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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

Project title: Gansu Zhouqu County Hujia'ai Hydropower Station Project
PDD Version: 4.0
Completion date PDD: 17/11/2008

Revision History:

Version	Date	Comments
Version 1.0	05 February 2007	Complete version of the PDD; prepared for host country approval
Version 2.0	10 July 2007	Revised PDD, incorporating minor editorial changes; prepared for validation
Version 3.0	26 May 2008	Revised PDD, in response to the draft validation protocol
Version 4.0	17 November 2008	Revised PDD, in response to a Request for Review from the EB

A.2. Description of the project activity:

The Gansu Zhouqu County Hujia'ai Hydropower Station Project (hereafter referred to as 'proposed project' or 'project') involves the construction of a run-of-river hydropower station at the main stream of the Bailongjiang River in Zhouqu County of Gannan Autonomous Tibetan Prefecture in Gansu Province, China.

The main objective of the project is to generate power from clean renewable hydro power in Gansu Province and contribute to the sustainability of power generation of the North West China Grid. The hydropower station will install 2 turbine / generator sets with a total installed capacity of 28 MW.

The project design mainly consists of a run-of-river scheme with an overflow dam, water diversion system, power house, tailrace, and a transformer station. The project has a design water flow capacity of 118 m^3/s. The expected effective operating hours are 5,107 hrs annually and expected annual power generation is 142,996 MWh. Annual net power supply to the grid is expected to be 138,740 MWh. The reservoir will have a total surface area of 238,400 m^2 and the power density of the project is 117.45 W/m^2.

Power generated by the project will be routed to the Gansu Provincial Grid through Zhouqu 110 kV Transformer Station. The Gansu Provincial Grid is part of the North West China Power Grid.

The project activity's contributions to sustainable development are:

- Reducing the dependence on exhaustible fossil fuels for power generation;
- Reducing air pollution by replacing coal-fired power plants with clean, renewable power;
- Reducing the adverse health impacts from air pollution;
- Reducing the emissions of greenhouse gases, to combat global climate change;
- Contributing to local economic development through employment creation.

This project fits with the Chinese government objective to reduce the dependence on exhaustible fossil fuels for power generation, make the energy sector in general and the power sector in particular more sustainable.

A.3. Project participants:

The parties involved in the project are shown in Table A.1:

Table A.1 Project participants

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Private entity: Gansu Ansheng Hydropower Development Co., Ltd. (as the Project Entity)	No
Japan	Private entity: Mitsui & Co., Ltd. (as the Purchasing Party)	No

Project Owner: Gansu Ansheng Hydropower Development Co., Ltd.

Gansu Ansheng Hydropower technology development Co., Ltd. is a limited liability company established in July 2004 under Chinese Law dedicated to the development of hydropower. Its main shareholder is Diebu Niaojiaga Hydropower Development Co., Ltd., which is a medium/small company active in the development of hydropower in Gansu Province.

Purchasing Party: Mitsui & Co., Ltd.

Mitsui is a trading company established in 1947 under Japanese law. The main business includes sales and export / import of metal products and minerals, machinery, electronics, chemicals, energy, foods and others. Mitsui is also diversifying services, exploring for and developing natural resources, making commercial investments and developing technologies in new businesses. It has more than 150 offices overseas (website: www.mitsui.co.jp/en/index.html)

For more detailed contact information on participants in the project activities, please refer to 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):

