qiliping village, Tianjiatping village	120	Project construction period
(v) Expedite development of tourism and catering service	Community residents in project affected area	Dangyangba village, Jigongling village, Hongtuping village, Chayuangou village, Qiliping village	2,173	Project construction and operation period
(vi) Expedite exploration and development of the cultures of the local ethnic groups.	Jianshi County minority areas	All people in Jianshi County	509,000	Project construction & operation period

SECTION F. Approval and authorization

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The letters of approval from Parties for the project activity are available at the time of submitting the PDD to the validating DOE.

- - - - -

Appendix 1. Contact information of project participants and responsible persons/ entities

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Appendix 2. Affirmation regarding public funding

No public funding from Annex 1 countries is provided to the proposed project. The funding to purchase the carbon emission reduction credit is from Community Development Carbon Fund (CDCF) entrusted at the World Bank, which is a special fund set by nine governments including Netherlands Government and 15 corporations/organizations. The CDCF aims to combine community development attributes with emission reductions to create "development plus carbon" credits, and significantly improve the lives of the poor and their local environment. It does not result in a diversion of official development assistance.

Appendix 3. Applicability of methodology and standardized baseline

Please refer to B.2. in the PDD.

Appendix 4. Further background information on ex ante calculation of emission reductions

The Appendix 4 provides the basic data and results in the baseline scenario.

Table A4-1 Calculation of Emission Coefficient

	Net caloric value per tce	Emission factor	Oxidation factor	Emission coefficient
Parameters	NCV_{Coal}	$EF_{CO2,Coal}$	$OXID_{Coal}$	$COEF_{Coal}$
Unit	GJ/tce	tCO_2/GJ		tCO_2/tce
Amount	29.27	0.0946	98%	2.714
COEFCoal=NCVCoal*EFCO2,Coal*OXIDCoal Data source: NCVCoal: China Energy Statistics Year Book 2004, p535. EFCO2,Coal: Revised IPCC Guidelines for National Greenhouse Gas Inventories. OXIDCoal: Revised IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, v2, p1.8, table 1-4.				

Table A 4-2 Calculate the OM of Central China Grid in 2002

Fuel Type	Unit	NCV	Unit for NCV	EF (tc/TJ)	OXID	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	CO2 Emission
		A		B	C	D	E	F	G	H	I	J=(D+E+F+G+H+I)*A*B*C*44/12
Raw Coal	Mt	20908	MJ/t	25.8	0.98	10.6263	46.7902	17.10	11.1378	3.9857	19.6432	211827873.74
Clean Coal	Mt	26344	MJ/t	25.8	0.98	0.0272						66430.55
Other washed	Mt	8363	MJ/t	25.8	0.98	0.0366	0.2649			2.4999		2171973.06
Coke	Mt	28435	MJ/t	29.50	0.98		0.0115					34663.36
Crude Oil	Mt	41816	MJ/t	20.00	0.99		0.0067	0.0117			0.0081	80449.80
Gasoline	Mt	43070	MJ/t	18.90	0.99							0.00
Kerosene	Mt	43070	MJ/t	19.60	0.99							0.00
Diesel	Mt	42652	MJ/t	20.20	0.99	0.01	0.0134	0.0108	0.0219	0.0051	0.0051	207353.29
Fuel Oil	Mt	41816	MJ/t	21.10	0.99	0.0033	0.0016	0.0034	0.0069		0.0151	97045.23
LPG	Mt	50179	MJ/t	17.20	0.99		0.0002					626.60
Refinery Gas	Mt	46055	MJ/t	18.20	0.99	0.0049			0.0196			74545.41
Other petroleum products	Mt	41816	MJ/t	20.00	0.99							0.00
Natural Gas	Mm^3	38931	kJ/m^3	15.3	0.995						175	380294.07
Coke Oven Gas	Mm^3	17354	kJ/m^3	13.00	0.995			111				91360.91
Other Coal Gas	Mm^3	16970	kJ/m^3	13.00	0.995		216					173849.50
Total		***a***										215206465.51
Generation	GWh	***b***				18648	85886	33944	20019	17151	27879	
Self Consumption rate		***c***				7.67%	8.03%	7.73%	7.73%	10.21%	9.59%	
Electricity delivered to Grid	GWh	***d=b*(1-c)***				17218	78989	31320	18472	15400	25205	186604

The Calculation of OM:
a : The total emissions of CCPG: **215206465.51 tCO_2**
d: The electricity delivered to CCPG by thermal power plants: **186604 GWh**
OM=a/d*10^{-6}=1.1533

Data Sources:

