CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

>>
Bailongjiang Dalijie Hydropower Station
Version 03
PDD date completion: 31/07/2012

01	10 May 2008	It is the initial version to GSP.
02	03 July 2009	Modified PDD, according to the draft protocol.
03	31 July 2012	Modified PDD, as the type of generators and turbines changes.

A.2. Description of the project activity:

>> The Bailongjiang Dalijie Hydropower Station (hereafter, the Project or the proposed project) developed by GEPIC Darong Electric Power Company Ltd. (hereafter, the project owner) is a run-of-river hydropower project in Gansu Province, the People's Republic of China (hereafter referred to as the "Host party"). Total installed capacity of the Project will be 40.2MW, consisting of three 13.4MW turbines. The project will generate annually 163,800 MWh and supply 163,472MWh (with Auxiliary Power Ratio 0.2%) electricity to the Gansu Power Grid, which is a part of the Northwest China Power Grid (hereafter, the NWCPG).

The purpose of the Project is to utilize the hydrological resources of the Bailong River through construction of a run-of-river hydro project to generate zero emissions electricity for the NWCPG. The electricity currently generated by the NWCPG is relatively carbon intensive. The Project is therefore expected to reduce emissions of greenhouse gases by reducing the need of thermally generated power and reducing needed capacity expansion of fossil fuel-based generation of the NWCPG at an estimated 138,919 tCO_2e per year during the crediting period.

The scenario existing prior to the start of the implementation of the proposed project:
The electricity service is provided by the NWCPG prior to the start of the implementation of the proposed project. The electricity currently generated by the NWCPG is dominated by the fossil-fuel fired power plants and is relatively carbon intensive.

The project scenario:
The Project will utilize the hydrological resources of the Bailong River through construction of a run-of-river hydro project to generate zero emissions electricity for the NWCPG. The Project is therefore expected to reduce emissions of greenhouse gases by reducing the need of thermally generated power and reducing needed capacity expansion of fossil fuel-based generation of the NWCPG at an estimated 138,919 tCO_2e per year during the crediting period.

The baseline scenario:
The baseline scenario is the same as the one existing prior to the start of the implementation of the proposed project.

The Project's contributions to sustainable development are as follows:

- Relieve the power shortage problem in the local area and facilitate the economic development of the local area;
- Supply of reliable, zero-emitting renewable energy to the provincial grid, reduce other pollutant resulting from the power generation Industry and improve and protect the environment;
- Increase local people's income, create job opportunities and improve the quality of life;
- Improved access roads that will enhance transport for the local goods and people.

A.3. Project participants:

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Table A.3-1: Project participants

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(-ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
China (host)	GEPIC Darong Electric Power Company Ltd	No
The Netherlands	N.V. Nuon Energy Trade & Wholesale	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

Further contact information of project participants is provided in Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

>> the People's Republic of China

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

>>Gansu Province

A.4.1.3. City/Town/Community etc:

>> Zhouqu County, Tibetan Autonomous Prefecture of Gannan

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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The Project, situated on the trunk stream of upper reaches of Bailong River, is part of Zhouqu County of Gannan Tibetan Autonomous Prefecture and spans 103º21′50.68″E to 103º24′37.44″E and 34º36′18.34″ N to 34º34′56.48″N. With the dam at Chenjiazui Village, Bazang Township, Zhouqu County, Gansu Province and the plant within Lijie Village, Lijie Township, it has the hinge 3 km far from Lijie Township Government, about 38 km far from Zhouqu County Town and at the distance of 375 km from Lanzhou City. The geographical coordinates of the dam are 104º02'11" E and 33º53'18" N, and the

geographical coordinates of the powerhouse are 104º03'23" E and 33º53'46" N. The figure A.4.1-1 shows the location of the project site.

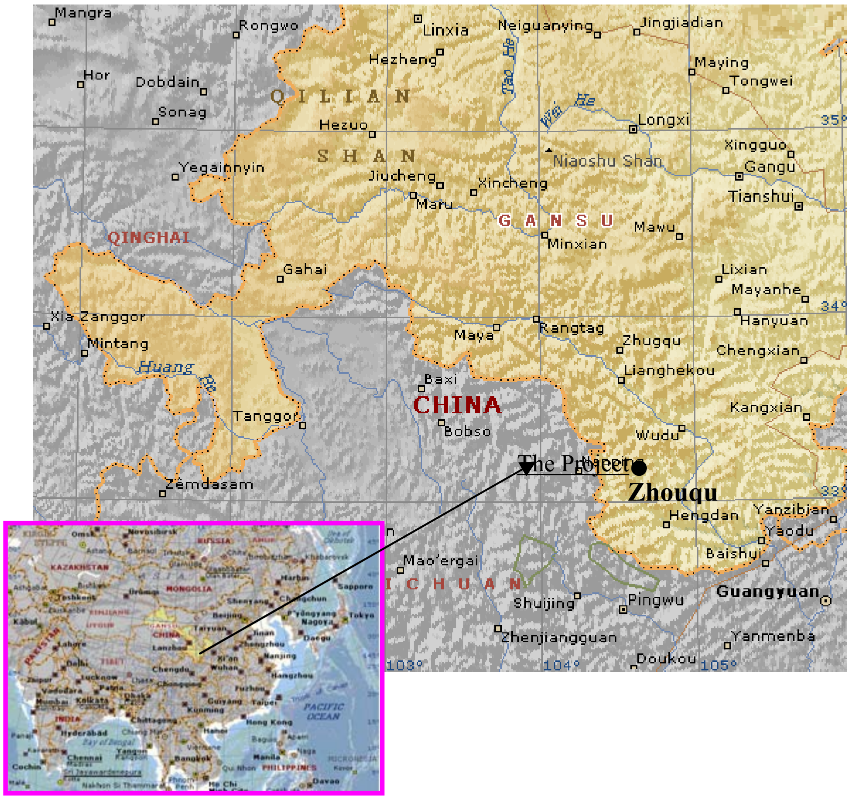

Fig A.4.1-1 Location of the Project

A.4.2. Category(ies) of project activity:

>>Sectoral Scope 1: Energy industries (renewable sources)

A.4.3. Technology to be employed by the project activity:

>> The purpose of the Project is to utilize the hydrological resources of the Bailong River through construction of a run-of-river hydro project to generate zero emissions electricity for the NWCPG. The electricity currently generated by the NWCPG is carbon intensive. The proposed project will result in emission reductions from the displacement of a fossil fuel based capacity that would otherwise be generated and dispatched in NWCPG. The energy displaced will be determined by measuring energy produced at the Project to the grid.

The scenario existing prior to the start of the implementation of the proposed project:

The location of the proposed project is covered by the Gansu Power Grid which is part of NWCPG. Electricity of NWCPG is generated by fossil fuels power, hydropower, wind power and others. The percentage of every type in 2004-2006 is showed as follows:

Table A.4.3-1:Proportion of different type of electricity generation technology in 2004-2006[1]

[1] China Electric Power Yearbook 2007,2006,2005

Type	2006MW	Proportion	2005MW	Proportion	2004MW	Proportion
Thermal power	29627	67.18%	25362.6	66.78%	22247.5	66.69%
Hydro power	14074	31.91%	12219.8	32.17%	10835.2	32.48%
Nuclear power	0	0.00%	0	0.00%	0	0.00%
Wind farm and Others	399	0.90%	399.5	1.05%	276	0.83%
Total	44100	100.00%	37981.9	100.00%	33358.7	100.00%

We could conclude from the above table that the NWCPG is dominated by the fossil-fuel fired power plants, which will emit Green House Gas during its power generation.

The project scenario:
The project will utilize the hydrological resources of the Bailong River through construction of a run-of-river hydro project to generate zero emissions electricity for the NWCPG. The project is therefore expected to reduce emissions of greenhouse gases by reducing the need of thermally generated power and reducing needed capacity expansion of fossil fuel-based generation of the NWCPG at an estimated 138,919 tCO2e per year during the crediting period.

The baseline scenario:
The baseline scenario is the same as it existing prior to the start of the implementation of the proposed project.

The Project is a run-of-river hydropower plant, which is composed of a concrete gravity dam, release sluice, channels, powerhouse and switch station. The annual power generation is expected to be approximately 163,800MWh over an expected operational lifetime of 25 years.

The major hinge works include left-bank flushing gate, bed overflow dam and structure of water diversion for power generation. As for the Station, the normal water level of its reservoir is 1,581.00m; the designed water head is 29m; rated discharge of single unit is 51.14m^3/s.

The water diversion tunnel, altogether 2037.53m in length, is designed to have a round section. The supporting type is the reinforced concrete full-section lining. The diameter of lined tunnel is 8.0m; the in-tunnel flow velocity is 3.08m/s; and the diameter of excavated channel is 9 m.

The power is delivered to the Gansu Power Grid (which is a part of the NWCPG) through two110 kV transmission lines to a station at a distance of 3km.

All the equipments are produced domestically and hence no technology introduction is induced to the host party.
The key technical data for equipments of the proposed project are show in table A.4.3-2.

Table A.4.3-2: Key technical data for the equipment within the Project

Parameter	Value
Installed Capacity (MW)	40.2
Designed water head (m)	29
Rated discharge water flow per turbine (m^3/s)	51.14
Rated discharge water flow for 3 turbines (m^3/s)	153.42
Expected annual Power supply to the grid(MWh)	163,472

Annual utilization hours(load factors)(h)		4075
Plant load factor		46.52%
Turbines		
HLA551C-LJ-272	Units	3
	Lifetime(years)	25
Generators		
SF-J13.4-36/5100	Units	3
	Lifetime(years)	25

Note: the lifetime of the equipments is not shown in manufacturer's specifications and industry standards, so the estimated lifetime of the Project is 25 years referring to the FSR.

Summary of post registration changes

The models of three installed turbines and generators aren't consistent with those in the registered PDD. The difference is because those types for turbines and generators are not strictly unified. Types with similar performance could be different because of different manufacturers. Although there are minor changes in parameters of the turbines and the generators compared with that in the PDD, the differences don't impact the installed capacity and output of units of project. Detailed information is in the following table.

Items		**In the registered PDD**	**Proposed Revised PDD**
Equipments	Turbines	HL290-LJ-280	HLA551C-LJ-272
	Generators	SF13.4-36-470	SF-J13.4-36/5100
Parameter	Rated discharge water flow for all the turbines	$154.83m^3/s$	$153.42m^3/s$

The nature and extent of the actual changes are:

(a) There is no change in the effective output capacity due to the model changes, as installed capacity and number of units are not changed. No installation of units with lower capacity and no units with a technology which is less advanced than that described in the PDD.

(b) No addition of component or extension of technology

(c) No removal or addition of one site (or more) of a project activity registered with multiple-sites;

(d) No actual operational parameters which are within the control of project participants differing from the expected parameters;

(e) No any consequential changes to the baseline methodology, including changing or adding another baseline methodology or applying a baseline scenario that is more appropriate as a result of the proposed or actual modifications to the project activity.

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

(a) These changes will not impact the applicability and application of the applied methodology under which the project activity has been registered;

(b) These changes will not impact compliance of the monitoring plan with the applied methodology for the monitoring plan has not been changed;

(c) These changes will not impact the level of accuracy and completeness in the monitoring of the project activity for the monitoring plan has not been changed;

(d) These changes will not impact the additionality of the project activity for:

The main parameters of the hydro turbines and generators, i.e. the rated capacity, rated voltage and rated water head, etc. are consistent with the description in the PDD. Even the rated water flow has 1% increase than the estimation, the rated capacity of the generator has not been changed. And as per the Clarification of Type Changes of Turbines and Generators of Bailongjiang Dalijie Hydropower Station issued by Northwest Hydro Consulting Engineers, CHECC on 06/05/2010, the plant load factor (PLF)/ the electricity generation of the Project has not been changed due to the changes.