People's Republic of China

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

Gansu Province

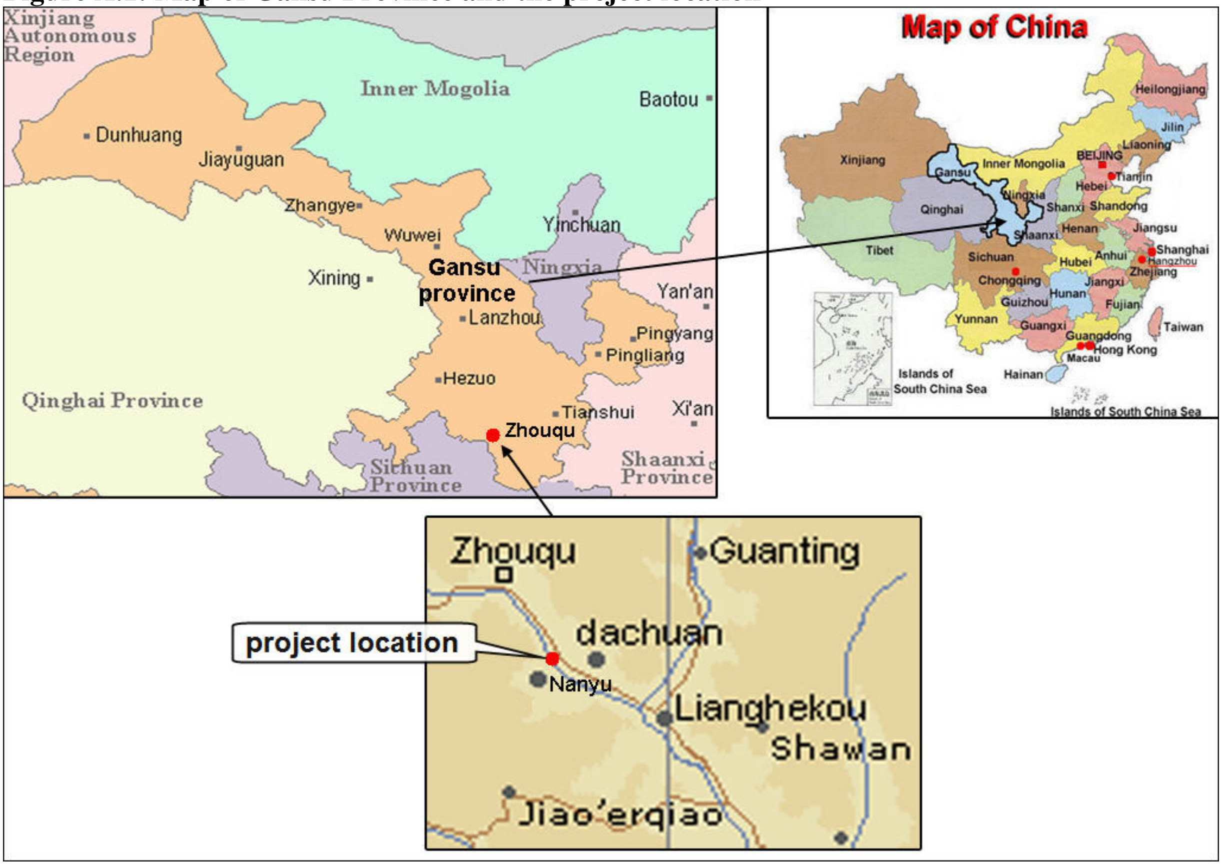
A.4.1.3. City/Town/Community etc:

Zhouqu County of Gannan Autonomous Tibetan Prefecture

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

The proposed project is located near Anziping village (upstream of the dam site) and Hujia'ai village (downstream of the power house) at the main stream of Bailongjiang river in Zhouqu County of Gansu province. The site's approximate coordinates are east longitude of 104°06'08" and north latitude of 33°02'39". The nearest large city is Longnan City, located 75 km east of the project site. The project area is mountainous with little vegetation. Figure A.1 shows the location of the project.

Figure A.1: Map of Gansu Province and the project location



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

The project activity falls within Sectoral Scope 1: Energy Industries.
- Electricity generation from renewable energy (hydropower)

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

The project is a diversion-type hydropower station with the design mainly consisting of a dam, water diversion system, penstocks, power house, tailrace, and a transformer station. Total installed capacity will be 28 MW and expected effective annual operating hours are 5,107 hr, resulting in an expected annual power generation of 142,996 MWh. Net annual power supply to the grid is estimated to be

138,740 MWh. The reservoir will have a total surface area of 238,400 m^2 and the power density of the project is 117.45 W/m^2. Average water flow is 81.9 m^3/s and the project has a design water flow capacity of 118 m^3/s. The head available for power generation is 26.2 meters.

The dam will consist of several sections, i.e. an overflow dam section, a water retaining section, a main dam section which will include 4 flood gates, and a water intake. The dam will be constructed from concrete and will have a maximum height of 8.7 meters and a total crest length of 117.7 meters. The water intake leads the water into a 694.3 meters long open channel which continues into a non-pressurized tunnel with a length of 1538 meters. The water is then led to the powerhouse through two penstocks. After passing through the turbines, the water will be returned to the river through a tailrace. At the power house site a step-up transformer station and a flood protection barrier will be constructed.

The choice of turbines for the proposed project reflects the medium head nature of the project and the need for adjustability to water flow variability. Two turbine / generator units with an individual capacity of 14 MW will be installed. The specific technical data of the turbines and generators are listed in Table A.2. The units will be manufactured by Tianjin Tianfa Heavy Hydropower Equipment Manufacturing Co., ltd. The technology consists of domestic hydropower technology which has been used before in China and is appropriate for the proposed project.

Table A.2 Technical data of the turbine / generator units

Main Technical Data		Value (per unit)
Turbines	Units	2
	Type number	ZZ550-ZH-285
	Type	Kaplan turbines (adjustable-blade propeller)
	Capacity	14.56 MW
	Nominal flow rate	60.3 m^3/s
Generators	Units	2
	Type number	SF14-26/4870
	Type	Vertically mounted three pole generators
	Capacity	14 MW
	Nominal revolutions	230.8 rpm
	Power factor	0.8

Power generated by the project will be routed to the Gansu Provincial Grid through Zhouqu 110 kV Transformer Station. The Gansu Provincial Grid is part of the North West China Power Grid.

