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

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SECTION A. General description of project activity

A.1 Title of the project activity:

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Datong River Tianwanggou Hydropower Station
Version 04
PDD completion date: 1 October 2010

01	10/05/2008	First version submitted to DOE
02	03/12/2008	Modified PDD following the draft validation protocol.
03	09/07/2009	Modified PDD following follow up draft validation report
04	01/10/2010	Correction after review

A.2. Description of the project activity:

>> The Datong River Tianwanggou 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, the host party). Total installed capacity of the Project will be 51 MW, consisting of three 17MW turbines. The Project will generate annually 212,000 MWh and supply 211,576 MWh (with Auxiliary Power Ratio 0.2%) electricity to the Gansu Power Grid, which is a part of the Northwest China Power Grid (hereafter, NWCPG).

The purpose of the Project is to utilize the hydrological resources of the Datong 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 179,797tCO_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 Datong River through construction of a run-of-river hydro project to generate zero emissions electricity for the NWCPG. No CO_2 emission occurred during the process according to the methodology. 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 179,797tCO_2e 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 proposed project activity is a renewable energy project in line with Chinese national policy of an optimum use of natural resources. The Project will hence contribute the sustainable development of the country through:

- Use of local renewable energy resources to displace fossil fuel based power generation and thereby reduces CO_2 emissions as well as associated emissions such as PM, SO_x and NO_x creating local and global air pollutants benefits.
- Adverse environmental impacts are limited. During the Project impacts will be avoided and/or mitigated with a proper Environmental Management Plan.
- Relieve the power shortage problem in the local area and facilitate the economic development of local area.
- Supply of reliable, zero-emitting renewable energy to the provincial grid, reduce other pollutant resulting from the power generation industry so as to 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)
The People's Republic of 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:

>> Yongdeng County, Lanzhou City

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

>> The Project lies within Yongdeng County, Lanzhou City, Gansu Province at the lower reaches of the Datong River. Datong River has the geographical coordinates of 98°30′E~103°15′E, 36°30′N~38°25′N. The dam is built at about 100km distance from Yongdeng County and about 150km from the provincial capital Lanzhou City. The geographical coordinates of the dam are 102º44'57" E and 36º42'49" N, and the geographical coordinates of the powerhouse are 102º46'20" E and 36º39'58" N. The figure A.4.1-1 shows the location of Gansu Province, Yongdeng County and the Project site respectively.

Fig A.4.1-1 The location of the Project

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

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The Project activity is a run-of-river hydro power plant. The Project activity falls in sectoral scope number 1: energy industries (renewable - /non-renewable sources) as per list of sectoral scopes (CDM-ACCR-06).

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

>> The purpose of the Project is to utilize the hydrological resources of the Datong 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 loss 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 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 utilise the hydrological resources of the Datong River through construction of a run-of-river hydro project to generate zero emissions electricity for the NWCPG. No CO_2 emission occurred during the process according to the methodology. 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 179,797tCO_2e per year during the crediting period.

The baseline scenario:
Equivalent power will be supplied by NWCPG without the proposed project. Therefore, the baseline scenario is the same as the scenario existing prior to the start of the implementation of the proposed project.

The measures/activities to be implemented:
The plant is composed of a concrete gravity dam, release sluice, channels, power house and switch station. The annual power generation is expected to be approximately 212,000MWh.

The water retaining structure is a concrete gravity dam with a total length of 33.86m. The water release structure includes one release sluice and a dam with three sluices. The release sluice is directly connected with a channel for diversion and release. The intake tunnel is a pressure tunnel with intake flow 115.5 m^3/s and has a length of 5954.37 m.

The total surface of the reservoir is 0.224 km^2 and the total capacity 2,003,000 m^3. The normal water level of the reservoir is 2010.50 m, the design rated water head 50 m. Since the reservoir is a gorge type one, which is built in a remote hillside area, no people will be displaced.

The power is delivered to the Gansu Power Grid (which is a part of the NWCPG) through two110 kV transmission lines to a substation at a distance of 14km,

All the equipment is produced domestically and hence no technology introduction to the host party is needed.
The key technical data for equipments of the proposed project are show in table A.4.3-1.

Table A.4.3-1: Key technical data for the equipment within the Project

Parameter	Value
Installed capacity (MW)	51
Design water head (m)	50
Design water flow (m^3/s)	115.5
Expected annual power supply to the grid (MWh)	211,576
Model of turbines	

Parameter		Value
HLA551-LJ-215	Units	3
	Lifetime(years)	25
Model of generators		
SF-J17-22/4250	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.

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 (tCO_2e)
01/10/2009-30/09/2010	179,797
01/10/2010-30/09/2011	179,797
01/09/2011-30/09/2012	179,797
01/10/2012-30/09/2013	179,797
01/10/2013-30/09/2014	179,797
01/10/2014-30/09/2015	179,797
01/10/2015-30/09/2016	179,797
01/10/2016-30/09/2017	179,797
01/10/2017-30/09/2018	179,797
01/10/2018-30/09/2019	179,797
Total estimated reductions (tCO_2e)	1,797,970
Total number of crediting years	10
Annual average of the estimated reductions over the crediting period (tCO_2e)	179,797

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. ACM0002 "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 CO_2 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 Feasibility Study Report of the Project (hereafter, FSR), the installed power generation capacity of the Project is 51 MW and the surface area at full reservoir level is about 0.224 km^2. Therefore the power density of the proposed project is about 228 W/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 the 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 installation proposed in this Project.

On the next page the project boundaries have been presented including emission sources.

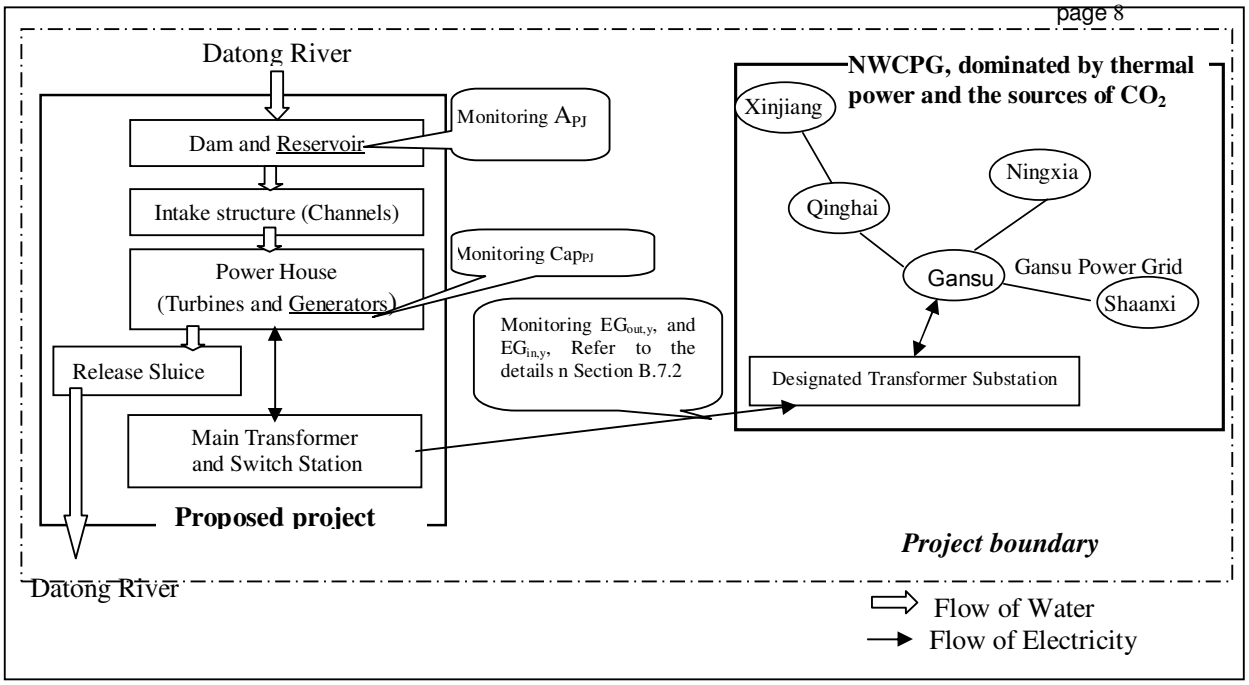

Figure B.3-1 Flowchart project boundary

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

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 228W/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 19 October 2005, on which date the project owner signed the construction contract.