As per the 2009 Financial Report of the GEPIC Darong Electric Power Company Ltd conducted by *Crowe Horwath China Certified Public Accountant Co., Ltd Gansu Branch*, which is a certified third party by Gansu Province Financial Department, the investment in fixed asset has been 363.10 million CNY which is higher than the estimated investment (329.92 million CNY) in the PDD, i.e. the actual investment is higher than the assumption made in the FSR.

Therefore the electricity output keeps the same, and the actual investment is higher than estiatmation in registered PDD, the income is deemed lower than estimated IRR in registered PDD.
In summary, the changes do not impact on the additionally of the project activity.
(e) These changes will not impact the scale of the project activity.

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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Table A.4.4-1. Estimated amount of emission reductions over the chosen crediting period

Years	**Estimation of annual emission reductions in tCO_2e**
01/10/2009-30/09/2010	138,919
01/10/2010-30/09/2011	138,919
01/09/2011-30/09/2012	138,919
01/10/2012-30/09/2013	138,919
01/10/2013-30/09/2014	138,919
01/10/2014-30/09/2015	138,919
01/10/2015-30/09/2016	138,919
01/10/2016-30/09/2017	138,919
01/10/2017-30/09/2018	138,919
01/10/2018-30/09/2019	138,919
Total estimated reductions (tCO_2e)	1,389,190
Total number of crediting years	10
Annual average of the estimated reductions over the crediting period (tCO_2e)	138,919

A.4.5. Public funding of the project activity:

>>No public funds are involved.

SECTION B. Application of a baseline and monitoring methodology

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

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1. The baseline and monitoring methodology ACM0002 is used: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 07;
2. Methodological tool: "Tool to calculate the emission factor for an electricity system " version 01.1;
3. Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, version 2;
4. The tool for demonstration and assessment of additionality used is: "Tool for demonstration and assessment of additionality", Version 05.2.

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

>>

The Project is a grid connected zero-emission renewable power generation activity and meets all the conditions stated in the approved consolidated baseline and monitoring methodology (ACM0002). These conditions are:

1. The Project is a run-of-river hydro power plant;
2. The Project activity results in a new reservoir. According to the Feasibility Study Report of Dalijie Hydropower Engineering (hereafter, FSR), the installed power generation capacity of the Project is 40.2 MW and the surface area at full reservoir level is about $0.52km^2$. Therefore the power density of the proposed project is about $77.3W/m^2$, which is greater than 4 W/m^2;
3. The Project is not a biomass fired power plant;
4. The Project is not an activity that involves switching from fossil fuels to renewable energy at the project site;
5. The geographic and system boundaries for the NWCPG are clearly identified and information on the characteristics of this grid at aggregate level is available.

B.3. Description of the sources and gases included in the project boundary

>> The spatial extent of the Project boundary includes power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

The generated electricity of the Project will be delivered to NWCPG, which includes Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Autonomous Region, and Xinjiang Autonomous Region Grid. So the Project boundary includes the NWCPG and the Project, which is delineated in the following.

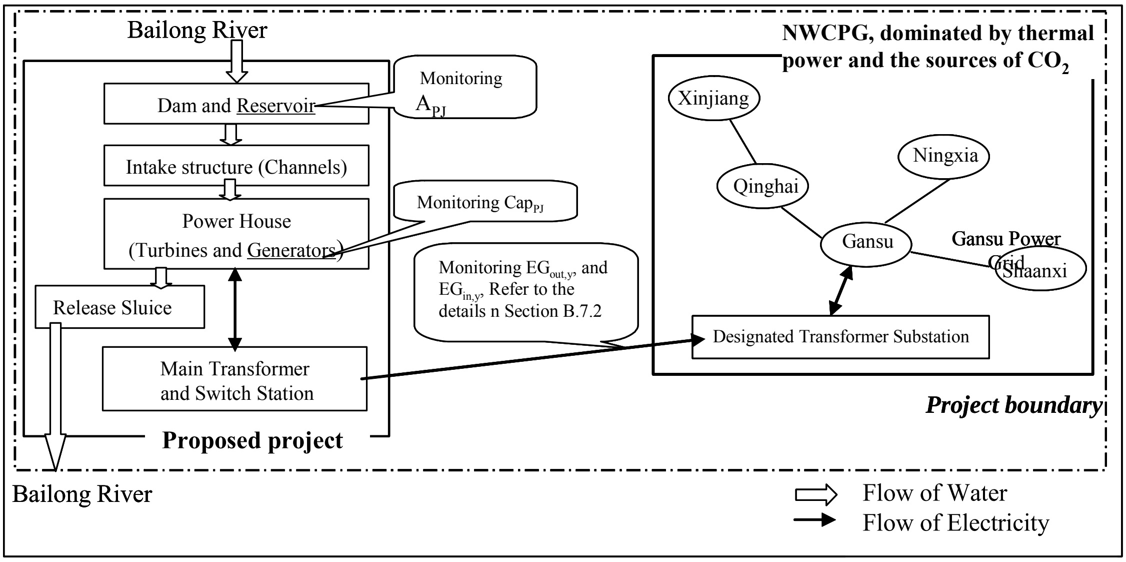

Figure B.3-1 Flowchart project boundary

The main emission sources and type of GHGs in project boundary are listed in Table B.3-1.

Table B.3-1 GHG emissions in project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	CO_2 Emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source. Excluded for simplification. This is conservative.
		N_2O	No	Minor emission source. Excluded for simplification. This is conservative.
Project Activity	The Project	CO_2	No	Minor emission source. Excluded for simplification. This is conservative.
		CH_4	No	As the Project' power density will be 77.3W/m^2, which is greater than 10 W/m^2, the Project emission should not be considered.
		N_2O	No	Minor emission source. Excluded for simplification. This is conservative.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

>>

The baseline scenario of the Project is the continued operation of the existing power plants and the addition of new generation sources on the NWCPG to meet 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 ACM0002, baseline emissions are equal to power generated by the project activity and delivered to the grid, multiplied by the baseline emission factor. The baseline emission factor is equal to the combined margin: a weighted average of the operating margin emission factor and the build margin emission factor.

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 CDM project activity (assessment and demonstration of additionality):

>>

Following the "Tool for the demonstration and assessment of additionality" it is demonstrated that the Project is additional because:

- The prospect of receiving CDM revenues has been an important factor in the decision to implement the Project (starting date test);
- There are alternatives to the Project that are consistent with current laws and regulations in China (step 1);
- Sensitivity analysis shows out that the Project is unlikely to be financially attractive (step 2);
- There are no similar activities observed that are implemented without support of the CDM (step 4).

Starting date test

The starting date of the Project is 10 November 2006, on which date the Project owner signed the construction contract. As per guidance of EB41 this is the earliest date the Project owner financially committed to the Project.

The starting date lies before start of validation, see table B.5.0.

Table B.5.0 – Project milestones

No	Milestone	Date
1	In the monthly meeting of the company [2],the development of the Project was discussed and the project owner decided to develop CDM for this project[3]	1 Jun 06

[2] Minutes of the Monthly Meeting of the Company, GEPIC Darong Electric Power Company Ltd., Jul. 2, 2006

[3] In the "monthly meeting of the company" on June 1, 2006, the management of GEPIC Darong Electric Power Company discussed the benefits of the CDM to improve the poor financial projections of the intended investment in the Dalijie project. Although the FSR hadn't finished, the PO already had some brief ideas of the project, like the geological conditions, the technical difficulties and the possible financial cost and income, etc.. With these brief ideas, the PO made its first decision to develop CDM for this project. CDM development would cost them nothing while bring a lot to the project, so they want to get started the sooner the better. The PO could abandon CDM without any loss if they finally decided not to invest on this project. PO made his final investment decision to develop the project on the base of getting the CDM benefit after he got the first version FSR.

No	Milestone	Date
2	CDM development contract with CDM consulting firm signed	6 Jun 06
3	First version of the FSR published by the Northwest Hydro Consulting Engineers, CHECC	Aug 06
4	The Lanzhou Electricity Power Branch of China Construction Bank Bank required CDM development as a precondition for a loan[4]	29 Aug 06
5	General Directors Office Meeting made investment decision for this project [5]	20 Sep 06
6	Applied for CDM development at Gansu DRC[6]	23 Sep 06
7	Approval feedback from Gansu DRC[7]	25 Sep 06
8	Approved version of the FSR published by Northwest Hydro Consulting Engineers, CHECC, following evaluation by the local DRC	Oct 06
9	Assessment report of the FSR published by the Investment Project Assessment Center of Gansu government	30 Oct 06
10	Contract for construction of conduit system signed	10 Nov 06
11	Contract for supply of generators signed	27 Nov 06
12	Opening ceremony on-site (published in Gansu Daily) [8]	12 Dec 06
13	PINs had been made	11 Jan 07
14	Preparing draft “Declaration for compliance with the WCD recommendations”	3 Apr 07
15	EIA Report published	Apr 07
16	EIA approval document obtained	25 May 07
17	Request and proposal for the validation of the Project	12 Jun 07
18	MOU with CER Buyer signed	24 Jul 07
19	Stakeholders conference for CDM	Sep 07
20	Verification and Approval (VA) obtained from Gansu DRC	20 Nov 07

[4] Loan Intent Letter on the Bailong River Dalijie Hydropower Station Project, Lanzhou Electricity Power Branch of China Construction Bank , Aug. 29, 2006

[5] Minutes of General Directors Office Meeting, GEPIC Darong Electric Power Company Ltd., Sep. 20, 2006

[6] The Referendum on the Application of CDM Development of Dalijie Hydropower Station, GEPIC Darong Electric Power Company Ltd. Sep. 23, 2006

[7] The Approval on Application of the CDM Development of Dalijie Hydropower Station, Local Economy Department of Development and Reform Commission of Gansu Province, Sep. 25, 2006

[8] Pragmatic and Innovation(a news report of GEPIC Darong Electric Power Company Ltd.), Gansu Daily, Nov. 15 ,2006

No	Milestone	Date
21	Start Validation	27 May 08
22	DOE on-site validation	Jun 08
23	Planned commissioning date	30 July 09

All project participants involved considered the incentives from the CDM long before the starting date of the project. Documented evidence of consideration of the CDM revenues in the investment decision by the project owner includes the milestones 1 – 6 as indicated in table B.5.0.

Ever since the decision to invest in the Project, the project owner has continued its activities to secure CDM revenues, as is evidenced by milestones 7, 8, 13, 14, 17-22 in table B.5.0.

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

Sub-step 1a. Define alternatives to the project activity:
As described in section B4, there are four plausible options, which are based on the condition of the local areas and available to meet the power requirement equivalent to 40.2MW:

Alternative i-The proposed hydropower plant development not undertaken as a CDM project activity;
Alternative ii-Construction of a fossil fuel-fired power plant with equivalent installed capacity or annual electricity generation;
Alternative iii-To supply electricity from the current grid (NWCPG). This option will reject the proposed project completely, and supply electricity from the current grid.
Alternative iv-To construct power plants using other renewable energy resources, which can generate equivalent electricity annually to the Project. Potential resources may include: photovoltaics, tidal/wave, wind, geothermal and renewable biomass etc.None of these are realistic nor feasible alternatives for the project owner: From China Electric Power Yearbook 2007, the dominant power generation in Gansu is thermal power generation and hydropower. The thermal power generation accounted for 58.95% of total installed capacity, the hydropower accounted for 39.23% of total installed capacity, which means the other renewable energy is uncommon to use and not financially feasible in Gansu province. So the Alternative iv is not a proper alternative, which is on the condition of the local area.