The main shareholder of the project entity, Diebu Niaojiaga Hydropower Development Co., Ltd., has extensive experience in the construction and operation of hydropower stations as will be further substantiated in Section B.5. Therefore, the project entity can be considered experienced and capable of constructing and operating a hydropower station and will be able to draw on the transfer of knowledge, planning and experience from its main shareholder.

An indicative schedule of the project's implementation is provided below in table A.3.

Table A.3 Technical data of the turbine / generator units

Period / date	Main Activity
September 2004 – June 2006	Construction of dam site
July 2004 – September 2006	Construction of water diversion system
September 2005 – June 2007	Construction of power house

21st of September 2007	First turbine operational
24th of January 2008	Second turbine operational

The project entity has appointed the Zhouqu Xingyuan Electricity Operation and Maintenance Company, Ltd. to operate the station and perform daily checks and maintenance of equipments and facilities. This will not effect the normal operation of the station. The Zhouqu Xingyuan Electricity Operation and Maintenance Company, Ltd. is currently operating 6 hydropower stations. Periodic maintenance of the turbines and generators will be performed by the manufacturer of the technology until the one-year warranty expires. At this time, the project owner will appoint a qualified technical company to perform maintenance of the turbines and generators. Emergency repairs in case of malfunctioning of the station will be entrusted to qualified technical experts, depending on the situation.

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

A 7-year renewable crediting period (renewable twice) is selected for the proposed project activity. The estimation of the emission reductions in the crediting period is presented in Table A.4.

Table A.4 The estimation of the emission reductions in first crediting period

Year	**The estimation of annual emission reductions (tCO_2e)**
Year 1: 1 September 2008 – 31 August 2009	117,901
Year 2: 1 September 2009 – 31 August 2010	117,901
Year 3: 1 September 2010 – 31 August 2011	117,901
Year 4: 1 September 2011 – 31 August 2012	117,901
Year 5: 1 September 2012 – 31 August 2013	117,901
Year 6: 1 September 2013 – 31 August 2014	117,901
Year 7: 1 September 2014 – 31 August 2015	117,901
Total estimated reductions (tons of CO2e)	**825,307**
Total number of crediting years in 1st crediting period	7
Annual average over the 1st crediting period of estimated reductions (tons of CO2e)	117,901

A.4.5. Public funding of the project activity:

There is no public funding from Annex I countries available to the proposed project.

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:

Baseline methodology:

Approved consolidated baseline and monitoring methodology ACM0002 (Version 6): Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources.

The methodology draws upon:

- Tool for the Demonstration and Assessment of Additionality (version 03)

Monitoring methodology

Approved consolidated monitoring methodology ACM0002 (Version 6): Consolidated monitoring methodology for grid-connected electricity generation from renewable sources

For more information on the baseline and monitoring methodology we refer to the UNFCCC website: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

The baseline and monitoring methodology ACM0002 is applicable to the proposed project, because the project meets all the applicability criteria stated in the methodology:

- The proposed project is a grid-connected renewable power generation project.
- The project is a capacity addition from a renewable energy source, i.e. a new hydro electric power project.
- The project has a power density greater than 10 W/m^2 (see also section B.3.)
- The project does not involve an on-site switch from fossil fuels to a renewable source.
- The geographic and system boundaries for the relevant electricity grid, the North West China Power Grid, can be clearly identified and information on the characteristics of the grid is available.
- The methodology will be used in conjunction with the approved consolidated monitoring methodology ACM0002 (Consolidated monitoring methodology for grid-connected electricity generation from renewable sources).

The latest version of ACM0002 (version 6) has been applied.

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

The project's boundary is North West China Power grid. The sources and gases included in the project boundary are described in Table B.1 as below:

Table B.1 Inclusion of gases and sources in the calculation of the emission reductions

	Source	Gas	Included?	Justification / explanation
Baseline	Fossil fuel-fired Power plants connected to the North West China Power grid	CO_2	Yes	Included as per the ACM0002 methodology
		CH_4	No	Excluded as per ACM0002.
		N_2O	No	Excluded as per ACM0002.
Project Activity	Not applicable, the project is a zero-emission renewable energy project.	CO_2	No	Excluded, the project activity is a renewable energy project which will not create emissions itself.
		CH_4	No	Excluded, the project activity is a renewable energy project which will not create emission itself. The power density is above 10 W/m2, and reservoir emissions do not have to be taken into account.
		N_2O	No	Excluded, the project activity is a renewable energy project which will not create emissions itself.