China Energy Statistical Yearbook 2000-2002, China Statistics Press, 2003.
China Electric Power Yearbook 2003, China Electric Power Press, 2003
Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, 1.6, Table 1-2, 1.8, Table 1-4

Table A 4-3 Calculate the OM of Central China Grid in 2003

Fuel Type	Unit	NCV	Unit for NCV	EF (tc/TJ)	OXID	Jiangxi	Henan	Hubei	Hunan	Chong qing	Sichua n	CO2 Emission
		A		B	C	D	E	F	G	H	I	J=(D+E+F+G+H+I)*A*B*C*44/12
Raw Coal	Mt	20908	MJ/t	25.8	0.98	14.2741	55.0494	20.7244	16.4647	7.6947	24.3093	268492109.09
Clean Coal	Mt	26344	MJ/t	25.8	0.98							0.00
Other washed	Mt	8363	MJ/t	25.8	0.98	0.0203	0.3963			1.06.2		1145763.47
Coke	Mt	28435	MJ/t	29.50	0.98				0.0122			36773.30
Crude Oil	Mt	41816	MJ/t	20.00	0.99		0.005	0.0024			0.012	58895.33
Gasoline	Mt	43070	MJ/t	18.90	0.99							0.00
Kerosene	Mt	43070	MJ/t	19.60	0.99							0.00
Diesel	Mt	42652	MJ/t	20.20	0.99	0.0052	0.0254	0.0069	0.0121	0.0077		179205.78
Fuel Oil	Mt	41816	MJ/t	21.10	0.99	0.0042	0.0025	0.0217	0.0054	0.0028	0.012	155656.71
LPG	Mt	50179	MJ/t	17.20	0.99				0.0066			20677.64
Refinery Gas	Mt	46055	MJ/t	18.20	0.99	0.0176	0.0653					252237.31
Other petroleum products	Mt	41816	MJ/t	20.00	0.99							0.00
Natural Gas	Mm^3	38931	kJ/m^3	15.3	0.995					4	220	486776.41
Coke Oven Gas	Mm^3	17354	kJ/m^3	13.00	0.995			93				76545.63
Other Coal Gas	Mm^3	16970	kJ/m^3	13.00	0.995							0.00
Total		***a***										270904640.66
Generation	GWh	***b***				27330	96876	39332	29479	16857	32782	
Self-Consumption rate		***c***				7.33%	8.07%	7.16%	7.67%	10.21%	9.75%	

Electricity delivered to Grid	GWh	***d=b*(1-c)***				25327	89058	36516	27218	15136	29586	222841
The Calculation of OM: ***a*** : The total emissions of CCPG: **270904640.66 tCO_2** ***d***: The electricity delivered to CCPG by thermal power plants: **222841 GWh** **OM=a/d*10^{-6}=1.2157 tCO_2/MWh**												
Data Sources: China Energy Statistical Yearbook 2003, China Statistics Press, 2005. China Electric Power Yearbook 2004, China Electric Power Press, 2004 Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, 1.6, Table 1-2, 1.8, Table 1-4												

Table A 4-4 Calculate the OM of Central China Grid in 2004

Fuel Type	Unit	NCV	Unit for NCV	EF (tc/TJ)	OXID	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	CO2 Emission
		A		B	C	D	E	F	G	H	I	J=(D+E+F+G+H+I)*A*B*C*44/12
Raw Coal	Mt	20908	MJ/t	25.8	0.98	18.638	69.485	25.105	21.9882	8.755	27.479	332328585.90
Clean Coal	Mt	26344	MJ/t	25.8	0.98		0.0234					57149.81
Other washed	Mt	8363	MJ/t	25.8	0.98	0.4893	1.0422			0.8972		1883012.41
Coke	Mt	28435	MJ/t	29.50	0.98		1.0961					3303869.86
Crude Oil	Mt	41816	MJ/t	20.00	0.99		0.0086	0.0022				32787.09
Gasoline	Mt	43070	MJ/t	18.90	0.99		0.0006			0.0001		2068.43
Kerosene	Mt	43070	MJ/t	19.60	0.99							0.00
Diesel	Mt	42652	MJ/t	20.20	0.99	0.0002	0.0386	0.017	0.0172	0.0114		263961.05
Fuel Oil	Mt	41816	MJ/t	21.10	0.99	0.0109	0.0019	0.0955	0.0138	0.0048	0.0168	460244.21
LPG	Mt	50179	MJ/t	17.20	0.99							0.00
Refinery Gas	Mt	46055	MJ/t	18.20	0.99	0.0352	0.0227					176170.57
Other petroleum	Mt	41816	MJ/t	20.00	0.99							0.00
products												
Natural Gas	Mm^3	38931	kJ/m^3	15.3	0.995						227	493295.73
Coke Oven Gas	Mm^3	17354	kJ/m^3	13.00	0.995			168		34		166260.40
Other Coal Gas	Mm^3	16970	kJ/m^3	13.00	0.995					261		210068.15