Sub-step 1b. Consistency with mandatory laws and regulations:
Alternatives i and iii are in compliance with applicable laws and regulation requirements of the host Party. For Alternative ii, according to most recent power industry policies[9], construction of coal-fired power plants with single capacity less than 135 MW is forbidden. The average annual utilization hours of the fossil fuel plants are 5,633[10] in China, which are larger than the average annual utilization of hydropower plants. Thus, the installed capacity of the fossil fuel-fired plants with equivalent annual electricity

[9] Source: Notice on Strictly Prhibiting the Installation of Fuel-fired Generaters with the Capacity of 135MW or below, issued by State Council Office, eecree no. 2002-6, http://www.gov.cn/gongbao/content/2002/content_61480.htm

[10] Source: National Statistics Express of Power Industry in 2006, China Electricity Council

generation to the Project will be smaller than 40.2 MW. Therefore Alternative ii is not in line with applicable laws and regulations and will not be considered as an accepted alternative.

Conclusion: The project satisfies Step 1 of the Additionality Tool.

Step 2. Investment analysis

The IRR of the project is below the common benchmark for hydropower projects of this size in China and hence is not considered financially attractive. The detailed investment analysis list is as follows:

Sub-step 2a. Determine appropriate analysis method

Because the proposed project generates revenue from CDM and from energy sales, simple cost analysis (Option I as per the Tool) cannot be applied as an appropriate analysis method. The investment comparison analysis (Option II) is only applicable to projects that have alternatives similar to the project. The alternative baseline scenario of the proposed project is the NWCPG rather than a new investment project. The investment comparison analysis (Option II) is thus not suitable to use. The proposed project will therefore use the benchmark analysis method (Option III) since data on the benchmark IRR are available.

Sub-step 2b – Option III. Apply benchmark analysis

With reference to *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*[11], the financial benchmark rate of return of the Chinese Power Industries is to be 8% of the total investment. This benchmark is widely used for the power project investments in China.

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

Table B.5-1 below are basic parameters for financial analysis.

Table B.5-1: Parameters used in financial analysis

Parameter	**Value and unit**	**Data source**
Installed Capacity	40.2 MW	See Page 1 in Chapter 14 Economic Assessment of the first version FSR
Investment	RMB 329.92 million[12]	See Page 1 in Chapter 14 Economic Assessment of the first version FSR
Annual Power Supply	163,472 MWh	See Page 8 in Chapter 14 Economic Assessment of the first version FSR
Electricity Tariff	0.227 RMB/kWh (incl. VAT)	The Document Fagai

[11] Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects, Term 1.11 on page 2, China Electric Power Press, 2003,

[12] Static investment is 329.92 million RMB in the first version FSR; while static investment is 330.35 million in the approved FSR. We used data from the first version FSR for conservative reason and for the first version FSR was the basis for the investment decision.

Parameter	Value and unit	Data source
		Price[2004] No. 1125
Annual Operational and Maintenance Costs	RMB 8.873 million[13]	See Page 7 in Chapter 14 Economic Assessment of the first version FSR
Project Lifetime	25 years	See Page 1 in Chapter 14 Economic Assessment of the first version FSR
Value Added Tax (VAT)	17 %	See Page 3 in Chapter 14 Economic Assessment of the first version FSR
Income Tax	33 % (exempt for the first two years and 16.5% for the later three years)	
Rate of additional education fee	3 %	
Rate of city construction tax	7 %	

The IRR[14] without CDM revenues is 3.88% after tax / 4.13% before tax, which is much lower than the financial benchmark of 8%. Thus the proposed project is not considered to be financially attractive.

It should be noted that the FSR was approved under exceptional conditions. In the first place the power tariff was highly inflated and unrealistic (RMB 0.314 Inc. VAT) as the actual tariff paid at that time was RMB 0.22 – 0.23 per kWh. The only reason for the author of the FSR to use a high tariff was to comply to the benchmark IRR of 8%, as required under Chinese regulations. The author back-calculated the tariff from the IRR requirement of 8%. Further, the assessment took place on IRR *before* tax, instead of the regular IRR after tax. The latter value amounted to only 7.2%.

The project owner of the project was aware of the unrealistic assumptions in the FSR, for which reason he decided to pursue CDM development to improve the financial return of the project. This is confirmed by the final bank loan approval from Lanzhou Electricity Power Branch of China Construction Bank of Aug 29, 2006 that requires development of CDM revenues as a condition precedent to the loan. The letter also confirms that the CDM is able to lift the financial barrier.

As a basis for financial modelling in this PDD a more realistic electricity tariff of RMB 0.227 was used. This number can be verified from the Policy document *The Document Fagai Price [2004] No. 1125*[15].

Sub-step 2d. Sensitivity analysis

For the sensitivity analysis the following financial indicators have been analyzed:

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[13] Annual Operational and Maintenance Costs is 8.873 million RMB in the first version FSR; while it is 8.878 million in the approved FSR. We used data from the first version FSR for conservative reason and for the first version FSR was the basis for the investment decision.

[14] Even though using the total electricity generation in the IRR calculation, the IRR still remains below the benchmark 8%.

[15] Notice on Channelizing the Confliction of Electricity Price in Northwest Power Grid, NDRC, Jun. 18, 2004

- Total Investment;
- Annual Power Supply;
- Electricity Tariff;
- Annual Operational and Maintenance Costs(Operation cost).

Table B.5-3:IRR sensitivity to different financial parameters (without CDM)

	-10.00%	0.00%	+10.00%
Total investment	5.03%	4.13%	3.35%
Annual power supply	2.93%	4.13%	5.23%
Electricity tariff	2.93%	4.13%	5.23%
Operation cost	4.44%	4.13%	3.81%

As shown in Table B5-3, the IRR of the project is consistently below the benchmark rate when the four variables are varied between -10% and +10% of the values used in the FSR. The sensitivity analysis confirms that the implementation of this project without CDM revenues is not financially attractive,
Conclusion: the project satisfies Step 2 of the Additionality Tool

Step 3. Barrier analysis

This step will not be followed. In the previous step the additionality of the CDM has been proven.

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:
Activities similar to the proposed project activity have been identified from the *Yearbook of China Water Resources (edition 2006)* and the UNFCCC-CDM website and are listed in Table B.5-5. The projects are in the same region (Gansu Province), rely on a broadly similar technology, are of a similar scale (20 MW – 60 MW)[16], and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, and access to financing. Only projects having been developed after 2002 are selected, because investment conditions before and after 2002 are quite different. In 2002 China started reforming its electric power sector by unbundling generation and transmission. The reform involved establishing State Grid Corporation of China and China Southern Power Grid Corporation[17]. The former State Power Corporation was restructured and separated into 5 national power generation companies[18]. This paved the way for independent power production. Before the power industry

[16] Projects with capacity from 0.5 to 1.5 times of the proposed project are similar with the proposed project. Then the capacity boundary is from 20MW to 60MW.

[17] Notice of the State Council on Printing and Distributing the Plans Regarding the Restructuring of the Power Industry(Guofa [2002] No.5), State Council on Feb 10, 2002

http://www.china5e.com/laws/index2.htm?id=200608080001

[18] Approval from State Development Planning Commission about Power Generation Asset Restructuring and Division Scheme of State Power Corporation, Guodianban (2002) No.952, Dec 26, 2002

http://www.365dq.com/Research/Info_View.asp?ContentID=1793

restructure in year 2002[19], hydropower plants were all developed by state-owned enterprises and these plants were supported by national or local governmental funds or by government loan guarantees for developers of the plants. The state-owned project developers did not have any financing difficulties. At the same time the government provided favourable policies for electricity tariff of the plants. The electricity tariff of each power plant was determined according to the principle of full-cost recovery[20], and so developers didn't have any investment risk. These preferential policies ended in 2001[21], after which private developers of hydropower projects were allowed in the market.

Table B.5-5: Activities similar to the project (20 MW-60 MW) *

Name of the Project	**Capacity (MW)**	**Construction (Commission) Date**	**Application of CDM**
Dala river	52.5	1/4/2003(15/11/2007)	Yes
Zhouqu Hujia'ai	28	01/07/2004(01/09/2008)	Yes
Qingshui	21.5	15/10/2004(01/07/2008)	Yes
Jingtieshan	30.45	5/11/2004 (1/1/2006)	Yes
Dang River	35.4	1/11/2004 (1/5/2007)	Yes
Haidianxia	60	09/12/2004(01/08/2008)	Yes
Diebu Duoer	32	2005 (1/6/2007)	Yes
Jinkouba	28	01/07/2005(01/01/2007)	Yes
Donghewan	29.7	12/08/2005(01/01/2009)	Yes
Tiangwanggou	51	10/2005	Yes
Xiaoshuichi	22.5	**1/12/2005(1/12/2007)**	Yes
Tiecheng	51.5	15/11/2005(15/10/2008)	Yes
Erlongshan	50.5	1/1/2006 (1/7/2007)	Yes
Anguoer	25.2	10/01/2006(01/08/2007)	Yes
Zhuchaxia	34	4/2006	Yes
Tao river Lianlu Cascade II(Xiacheng)	37.5	02/06/2006(01/10/2009)	Yes
Shuiboxia	57	10/2006	Yes
Dalijie	40.2	12/2006	Yes
Lubasi	51	01/01/2007(1/01/2009)	Yes
Luqu duosongduo	21	18/01/2007(01/09/2008)	Yes
Yangjiahe	37.5	28/03/2007(01/01/2009)	Yes
Zhuoni Niuzi	30	15/4/2007(1/1/2009)	Yes
Huangshui Baichuan	36	19/09/2007(01/03/2010)	Yes
Liuyuan	25	20/11/2007(01/01/2010)	Yes

[19] Notice of the State Council on Printing and Distributing the Plans Regarding the Restructuring of the Power Industry (Guofa [2002] No.5), State Council, Feb 10, 2002

[20] Notice on Implementation Method of Various Electricity Tariff (No. 101 Shuidiancaizi[1987]), Ministry of Water Resources and Electric Power, State Economic Committee and State Price Bureau, Nov 28, 1987

[21] Notice on Standardizing Electricity Tariff Management (No. 701 Jijiage[2001]), State Planning Committee, Apr 23, 2001.

Huangtuwan	20.5	27/11/2007(01/10/2009)	Yes
Wudu JiaoyuanbaJiaoyuanba	25	1/12/2007(01/01/2008)	Yes
Saiwuduo	20	25/03/2008(01/07/2009)	Yes
Liangfengkou	52.5	03/03/2008(01/01/2011)	Yes
Shawan	51	18/5/2008(01/02/2011)	Yes

*Data source: *Yearbook of China Water Resources (edition 2006)*
http://cdm.unfccc.int/Projects/registered.html
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1571.pdf

Sub-step 4b. Discuss any similar options that are occurring:

There are no project activities identified that are similar to the project that do not use the CDM. It is hence concluded that the project is not common practice.

Conclusion: the project satisfies the four steps of the Additionality Tool and is hence considered additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>> The proposed project activity will generate GHG emission reductions by avoiding CO_2 emissions from electricity generated by fossil fuel power plants. The emission reductions ER, during a given year y is the difference of baseline emission BE_y, deduce the project emission PE_y, and the leakage LE_y, calculated as

$$ER_y = BE_y - PE_y - LE_y \quad \text{(B.6-1)}$$

Where:
ER_y = Emission reductions in year y (t CO_2e/yr).
BE_y = Baseline emissions in year y (t CO_2e/yr).
PE_y = Project emissions in year y (t CO_2e/yr).
LE_y = Leakage emissions in year y (t CO_2e/yr).

Calculation of PE_y

According to the ACM0002, if the power density (PD) of the power plant is greater than 10 W/m^2:
PEy= 0
The power density of the project activity is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \quad \text{(B.6-2)}$$

Where:
PD = Power density of the project activity (W/m^2).
Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W).
Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero.
A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2).
A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.