In line with the methodology, the only greenhouse gas accounted for in the calculation of the emission reductions is CO_2. The emission sources are the power plants connected to the North West China Power Grid, as defined below. The project's spatial boundary is the North West China Power Grid, and the Gansu Zhouqu County Hujia'ai Hydropower Station Project, including:

- reservoir created by the project activity
- dam structure including flood gates and water intake
- water diversion system
- power house
- tailrace
- switching / transformer station (owned by the project entity)
- transmission lines to the grid

In accordance with the ACM0002 methodology, leakage due to project emissions from the reservoir have to be taken into account in case the power density of the project is between 4 and 10 W/m^2. The power density of the proposed project activity can be calculcated as follows:

Reservoir surface area at full reservoir level: 238,400 m^2
Total installed capacity: 28,000,000 W
Power Density: Installed capacity / reservoir surface level = 28,000,000 / 238,400 = 117.45 W/m^2

From above calculation it is clear that the power density is substantially greater than 10 and therefore, in accordance with the ACM0002 methodology, emissions from the reservoir are not taken into account in the calculation of emission reductions. In agreement with the methodology, other leakage (arising from power plant construction, fuel handling, etc.) is ignored. The project participants also do not claim emission reductions resulting from a reduction of these emissions under the baseline level.

According to the ACM0002 (version 6) methodology, the relevant grid definition should be based on the following considerations:

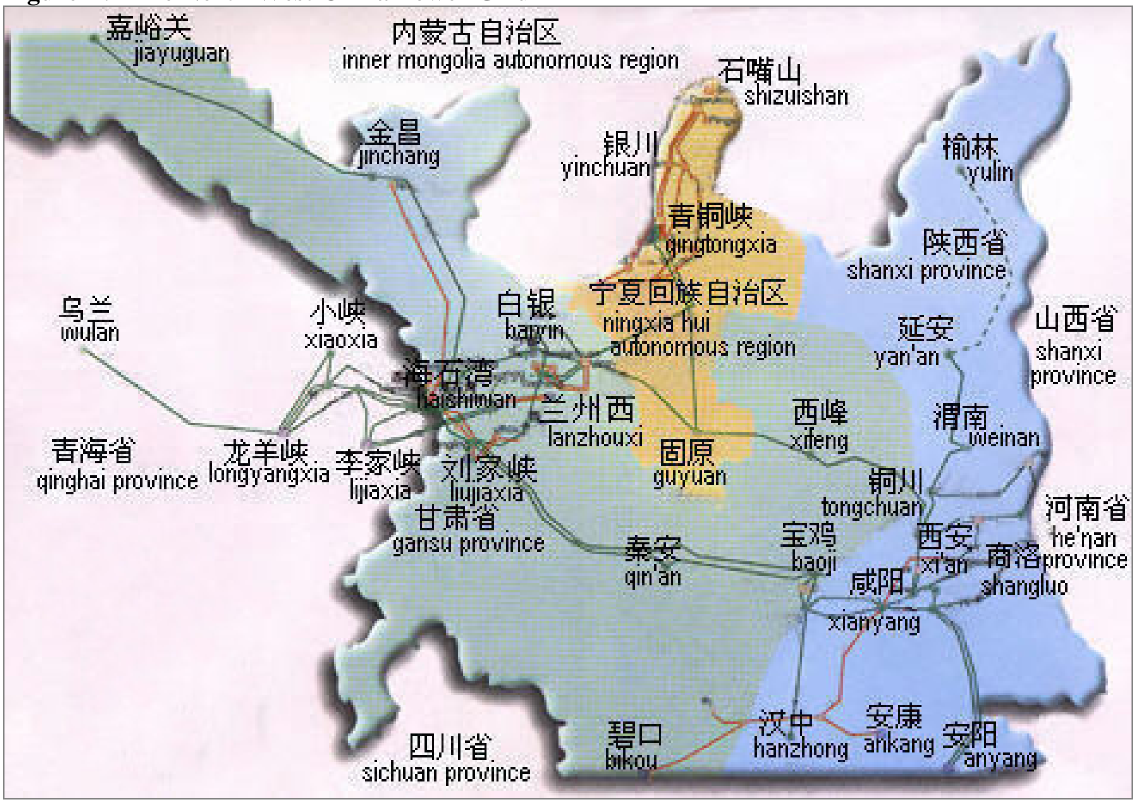
1. Use the delineation of grid boundaries as provided by the DNA of the host country if available; or
2. Use, where DNA guidance is not available, the following definition of boundary:

In large countries with layered dispatch system (e.g. state/provincial/regional/national) the regional grid definition should be used.

According to above requirements, the regional grid (North West China Grid) is selected as the project boundary.

The project is connected through the Zhouqu 110 kV Transformer Station to the Gansu Power Grid (See also figure B.3.). The Gansu Power Grid is part of the North West China Power grid (illustrated in figure B.1), which includes the Gansu, Ningxia, Shaanxi, Qinghai and Xinjiang power grids.