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

Table B.5.0 – Project milestones

No	Milestone	Date
1	Briefing on a workshop of CDM Project Development and Financing[1]	12 July 04
2	Selected CDM consulting company[2]	August 05
3	First version of FSR published by Northwest Hydro Consulting Engineers, CHECC	August 05

[1] Notice on "Workshop of CDM Project Development and Financing", Gansu Provincial Sci. and Tech. Department, July 2004

[2] Introduction brochure and unsigned contract of other company, 2005

No	Milestone	Date
4	MOU of CDM development cooperation with CDM consulting firm. signed	17 August 05
5	The Lanzhou Electricity Power Branch of China Construction Bank required CDM development as a precondition for a loan.[3]	13 September 05
6	Meeting of the general directors to make investment decision for this Project[4]	19 September 05
7	EIA approval document	20 September 05
8	Applied for CDM development at Gansu DRC[5]	20 Sep 05
9	Approval feedback from Gansu DRC[6]	22 Sep 05
10	Contract for the construction of water division system signed	19 October 05
11	Opening ceremony on-site (published in Gansu Daily)[7]	24 October 05
12	Examine version of the FSR published by Northwest Hydro Consulting Engineers, CHECC, following evaluation by the local DRC	November 05
13	Contract for the supply of hydro-generators signed	12 December 05
14	Project approval document obtained	15 May 06
15	Signing CDM development contract with CDM consulting firm	6 June 06
16	First proposal from the buyer of the carbon credits	31 July 06
17	PINs had been made	11 Jan 07
18	Preparing draft "Declaration for compliance with the WCD recommendations"	3 Apr 07
19	Request and proposal for the validation of the Project	12 June 07
20	Signing MoU between the buyer and the project owner	24 July 07
21	Signing contract buyer – Project Owner (ERPA)	9 January 08
22	Start Validation	27 May 08
23	Commissioning	20 June 08

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, 2, 4, 6, 8 and 9 as indicated 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:

[3] Loan Intent Letter on the Datong River Tianwanggou Hydropower Station Project, Lanzhou Electricity Power Branch of China Construction Bank , Sep 13, 2005

[4] Minutes of the Director General Office Meeting, GEPIC Darong Electric Power Company Ltd., Sep 19, 2005

[5] The Referendum on the Application of CDM Development of Tianwanggou Hydropower Station, GEPIC Darong Electric Power Company Ltd. Sep 20 2005

[6] The Approval on Application of the CDM Development of Tianwanggou Hydropower Station, Local Economy Department of Development and Reform Commission of Gansu Province, Sep 22 2005

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

There are four plausible options, which are based on the condition of the local areas and available to meet the power requirement equivalent to 51 MW:

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).
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[8], 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[9] 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 generation to the Project will be smaller than 51 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

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

[8] 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

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

With reference to *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*[10], the benchmark of the China Power Industries is to be 8% of the total investment after tax. 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 lists the basic parameters for the investment analysis.

Table B.5-1: Parameters used in the investment analysis

Parameter	**Value and unit**	**Data source**
Installed Capacity	51 MW	See Page 1 in Chapter 14 Economic Assessment of the first version FSR
Investment	CNY 364,060,000	See Page 1 in Chapter 14 Economic Assessment of the first version FSR
Annual Power Supply	211,576 MWh	See Page 9 in Chapter 14 Economic Assessment of the first version FSR
Electricity Tariff	0.227 CNY/kWh (incl. VAT)	The Document Fagai Price[2004] No.1125
Annual Operational and Maintenance Costs	CNY 8.684 million	See Page 9 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	15% (exempt for the first two years and 7.5% for the later three years)	
Rate of additional education fee	3 %	
Rate of city construction tax	7 %	

The IRR without CDM revenues is 6%, 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 based on unrealistic assumptions. The power tariff was inflated (CNY 0.268) as the actual tariff paid at that time was CNY 0.22 – 0.23 per kWh. The only reason for the author of the FSR to use a high tariff was to comply with the benchmark IRR of 8%, as required under Chinese regulations.

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

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 was further confirmed when applying for a bank loan, which is described in step 3 of this additionality test.

As a basis for financial modelling in this PDD a more realistic electricity tariff of CNY 0.227 was used. This number can be verified from the Policy document *The Document Fagai Price [2004] No. 1125*[11].

Appropriateness of the tariff – Discussion of E+ and E- policies

The rate of CNY 0.227 per kWh incl. VAT is appropriate, even while considering that there are higher tariffs in the Gansu Province.

Table Annex 3-17 provides an overview of policies relevant to power projects in Gansu. We will argue below that none of these have systematically influenced the tariff of hydropower projects in another way than they have affected the tariff of other power generation projects. There are no E+ policies (referring to policies before 11 December 1997) neither are there E- policies (after 11 November 2001).

Feed-in tariff policy highlights before 11 December 1997:

As per the policy as of 1985**,** power tariffs were established taking into account the repayment of the debt service. The possible benefit of this practice was the acceleration of electric power development, and the release of pressure of power supply.

Feed-in tariff policy highlights after 11 November 2001:

***Policy* 1.** 10 February 2002, official start of Electricity Power System Reform and Electricity Price Reform

On 10 February 2002 were issued:

- "Notice on Printing and Distributing the Plans for Electricity Power System Reform from the State Council" (Guofa[2002]5) [12] and
- "Notice on printing and Distributing the Electricity Price Reform Plan from General Office of the State Council" (Guobanfa [2003] 62) [13]

The reform aimed at separating power generation from transmission and distribution to facilitate private power production and the introduction of a competitive system for establishing power generation tariffs. The main changes included:

- Changes in the regulatory system to improve the operation of the power market and the creation of the State Electricity Regulatory Commission (SERC) to supervise and regulate market competition in the power market.

[11] Notice on Channelizing the Confliction of Electricity Price in Northwest Power Grid, NDRC, June 18 2004

[12] http://www.lawyee.net/Act/Act_Display.asp?RID=341667

[13] http://law.baidu.com/pages/chinalawinfo/5/78/20729520762054426180c79cbb8fbbd3_0.html

- The State Power Corporation (SPC) was split up into five power generation companies and two transmission firms.
- The monopoly operation of the SPC was terminated and competition introduced in order to improve efficiency in the power sector.
- The practice of competitive tariffs was introduced.

Impact on tariff:

In the past, provincial governments used to guarantee tariffs that provided investors with a sufficient return. This could seduce investors to increase their costs and get a higher tariff which could push the electricity price. The reform aimed at introducing for a market mechanism on tariffs, creating a competitive market in which producers would compete with each other to provide power to the grid encouraging investors to reduce costs and improve efficiency.

In practice the competitive tariff determination processes in Gansu province did not really take off and transition policies were put in place, as is further elaborated below.

One thing is clear however: the reform addresses the power sector as a whole and does not address specific sectors. Generation types like coal, hydro or wind are not even mentioned in the reform. Hence, it can be concluded that the reform is applicable to all types of power generation. It does not give any comparative advantage to less emissions intensive technologies or more emissions intensive technologies or fuels, i.e. this policy is neither E+ nor E-.

This reform had far-reaching impacts on the structure of the entire power sector. Consequently tariffs for projects before 2002 cannot be compared with tariffs after 2002.

Policy 2. 28 June 2004, issuance of "Notice on channelizing the confliction of electricity price in Northwest Power Grid (Fagai Price[2004]1125)

The regulatory framework of the Chinese power sector continued evolving after the power reform of 2001. Although the reform aimed to practice competition for tariffs, it could not be achieved within one day. Instructive and transitional policies had to be followed to achieve this goal gradually. Of these, Policy 2 below is an important one.