For this project: PD=40,200,000W÷520,000m^2=77.3W/m^2， is greater than 10 W/m^2. So the Project emission is zero. i.e. PE_y=0.

Calculation of LE_y

According to the ACM0002 methodology, the leakage in the proposed project is neglected, i.e. LEy=0.

Calculation of BE_y

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

$$BE_y = (EG_y - EG_{baseline}) \bullet EF_{grid,CM,y} \quad \text{(B.6-3)}$$

Where:
BE_y = Baseline emissions in year y (tCO_2/yr).
EG_y = Electricity supplied by the project activity to the grid (MWh).
$EG_{baseline}$ = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero, for this proposed project is zero, i.e. $EG_{baseline}$ =0.
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

According to the "Tool to calculate the emission factor for an electricity system", project participants shall apply the following six steps to calculate the $EF_{grid,CM,y}$:
STEP 1. Identify the relevant electric power system.
STEP 2. Select an operating margin (OM) method.
STEP 3. Calculate the operating margin emission factor according to the selected method.
STEP 4. Identify the cohort of power units to be included in the build margin (BM).
STEP 5. Calculate the build margin emission factor.
STEP 6. Calculate the combined margin (CM) emissions factor.

STEP 1. Identify the relevant electric power system.

If the DNA of the host party has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. There is guidance available from the Chinese DNA on the applicable grid as the project boundary[22]. For this project, the Northwest China Power Grid (NWCPG), which covers the area of Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Autonomous Region, and Xinjiang Autonomous Region, is determined as the project boundary.

STEP 2. Select an operating margin (OM) method.

The tool offers several options for the calculation of the OM emission factor.

22 Notification on Determining Baseline Emission Factors for Regional Power Grids in China, Chinese DNA, July 18, 2008 on http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2847

Because low cost/must run resources (hydropower and wind power) constitute less than 50% of total grid generation (see Table B.6.1-1). Therefore, the calculation method of simple OM is suitable for this project activity.

Table B.6.1-1 Electricity generation of the NWCPG, 2002-2005[23]

Year	Electricity generation (GWh)				
	Thermal	**Hydro**	**Others**	**Total**	**Low cost/must run resources % of the total grid generation**
2001	81148	27447	n.a.	108595	25.27%
2002	93428	27427	198	121053	22.82%
2003	113093	25899	242	139234	18.77%
2004	131939	34813	705	167457	21.21%
2005	133909	42801	7852	184562	27.44%
Average	110703	31677	2249	144180	23.11%

Data vintage selection:

For the simple OM, the emissions factor can be calculated using either of the two following data vintages:

Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or

Ex post option: The year, in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

Based on the most recent statistics available of the project activity at the time of PDD submission, the first data vintages (ex-ante) for the calculation of the OM emission factor was chosen for this project, ex-post calculation would not be needed. The generation data for various power generating sources for the most recent three years (2003-2005) are presented in the Annex 3 attached.

STEP 3. Calculate the operating margin emission factor according to the selected method.

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

- Based on data on fuel consumption and net electricity generation of each power plant / unit (Option A), or
- Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B), or

[23] China Electric Power Yearbook (editions 2002, 2003, 2004, 2005, and 2006).

- Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C)

Option A should be preferred and must be used if fuel consumption data is available for each power plant / unit. In other cases, option B or option C can be used. For the purpose of calculating the simple OM, Option C should only be used if the necessary data for option A and option B is not available and can only be used if only nuclear and renewable power generation are considered as low-cost / must-run power sources and if the quantity of electricity supplied to the grid by these sources is known.

Considering of data availability (detailed plant/unit data can not be available publicly), we cannot use the Option A and Option B. On the other hand, according to the *China Electric Power Yearbook*, the nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known. We apply the Option C to calculate the OM.

Where Option C is used, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost / must-run power plants / units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,} FC_{i,y} \bullet NCV_{i,y} \bullet EF_{CO2,i,y}}{EG_y} \qquad (B.6\text{-}4)$$

where:
$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y (tCO2/MWh)
$FC_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$ = CO2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EGy = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i = All fossil fuel types combusted in power sources in the project electricity system in year y
y = Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2.

STEP 4. Identify the cohort of power units to be included in the build margin (BM).
The sample group of power units m used to calculate the build margin consists of either:
(a) The set of five power units that have been built most recently, or
(b) The set of power capacity additions in the electricity system that comprize 20% of the system generation (in MWh) and that have been built most recently.

project participants should use the set of power units that comprizes the larger annual generation.

Because it is very difficult to obtain the data of five most recently built power plants as these data are considered as confidential business information in China, the power plant capacity additions in the electricity system that comprize 20% of the system generation (in MWh) and that have been built most recently is selected as the sample group m.

However, even for those built most recently power plants that comprize 20% of the system generation, it is also difficult to obtain the specific data regarding to fuel consumption and electricity generation

additions by each power sources as confidential reason. Considering this situation, the following clarifications[24] are given by EB for deviation in use of methodology AM0005 and AMS-I.D by several project activities in China when estimating BM emission coefficient (Since methodology AM0005 has been replaced by and incorporated into the consolidated methodology ACM0002, the deviation above is also applicable to the consolidated methodology ACM0002.):

- Use of installed capacity in place of annual electricity generation; and
- Use of capacity additions during the last 1~3 years for estimating the build margin emission factor for grid electricity;
- It is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption.

Thus, the most recent built power plants are calculated as the difference of total installed power capacities in the year 2005 and 2003, which accounted for 21.02% of the total capacity in 2005 (see Table B.6.1-2). So the calculation by using the data in the years 2005 and 2003 satisfies the requirements of the tool.

Table B.6.1-2 Installed capacity of the NWCPG, 2003-2005[25]

Type	Installed Capacity 2003(MW)	Installed Capacity 2004(MW)	Installed Capacity 2005(MW)	New Capacity Additions(MW)
	A	B	C	C-A
Thermal Power	20492.7	22247.5	25362.6	4869.9
Hydro Power	9382	10835.2	12219.8	2837.8
Nuclear Power	0	0	0	0
Others	122.9	276	399.5	276.6
Total	29997.6	33358.7	37981.9	7984.3

Data vintage selection:

In this PDD, Option 1 is employed, which for the period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. This option does not require monitoring the emission factor during the crediting period.

STEP 5. Calculate the build margin emission factor.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

[24] "Request for clarification on use of approved methodology AM0005 for several projects in China", the EB's guidance on DNV deviation request.
http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

[25] China Electric Power Yearbook (editions 2004, 2005 and 2006).

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \cdot EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \qquad (B.6\text{-}5)$$

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in step 3 (a) for the simple OM, using options B1, B2 or B3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin.
Option B1. If for a power unit m data on fuel consumption and electricity generation is available.
Option B2. If for a power unit m only data on electricity generation and the fuel types used is available, the emission factor should be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit.
Option B3. If for a power unit m only data on electricity generation is available, an emission factor of 0 tCO_2/MWh can be assumed as a simple and conservative approach.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available. According to the tool and clarifications by EB (in step 4 of this section), the main steps for BM calculation are as following:

Sub-step 5a: Calculation of weights of CO_2 emissions by coal-fired, oil-fired and gas-fired plants in total CO_2 emissions of NWCPG.

$$\lambda_{coal} = \frac{\sum_{i \in coal} FC_{i,y} \bullet NCV_{i,y} \bullet EF_{CO2,i,y}}{\sum_{i \in thermal} FC_{i,y} \bullet NCV_{i,y} \bullet EF_{CO2,i,y}} \qquad (B.6\text{-}6)$$

$$\lambda_{oil} = \frac{\sum_{i \in oil} FC_{i,y} \bullet NCV_{i,y} \bullet EF_{CO2,i,y}}{\sum_{i \in thermal} FC_{i,y} \bullet NCV_{i,y} \bullet EF_{CO2,i,y}} \qquad (B.6\text{-}7)$$

$$\lambda_{gas} = \frac{\sum_{i \in gas} FC_{i,y} \bullet NCV_{i,y} \bullet EF_{CO2,i,y}}{\sum_{i \in thermal} FC_{i,y} \bullet NCV_{i,y} \bullet EF_{CO2,i,y}} \qquad (B.6\text{-}8)$$

Where:
$FC_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
i = fossil fuel types combusted in power sources in power unit m in year y
y = Most recent historical year for which power generation data is available
Coal, Oil and Gas refer to the fuel categories, respectively solids fuels, liquid fuels, and gas fuels.

Sub-step 5b Calculation of NWCPG Emission Factor for the thermal power
The Emission Factor for the thermal power is calculated as a weighted emission factor as the following formula:

$$EF_{Thermal} = \lambda_{Coal} \cdot EF_{Coal,Adv} + \lambda_{Oil} \cdot EF_{Oil,Adv} + \lambda_{Gas} \cdot EF_{Gas,Adv} \quad \text{(B.6-9)}$$

Where:
$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are the emission factors of the best technology for coal, oil, gas fired power plants commercially available in China, which are calculated based on the efficiency level of the best technology for each fuel type commercially available in China as follows:

$$EF_{\mathrm{j,adv}} = \frac{\mathrm{EF}_{\mathrm{CO2,j}} \bullet 3.6}{\eta_{\mathrm{j,adv}}} \quad \text{(B.6-10)}$$

Where:
$EF_{j,adv}$ = CO_2 emission factor of the best technology for coal, oil, gas fired power plants commercially available in China (tCO_2/MWh)
$EF_{CO2,m,i}$ = Average CO_2 emission factor of fuel type i used in the best technology for coal, oil, gas fired power plants commercially available in China(tCO_2/GJ)
$\eta_{j,adv}$= Average net energy conversion efficiency of the best technology for coal, oil, gas fired power plants commercially available in China (%)

According to the data issued by China DNA, the efficiency levels of domestic sub-critical 600 MW coal power unit and the efficiency level of 200 MW combined cycle power unit are taken as the efficiency level of the best technology for coal-fired power plants, and oil and gas fired power plants commercially available in China, which are at 35.82% and 47.67%, respectively.
(See Annex 3 for details)

Sub-step 5c Calculation of the BM emission Factor

$$EF_{\mathrm{grid},BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \cdot EF_{Thermal} \quad \text{(B.6-11)}$$

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

STEP 6. Calculate the combined margin (CM) emissions factor.

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

$$EF_{\mathrm{grid,CM,y}} = \mathrm{E}F_{\mathrm{grid,OM,y}} \times \omega_{\mathrm{OM}} + EF_{\mathrm{grid,BM,y}} \times \omega_{\mathrm{BM}} \quad \text{(B.6-12)}$$

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
ω_{OM} = Weighting of operating margin emissions factor (%)

ω_{BM} = Weighting of build margin emissions factor (%)

The weights ω_{OM} and ω_{BM} by default, are 50%.

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

Data / Parameter:	**A_{BL}**
Data unit:	**m^2**
Description:	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.
Source of data used:	The status of the Project.
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	This value is zero, since there will be a new reservoir for this project.
Any comment:	

Data / Parameter:	**$EF_{grid,CM,y}$**
Data unit:	**tCO_2/MWh**
Description:	Combined margin CO_2 emission factor for grid connected power generation in year y
Source of data used:	Official data from Chinese DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf
Value applied:	0.8498. See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published official statistics by Chinese DNA.
Any comment:	

Data / Parameter:	**$EF_{grid,OM,y}$**
Data unit:	**tCO_2/MWh**
Description:	Simple operating margin CO2 emission factor in year y
Source of data used:	Official data from Chinese DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf
Value applied:	1.1257. See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published official statistics by Chinese DNA.