Total		***a***										339377473.62
Generation	GWh	***b***				30344	120047	39048	37288	15480	34627	
Self-Consumption rate		***c***				7.04%	8.19%	6.58%	7.47%	11.06%	9.41%	
Electricity delivered to Grid	GWh	***d=b*(1-c)***				28208	110215	36479	34503	13768	31715	254888
The Calculation of OM: ***a*** : The total emissions of CCPG: **339377473.62 tCO_2** ***d***: The electricity delivered to CCPG by thermal power plants: **254888 GWh** **OM=a/d*10^{-6}=1.3315**												
Data Sources: China Energy Statistical Yearbook 2004, China Statistics Press, 2006. China Electric Power Yearbook 2005, China Electric Power Press, 2006 Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, 1.6, Table 1-2, 1.8, Table 1-4												

Table A4-5 Calculate the Simple OM

	Year 2002	Year 2003	Year 2004	OM
OM(tCO_2/MWh)	1.1533	1.2157	1.3315	1.2426
Electricity delivered to Grid	186604	222841	254888	

Table A4-6 Installed Capacity and generation of CCPG in 2000

	Jiangxi	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total**
	A	B	C	D	E	F	G=A+B+C+D+E+F
Thermal Capacity (MW)	4474.3	13789.0	8038.8	4477.4	2995.0	6090.1	39864.60
Hydro Capacity (MW)	1846.0	1528.0	7070.5	5858.0	1327.0	11008.3	28637.80
Total Capacity (MW)	6320.3	15317.0	15109.3	10335.4	4322.0	17098.4	68502.40
Generation from thermal plants (GWh)	14881	67999	27773	16574	12968	18733	158928
Generation from hydro plants (GWh)	5225	2274	28140	21063	3822	36905	97428
Total generation (GWh)	20106	70273	55912	37637	16790	55638	256356
Average generation hours of thermal plants							3987

Average generation hours of hydro plants							3402
Data Source: China Electric Power Yearbook 2001, China Electric Power Press, 2001							

Table A4-7 Installed Capacity and generation of CCPG in 2001

	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
	A	B	C	D	E	F	G=A+B+C+D+E+F
Thermal Capacity (MW)	4869.8	15349.0	8077.3	4997.8	2898.3	6377.0	42569.20
Hydro Capacity (MW)	2067.8	2438.0	7125.6	5966.1	1268.0	11531.5	30397.00
Total Capacity (MW)	6937.6	17787.0	15202.9	10963.9	4166.3	17908.5	72966.20
Generation from thermal plants (GWh)	16191	76022	32045	19403	13687	20808	178156
Generation from hydro plants (GWh)	5425	3572	27025	21340	3354	42839	103555
Total generation (GWh)	21616	79594	59070	40743	17041	63647	281711
Average generation hours of thermal plants							4185
Average generation hours of hydro plants							3407
Data Source: China Electric Power Yearbook 2002, China Electric Power Press, 2002							

Table A4-8 Installed Capacity and generation of CCPG in 2002

	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
	A	B	C	D	E	F	G=A+B+C+D+E+F
Thermal Capacity (MW)	5128.8	15904.5	8147.8	4975.6	3004.5	6142.0	43303.20
Hydro Capacity (MW)	2197.4	2438.0	7213.9	6135.3	1195.5	11854.6	31034.70
Total Capacity (MW)	7326.2	18342.5	15361.7	11110.9	4200.0	17996.6	74337.90
Generation from thermal plants (GWh)	18648	84734	34301	20058	14727	27879	200347

Generation from hydro plants (GWh)	6151	4859	27854	25329	3748	44500	112441
Total generation (GWh)	24799	89593	62155	45387	18475	72379	312788
Average generation hours of thermal plants							4627
Average generation hours of hydro plants							3623
Data Source: China Electric Power Yearbook 2003, China Electric Power Press, 2003							