The main purpose of this policy was to unify the on-grid tariff for newly commissioned power stations in the northwestern provinces. For Gansu this meant a flat rate of 0.227 CNY/kWh with VAT for both newly commissioned coal-fired units and newly commissioned hydropower plants. For individual projects, the actual implemented tariff could be changed further to specific circumstances of projects. These changes were limited however and strictly controlled by related price authorities to ensure enough reasons and fairness among projects.

Impact on tariff:

Before Fagai Price[2004]1125 was released, there was no unified tariff regulation for hydropower projects in Gansu Province. This policy provided a guiding tariff for power stations. With this tariff, investors of power plants would have a clear expectation of the tariff, which is helpful to control the investment cost and risk.

The policy is applicable to both newly commissioned coal-fired units and newly commissioned hydropower plants. This policy is the first policy on on-grid tariff for Gansu power plants since the power sector reform described above. Policy 2 does not give any comparative advantage to less emissions intensive technologies or more emissions intensive technologies or fuels, hence Policy 2 is neither E+ nor E-.

Conclusion:

The Electricity Power System Reform had far-reaching impacts on the structure of the entire power sector. Consequently tariffs for projects before 2002 cannot be compared with tariffs after 2002. No relevant E+/E- policy can be found in the context of feed-in tariff policies in Gansu that are affecting the tariff. After the tariff regulation Fagai Price[2004]1125 was issued, all hydropower projects in Gansu province followed the same guiding tariff, i.e. 0.227 CNY/kWh (incl. VAT). And since then, the tariff in Gansu province for the hydropower projects has been stable. There is no reason to assume that there has been a reduction in tariff, which confirms that the proposed tariff of CNY 0.227 per kWh is appropriate.

Appropriateness of the applied tariff 0.227 CNY/kWh (incl. VAT):

We use the following steps to assess the suitability of the input values to the investment analysis, in particular, the tariff 0.227 CNY/kWh (incl. VAT):

Step I-1: The sources of the input values and its credibility;

Step I-2: Other evidence to demonstrate the suitability of the input values.

Step I-1: The sources of the input values and its credibility;

The input values to the investment analysis of the Project except the electricity tariff are taken from its FSR developed by Northwest Hydro Consulting Engineers, CHECC in August 2005. Northwest Hydro Consulting Engineers, CHECC is certified as a Class A design firm of the People's Republic of China, which has been consistently listed at a leading place in the China Top 100 Investigation & Design Firms since 1992. The electricity tariff, 0.227 CNY/kWh (with VAT) is derived from an official price notice (Document Fagai Price [2004] No.1125) published by the National Development and Reform Commission on June 18, 2004 (implemented from Jun 25, 2004), which was the only predicable and reasonable tariff at the time of the investment decision (19 September 2005).

The FSR was published in August 2005, thus it is less than two months prior to the date when the investment decision was made on 19 September 2005. Given this relative short period of time between the FSR and the decision to invest on this project, it is unlikely that the input values would have been materially changed. Therefore, the input values for the IRR calculation in the PDD are applicable at the time of the investment decision.

Step I-2: Other evidence to demonstrate the suitability of tariff 0.227 CNY/kWh

In preparing the FSR, tariff used in the FSR (0.268 CNY/kWh, with 17% VAT) was calculated backwards in order to reach the benchmark 8%. This backwards calculated tariff told the project owner that only applying this tariff or tariff above it, the project could reach or exceed the basic benchmark and is financial feasible. But this calculated tariff is much higher than the tariff level of similar projects, which was 0.227 CNY/kWh with VAT according to the public available document, the Document Fagai Price [2004] No.1125 approved by National Development and Reform Commission on June 18, 2004. In this case, the project owner had a meeting of general directors and decided to invest on the Project paralleled with CDM development to improve the financial status of the Project on 19 September 2005. The tariff policy of Gansu hydropower projects are consistent tariff according to recent regulation (Ganjiashang (2006) No.125)[14]of Gansu, and the guiding tariff for hydropower plants regulated by Gansu Price Bureau has not been increased over the past 4 years; the guiding tariff has consistently been set at 0.227 CNY/kWh including VAT for newly operational hydropower plants after Jan 1 2005.

[14] http://www.gswj.gov.cn/detail.asp?LMID=2&ID=5860&Class=2261&FN=Jgzc

The tariff has been crosschecked by the actual applicable tariff after the project commissioned. The actual applicable tariff for the Project was 0.227 CNY/kWh with VAT for a significant period after the investment decision and during project development, even until 1 July 2008, which could be shown in power purchase invoice the project owner issued to the Gansu Power Grid on 1 August 2008 for power purchase in July of 2008. The actual tariff was increased by the Gansu Price Bureau to 0.2503 CNY/ kWh according to "Notice on the On-grid Tariff of the Inter-Provincial Power Plant and Related Issues for 2008" (Ganjiadianli[2008]193). issued by Gansu Price Bureau on July 16, 2008 (in effect since July 1, 2008). This increase tariff had been obtained after the CDM consideration and the starting dates of the Project. Therefore, the 0.227CNY/kWh was used in the PDD since it was valid tariff at the time of the investment decision according to VVM paragraph 111(a) and (b). Even with this increase tariff, the IRR was 7.16%, which did not reach the benchmark 8%. Furthermore, reason for the tariff increased to 0.2503 CNY/kWh was all the investment of its transmission engineering was undertaken by the project owner, which was 15,109,764.8 CNY and had not been included in its total investment of its FSR and investment analysis in its PDD.

The electricity prevailing in 2005 when the investment decision of the proposed project as CDM was also confirmed in the report "The report on implementation of Tariff in North-west district in 2005"[15]. According to this report, the average tariff for hydropower plants in Gansu province is 196.54 CNY/MWh = 0.19654 CNY/kWh. 0.227 CNY/kWh is 15.5% higher than the average, therefore applying this value is conservative.

Conclusion:

The tariff 0.227 CNY/kWh (incl. VAT) is suitable as it was the only predicable and reasonable and policy required tariff at the time of the investment decision. This tariff is also be confirmed by the actual tariff of the Project in its earlier generation period. The average tariff for hydropower plants in Gansu province is 0.19654 CNY/kWh, also confirmed calculating with 0.227 CNY/kWh is conservative.

Appropriateness of the tariff: comparing with the applicable highest tariff in the region

The EB requires testing of the project against the highest tariff awarded for similar projects. Table B.5-2 and Table B.5-3 below provide an overview of similar projects and non-similar projects in Gansu Province and their tariffs. The highest tariff issued for these projects in Gansu province is 0.26 CNY/kWh with VAT for the Haidianxia project. Applying this tariff to the Project, the Project IRR is 7.63%, which is below the benchmark of 8%. Please note that the tariff of CNY 0.26 per kWh for this project is exceptional and was granted based on the financial status of the Haindianxia project.

Based on above assessment, we could conclude that even applying the highest tariff issued for similar projects in Gansu province, the IRR does not cross the benchmark.