Any comment:	

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/MWh
Description:	Build margin CO_2 emission factor in year y
Source of data used:	Official data from Chinese DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf
Value applied:	0.5739. See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published official statistics by Chinese DNA
Any comment:	

Data / Parameter:	$FC_{i,y}$
Data unit:	10^4 t,$10^8 m^3$
Description:	Amount of fossil fuel type i consumed in the project electricity system NWCPG in years y (2003-2005, including Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang)
Source of data used:	China Energy Statistical Yearbook (editions 2004, 2005 and 2006).
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published official statistics.
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	MJ/t or MJ/km^3
Description:	Net calorific value (energy content) of fossil fuel type i in year y
Source of data used:	Page 287, China Energy Statistical Yearbook (editions 2006).
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published official statistics.
Any comment:	

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/TJ

Description:	CO_2 emission factor per energy unit of fuel i in year y
Source of data used:	The values of coke, coke oven gas, other gas and refinery gas are taken from “2006 IPCC Guidelines for National Greenhouse Gas Inventories” Volume 2 Energy, Chapter 1, 1.21-1.24.
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	The national value is unavailable, adopt IPCC default value
Any comment:	

Data / Parameter:	**$EG_{m,y}$, EG_y, $EG_{j,y}$, $EG_{k,y}$**
Data unit:	**MWh**
Description:	Net electricity generated and delivered to the grid by power plant / unit m,j,k or n (or in the project electricity system in case of EGy) in year y
Source of data used:	China Electric Power Yearbook (editions 2002, 2003, 2004, 2005 and 2006).
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published official statistics.
Any comment:	To calculate the electricity output (MWh) supplied to the grid by unit m of the NWCPG in year y.

Data / Parameter:	**Auxiliary Power Ratio**
Data unit:	%
Description:	The ratio between electricity used by the power plant and the electricity generation by the plant.
Source of data used:	China Electric Power Yearbook (editions 2002, 2003, 2004, 2005 and 2006).
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published official statistics.
Any comment:	To calculate the electricity output (MWh) supplied to the grid by unit m of the NWCPG in year y.

Data / Parameter:	**$CAP_{j,y}$**
Data unit:	MW
Description:	Power generated in year y
Source of data used:	China Electric Power Yearbook (editions 2004, 2005 and 2006).

Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published official statistics.
Any comment:	

Data / Parameter:	$\eta_{i,adv}$
Data unit:	%
Description:	Average net energy conversion efficiency of the best technology for coal, oil, gas fired power plants commercially available in China
Source of data used:	Official data from Chinese DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1365.pdf
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published official statistics by Chinese DNA.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>> The calculation of emission reductions of the proposed project is based on the section B.6.1 described above. The outcome of the steps is as follows:

PE_y=0

LEy=0

Calculation of BE_y of the NWCPG(get detailed data from the Annex 3**)**

Based on the formulae (B.6-4) above, $EF_{grid,OMsimple,y}$=1.1257 tCO_2/MWh
Based on the formulae (B.6-5~ B.6-11) above, $Ef_{grid,BM,y}$=0.5739 tCO_2e/MWh
Based on the formulae (B.6-12) above,

$$EF_{grid,CM,y} = 0.5 * EF_{grid,OM,y} + 0.5 * EF_{grid,BM,y} = 0.5 * 1.1257 + 0.5 * 0.5739 = 0.8498 tCO_2 e / MWh$$

Based on the formulae (B.6-3) above, BE_y =163,472*0.8498= 138,919tCO_2e/yr

Emission reduction (ERy) by the proposed project activity
Based on the formulae (B.6-1) ,
$ER_y = BE_y - PE_y - LE_y$= BE_y -0-0=138,919 tCO_2e/yr

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

>>

Table B.6.4-1 Summary of the ex-ante estimation of emission reductions:

Year	**Estimation of project activity emissions (tCO_2 e)**	**Estimation of baseline emissions (tCO_2 e)**	**Estimation of leakage (tCO_2 e)**	**Estimation of overall emission reductions (tCO_2 e)**
01/10/2009-30/09/2010	0	138,919	0	138,919
01/10/2010-30/09/2011	0	138,919	0	138,919
01/09/2011-30/09/2012	0	138,919	0	138,919
01/10/2012-30/09/2013	0	138,919	0	138,919
01/10/2013-30/09/2014	0	138,919	0	138,919
01/10/2014-30/09/2015	0	138,919	0	138,919
01/10/2015-30/09/2016	0	138,919	0	138,919
01/10/2016-30/09/2017	0	138,919	0	138,919
01/10/2017-30/09/2018	0	138,919	0	138,919
01/10/2018-30/09/2019	0	138,919	0	138,919
Total (tonnes of CO_2 e)	0	1,389,190	0	1,389,190

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG_{out,y}$**
Data unit:	**MWh**
Description:	Annual on-grid electricity supplied to NWCPG by the proposed project.
Source of data to be used:	Electricity will be measured directly and continuously by computed and precise meters.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	163,472
Description of measurement methods and procedures to be applied:	Measured continuously and recorded on a monthly basis; the data will be archived both in electronic and paper. The data will be kept for at least 2 years after the end of the fixed crediting period.
QA/QC procedures to be applied:	Set up a special CDM project team; constitute detailed rules on monitoring management; introduce precision meters; keep the invoice of electricity sales as a hard proof for data quality control.
Any comment:	To calculate $EG_y=EG_{out,y}-EG_{in,y}$

Data / Parameter:	**$EG_{in,y}$**
Data unit:	**MWh**
Description:	Annual on-grid electricity purchased from NWCPG by the proposed project for the plant operation.
Source of data to be used:	Electricity will be measured directly and continuously by computed and precise meters.

Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Measured continuously and recorded on a monthly basis; the data will be archived both in electronic and paper. The data will be kept for at least 2 years after the end of the fixed crediting period.
QA/QC procedures to be applied:	Set up a special CDM project team; constitute detailed rules on monitoring management; introduce precision meters; keep the invoice of electricity purchase as a hard proof for data quality control.
Any comment:	To calculate $EG_y=EG_{out,y}-EG_{in,y}$

Data / Parameter:	**TEG_y**
Data unit:	**MWh**
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y.
Source of data to be used:	Electricity will be measured directly and continuously by computed and precise meters.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	163,800
Description of measurement methods and procedures to be applied:	Measured continuously and recorded on a monthly basis; the data will be archived both in electronic and paper. The data will be kept for at least 2 years after the end of the fixed crediting period.
QA/QC procedures to be applied:	Set up a special CDM project team; constitute detailed rules on monitoring management.
Any comment:	

Data / Parameter:	**Cap_{PJ}**
Data unit:	**MW**
Description:	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data to be used:	Check the nameplate of the equipment on the site, yearly.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	40.2
Description of measurement methods and procedures to be applied:	Check the nameplate of the equipment on the site.

QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	**A_{PJ}**
Data unit:	**km^2**
Description:	Area of the reservoir measured at the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data to be used:	Project site, yearly.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.52
Description of measurement methods and procedures to be applied:	Measured from topographical surveys. The data will be kept for at least 2 years after the end of the fixed crediting period.
QA/QC procedures to be applied:	-
Any comment:	-

B.7.2 Description of the monitoring plan:

1. Introduction of Monitoring Plan

This Monitoring plan will set out a number of monitoring tasks in order to ensure that all aspects of projected greenhouse gas (GHG) emission reductions for the proposed project are controlled and reported. This requires an on going monitoring of the Project to ensure performance according to its design and that claimed Certified Emission Reductions (CERs) are actually achieved.

The monitoring plan of the proposed project is a guidance document that provides the set of procedures for preparing key project indicators, tracking and monitoring the impacts of the proposed project. The monitoring plan will be used throughout the defined crediting period for the Project to determine and provide documentation of GHG emission impacts from the proposed project. This monitoring plan fulfils the requirement set out by the Kyoto Protocol that emission reductions projects under the CDM have real, measurable and long-term benefits and that the reductions in emissions are additional to any that would occur in the absence of the certified project activity. The monitoring plan provides the requirements and instructions for:

- Establishing and maintaining the appropriate monitoring systems for electricity generated by the Project;
- Quality control of the measurements;
- Procedures for the periodic calculation of GHG emission reductions;
- Assigning monitoring responsibilities to personnel;
- Data storage and filing system;
- Preparing for the requirements of an independent, third party auditor or verifier.

2. Management structure responsibility

The monitoring of the emission reductions will be carried out according to the diagram shown in Figure B.7.2-1. The Vice general Manager will hold the overall responsibility for the monitoring process and approval of the monitoring report. The plant operation staff, is responsible for the measurement of the monitored data, and assisted the monitoring officer on the plant site.

The monitoring officer will be appointed by the vice general manager. The monitoring officer will be selected from among the senior technical or managerial staff. Before he/she commences monitoring duties, he/she will receive training on CDM monitoring requirements and procedures.

The monitoring officer will be responsible for carrying out the following tasks:

- **Supervise and verify metering and recording:**

The monitoring officer will coordinate with the plant operation staff to ensure and verify adequate metering and recording of data, including power delivered to the grid.

- **Collection of additional data, sales / billing receipts:**

The monitoring officer will collect sales receipts for power delivered to the grid, billing receipts for power delivered by the grid to the hydropower station and additional data such as the daily operational reports of the hydropower station.

- **Calibration:**

The monitoring officer will coordinate with staff of the project owner to ensure that calibration of the metering instruments is carried out periodically in accordance with regulations of the grid company and in accordance with relevant industry standards.

- **Calculation of emission reductions:**

The monitoring officer will calculate the annual emission reductions on the basis of net power supply to the grid. The monitoring officer will be provided with a calculation template in electronic form by the project's CDM advisors.

- **Preparation of monitoring report:**

The monitoring officer will annually prepare a monitoring report which will include among others a summary of daily operations, metering values of power supplied to and received from the grid, copies of sales/billing receipts, a report on calibration and a calculation of emission reductions.

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.

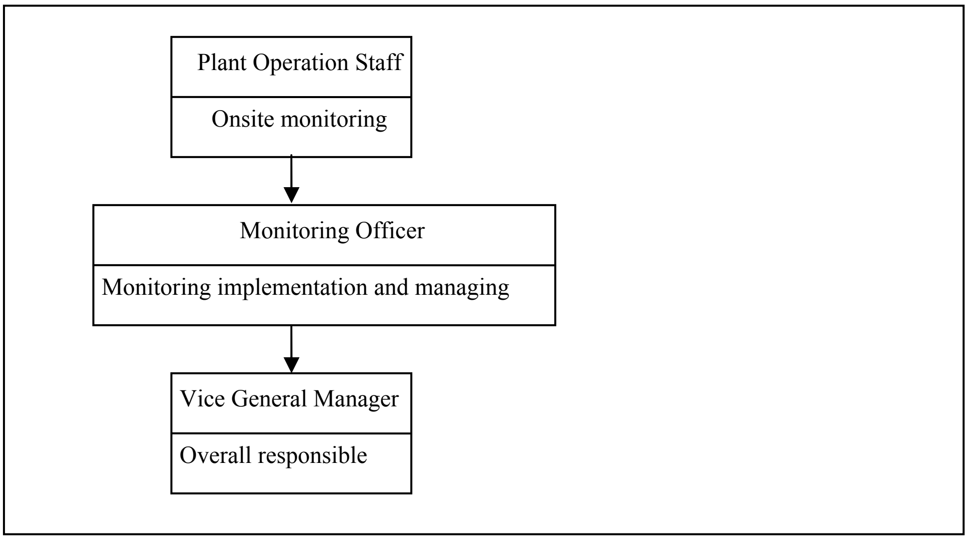

Figure B.7.2-1 Management structure for monitoring

3. Monitoring equipment installation and program

There are two teams of meters and three meters to monitor the electricity generated by the plant. A diagram of monitoring meters is given in Figure B.7.2-2.