Figure B.1 The North West China Power Grid



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

The baseline scenario of the Gansu Zhouqu County Hujia'ai Hydropower Station Project is the continued operation of the existing power plants and the addition of new generation sources on the North West China Grid 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 the ACM0002 methodology, 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):

The additionality of the project activity is demonstrated using the steps described in the 'Tool for the demonstration and assessment of additionality' (version 03). See UNFCC website:

http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf

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

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

The methodology requires a number of sub-steps to provide realistic and credible alternatives to the project activity. There are only a few alternatives that are prima facie realistic and credible in the context of the North West China Power Grid:

- Fossil fuel-fired power generation
- Wind power
- The proposed hydropower activity, without the support of CDM
- The same service of power supply is provided from grid

These are credible and realistic alternatives and these alternatives are in accordance with the description of the methodology (the additionality tool requires that the proposed project activity be included as an alternative, without the benefit from CDM).

Coal-fired power generation is the dominant power supply option in China. In the case of the North West China Power Grid, both coal-fired power generation and hydropower are common options. In 2004, coal-fired power accounted for 66.7% of total installed capacity and 78.8% of total power generation. Hydropower accounted for 32.5% of total installed capacity and 20.8 % of power generation.[1]

Continuation of the present situation (no capacity addition to the project electricity system) is not realistic in the context of this project, because power demand has been increasing rapidly over the last few years. China has experienced severe power shortages, spurned by fast demand for power; and hence the grids have been expanding rapidly. For example, the total supply of the North West China Power Grid grew by 39 % between 2002 and 2004.

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

The second sub-steps involve the confrontation of the alternatives with China's applicable laws and regulations. All four alternatives identified above are in compliance with China's relevant laws and

[1] China Statistical Press (2005) 'China Electrical Power Yearbook' p. 473-474.

regulations.[2] This may be demonstrated by referring to statistics, which show that each of these power supply options is used in China.

The proposed project activity is consistent with national policies for environmental protection, energy conservation and sustainable development. However, there are no binding legal and regulatory requirements for this project type. The Renewable Energy Law adopted by the National People's Congress on 28 Feb. 2005 encourages and supports renewable-based power generation, but does not stipulate specific goals for local air quality improvement.

Conclusion: We conclude that each of the alternatives is in compliance with the relevant Chinese laws and regulations. As there are alternatives to the project activity that are in compliance with the relevant Chinese laws and regulations, the project may be additional.

Step 2. Investment analysis

Sub-step 2a: Determine appropriate analysis method

The analysis will be analyzed through Option III of the additionality tool, i.e. benchmark analysis. This method is applicable because:

- Option I: Simple cost analysis, does not apply as the project generates economic returns through the sales of electric power to the grid.
- Option II: Investment comparison analysis is not used as the project entity is not considering to invest in the construction of one of the other identified alternatives.
- Option III: Benchmark analysis is used as the return on investment relative to the industry benchmark was crucial for the decision to go ahead with the project.

Conclusion: We conclude that option III is applicable to the project activity.

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

The project faces a barrier to implementation due to the poor returns on investment. To illustrate this, we performed a benchmark analysis in which calculate the Internal Rate of Return (IRR) of the project and compare this with the industry benchmark for hydropower projects, which in the case of hydropower projects under 50MW in China is set at 10% (see Economic Evaluation Code for Small Hydropower Projects, 1995).

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

For the calculation of the financial indicators for the proposed hydropower project, we used the parameters listed in Table B.2. The data listed are all from the Preliminary Design Report (PDR), with the exception of an assumed CER market price of 8 EUR/tCO2e.

2 Conventional coal-fired power plants are consistent with regulations although the construction of small-scale power plants with a capacity under 135 MW has been prohibited, see General Office of the State Council (2002), *Notice of the General Office of the State Council concerning the Strict Prohibition of the Construction of Thermal Power Units with a Capacity of 135MW or Below*, Guo Ban Fa Ming Dian (2002) Document No.6.

Table B.2 Parameters used in the calculation of the IRR

Proposed Project	
Installed capacity	28MW
Static total investment	200,701,800 RMB
Annual power supply	138,740 MWh
Annual O & M Cost	5,360,000 RMB
Investment horizon	25 years[3]
Expected Power price	0.2 RMB/kWh
Expected CER price	8 EUR /tCO2e

Source: Preliminary Design Report (PDR)

The following table provides a breakdown of the total static investment costs.

Table B.3. The breakdown of the total static investment cost

Item	Unit (RMB Yuan)
Main construction cost	97,352,400
Electromechanical equipment	44,912,500
Metal structures	8,601,600
Temporary facilities	12,244,600
Flood prevention fee and Compensation	4,496,900
Basic preparation fee	9,557,200
Others	23,536,600
Total static investment	***200,701,800***

The investment analysis compares the internal rate of return (IRR) of the project with the benchmark defined in sub-step 2b. The main results of the investment analysis are presented in Table B.4, where the IRR for the proposed project has been calculated with and without CDM revenues.