Table B.5-2: Tariffs of similar projects (25 MW-77 MW) Projects (sources, unless otherwise noted, published PDDs on UNFCCC website)

Name of the Project	Capacity (MW)	Start date (Commission) Date	CDM	Tariff for IRR calculation in PDD (CNY/kWh)	Real tariff (CNY/kWh) + source
Hanpingzui	72	11/4/2002 (6/2004)	Yes	0.227 with 17% VAT	0.227 Ganjiahan [2005]66

[15] http://xbj.serc.gov.cn/UploadFiles/200688163413357.doc

Name of the Project	Capacity (MW)	Start date (Commission) Date	CDM	Tariff for IRR calculation in PDD (CNY/kWh)	Real tariff (CNY/kWh) + source
Dala river	52.5	1/4/2003 (15/11/2007)	Yes	0.227 with 17% VAT	0.227 Ganjiashang [2006]346
Zhouqu Hujia'ai (Ref 1886)	28	01/07/2004 (01/09/2008)	Yes	0.234 with 17% VAT (according to its PDR)	0.227 Ganjiashang [2006]346
Jingtieshan (Ref 0907)	30.45	5/11/2004 (1/1/2006)	Yes	0.17 with 10% VAT (according to its PPA)	Ganjiadianli [2008]295
Dang River	35.4	1/11/2004 (1/5/2007)	Yes	0.18 with 8% VAT (according to Price Bureau of Gansu Province)	N.A. *
Diebu Duoer (Ref 1079)	32	2005 (1/6/2007)	Yes	0.22684with 6% VAT (according to its PPA)	0.229 Ganjiadianli [2008]296
Jinkouba (Ref 1633)	28	01/07/2005 (01/01/2007)	Yes	0.22 with 6% VAT (according to Price Bureau of Gansu Province[16])	0.227 Tariff notice of Gansu Price Bureau on Aug 8,2007
Donghewan (Ref 2844)	29.7	12/08/2005 (01/01/2009)	Yes	0.20 with 6% VAT (according to its Summary of the Coordination Conference with the Grid Company)	0.227 Ganjiashang [2006]346
Tiangwanggou	51	10/2005	Yes	0.227 with 17% VAT	0.2503 including its transmission engineering Ganjiadianli [2008]193
Tiecheng (Ref 2108)	51.5	15/11/2005 (15/10/2008)	Yes	0.227 with 17% VAT	0.227 Ganjiadianli [2008]24
Erlongshan (Ref 0574)	50.5	1/1/2006 (1/7/2007)	Yes	0.227 with 17% VAT	0.227 Tariff notice of Gansu Price Bureau on Aug 8, 2007
Anguoer (Ref 0886)	25.2	10/01/2006 (01/08/2007)	Yes	0.1908 with 6% VAT[17]	0.227 Tariff notice of Gansu Price Bureau [18] on Aug 8, 2007
Zhuchaxia (Ref 2845)	34	4/2006	Yes	0.227 with 17% VAT	0.2503 including its transmission engineering Ganjiadianli [2008]193

[16] Document from Price Bureau in Gansu Province (File No. as [2005] 312).

[17] Notice to clarify the electricity tariff for hydropower project in Gansu Province, Gansu Provincial Bureau of Pricing, 26 December 2005.

[18] http://www.gswj.gov.cn/SearchDetail.asp?ID=10063&Class=2261&Keyword=%B9%D8%D3%DA%CA%A1%C4%DA%B2%BF%B7%D6%CB%AE%C1%A6%B7%A2%B5%E7%C6%F3%D2%B5%C9%CF%CD%F8%B5%E7%BC%DB%D3%D0%B9%D8%CE%CA%CC%E2%B5%C4%CD%A8%D6%AA

Name of the Project	Capacity (MW)	Start date (Commission) Date	CDM	Tariff for IRR calculation in PDD (CNY/kWh)	Real tariff (CNY/kWh) + source
Tao river Lianlu Cascade I (Xiacheng) (Ref 2931)	66	02/06/2006 (01/10/2009)	Yes	0.227 with 17% VAT	0.2464 Ganjiadianli [2008]193
Tao river Lianlu Cascade II (Xiacheng) (Ref 2932)	37.5	02/06/2006 (01/10/2009)	Yes	0.227 with 17% VAT	0.2464 Ganjiadianli [2008]193
Shuiboxia (Ref 2866)	57	10/2006	Yes	0.227 with 17% VAT	0.25 including its transmission engineering Ganjiadianli [2009]129
Dalijie (Ref 2848)	40.2	12/2006	Yes	0.227 with 17% VAT	0.25 including its transmission engineering Ganjiadianli [2008]193
Lubasi	51	01/01/2007 (1/01/2009)	Yes	0.227 with 17% VAT	N.A. *
Yangjiahe (Ref 2843)	37.5	28/03/2007 (01/01/2009)	Yes	0.227 with 6% VAT Letter on issued by Gansu Power Group Co., Ltd. on 31/07/2006.	N.A.*
Zhuoni Niuzi (Ref 2012)	30	15/4/2007 (1/1/2009)	Yes	0.227 with 6% VAT	N.A.*
Dagushan	65	16/09/2007 (01/04/2009)	Yes	0.227 with 17% VAT	0.227 Ganjiadianli[2009]273
Huangshui Baichuan	36	19/09/2007 (01/03/2010)	Yes	0.227 with 6% VAT	N.A.*
Liuyuan	25	20/11/2007 (01/01/2010)	Yes	0.227 with 17% VAT	N.A.*
Wudu Jiaoyuanba	25	1/12/2007 (01/01/2008)	Yes	0.227 with 17% VAT	N.A.*
Liangfengke	52.5	03/03/2008 (01/01/2011)	Yes	-[19]	N.A.*
Shawan	51	18/5/2008 (01/02/2011)	Yes	0.227 with 6% VAT	N.A.*
Haidianxia (Ref 2882)	60	9/11/2004(1/11/2009)	Yes	0.227 with17% VAT	0.26 Ganjiadianli [2008]118
Suo'ertou	66	-	Yes	-[20]	N.A.*
Bazang	51	-	Yes	-[21]	N.A.*

[19] The project has received an LoA but there is no PDD information on EB website.

[20] The project has received an LoA but there is no PDD information on EB website.

Name of the Project	Capacity (MW)	Start date (Commission) Date	CDM	Tariff for IRR calculation in PDD (CNY/kWh)	Real tariff (CNY/kWh) + source
Qingyanggou	50	-	Yes	-[22]	N.A.*
Dayuanba	26	-	Yes	-[23]	N.A.*
Dongshuixia	52.8	-	Yes	-[24]	N.A.*

*The real tariffs of these projects are not available based on the enclosed document "Reply on Feed-in Tariff (2010)018".

Table B.5-3: Tariffs of non-similar projects (>77 MW)[25] Projects (sources, unless otherwise noted, published PDDs on UNFCCC website)

Name of the Project	Capacity (MW)	Start date (Commission) Date	CDM	Tariff for IRR calculation in PDD (CNY/kWh)	Real tariff (CNY/kWh) + source
Xiaogushan(Ref 0378)	98	20/10/2003(12/05/2006)	Yes	0.29 with17% VAT	0.227 Ganjiashang[2005]195
Qilinsi(Ref2759)	111	05/12/2005(01/11/2009)	Yes	0.235 without 17% VAT, sourced from its FSR	0.227 Ganjiahan[2008]149
Sandaowan(Ref1264)	112	10/2004(01/05/2008)	Yes	0.227 with17% VAT	0.239 Ganjiadianli[2008]345
Wujinxia(Ref3050)	140	04/12/2005(01/01/2010)	Yes	0.227 with17% VAT	0.227 Ganjiadianli [2008]168
Bingling(Ref1985)	240	03/06/2005(15/10/2008)	Yes	0.227 with 17% VAT	0.2529Ganjiadianli[2008]193

Appropriateness of the tariff: the tariff in the PDD of project 0378

The EB has identified a tariff of CNY 0.29 per kWh, as presented in the PDD of project 0378 as the highest tariff assigned to similar projects in Gansu province and requires testing of the proposed project against this tariff. The tariff used in the PDD of project 0378 is not real however. The actually approved tariff for Project 0378 is 0.227 CNY/kWh and not 0.29 CNY/kWh as becomes clear from the "Power Purchase Settlement Notice by Gansu Grid" [26] and the "Notice on the On-grid Tariff of Power Plants in Inter Gansu Provincial and Related Issues in 2005 Ganjiashang[2005]195) [27]" from Gansu Price Bureau on 22 August 2005.

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[21] The project has received an LoA but there is no PDD information on EB website.

[22] The project has received an LoA but there is no PDD information on EB website.

[23] The project has received an LoA but there is no PDD information on EB website.