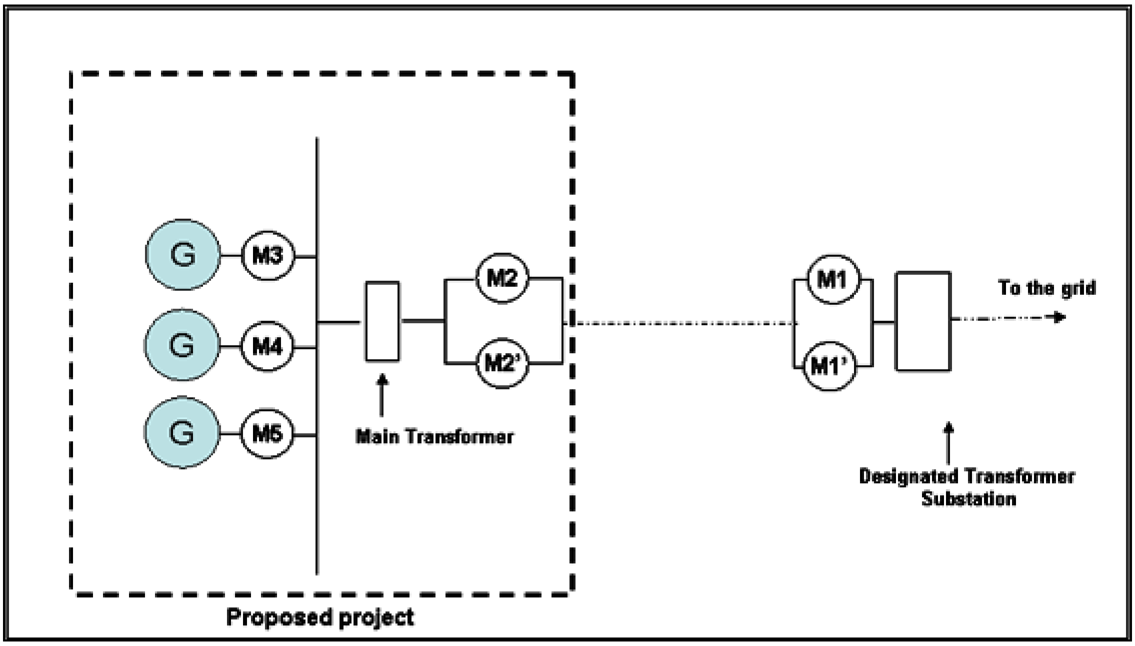

Figure B.7.2-2 Diagram of monitoring meters

Details of each meter are as follows:

M1

Function: Main meter to monitor the electricity supplied to the Grid Company and the electricity consumed by project from the grid company. Under normal circumstances, the sales receipts for power supplied to the grid and billing receipts for power received from the grid will be given according to the data from this meter.
Owned by: The project owner
Recorded by: The grid company
Accuracy: 0.2s
Monitoring frequency: Continuous
Recording frequency: Monthly
Calibration: Calibrations are carried out by the grid company or by a certified company appointed by the grid company according to relevant regulation of the grid company. Calibration frequency should be once in a year.

M1'

Function: Auxiliary meter for the M1 with the same function as above. M2 could check the data and will replace the M1 in case of the failure of M1.
Owned by: The project owner
Recorded by: The grid company
Accuracy: 0.2s
Monitoring frequency: Continuous
Recording frequency: Monthly
Calibration: Calibrations are carried out by the grid company or by a certified company appointed by the grid company according to relevant regulation of the grid company. Calibration frequency should be once in a year.

M2

Function: Main check meter to monitor the electricity supplied to the grid and the electricity consumed by project from the grid company.
Owned and recorded by: The project owner
Accuracy: 0.2s
Monitoring frequency: Continuous
Recording frequency: Monthly
Calibration: Calibrations are carried out by the grid company or by a certified company appointed by the grid company according to relevant regulation of the grid company. Calibration frequency should be once in three years.

M2'

Function: Auxiliary check meter for the M2 with the same function as above. M2' could check the data and will replace the M2 in case of the failure of M2.
Owned and recorded by: The project owner
Accuracy: 0.2s
Monitoring frequency: Continuous
Recording frequency: Monthly
Calibration: Calibrations are carried out by the grid company or by a certified company appointed by the grid company according to relevant regulation of the grid company. Calibration frequency should be once in three years.

M3, M4, M5
Function: Meter to monitor the electricity produced by the each generator, including the electricity supplied to the grid and the electricity supplied to internal loads.
Owned and recorded by: The project owner
Monitoring frequency: Continuous
Recording frequency: Monthly
Calibration: Calibrations are carried out by the grid company or by a certified company appointed by the grid company according to relevant regulation of the grid company. Calibration frequency should be once in three years.

In case metering equipment is damaged and no reliable readings can be recorded the project owner will use the following procedure:

• In case two meters (i.e. M1 and M1') recorded by the grid company are in malfunction only:
If only M1 exceeds the allowable tolerance or otherwise the meter mal functioned, M1' will be used to monitor the data. If both M1 and M1' are in malfunction, the monitoring data logged by the project owner, will be used to calculate the data for the sales receipts/billing invoices.

• In case meters recorded by project owner are in malfunction only:
If only M2 exceeds the allowable tolerance or otherwise the meter malfunctioned, M2' will be used to play the check role. If both M2 and M2' are in malfunction, the monitoring data by the M3, M4 and M5 will be used to play the check role, which discount the internal loads according to historical data.

• In case all meters are in malfunction:
The project owner and the grid company will jointly calculate a conservative estimate of all the data. If the project owner and the Grid Company fail to reach an agreement concerning the correct reading, then the matter will be submitted for arbitration according to agreed procedures.

4. Monitoring data collection and monitoring report

As per monitoring report in the PDD, the data to be monitored for estimation of the emission reductions are the following:

(i.) Electricity supplied by the project activity to the grid ($EG_{out,y}$)in MWh. Value needs to be double checked by receipt of sales.
(ii.) Total electricity produced by the project activity(TEG_y), including the electricity supplied to the grid and the electricity supplied to internal loads
(iii.) Net electricity exported (EG_y) to the grid in MWh (EG_y=$EG_{out,y}$-$EG_{in,y}$).
(iv.) Electricity imported from the grid ($EG_{in,y}$) in MWh
(v) Installed capacity of the hydro power plant after the implementation of the project activity (Cap_{PJ}) in MW
(vi) Area of the reservoir measured in the surface of the water (A_{PJ}), after the implementation of the project activity, when the reservoir is full. To be measured in m^2.

(i), (ii) and (iv) shall be monitored in MWh and shall be measured continuously and recorded on a monthly basis by the project proponent. (iii) shall be calculated and recorded monthly. (v) and (vi) shall be measured and recorded yearly.

Electricity imported from the grid in MWh is conservatively considered in the ER calculation by discounting the same from the electricity exported to the grid

All data as part of monitoring shall be archived electronically and be kept for at least 2 years after the end of the last crediting period.

5. Emission Reductions of the project activity

The emission reductions of the project activity is the net electricity exported to the grid (EG_y) in MWh multiplied by the baseline emission factor ((CEF)) in tCO_2 /MWh.

Emissions reductions [tCO_2] = EG_y [MWh] * CEF [t CO_2/MWh]

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

>>
The baseline study and monitoring plan of the proposed project were completed on 20/12/2007 by DHV BEEC Co., Ltd..
The key researchers involved in the baseline study include:
MSc Ir. Malgorzata Sieniuc, ms@dunin.nl;
Ms. HuanWang, DHV BEEC Co., Ltd., jennifer.wang@dhv.com,
The person/entity is not project participant listed in Annex 1.

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:

>>
10/11/2006, on which date the project owner signed the construction contract.

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

>>25 years and 0 months

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:

>>n.a.

C.2.1.2. Length of the first crediting period:

>>n.a.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>01/10/2009 or registration date whichever is later

C.2.2.2. Length:

>> 10 (ten) years

SECTION D. Environmental impacts

D.1. Documentation on the analysis of environmental impacts, including transboundary impacts:

>> The project owner entrusted a third party: Environmental Assessment Research Center of Lanzhou University to conduct the environmental impact assessment (EIA) on the project and obtained the approval from Environmental Protection Bureau of Gansu Province in May 2007 (Ganhuanzifa [2007] 32).

The EIA report is prepared for future reference, and the main comments of the EIA are as follows:

Construction phase

During this phase these is an overall negative environmental impact. Due to increased heavy traffic by transport of the materials, but also by construction machinery, air pollution and noize form a nuisance for the surroundings. Also increased amount of waste takes place.

Operation phase

There is no resettlement from the Project. The negative impacts mainly involve alteration of the hydrology conditions in the section of the river with the intake and the powerhouse. Other potential impacts mainly include alterations of water quality in the downriver sections, flood control and aquatic etc; however these impacts are extremely small.

The Project will not have any significant negative impacts to the local environment. The mentioned above issues will be minimized by application of good engineering practices including enclosed operation, sewage tank treatment, vibration reduction, sound insulation and other measures. Solid waste will be transported to the nearby two dumping sites from where construction will take place, including the construction of diversion weir, penstock and powerhouse etc.

There are many beneficial effects, such as increase in local residents' living standards, improvement in electric power supply and infrastructure level etc. Therefore, the proposed project will have positive impacts on local environment.

To sum up, negative impacts on the environment will disappear along with the completion of the Project construction. In conjunction with the implementation of a series of environment protection measures during the construction and operation, the Project will not have significant impacts on the 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:

>> Both of the host Party and the project owner regard that the proposed project will not bring significant impacts on the environment. During design, build and operation phase, the project owner will manage the environment of the project to guarantee the water polluted treatment, soil and water conservation, vegetation recovery, and other ecological protection measurements of EIA report executed and will do things according to the relevant technique and quality standard to low the impact to the environment to the minimum. After the completion of the project construction, the project will be put into operation only after the inspection and acceptance of local environmental protection department.

SECTION E. Stakeholders' comments

>> There were two public consultations carried out.

The first one took place in March 2007, which the emphasis has been put on the environment impact of the project activity.

The second round of the public consultation has been organized in September 2007 in purpose to introduce the project from the CDM point of view and get stakeholders' comments.

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

>> ***FIRST CONSULTATION***

The evaluation of environmental impact of the Hydropower Station was executed jointly in such modes as social survey, small-scale symposium and publication of environmental impact bulletin.

Social survey
The quantitative survey and the random interview were applied to this social survey. In the quantitative survey, the public, with whom information was exchanged in the mode of questionnaire, was questioned through a standard method and sequence.
(1) Surveyed scope: This survey involved residents above the age of 18—who have different professions, sexes, educational degrees and ages—within the area influenced by the planned hydropower station.
(2) Surveyed objects: This survey adopted the sampling survey. We, based on the principle of gradual degression outward from the densely populated area to determine the sample for sampling fraction and on the method of multi-stage stratified random sampling, issued 100 copies of questionnaire and recovered 95 copies, where recovery ratio is 95%, valid qualified questionnaire is 95 copies and qualification ratio is 95%.
(3) Rational design of questionnaire: In this survey, the questionnaire was designed in the form of choice (3~6 options available for each question) and question & answer.
(4) Statistics of survey results: Following patient and careful selection of questionnaire copies, we rejected unqualified questionnaire copies and took statistics of survey results.

Small-scale symposium
Small-scales symposiums were convoked in Township Government, Village Committee and other agencies to investigate and analyze those problems, e.g. post-construction impacts of the Hydropower Station on lower reaches and local environment and post-operation impacts of the Hydropower Station on economy and society.

Environmental impact bulletin
The construction organization published the bulletin of *Public Participation in Environmental Impact Evaluation of Guansu Bailong River Dalijie Hydropower Station Engineering*, of which closing date is Mar. 18, 2007, on Gannan Daily on Mar.13, 2007, pursuant to the *Temporary Measures of Public Participation in Environmental Impact Evaluation*. With respect to detailed information of the bulletin, please see Gannan Daily.