Table B.4 Main results of the IRR calculations

Scenario	IRR
Project without revenues from the sale of CERs	8.27 %
Project with CER revenues (at 8 EUR / tCO2)	12.46 %

(For the IRRs under variations in critical assumptions, please see table B.5 below)

From the results in Table B.4 it is clear that the return on investment for the Gansu Zhouqu County Hujia'ai Hydropower Station Project without the revenues from the sales of CERs is considerably lower than the 10% benchmark that applies to hydropower stations of this scale. This demonstrates that the proposed project activity is not a commercially viable option to supply power. The detailed spreadsheet calculations are available to the validator.

<u>Sub-step 2d: Sensitivity analysis</u>

The 'Tool for the demonstration and assessment of additionality' requires that a sensitivity analysis is conducted to check whether the financial attractiveness remains unaltered for reasonable variations in the critical assumptions. For the IRR with CDM revenues, we have considered variations in the CER price. For the IRR without CDM revenues, the following parameters were used as critical assumptions:

- Total investment

[3] The investment horizon used in the calculation is identical to the investment horizon in the Preliminary Design Report.

- Power sales revenues [4]
- Annual operation and maintenance cost

In the sensitivity analysis, variations of ±10% have been considered in the critical assumptions. The results of the sensitivity analysis for the IRR without CDM revenues are shown in Table B.5.a., and the results of the analysis for the IRR with CDM revenues are shown in table B.5.b. Figure B.2 provides a graphic depiction of both.

Table B.5.a Sensitivity analysis; impact of variations in assumptions on the IRR without CDM revenues

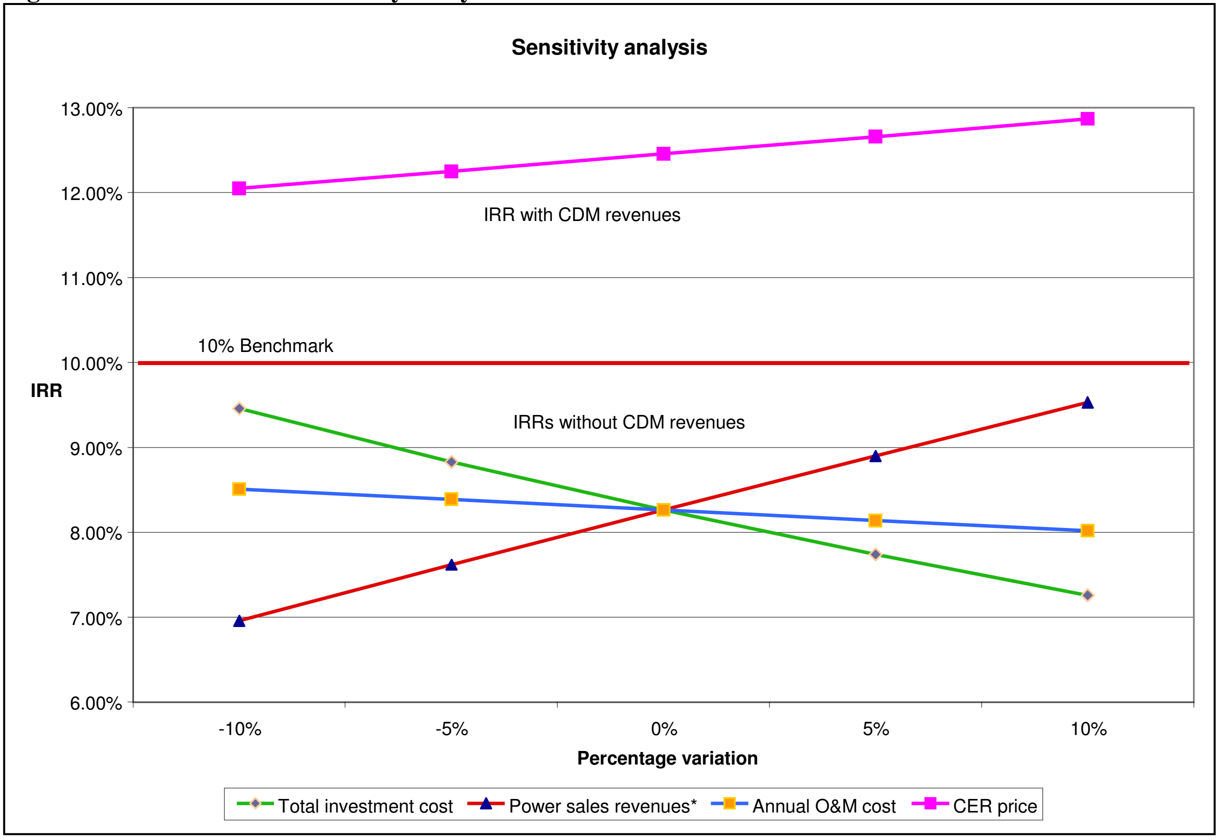
Percentage Variation / Critical assumption	-10%	-5%	0%	+5%	+10%
Total investment	9.46%	8.83%	8.27%	7.74%	7.26%
Power sales revenues	6.96%	7.62%	8.27%	8.90%	9.53%
Annual O&M Cost	8.51%	8.39%	8.27%	8.14%	8.02%