Table A4-9 Installed Capacity and generation of CCPG in 2003

	Jiangxi	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total**
	A	B	C	D	E	F	H=A+B+C+D+E+F
Thermal Capacity (MW)	5407.80	17635.50	8173.30	6446.70	3126.20	6104.00	46893.50
Hydro Capacity (MW)	2304.70	2438.00	7337.20	6603.20	1329.80	12341.40	30549.30
Total Capacity (MW)	7712.50	20073.50	15510.50	13049.90	4456.00	18445.40	79247.8
Generation from thermal plants (GWh)	27165	95518	39532	29501	16341	32783	240840
Generation from hydro plants (GWh)	3864	5457	30169	24402	3951	50000	117843
Total generation (GWh)	31029	100975	69701	53903	20292	82783	358683
Average generation hours of thermal plants							5136
Average generation hours of hydro plants							3857
Data Source: China Electric Power Yearbook 2004, China Electric Power Press, 2004 http://www.3g.gov.cn/news/sxkd/200602130003.htm http://www.sp.com.cn/zgdl/spw/12y/kqsdl.htm							

Table A4-10 Installed Capacity and generation of CCPG in 2004

	Jiangxi	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total**

	A	B	C	D	E	F	H=A+B+C+D+E+F
Thermal Capacity (MW)	5496.00	21788.50	9509.30	6779.50	3271.10	6900.30	53744.70
Hydro Capacity (MW)	2549.90	2438.00	7415.10	7448.30	1407.90	13382.90	34642.10
Total Capacity (MW)	8045.90	24226.50	16924.40	14227.80	4679.00	20283.20	88386.80
Generation from thermal plants (GWh)	30127	109352	43034	37186	16520	34627	270846
Generation from hydro plants (GWh)	3890	6884	30357	24237	5670	58902	129940
Total generation (GWh)	34017	116236	73391	61423	22914	93529	401510
Average generation hours of thermal plants							5039
Average generation hours of hydro plants							3750
Data Source: China Electric Power Yearbook 2005, China Electric Power Press, 2005 http://www.3g.gov.cn/news/sxkd/200602130003.htm http://www.sp.com.cn/zgdl/spw/04_12y/04_12_kqsdl.htm							

Table A4-11 Electricity import and export of Central China Power Grid (2002-2004)

Year		2002	2003	2004
		GWh	GWh	GWh
Central China Power Grid to China Power Grid	A	4375	8310	26934
East China Power Grid to Central	B	657	4807	0.22
Net +import/-export of CCPG	D=B-A	-3718	-3503	-26934
Data source: http://www.ica.gov.cn/new/hybd/yydl/yydl2002/01/yydl012901.htm http://www.cec.org.cn/news/content.asp?NewsID=19795 http://www.sp.com.cn/zgdl/spw/12y/kqsdl.htm China Electric Power Yearbook 2005, China Electric Power Press, 2006				

Appendix 5. Further background information on monitoring plan

This monitoring plan includes the management and implementation structures of monitoring activity, parameter to be monitored and quality control process.

Management and implementation structure for monitoring plan

This monitoring plan will be implemented by professional staff authorized by the project sponsor. Parameter to be monitored Please refer to section D of this PDD.

Quality Control

Firstly, the project company and Electric Power Company will identify jointly the exact points at which the amount of electricity delivered to the electric grid will be measured. The accuracy of the meter will be 0.2s and will be calibrated annually by qualified staff in Electric Power Company[5].

Secondly, the amount of electricity that has been delivered by the project to the electric grid will be recorded every month jointly by designated staff of the Project Company and Electric Power Company. After that, Electric Power Company will pay to the project company within a certain period and the project company will give corresponding receipt.

Thirdly, the installation and calibration of related kilowatt-hour meters will be in compliance with the regulations of State Electricity Regulatory Commission and relevant articles in the power purchase agreement. The metering equipment will be calibrated annually by the Electric Power Company.

Procedures for ensuring effective monitoring of the proposed project are described in a document "CDM Project Management and Operating Procedures" that the Project Company will utilize. The document contains the following sections:

Chap 1 Introduction
Chap 2 Overall Project Management
Chap 3 CDM Project Management and Calculations
Sec 3.1 Data to be monitored and recorded
Sec 3.2 Emissions Reduction Calculation for the Project
Chap 4 Procedures to be followed
4.1 Monitoring Procedures
4.2 Calibration Procedures
4.3 Maintenance Procedures
4.4 Procedure for Training of Personnel engaged in the MVP
Chap 5 Records Keeping, Error Handling and Reporting Procedures
5.1 Records Keeping and Internal Reporting Procedure
5.2 Error Handling Procedure
5.3 External Reporting Procedure
5.4 Procedure for corrective actions arising
5.5 Change of CDM Manager
Chap 6 Confirmation of the adoption of these CDM Operating Procedure.

[5] Before 26/11/2012, the Electric Power Company is Jianshi Electric Power Company. From 26/11/2012 on, the Electric Power Company is changed to Hubei Electric Power Company.