Surveyed contents and statistic results:

The questionnaire described the general project situation, the basic conditions of the project, and the effect of the construction phase on the local economy and environment. The questions are shown in Table E.1-1.

Table E.1-1: Questionnaire of Public Participation for Gansu Bailong River Dalijie Hydropower Station Engineering

1 How much do you acquaint yourself with this engineering?
□More □A little □None
2 What impacts do you think this engineering construction has on local eco-environment?
□Favorable □Adverse □ None
3 What impacts does this engineering construction have on your living quality?
□Improved □Reduced □None
4 What impacts do you think this engineering construction has on the development of regional economy?
□Improved □Reduced □None
5 What problems do you care during construction period?

□Ecological destruction □Influenced traffic □Garbage pollution
6 Are you satisfied with the policy of land requisition compensation?
□Satisfied □Unsatisfied □Extremely unsatisfied
7 What is your attitude of this engineering?
□Supporting □Opposed □Unclear

SECOND CONSULTATION:

Meeting Program

1. Participant's registration.
2. Word of welcome and introduction of the meeting agenda (by the host Mr. Wu).
3. Introduction of the project by the project owner (Project manager)
4. Explanation of the CDM and the purpose of the meeting
5. Comments, questions from the public
6. Take a picture of all the participants

Channels to inform all the potential stakeholders of the stakeholder consultancy

1. Newspaper announcement on 19 Sep, 2007 in the Gansu Daily(Gansu's leading daily newspaper)
2. Online announcement on the website: www.dhv.cn (from 13 Sep, 2007)
3. Distribution project information leaflets among the neighbourhood of the project

Both the Project information leaflets and the website have included the detail of the project and the date of the stakeholder consultation period and the date of the stakeholder consultation meeting.

Table E.1-2 Participants of the meeting, 27 September 2007:

Num	Affiliation	Name of Participants	Position/Occupation
1	National Development and Reform Commission (NDRC) of Zhouqu County	Zhichao Zhang	Secretary of CPC of Zhouqu County
2	Investment promotion bureau	Shaoguang Chen	Director
3	National Land Resource Bureau Zhouqu County	Runming He	Department Director
4	Bureau of Local Taxation	Shimin Han	Director
5	Bureau of Radio, Film and Television of Zhouqu County	Xiaohong Feng	Correspondent
6	Lijie Engineering Bureau of Zhouqu	Xiaokang Yan	Director
7	Core Primary School	Xinping Zhao	Teacher
8	Government of Bazhang Township, Zhouqu town	Jiashen Sun	Secretary of CPC
9	Government of Bazhang Township, Zhouqu town	Xinghuai Yang	Secretary
10	Bazhang Township	Xiaojun Sun	Villager
11	Bazhang Township	Qinglin Li	Villager
12	Bazhang Township	Xiaohong Zeng	Villager
13	Bazhang Township	Linlin Zhang	Villager
14	Bazhang Township	Banyu Fang	Villager
15	Bazhang Township	Zufeng Yuan	Villager

16	Gansu Darong Electric Power Limited Company(GEPIC)	Yikai Wu	Department Manager
17	Dalijie Project Department of GEPIC	Tianhai Huang	Engineer
18	Dalijie Project Department of GEPIC	Changjun Ma	Engineer
19	Dalijie Project Department of GEPIC	Xingyou Ji	Accountant
20	Dalijie Project Department of GEPIC	Jibing Wei	Vice manager
21	DHV BEEC Co., Ltd.	Malgorzata Sieniuc	CDM Project Director
22	DHV BEEC Co., Ltd.	Huan Wang	Project Director

E.2. Summary of the comments received:

>> ***FIRST CONSULTAIONS:***

According to survey results, public opinions were concluded as follows:

(1) Positively support construction of the Hydropower Station and fully affirm that social, economic and environmental benefits of the Hydropower Station are evident;
(2) Be sure to take into account security in designing and constructing the Hydropower Station, carefully investigate and research eco-environment of its place, protect environment well, make an effort to reduce vegetation destruction, and assure that construction and operation of the Hydropower Station will not have an irreversible impact on eco-environment; and
(3) Hope that the Hydropower Station would be initiated, finished and put into production as early as possible.

SECOND CONSULTATIONS:

Speaker	National Development and Reform Commission (NDRC) of Zhouqu County	Zhichao Zhang	Secretary of CPC of Zhouqu County
Comments	Hydropower is clean and environment friendly energy, which will draw the development of local economy and increase the common people's income. This project obtained the approval in the construction process. Our county is one of the poor counties in our country. The development of hydropower, which use our resources superiority, is significant to lead our county to become rich. We		

Speaker	Investment Promotion Bureau	Shaoguang Chen	Director
	National Land Resource Bureau Zhouqu County	Runming He	Department Director
Comments	The Project will alleviates the insufficient electricity in this area, draws the local economy to grow, adjust energy structure, which is good to the country, the place and the enterprize. The Project is good for the local agriculture and industry too.		

Speaker	Government of Bazhang Township, Zhouqu town	Jiashen Sun	Secretary of CPC

Comments	To our Bazhang Township, the plant alters our dry land to irrigated land and increases our yield; give us compensation for the expropriation; provide more chance for us to work on the site and increase our income; have positive effect on the climate regulation and ecoenvironment. All together, there are 100 Mu(Chinese Acre, 1 Mu=666.7 m^2)land expropriated permanently by the Project, which involved 40-50 family. The standard is 19800 RMB/Mu. For the temporary used land, the standard is 1500RMB/Mu/Year. We are satisfied with the compensation.
Comments	Power failure happens in this area, for the line of transmission is not good enough and the unstable status of the amount of electricity. Although the Project cannot supply power directly to the local, but it will contribute to the stability of our Grid, which finally will reduce the power failure.
Speaker	Core Primary School Xinping Zhao Teacher
Comments	Our school has 524 students coming from 5 different villages(the farrest is 5 km from the school). I think no impact occurred on the students because of the Project. Maybe We will arrange a visit to the Project for the students.
Question	What is the proportion of the minority people locally?
Comments	5% is Zang minority and the others are Han.
Question	Do we have other industries around the Project?
Comments	Two mines, one is gold, the other is iron.
Question	Is the river polluted? Do you drink the water from the river?
Comments	It isn't polluted, but it is far from to river to the families. We drink the spring water.
Questions	How do you use the river?
Answers	Irrigation.
Questions	How many local people worked or working in this project
Answers	Around 100 persons, it depends on the progress of the Project.(there are about 1500 people in the village)

Questions	How much will they earn for the work.
Answers	Averagely, 35-50 RMB /People /Day. It depends on the work. Sand transportation work will be worth 130 RMB/Day.

Comments received through website:
No comments by e-mail through the stakeholder consultation website or by telephone have been received.

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

>> From the consultation survey it could be concluded that the majority of residents in the area are supportive to the construction and operation of the project. The project owner will insure sufficient investment to be used for fulfilling the requirements established in the EIA and relevant environmental standards. The project owner made a quick response in views of the questions reflected in the stakeholders' consultations.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	GEPIC Darong Electric Power Company Ltd
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Represented by:	Kaifu Xian
Title:	Vice General Manager
Salutation:	Mr.
Last Name:	Xian
Middle Name:	-
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This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.

Organization:	N.V. NUON ENERGY TRADE &WHOLESALE
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Represented by:	Stephen Asplin
Title:	Managing Director
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Personal E-Mail:	stephen.asplin@nuon.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I Parties for this project.

Annex 3

BASELINE INFORMATION

The baseline uses basically the same methodology as used in the calculation of the OM and BM emission factors published by the Chinese authorities for climate change on the website.

Full information on the calculation of the baseline and underlying data can be found at:

http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf: calculation result of the baseline emission factor of Chinese power grid.
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1358.xls: calculation process of the baseline OM emission factor of Chinese power grid.
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1365.pdf: calculation process of the baseline BM emission factor of Chinese power grid.

Below we provide the main data used in the calculation of the baseline emission factor.

Calculation of the Operating Margin emission factor ($EF_{grid,OM,y}$) of NWCPG

Table Annex3-1 the net calorific value, CO_2 emission factors of fuels

	Emission Factor （tc/TJ） $EF_{CO2,i,y}$	Net CalorificValue $NCV_{i,y}$
Raw Coal	25.8	20908 kJ/kg
Cleaned Coal	25.8	26344 kJ/kg
Other Washed Coal	25.8	8363 kJ/kg
Coke	25.8	28435 kJ/kg
Crude Oil	20	41816 kJ/kg
Gasoline	18.9	43070 kJ/kg
Diesel Oil	20.2	42652 kJ/kg
Fuel Oil	21.1	41816 kJ/kg
Natural Gas	15.3	38931 kJ/m^3
Coke Oven Gas	12.1	16726 kJ/m^3
Other Gas	12.1	5227 kJ/m^3
LPG	17.2	50179 kJ/kg
Refinery Dry Gas	18.2	46055 kJ/kg
Other Petroleum Products	20	38369 kJ/kg
Other Coking Products	25.8	28435 kJ/kg
Other energy	0	0

Data source: 1) Emission Factor: 2006 IPCC Guidelines for National Greenhouse Gas Inventories， Volume 2 Energy

2) Net Calorific Value: China Energy Statistical Yearbook 2006

Table Annex3-2 Calculation of CO_2 emissions from the NWCPG, 2003

Fuel	Unit	Shaanxi A	Gansu B	Qinghai C	Ningxia D	Xinjiang E	Total F=A+B+C+D+E	Carbon coefficient (tc/TJ) G	NCV (MJ/t,km3) H	CO_2 emissions (tCO_2e) J=G*H*F*44/12/100(t) J=G*H*F*44/12/10(m^3)
Raw coal	10^4 Tons	2002.26	1479.62	330.67	682	1065.75	**5560.3**	25.8	20908	109976995.8
Clean coal	10^4 Tons						**0**	25.8	26344	0
Other washed coal	10^4 Tons				27	3.64	**30.64**	25.8	8363	242405.2347
Coke	10^4 Tons						**0**	25.8	28435	0
Coke oven gas	10^8m^3		1.54				**1.54**	12.1	16726	114279.8375
Other gas	10^8m^3		0.12				**0.12**	12.1	5227	2782.8548
Crude oil	10^4 Tons						**0**	20	41816	0
Gasoline	10^4 Tons						**0**	18.9	43070	0
Diesel	10^4 Tons	3.12			0.04	0.4	**3.56**	20.2	42652	112463.6562
Fuel oil	10^4 Tons		1.19			1.02	**2.21**	21.1	41816	71497.13619
LPG	10^4 Tons						**0**	17.2	50179	0
Refinery gas	10^4 Tons					3.48	**3.48**	18.2	46055	106954.4476
Natural gas	10^8m^3	0.1	0.54			5.95	**6.59**	15.3	38931	1439275.177
Other petroleum products	10^4 Tons						**0**	20	38369	0
Other coking products	10^4 Tons						**0**	25.8	28435	0
Other E (standard coal)	10^4 Tec		5.86			2.3	**8.16**	0	0	0
Total										112066654.1

Data source: China Energy Statistical Yearbook 2004

Table Annex3-3. Electricity generation of the NWCPG, 2003

Province	Electricity generation (MWh)	Auxiliary power ratio (%)	Power output (MWh)
Shanxi	38144000	6.94	35,496,806
Gansu	29494000	6.35	27,621,131
Qinghai	6446000	4.5	6,155,930
Ningxia	19175000	5.25	18,168,313
Xinjiang	19834000	8.19	18,209,595
total			105,651,775