Table B.5.b Sensitivity analysis; impact of variations in the CER price on the IRR with CDM revenues

Percentage Variation / Critical assumption	-10%	-5%	0%	+5%	+10%
CER price	12.05%	12.25%	12.46%	12.66%	12.87%

4 The impact of a variation in power sale revenues is equivalent to a variation of either the grid price or the annual operation time and therefore only the product of these parameters (i.e. power sale revenues) has been included in the sensitivity analysis.

Figure B.2 Results of the sensitivity analysis



The sensitivity analysis of the Internal Rate of Return confirms that the proposed project after realistic modifications to the critical assumptions remains commercially non viable without CDM revenues. The Internal Rate of Return of the proposed project activity without CDM revenues remains below the 10% benchmark.

The conclusion may be clear that with reasonable modifications in the critical assumptions, the main results remain unaltered. The results of the sensitivity analysis therefore confirm that the project faces significant economic barriers without CDM revenues.

Step 3. Barrier analysis

The project does not face other barriers besides the low economic returns. Therefore step 3 of the additionality tool is skipped.

Step 4. Common practice analysis

<u>Sub-step 4a. Analyze other activities similar to the proposed project activity:</u>

The power sector in China has been through a number of reforms during the recent decennia.[5] In the seventies and eighties, the Chinese power sector was dominated by the government. Later reform has opened the market to independent power producers (IPPs). The main recent changes in the relevant regulations are:

<u>1998</u>

- In 1998, abolition of the Ministry of Electric Power, which had regulatory and operational responsibilities. The regulatory responsibilities were moved to the then SETC, while the State Power Corp took over the operational responsibilities.

<u>2002</u>

- The changes in the regulatory system introduced at the 16th Party Congress in November 2002 involved measures to improve the operation of the power market. It involved the creation of the SERC (State Electricity Regulatory Commission) to supervise and regulate market competition in the power market.
- Additionally, the SPC was broken into five power generation companies and 2 transmission firms

The most important and difficult part of the latest set of reforms was the impact on power tariffs provided to power suppliers. In the past, provincial governments used to guarantee tariffs that provided the investors with a sufficient return. The tariff to IPPs was much higher than tariffs for SPC-owned power plants. The main effect of the deregulation is to introduce a competitive market in which producers will bid against each other to provide power to the grid. For IPPs, this will mean a reduction in tariffs after the 2002 deregulation, while for SPC-owned plants, the tariffs will go up.

A consequence is that projects constructed before the 2002 deregulation face a market environment that is substantially different from the current market environment, and which, for independent power producers at least, is considerably less attractive.

On the basis of this analysis we consider that the pre-2003 investments took place in a markedly different investment environment and are therefore not implemented in “a comparable environment”.

The proposed project is 28MW. We have decided to analyze all projects in the wide range of 15 to 100MW, since projects outside this range experience either lower start-up costs and easier to satisfy financing needs or advantages of scale. Table B.6 lists all hydropower stations constructed or under construction in Gansu Province since 2000 with installed capacities in the range of 15 to 100 MW. The table shows that since 2000, fourteen projects started operations or are currently under construction.

[5] The following section on the reform of the Chinese power sector is based on Economist Intelligence Unit (2003), “China Hand”, page 37-40.

Table B.6 Similar hydropower stations constructed in Gansu Province since 2000

	Project name	Location	Operationalization date	Capacity (MW)	Remark
1	Liancheng Hydropower station	Yongdeng County of Gansu Province	Under construction	15	Developed under CDM
2	Lianghekou Hydropower station	Zhouqu county of Gansu Province	Under construction	15	Developed under CDM
3	Shimenping Hydropower station	Zhouqu county of Gansu Province	Under construction	15	Developed under CDM
4	Qingshui Hydropower station	Min County of Gansu Province	Under construction	21.5	Developed under CDM
5	Xiaoshuichi hydropower station	Yongdeng County of Gansu Province	March 2005	22.5	Developed under CDM
6	Gucheng Hydropower station	Min County of Gansu Province	June 2004	25.5	Started construction under different market regime
7	Duo'er Hydropower station	Diebu county of Gansu Province	Under construction	30	Developed under CDM
8	Bazang hydropower station	Zhouqu County of Gansu Province	Under construction	51	Developed under CDM
9	Dala river hydropower station	Zhouqu County of Gansu Province	Under construction	52.5	Developed under CDM
10	Haidianxia hydropower station	Weiyuan County of Gansu Province	Under construction	52.5	Developed under CDM
11	Longshou Hydropower station	Ganzhou District of Gansu Province	June 2002	59	Developed under Japanese development assistance
12	Hanpingzui Hydropower station	Wen County of Gansu Province	September 2005	72	Developed under Japanese development assistance
13	Jiulongxia hydropower station	Diebu county of Gansu Province	Under construction	81	Developed under CDM
14	Xiaogushan Hydropower station	Sunan county of Gansu Province	May 2005	100	Developed under CDM