Appendix 6. Summary of post registration changes

The monitoring plan of the proposed project was changed during the first time of verification, and the revised monitoring plan was approved by CDM EB on 27/12/2011. The revision points to the registered monitoring plan are as followed:

1. In the revised monitoring plan, three 10kV backup lines were included in the monitoring system. Electricity imported from the grid via backup lines is specified to be monitored and deducted from electricity supplied to the grid by the project (EG_y). A line diagram of the monitoring system was also provided in the revised monitoring plan.
2. The position of monitoring meters is also specified in the revised monitoring plan. Meter M1 with the accuracy of 0.2S is installed at 110kV Jianshi Substation to measure electricity exported to the grid by the project and elelctricity imported from the grid via main line by the project. Meter M2 and M3 are installed to measure electricity generation by the project and used for internal reference only. Meter M4, M5 and M6 are installed on the 10kV backup lines to measure electricity imported from the grid via backup lines. Accuracy and calibration of meter M2, M3, M4 and M6 is to be in compliance with relevant national standard.
3. In the revised monitoring plan, the electrical wiring system has been detailed according to the actual situation. The project consists of three small-sized hydropower plants (Hongwawu I, Hongwawu II and Zhamushui hydropower plant). Hongwawu II hydropower plant directly connects to 110kV Zhamushui substation through 110kV transmission line, while Hongwawu I hydropower plant connects to Zhamushui substation through Hongwawu II substation, the transmission line between Hongwawu I station and Hongwawu II station is 35kV transmission line. 110kV Zhamushui substation then connects to 110kV Jianshi Substation of the grid through 110kV transmission line.

Based on the registered CDM-PDD (version 2.0 dated 12/11/2006) and the revised monitoring plan (approved on 27/11/2011), in this revised PDD, there are mainly two post registration changes, which are as followed:

1. The installed capacity of the project

In the registered CDM-PDD, there are three power stations (Hongwawu I, Hongwawu II and Zhamushui) with the total installed capacity of 28 MW implemented and operated by the project activity. However, on 25/09/2012, the Kongzishan station with the installed capacity of 400kW was put into commercial operation. Then, the project activity has four power stations (Hongwawu I, Hongwawu II, Zhamushui and Kongzishan) with the total installed capacity of 28.4 MW.

2. The monitoring plan of the project

Due to the installation of Kongzishan Station, the monitoring plan of the project was changed correspondingly. A meter M7 is installed at 10kV Kongzishan Substation in the project site to measure the electricity export and import of Kongzishan Station. Accuracy and calibration of meter M7 is to be in compliance with relevant national standard.

Besides, there are some corrections in this revised PDD, which are summarized as followed:

1. The Project participants have been changed. Meanwhile, the contact information of the project participants in Annex 1 of the revised PDD have also been updated accordingly.
2. The Electric Power Company mentioned in the registered PDD and the revised monitoring plan has been changed on 26/11/2012. Before 26/11/2012, the Electric Power Company is Jianshi Electric Power Company. From 26/11/2012 on, the Electric Power Company is changed to Hubei Electric Power Company.

3. The version of the PDD template of the registered PDD is version 02. However, the version of the PDD template of the revised PDD is version 05.0. Hence, some corrections are made according to the requirements of the latest PDD template (version 05.0), which are:
   (1) In Section 7.4 of the revised PDD, the contact information of responsible persons/entities has been added.
   (2) In Section F of the revised PDD, the information of the approval and authorization has been added.

The impacts of the actual changes to the registered CDM project activity are reported in the following:

(a) The applicability and application of the applied methodology and, where applicable, the applied standardized baseline under which the project activity has been registered;

According to Section B.2, the approved methodology ACM0002 version 06 is applicable to the proposed project. Furthermore, the post registration changes have no impact on the establishment and description of baseline scenario.

(b) Compliance of the monitoring plan with the applied methodology and, where applicable, the applied standardized baseline;

The monitoring plan is compliance with the applied methodology and the applied standardized baseline. The post registration changes have no impact on it.

(c) The level of accuracy and completeness in the monitoring of the project activity;

The post registration changes ensure that the level of accuracy and completeness in the monitoring of the project activity is not reduced. Please refer to Section B.7 for the detailed information of the monitoring plan.

(d) The additionality of the project activity;

According to Section B.5 in the revised PDD, the proposed project is still additional. Thus, the post registration changes have no impact on the additionality of the project activity.

(e) The scale of the project activity.

The installation capacity of the proposed project is changed from 28MW to 28.4MW, which leads the annual output of the proposed project change from 89.28GWh to 90.4935GWh.

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Document information

Version	*Date*	*Description*
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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