Data source: China Electric Power Yearbook 2004

Table Annex3-4. Calculation of CO2 emissions from the NWCPG, 2004

Fuel	Unit	Shanxi A	Gansu B	Qinghai C	Ningxia D	Xinjiang E	Total F=A+B+C+D+E	Carbon coefficient (tc/TJ) G	NCV (MJ/t,km3) H	CO_2 emissions (tCO_2e) J=G*H*F*44/12/100(t) J=G*H*F*44/12/10(m^3)
Raw coal	10^4 Tons	2428.7	1595.9	322.8	1270.1	1240.9	**6858.4**	25.8	20908	135652074.1
Clean coal	10^4 Tons						**0**	25.8	26344	0
Other washed coal	10^4 Tons				102.64	10.5	**113.14**	25.8	8363	895095.5697
Coke	10^4 Tons	0.78					**0.78**	25.8	28435	20981.6178
Coke oven gas	10^8m^3		0.3				**0.3**	12.1	16726	22262.306
Other gas	10^8m^3	0.74	1.26				**2**	12.1	5227	46380.91333
Crude oil	10^4 Tons	0.01				0.06	**0.07**	20	41816	2146.554667
Gasoline	10^4 Tons	0.02					**0.02**	18.9	43070	596.9502
Diesel	10^4 Tons	2.16	0.36		0.05	0.41	**2.98**	20.2	42652	94140.92571
Fuel oil	10^4 Tons	0.01	0.69			0.3	**1**	21.1	41816	32351.64533
LPG	10^4 Tons						**0**	17.2	50179	0
Refinery gas	10^4 Tons					3.26	**3.26**	18.2	46055	100192.9595
Natural gas	10^8m^3	1.61	0.59			6.27	**8.47**	15.3	38931	1849872.648
Other petroleum products	10^4 Tons						**0**	20	38369	0
Other coking products	10^4 Tons						**0**	25.8	28435	0
Other E (standard coal)	10^4 Tec		6.17			3.46	**9.63**	0	0	0
Total										138716096.2

Data source: China Energy Statistical Yearbook 2005

Table Annex3-5. Electricity generation of the NWCPG, 2004

Province	Electricity generation (MWh)	Auxiliary power ratio (%)	Power output (MWh)
Shanxi	44439000	7.5	41,106,075
Gansu	33242000	6.21	31,177,672
Qinghai	6208000	7.96	5,713,843
Ningxia	25298000	5.45	23,919,259
Xinjiang	22752000	9.07	20,688,394
Total			122,605,243

Data source: China Electric Power Yearbook 2005

Table Annex3-6. Calculation of CO2 emissions from the NWCPG, 2005

Fuel	Unit	Shanxi A	Gansu B	Qinghai C	Ningxia D	Xinjiang E	Total F=A+B+C+D+E	Carbon coefficient (tc/TJ) G	NCV (MJ/t,km3) H	CO_2 emissions (tCO_2e) J=G*H*F*44/12/100(t) J=G*H*F*44/12/10(m^3)
Raw coal	10^4 Tons	2461.28	1597	345.1	1467.7	1358.09	**7229.17**	25.8	20908	142985522.1
Clean coal	10^4 Tons	16.22					**16.22**	25.8	26344	404225.4973
Other washed coal	10^4 Tons	35.56			101.95	10.2	**147.71**	25.8	8363	1168592.599
Coke	10^4 Tons	3.23					**3.23**	25.8	28435	86885.4173
Coke oven gas	10^8m^3						**0**	12.1	16726	0
Other gas	10^8m^3						**0**	12.1	5227	0
Crude oil	10^4 Tons					0.18	**0.18**	20	41816	5519.712
Gasoline	10^4 Tons	0.02				0.01	**0.03**	18.9	43070	895.4253
Diesel	10^4 Tons	2.24	0.46	0.06		0.5	**3.26**	20.2	42652	102986.3818
Fuel oil	10^4 Tons	0.01	0.57			0.25	**0.83**	21.1	41816	26851.86563
LPG	10^4 Tons						**0**	17.2	50179	0
Refinery gas	10^4 Tons					7.71	**7.71**	18.2	46055	236959.4227
Natural gas	10^8m^3	1.46	0.52	1.33		7.81	**11.12**	15.3	38931	2428640.359
Other petroleum products	10^4 Tons						**0**	20	38369	0
Other coking products	10^4 Tons						**0**	25.8	28435	0
Other E (standard coal)	10^4 Tec	8.24	1.3				**9.54**	0	0	0
Total										147447078.8

Data source: China Energy Statistical Yearbook 2006

Table Annex3-7. Electricity generation of NWCPG, 2005

Province	Electricity generation (MWh)	Auxiliary power ratio (%)	Power output (MWh)
Shanxi	41100000	7.16	38,157,240
Gansu	33106000	4.23	31,705,616
Qinghai	5500000	2.69	5,352,050
Ningxia	27643000	5.73	26,059,056
Xinjiang	26560000	8.8	24,222,720
Total			125,496,682

Data source: China Electric Power Yearbook 2006

Table Annex3-8. Calculation of the Operating Margin factor ($EF_{grid,OM,y}$) of the NWCPG

		2003	2004	2005	$EF_{grid,OM,y}$
Total CO2 emission	**tCO2e**	**112,066,654**	**138,716,096**	**147,447,079**	
Electricity generation	**MWh**	**105,651,775**	**122,605,243**	**125,496,682**	**1.1257263**

Calculation of Building Margin Emission Factor ($EF_{grid,BM,y}$) for the NWCPG

Table Annex3-9. Calculation of λs (solid, gaseous respectively liquid fuels' share in total CO2 emissions) for the calculation of the BM, NWCPG

Fuel	**Unit**	Shaanxi A	Gansu B	Qinghai C	Ningxia D	Xinjiang E	Total F	NCV（MJ/t,km3） G	**Carbon coefficient** H	**CO_2 emissions（tCO_2e）** J=F*G*H*44/12/100	Λs
Raw coal	10^4 Tons	2461.28	1597	345.1	1467.7	1358.09	7229.17	20908	25.8	142985522.1	
Clean coal	10^4 Tons	16.22	0	0	0	0	16.22	26344	25.8	404225.4973	
Other washed coal	10^4 Tons	35.56	0	0	101.95	10.2	147.71	8363	25.8	1168592.599	
Coke	10^4 Tons	3.23	0	0	0	0	3.23	28435	25.8	86885.4173	
Coal, Total							0			144645225.6	0.980997567
Crude oil	10^4 Tons	0	0	0	0	0.18	0.18	41816	20	5519.712	
Gasoline	10^4 Tons	0.02	0	0	0	0.01	0.03	43070	18.9	895.4253	
Coal oil	10^4 Tons	0	0	0	0		0	43070	19.6	0	
Diesel	10^4 Tons	2.24	0.46	0.06	0	0.5	3.26	42652	20.2	102986.3818	
Fuel oil	10^4 Tons	0.01	0.57	0	0	0.25	0.83	41816	21.1	26851.86563	
Other petroleum products	10^4 Tons	0	0	0	0		0	38369	20	0	
Oil, Total							0			136253.3847	0.000924083
Natural gas	10^7 m3	14.6	5.2	13.3	0	78.1	111.2	38931	15.3	2428640.359	
Coke oven gas	10^7 m3	0	0	0	0		0	16726	12.1	0	
Other gas	10^7 m3	0	0	0	0		0	5227	12.1	0	
LPG	10^4 Tons	0	0	0	0		0	50179	17.2	0	
Refinery gas	10^4 Tons	0	0	0	0	7.71	7.71	46055	18.2	236959.4227	
Gas, Total										2665599.782	0.018078349
Total										147447078.8	

Data source: China Energy Statistical Yearbook 2006

Table Annex3-10 CO_2 emission factor of the best technology for coal, oil, gas fired power plants commercially available in China

	Variable	Average net energy conversion efficiency the best technology for coal, oil, gas fired power plants commercially available in China	CO_2 emission factor of fuel type	CO_2 emission factor of the best technology for coal, oil, gas fired power plants commercially available in China
		A	B	C=3.6/A/1000*B*44/12
Coal fuel power plant	$EF_{Coal,adv}$	35.82%	25.8	0.9508
Oil fuel power plant	$EF_{Oil,adv}$	47.67%	21.1	0.5843
Gsa fuel power plant	$EF_{Gas,adv}$	47.67%	15.3	0.4237

Data source: China DNA website:http://cdm.ccchina.gov.cn/website/CDM/UpFile/File1364.pdf

Table Annex3-11. $EF_{thermal}$calculation

		Coal	Oil	Gas
λ		98.10%	0.09%	1.81%
$EF_{x,adv}$		0.9508	0.584	0.4237
$EF_{thermal}$	0.9409			

Data source of $EF_{coal,adv}$,$EF_{oil,adv}$,$EF_{gas,adv}$: China DNA website:http://cdm.ccchina.gov.cn/website/CDM/UpFile/File1364.pdf

$EF_{Thermal}= \lambda_{Coal}*EF_{Coal,Adv}+\lambda_{Oil}*EF_{Oil,Adv}+\lambda_{Gas}EF_{Gas,Adv}=0.9409$

Table Annex3-12. Installed capacity in the NWCPG, 2005

Type	unit	**Shaanxi**	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	**Total**
thermal power	MW	9132.1	5715	886.8	4577	5051.7	25362.6
hydro power	MW	1578	4036.2	4825	428.5	1352.1	12219.8
nuclear power	MW	0	0	0	0	0	0
wind farm and others	MW	46	109.1	0	112.2	132.2	399.5
total	MW	10756.1	9860.3	5711.8	5117.7	6536	37981.9

Data source: China Electric Power Yearbook 2006

Table Annex3-13. Installed capacity in the NWCPG, 2004

Type	unit	**Shaanxi**	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	**Total**
thermal power	MW	7640.4	4975.6	889.8	3782	4959.7	22247.5
hydro power	MW	1876.5	3566.1	4053.4	366.2	973	10835.2
nuclear power	MW	0	0	0	0	0	0
wind farm and others	MW	0	138.2	0	42.5	95.3	276
total	MW	9516.9	8679.9	4943.2	4190.7	6028	33358.7

Data source: China Electric Power Yearbook 2005

Table Annex3-14. Installed capacity in the NWCPG, 2003

Type	unit	**Shanxi**	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	**Total**
thermal power	MW	7326.4	4745	905.8	3102	4413.5	20492.7
hydro power	MW	1462.3	3280.6	3341.1	308.2	989.8	9382
nuclear power	MW	0	0	0	0	0	0
wind farm and others	MW	0	21.6	0	10	91.3	122.9
total	MW	8788.7	8047.2	4246.9	3420.2	5494.6	29997.6

Data source: China Electric Power Yearbook 2004

Table Annex3-15. Calculation of the Build Margin emission factor ($EF_{grid,BM,y}$)

	2003	2004	2005	New added capacity (2003-2005)	Ratio
	A	B	C	D＝C－A	
Thermal installed capacity (MW)	20492.7	22247.5	25362.6	4869.9	60.99%
Hydropower installed capacity (MW)	9382	10835.2	12219.8	2837.8	35.54%
Wind power installed capacity (MW)	122.9	276	399.5	276.6	3.46%
Total (MW)	29997.6	33358.7	37981.9	7984.3	100%

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$EF_{grid,BM,y}$=0.9409×60.99%=0.5739 tCO_2/MWh

Calculation of the baseline emission factor ($EF_{grid,CM,y}$)

Table Annex3-16. Calculation of the baseline emission factor ($EF_{grid,CM,y}$)

		Unit	Equation	
A	Operating margin emission factor ($EF_{grid,OM,y}$)	tCO2/MWh		1.1257
B	Building margin emission factor ($EF_{grid,BM,y}$)	tCO2/MWh		0.5739
C	Baseline emission factor ($EF_{grid,CM,y}$)	tCO2/MWh	=(A+B)/2	0.8498

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Annex 4

MONITORING PLAN

Please refer to the section B.7 of the PDD.