[24] The project has received an LoA but there is no PDD information on EB website.

[25] Since the highest tariff of hydropower projects smaller than 25MW in Gansu is acknowledged as 0.227 CNY/kWh, we didn't include projects fallen into this range.

[26] http://cdm.unfccc.int/UserManagement/FileStorage/S3X1D51YHINDFTEEQ8L4CUV7OH3CFU

[27] http://wjj.zhangye.gov.cn/jggl/200811/101325.html

The tariff of 0.29 CNY/kWh used in the PDD of registered CDM project 0378 is likely to be a back calculated price from it's the original design documents or alternatively a tariff that the project owner would expect from pre-reform times. Please note that at the time of the start of project 0378 on 28 June 2004, Policy 2 above was already in place, defining a fixed tariff of CNY 0.227 per kWh.

Furthermore, the PDD mentions a range of 0.29-0.34 RBM/kWh as the average tariff in Gansu Power Grid during 2000-2004 according to "regulatory documents, issued by the NDRC dated April of 2000", i.e. "Notice on Tariff Adjustment of Gansu Power Grid and Relevant Issues from the State Development and Planning Commission (SDPC) "(Jijiage[2000]425)[28]. The PDD of project 0378 forgets to mention two important issues of the Jijiage[2000]425:

- the tariffs had been established in 2000, i.e. before the power sector reform;
- the tariffs applied to four large hydropower plants (from 300MW-2000MW, which is not comparable to the project 0378) only and are project-specific tariffs and are hence not representative for all power plants in Gansu.

The tariffs approved in this Jijiage[2000]425 are listed in the table below:

Project	Installed capacity (MW)	Approved tariff (CNY/kWh)
Daxia Hydropower Plant	300	0.347
Lijiaxia Hydropower Plant	2000	0.294
Liujiaxia HPP (Increment unit from retrofitting)	1100 (total)	0.29
Yanguoxia HPP (Increment unit from retrofitting)	394 (total)	0.29

Conclusion:

0.29 CNY/kWh (incl.VAT) is not the actual tariff of project 0378. 0.29 CNY/kWh (incl.VAT) and the ranges mentioned in the PDD of project 0378 were only project-specific tariff before the power sector reform and do not represent the right condition even at the time of starting project 0378. 0.29 CNY/kWh (incl.VAT)is not suitable to be the highest tariff applicable hydro tariffs in Gansu Province. The suitable highest applicable hydro tariff in Gansu Province is in the above part "Appropriateness of the tariff: comparing with the applicable highest tariff in the region".

Appropriateness of the tariff: reference calculation based on the tariff of project 0378

As argued before, the tariffs in Gansu are awarded to projects on a case by case basis. The IRR of project 0378 for which the highest tariff of CNY 0.29 per kWh was discussed, would still not pass the benchmark without support from the CDM. The same turns true when the situation of project 0378 is transposed to the proposed project: the IRR remains below the benchmark.

In order to make the proposed project comparable to project 0378 we have simulated a hypothetical case in which the financial parameters of project 0378 apply to our proposed project. This results in a hypothetical IRR and an ensuing reference tariff that are tested against the benchmark.

[28] Notice on Tariff Adjustment of Gansu Power Grid and Relevant Issues from the State Development and Planning Commission (SDPC), Jijiage[2000]425, 17 April 2000.
http://www.fjjg.gov.cn/fjwjj/jgfw/gjjgzc/webinfo/2000/04/1187774414996019.htm

The reference tariff is calculated based on the available information on the project 0378 with the highest tariff. To quantitatively demonstrate whether the net return to the investor has been reduced or not, two calculations are made as follows:

1) *Calculate the hypothetic IRR when the Project faced the same situation as the project 0378 with the highest tariff;*
   By introducing the financial parameters for project 0378 with the highest tariff into the IRR spreadsheet of the proposed project to calculate the hypothetic IRR as if the Project faced the same situation with the projects with the highest tariff, a hypothetic IRR is calculated. The data from CDM project 0378 are used. All the data is included in the calculation spreadsheet.

2) *Calculate the reference tariff at which the IRR of the proposed project equals the hypothetical IRR;*
   With the hypothetic IRR calculated as above, the tariff at which the proposed project reaches the same level can be calculated. This is the reference tariff.

Table 1 shows that the proposed project with the reference tariff reaches an IRR of 6.61%, which is below the benchmark of 8%. This reconfirms the additionality of the project.

Table 1: Reference calculation based on the tariff of CNY 0.29 per kWh

Project Name	Tariff (CNY/kWh, incl.VAT)	Investment Costs/kW (CNY/kW)	Operation Cost /kWh (CNY/kWh)	Installed Capacity(MW)	IRR without CDM	Note
Xiaogushan	0.29	7,140	0.0755	98	7.2%	Data from PDD of Project 0378
Tianwanggou	0.227	7,138	0.03707	51	6%	Proposed project
Tianwanggou with reference tariff	**0.239**	7,138	0.03707	51	**6.61%**	Proposed project with the reference tariff

A similar exercise was carried out with tariffs and investment characteristics of other projects that have been awarded higher tariffs than the Project: Haidianxia (ref 2882) and Bingling (ref 1985). In both cases it turns out that the reference tariff calculated from these projects results in the Project achieving an IRR below the benchmark of 8%. This confirms the claim that the Project is not feasible without the CDM, even when higher tariffs that have been awarded in Gansu, would be applied.

Table 2: Reference calculation based on projects receiving higher tariffs than the Project

Project Name	**Tariff (CNY/kWh, incl.VAT)**	**Investment Costs/kW (CNY/kW)**	**Operation Cost /kWh (CNY/kWh)**	**Installed Capacity(MW)**	**IRR without CDM**	**Note**
Tianwanggou	0.227	7,138	0.03707	51	6%	Proposed project
Haidianxia (2882)	0.26	8,563	0.0318	60	5.18%	PDD of Project 2882
Tianwanggou with reference tariff calculated from 2882	**0.2274**	7,138	0.03707	51	**6.02%**	Proposed project with the 2882 reference tariff
Bingling (1985)	0.2529	6,604	0.0394	240	6.29 %	PDD of Project 1985
Tianwanggou with reference tariff	**0.2599**	7,138	0.03707	51	**7.62%**	Proposed project with

calculated from 1985						the 1985 reference tariff

Sub-step 2d. Sensitivity analysis
For the financial analysis the following financial indicators have been analysed:

- 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%	**0%**	**+10%**
Total investment	7.09%	6.00%	5.04%
Annual power supply	4.79%	6.00%	7.13%
Electricity tariff	4.79%	6.00%	7.13%
Operation cost	6.25%	6.00%	5.75%

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 (25 MW – 77MW), 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. This paved the way for independent power production. Hydropower plants completed before 2002 were all developed by state-owned enterprizes 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[29], and so developers didn't have any investment risk. These preferential policies ended in 2001[30], after which private developers of hydropower projects were allowed in the market.

Table B.5-5: Activities similar to the Project (25 MW-77 MW) *

Name of the Project	Capacity (MW)	Construction (Commission) Date	Application of CDM
Hanpingzui	72	11/4/2002 (6/2004)	Yes
Dala river	52.5	1/4/2003(15/11/2007)	Yes
Zhouqu Hujia'ai	28	01/07/2004(01/09/2008)	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
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 I(Xiacheng)	66	02/06/2006(01/10/2009)	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
Yangjiahe	37.5	28/03/2007(01/01/2009)	Yes
Zhuoni Niuzi	30	15/4/2007(1/1/2009)	Yes
Dagushan	65	16/09/2007(01/04/2009)	Yes
Huangshui Baichuan	36	19/09/2007(01/03/2010)	Yes
Liuyuan	25	20/11/2007(01/01/2010)	Yes
Wudu JiaoyuanbaJiaoyuanba	25	1/12/2007(01/01/2008)	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:

[29] 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, 28 Nov. 1987

Notice on Standardizing Electricity Tariff Management (No. 701 Jijiage[2001]), [30] State Planning Committee, Apr. 23 2001.

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=51,000,000W÷224000m^2=228W/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[31]. 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.
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[32]

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%

[31] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf

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

Year	Electricity generation (GWh)				
	Thermal	Hydro	Others	Total	Low cost/must run resources % of the total grid generation
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
- 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 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:

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

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)

$EF_{CO2,i,y}$ = CO_2 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 because this information is confidential. Considering this situation, the following clarifications[33] 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.):

[33] Source: "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

- 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[34]

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 crediting 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:

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

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/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

34 Source: China Electric Power Yearbook (editions 2005, 2006 and 2007).

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.

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

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

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

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:

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

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

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

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 ($EF_{grid,_{BM,y}}$):

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

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:

(Copy this table for each data and parameter)

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	The national value is unavailable, adopt IPCC default value

description of measurement methods and procedures actually applied:	
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:	$\eta_{j,adv}$
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 =211,576*0.8498= 179,797tCO_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=179,797tCO_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_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions

				(tCO2 e)
01/10/2009-30/09/2010	0	179,797	0	179,797
01/10/2010-30/09/2011	0	179,797	0	179,797
01/09/2011-30/09/2012	0	179,797	0	179,797
01/10/2012-30/09/2013	0	179,797	0	179,797
01/10/2013-30/09/2014	0	179,797	0	179,797
01/10/2014-30/09/2015	0	179,797	0	179,797
01/10/2015-30/09/2016	0	179,797	0	179,797
01/10/2016-30/09/2017	0	179,797	0	179,797
01/10/2017-30/09/2018	0	179,797	0	179,797
01/10/2018-30/09/2019	0	179,797	0	179,797
Total (tonnes of CO2 e)	0	1,797,970	0	1,797,970

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	211,576
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	0

emission reductions in section B.5	
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	212,000
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	51
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	0.224
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:

• **Supervize and verify metering and recording:**

The monitoring officer will coordinate with 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.

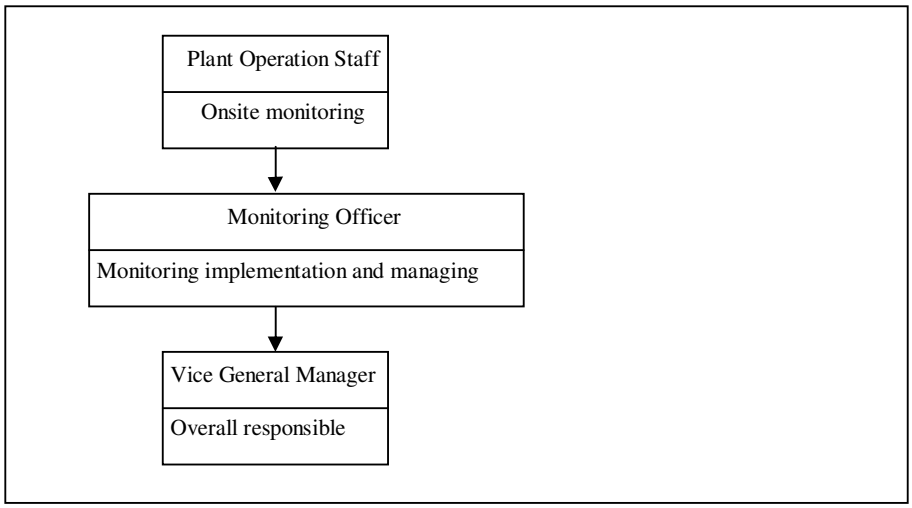

Figure B.7.2-1 Management structure for monitoring

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.

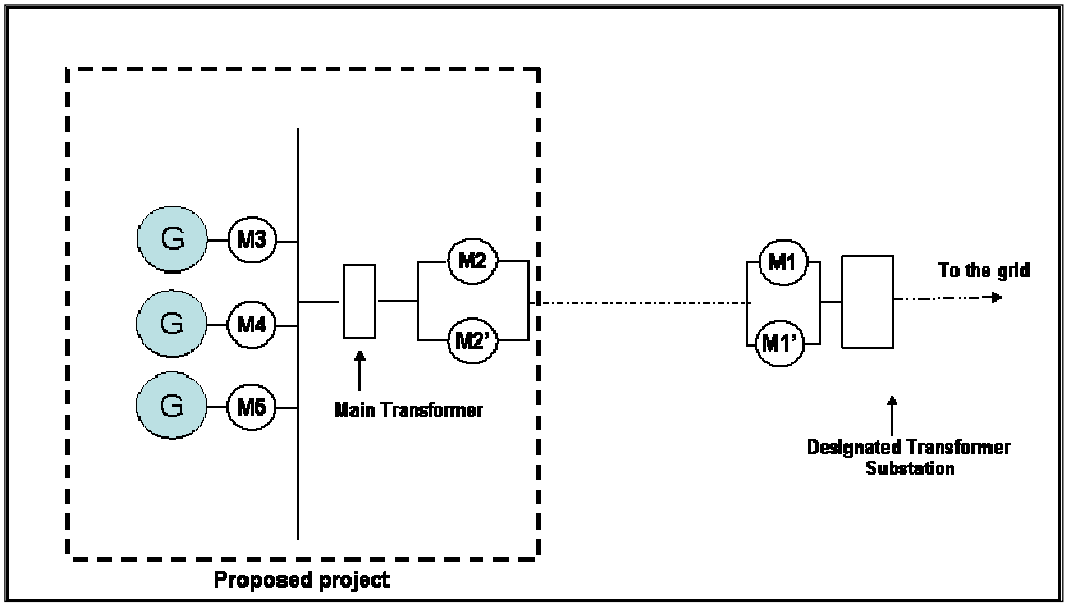

Figure B.7.2-2 Diagram of monitoring meters

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
Type and Accuracy: SL7000 and 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
Type and Accuracy: SL7000 and 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
Type and Accuracy: SL7000 and 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
Type and Accuracy: SL7000 and 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.

• 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.

The electricity imported from the grid in MWh would contribute the project emissions.

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:

>>19/10/2005, 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:

>>Not applicable

C.2.1.2. Length of the first crediting period:

>> Not applicable

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:

>> Ten (10) 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 on Sept 20 2005 (Ganhuanzifa [2005] 46).

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

1. **Water environmental impact evaluation**

After the planned project is put into operation, the water body and water quality will alter little in the reservoir area and the outflow water quality will remain at the current level. Operation of the reservoir will have no effect on daily runoff volume of other lower-reach watercourses. There is no obvious adverse

impact on daily pollutant-holding capability of down stream watercourses on the premize that the basic eco-flux of 6.0 m^3/s is ensured. Therefore, operation of this reservoir and hydro-power plant will not influence the environmental function of surface water so the former functional zoning of water environment can be maintained.

During the construction period, pollution sources of the water in the river are mainly industrial from construction processes (i.e. polluted with tint, oil, cement components) and household wastewater. However the wastewater is treated before discharging it into the river. According to the standard measurements, the industrial and household wastewater is purified up to Level 1 of discharge standard in the national *Integrated Wastewater Discharge Standard* (GB8978-1996). Therefore the pollution has an insignificant impact on water quality of the river. Moreover, the pollution sources will disappear when the construction is complete. As a result, wastewater from engineering construction does not influence the environmental.

2. **Atmosphere**

There is a small population in the area of the Project living at a distance of 200-400 m. It is not expected that these families will suffer from any atmospheric pollution caused by the project activities.

The atmospheric pollution from blasting, mixing concrete or exhaust fumes may affect the environment. However the impact is not expected to be significant.

To avoid these impacts, the project owner should spray water regularly, and the workers should be protected by masks. The project owner should plant trees after construction completion. These measures would prevent air pollution effectively.

3. **Noise**

The noise disturbance is very slight within 150 m from the project site and will not affect the people far away.

4. **Impacts on public health during operation period**

Impacts on public health during construction period:

There are 1.100 people involved in the construction. This high concentration of people living in simple conditions and inadequate sanitary conditions may lead to lower immunity of workers which may result in negative health effects. Therefore it is necessary to increase awareness of the workers in the area of hygiene and to prevent epidemics.

The recommendations of the EIA are: Sanitary inspections are conducted periodically to ensure public sanitary facilities are up to national standards and requirements. Preventive measures, e.g. preventive vaccinations, are provided. Once any epidemic situation is detected, the epidemic source will be treated, insulated and observed; preventive measures will be taken to protect any part of the population that is at risk of infection; the epidemic situation will be reported to the relevant health authorities.

5. Impacts on nature reserves

There are no protected animals living in the direct surroundings of the project area. Most of the non-protected animals live in the high mountain, where the project activities have no influence on their life.
As the construction implicates a small scope and has a weak impact degree, it will not affect the basic ecological function of a nature reserve.

6. Loss of water and erosion of soil

The activities from the proposed project may erode the original landform; weaken the ability of the earth's surface to resist the erosion as well as to exacerbate loss of water. Therefore the project owner will monitor the water levels and soil erosion and use trees planting and soil waste controlling measurement to control.

7. Brief summary of eco-environmental impact evaluation

(1) There is a certain impact on the local micro-climate near the reservoir area and reservoir bank. After the reservoir is filled with water, annual air temperature is expected to increase by about 0.3 ^{o}C and the annual average relative humidity is expected to increase by about 2% within a 1 km range around the reservoir. This will favour the growth of thermophilic and hygrophilic vegetation in the reservoir area.

(2) The engineering construction principally destroyed secondary shrub forest and grassland, but did not affect rare plants. With the implementation of a soil and water conservation scheme of the civil works, the above destroyed vegetation can be restored. There were no patches of forest vegetation but many artificial coniferous forests dominated by pines and firs as well as farmland vegetation below the reservoir flood line. The works had minor impact on natural species and on the state of the ecosystem.

(3) No rare or endangered protected species were affected in the project area. Some rodents were present in the area, which have an extensive distribution area and are present in large quantities, so they were influenced less by flooding. The population of waterfowl and birds are expected to increase after completion of the Project.

(4) During low flow periods of the river intermittent dry-up of the river bed might be caused in the stretch of river below the dam due to the diversion-type power generation The would lead to enormous damage to the watercourse ecosystem at lower reaches. Therefore it is required to at least guarantee a minimum flow to preserve the ecosystem. This minimum flow is calculated at 6.0m^3/s and will be preserved at all times.

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 treatment of polluted water, 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 minimize the impact on the environment. After the completion of the Project construction, the Project will be put into operation only after the inspection and acceptance of the local environmental protection department.

SECTION E. Stakeholders' comments

>> There were two public consultations carried out.

The first one took place in August 2005, of 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 with the 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***

Outline of survey of public participation:

In order to receive the permit for construction and operation of any power, an Environmental Impact Assessment is needed. One of the most important elements of the EIA are public consultations.
In August 2005 Environmental Assessment Research Center of Lanzhou University, under the assistance of Gansu Liancheng National Nature Reserve Administration, Yongdeng County Environmental Protection Administration and other agencies, a survey of public participation has been carried out.

Survey modes and surveyed objects:

This survey was done with a questionnaire that was handed out to 50 people. 40 copies were filled out and returned. The survey was focused on: farmers within the area affected by the Project, the flooded area (expropriated land), Gansu Liancheng National Nature Reserve Administration, protection station and people in Yongdeng County. The participants were representing all the social groups with different professions, educational degrees and ages.

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.
Surveyed were 34 males, 6 females, 12 persons aged above 40, 28 persons aged below 40, 20 persons with educational degree of senior high school, 20 persons with educational degree of junior high school, 13 cadres, 17 farmers and 10 others. The survey results are shown in E.1-2.

Table E.1-1: Questionnaire of Public Participation for Datong River Tianwanggou Hydropower Station Engineering

1.Do you agree to build this hydropower station?	A Yes	B No	C I don't care	
2.Is this project helpful to local economic	A Yes	B No	C I don't know	

development?				
3.Is this project beneficial to an improvement in local environment?	A Yes	B No	C I don't know	
4. Do you know the policy of land requisition compensation for a construction project?	A Yes	B No	C I don't know	
5.Are you satisfied with the land requisition mode?	A Satisfied	B Unsatisfied	C Extremely unsatisfied	
6. Are you satisfied with the policy of land requisition compensation?	A Satisfied	B Unsatisfied	C Extremely unsatisfied	
7.Which environmental aspect is influenced most by the Station construction?	A Water consumption	B Aquatic organism	C Terrestrial organism	
	D Water quality	E Noizes	F Atmosphere	

Notes: 1. Please tick off your each answer.

2. Please write down your other opinions, proposals and specific requirements or on a piece of paper attached.

Table E.1-2: Survey Statistics of Public Opinions

Do you agree to build this hydropower station?	Yes	92.5%	No	0	I don't care	7.5%
Is this project helpful to local economic development?	Yes	97.5%	No	0	I don't know	2.5%
Is this project beneficial to an improvement in local environment?	Yes	95.0%	No	0	I don't know	5.0%
Do you know the policy of land requisition compensation for a construction project?	Yes	97.5%	No	0	I don't know	2.5%
Are you satisfied with the land requisition mode?	Satisfied	92.5%	Unsatisfied	5.0%	Extremely unsatisfied	2.5%
Are you satisfied with the policy of land requisition compensation?	Satisfied	62.5%	Unsatisfied	25%	Extremely unsatisfied	12.5%
Which environmental aspect is influenced most by the Station construction?	Water consumption	5.0%	Aquatic organism	32.5%	Terrestrial organism	5.0%
	Water quality	55.0%	Noises	2.5%	Atmosphere	

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.1-3 Participants of the meeting, 24 September 2007:

Num	Affiliation	Name of Participant	Position/Occupation
1	Government of Liancheng Town	Zhaoyuan Zhang	Vice Mayor
2	Government of Liancheng Town	Yongfeng Wang	Secretary of CPC
3	Economic and Trade Committee of Liancheng Town	Changshan Gao	Director
4	Liancheng Nature Reserve Administration	Youren Zheng	Vice Director
5	Liancheng Nature Reserve Administration	Xuefang Di	Section Chief
6	Power Substation of Bureau of Agriculture of Yongdeng County	Xueming Zhang	Director
7	Second Branch of Yellow River Diversion Project	Yongzhong Li	Director
8	Second Branch of Yellow River Diversion Project	Lucheng Wang	Engineer
9	Jingyuansanjian Construction Company	Songlin Ding	Manager
10	Local resident, Dongheyan Village	Zude Yu	Farmer
11	Local resident, Dongheyan Village	Zuzhen Tie	Farmer
12	Local resident, Dongheyan Village	Xilai Tie	Farmer
13	Local resident, Dongheyan Village	Zhongying Tie	Farmer
14	Local resident, Dongheyan Village	Zhongde Yu	Farmer
15	Local resident, Dongheyan Village	Yingde Yu	Farmer
16	Local resident, Dongheyan Village	Fengmei Ma	Farmer
17	Local resident, Dongheyan Village	Caixia Gao	Farmer
18	Gansu Darong Electric Power Limited Company(GEPIC)	Yikai Wu	Department Manager
19	Tianwanggou Project department of GEPIC	Rong Zuo	Manager
20	Tianwanggou Project department of GEPIC	Bo Zhang	Engineer
21	Tianwanggou Project department of GEPIC	Dangqun Zhang	Engineer
22	Tianwanggou Project department of GEPIC	Wenkai Yang	Office Manager
23	Tianwanggou Project department of GEPIC	Xuejuan Wang	Document Controller
24	DHV BEEC Co., Ltd.	Malgorzata Sieniuc	CDM Project Director
25	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) Most of surveyed persons agree to construction of this project. They think this project can help local economic development, improve the local environment and benefit country and people.

(2) A large proportion of surveyed objects know the policy of land requisition compensation, but several farmers do not know it. In the mean time, a majority of surveyed persons expresses that they will adhere to the land requisition mode.

(3) Surveyed persons suggest to compensating farmers for their expropriated lands directly and also increasing the compensation standardization.

(4) Most of surveyed persons believe that this project influences water, acoustic environment and eco-environment; furthermore, they hope that these influences would be reduced by good organization and planning of the Project and site greening.

SECOND CONSULTATIONS:

1.Participants: Zhaoyuan Zhang, Vice Mayor of Liancheng Town

Comments: The hydropower project is a clean energy and environmentally friendly project. It can spur the development of the local economy and increase the income of local people. Hence, the local government supports this project. Since no other industry is adapted to this area, tourism business will top the agenda of the local government, which will rely on the hydropower station projects and nature reserve resources. The tourism businesses will do well to the local service business. Local resident will get more money by selling traditional craftwork like paper-cuts, bonsai stones, and specialties in this region. All of these will be good to the local environment.

2.Participants: Yongfeng Wang, Secretary of CPC, Liancheng Town

Comments: Developing Clean energy is fits the policy of China. We will get positive spin-off from the hydropower as follows: It will protect local environment and do well to sustainable development; it will meet the need of local people (the electricity demand is getting higher and higher these years, partly because more and more families bought electrical appliances); it will boost local economy development, supply more labour demands, promote tax and financial income of the local population. We know there will be influence on the area during the construction period of the projects. But these influences are temporary. The negative influence will disappear when the construction is finished. The Tianwanggou project is good to the development of enterprizes and the Construction of New Socialism Rural Area.

3.Participants: Youren Zheng,Vice Director of Liancheng Nature Reserve Administration

Comments: There will be an influence on the local environment during the construction period of the Project, but this is temporary. Once we came a across problem, we contacted the operation company and they reacted promptly. They said they would do everything according to the water and soil conservation measures and EIA regulations, and promized to restore the quality of the temporarirly expropriated land.

4 . Participants: Xuefang Di,Vice Director of Liancheng Nature Reserve Administration

Comments: The company should strengthen management of the construction company, and guarantee they put the solid waste (like sand, rocks, bricks) from the construction field on the granted area.

5. Participants: Songlin Ding ,Manager of Jingyuansanjian Construction Company

Comments: Two thirds of the solid waste (like sand, rocks, bricks) from the construction field is used as the raw material of the Project construction. The other one third will be put to the granted area according to the EIA.

6. Participants: Rong Zuo, Manager of Tianwanggou Project department of GEPIC (response to the question: since the EIA in 2005, is changes so far ?)

Comments: there have been changes since then, but not big. First because of our national policy returning farmland to forest, more vegetation have developed upstream, which lead to more water volume in the river. The second change comes from in that process, with more water volume, the riverbank washed out harder than before. Third, other changes are not very big, as all activities are according to the EIA.

The local people support us all the time. We provide more opportunities to work and increase incomes. A lot of them bought the auto-bike, which was convenient to get other jobs for them. 60% of our works are done by local workers.

7. Questions to the participants:

Question	What do the local people live with?
Answer	They mainly live on farming. The income is very limited, therefore very many people go out to work. If there are no enough posts, they must travel far for work.
Question	How do you use the river?
Answer	Irrigation.
Question	Is the river polluted? Do you drink the water from the river?
Comment	It isn't polluted, but it is far from to river to the families. We drink the spring water.
Question	Do you or your family work on the site?
Answer	Yes, with a salary of 30-40 CNY/people/Day, we are satisfied.
Question	Do the Project affect the traffic?
Answer	No.
Question	Are you local people satisfied by the compensation for the Project?
Answer	Yes, we hope there will be more projects like this, for we will be compensated enough. Our yield for 1Mu is only 250kg/year, but they compensated us 400kg/year. We don't have to plant but get more money. No reason to be unhappy.

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. The following are the corresponding replies towards the problems shown in the previous section:

- Publicize the land compensation policy among the local peoples;

- Compensate the affected people in accordance with relevant laws, and propose to related government sector to increase the standard of the compensation;
- The project owner will restore vegetation around the Project site in time to strengthen the water and soil control.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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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	Gansu	Qinghai	Ningxia	Xinjiang	Total	Carbon coefficient (tc/TJ)	NCV (MJ/t,km3)	CO_2 emissions (tCO_2e) J=G*H*F*44/12/100(t) J=G*H*F*44/12/10(m^3)
		A	B	C	D	E	F=A+B+C+D+E	G	H	
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

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

Fuel	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Carbon coefficient (tc/TJ)	NCV (MJ/t,km3)	CO_2 emissions (tCO_2e) J=G*H*F*44/12/100(t) J=G*H*F*44/12/10(m^3)
		A	B	C	D	E	F=A+B+C+D+E	G	H	
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

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

Fuel	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Carbon coefficient (tc/TJ)	NCV (MJ/t,km3)	CO_2 emissions (tCO_2e) J=G*H*F*44/12/100(t) J=G*H*F*44/12/10(m^3)
		A	B	C	D	E	F=A+B+C+D+E	G	H	
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	B	Gansu C	Qinghai D	Ningxia E	Xinjiang F	Total G	NCV (MJ/t,km3) H	**Carbon coefficient** J	**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%

$EF_{grid,BM,y}$=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

Table Annex3-17. Calculation of the baseline emission factor ($EF_{grid,CM,y}$)

Issuance date	Highlights	Document/policy
1985	Tariff is according to repayment of the debt service;	
17 Apr 2000	In order to resolve the servicing problems (repay the principal and the interest problems) of new commissioned power projects, mitigate the production and operation difficulties of electricity enterprises justify on-grid tariff of four large hydropower plants	Notice on Tariff Adjustment of Gansu Power Grid and Relevant Issues from the State Development and Planning Commission (SDPC) (Jijiage[2000]425)
23 Apr 2001	The approval tariff should be based on average electricity tariff during the operation period of the power generation projects.	Notice on Standardizing Electricity Tariff Management from the State Development and Planning Commission (SDPC) (Jiajiage[2001]701)
10 Feb 2002	Official start of Electricity Power System Reform	Notice on Printing and Distributing the Plans for Electricity Power System Reform from the State Council (Guofa[2002]5))
9 July 2003	Electricity Price Reform Plan	Notice on printing and Distributing the Electricity Price Reform Plan from General Office of the State Council" (Guobanfa [2003] 62)

18 Jun 2004	Unify the on-grid tariff for newly commissioned power stations in the northwestern provinces. For Gansu this meant a flat rate of 0.227 RMB/kWh with VAT for both newly commissioned coal-fired units and newly commissioned hydropower plants.	Notice on channelizing the confliction of electricity price in Northwest Power Grid (Fagai Price[2004]1125)
22 Aug 2005	Execute the unified on-grid guiding tariff to newly commissioned generators in 2005 according to nation regulation. For Zhangye Xiaogushan Hydropower Co. Ltd. [35] , the on-grid tariff is 0.227 RBM/kWh.	Notice on the On-grid Tariff of Power Plants in Inter Gansu Provincial and Related Issues in 2005 (Ganjiashang[2005]195)
11 Jul 2006	Any newly commissioned hydropower projects within Gansu Grid started operation after 1 Jan 2005 (regardless the capacity) execute 0.227RMB/kWh as a guiding on-grid tariff.	Notice on On-grid Tariff and Relevant Issues for Newly Commissioned Hydropower Projects in Gansu Province (Ganjiashang (2006) No.125)
16 Jul 2008	On-grid tariff of Tianwanggou project is approved as 0.2503RMB/kWh considering its transmission cost burdened by its project owner.	Notice on the On-grid Tariff of the Inter-Provincial Power Plant and Related Issues for 2008 (Ganjiadianli[2008]193)

[35] For Project 0378 "China Xiaogushan Hydropower Project"

Annex 4

MONITORING PLAN

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