Source: *"Overview of hydropower station project construction in Gansu", Planning Department of Gansu Power Company, June 2005.*

<u>Sub-step 4b. Discuss any similar options that are occurring:</u>

Of the 14 hydropower stations listed in table B6, 11 are applying for CDM status or have been developed under CDM to overcome barriers they are facing. The remaining three projects have benefited or are benefiting from certain advantages not available to the proposed project.

The Hanpingzui hydropower station project is one of the projects that received Japanese Development Assistance. To help finance its total investment of around 499 million RMB, the project received a 4.638 billion JPY loan with an annual interest rate of 0.75% and a favorable repayment period of 40 years from the Japan Bank for International Cooperation. Therefore, the project benefits from low financing costs. The same argument applies to the Longshou Hydropower station, which also benefited from Japanese Development Assistance.

According to the tool for the demonstration and assessment of additionally, projects are considered "similar" in case they "take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc". The Gucheng hydropower station started construction relatively early in December 2001, before the "change in environment" as discussed above and can therefore be excluded as a similar project.

It is clear from the investment analysis that the proposed project, like all other similar projects benefiting from or applying for CDM support, does not benefit from the same economic advantages as the Gucheng, Hanpingzui, or Longshou projects. Therefore, the project is additional.

Impact of CDM registration

Registration of the project as a CDM project would result in additional revenues for the project, significantly improving the economic attractiveness of the project. This is the most important contribution of CDM to the project realization, removing the crucial barrier towards its realization. The income through CDM will raise the IRR for the project from 8.01% to 11.47%, which is above the 10% benchmark.

-Start of the project activity:

The proposed project activity started preliminary construction activities in July 2004. As this date is before the signing of the main equipment purchase agreement (i.e. August 2005) and other relevant contracts, this can be considered as the formal starting date of the proposed project activity in accordance with the Glossary of CDM Terms and subsequent guidance provided by the EB in its meeting report of EB41, paragraph 67.

-Early CDM consideration:

As explained above, the formal start of the project activity was in July 2004. At this time, the main shareholder of the project entity, Diebu Niaojiaga Hydropower Development Co., Ltd., was very knowledgeable about the possibilities offered by CDM. It had started preparations of the development under CDM of another hydropower station (the Gansu Diebu Niaojiaga 12.9 MW Hydropower Station Project) as early as 2002. This is evidenced by the fact that this project was considered for the development as a small-scale CDM project activity in the Asian Development Bank (ADB) Technical Assistance (TA) project TA3840 which was carried out from 15 August 2002 to early 2004. Part of this TA project involved the preparation of a Project Design Document as early as 2003. The shareholder considered the potential of the CDM revenues when they decided to invest in the proposed project activity. The other shareholder, Gansu Hongwei Hydropower Investment Co., Ltd. made preparations for the project to be developed under CDM as early as December 2003 by contacting the Provincial Science and Technology Bureau. An overview of key events up until the start of the project activity is given in table B.7.a.

Table B.7.a: Overview of key events until the start of the project activity

Date	Key Event
August 2002	Diebu Niaojiaga Hydropower Development Co., Ltd. (the main shareholder of the project entity.) participated in a "CDM Development Opportunities in the Chinese Energy Market" workshop, where EB member Mr. Lu Xuedu provided the opening speech. One of their projects (i.e. the "Gansu Diebu Niaojiaga 12.9 MW Hydropower Station Project) was studied as an example in Gansu province.
August 2002 - Early 2004	The Gansu Diebu Niaojiaga 12.9 MW Hydropower Station Project was considered as a CDM project by the ADB sponsored TA project TA3840 and

	a draft PDD was prepared for this project.
December 29th, 2003	Major shareholder of proposed project activity submitted an application report to the Gansu Science & Technology Bureau for the Hujiaai Project to be considered for CDM.
June 18th, 2004	Diebu Niaojiaga Hydropower Development Co., Ltd. signed CDM development contract with CDM advisers for the Niaojiaga hydropower station project
July 2nd, 2004	Establishment of the project entity: "Gansu Ansheng Hydropower Technology Development Co., Ltd."
July 2004	Start of construction of water diversion system

-Continued CDM consideration:

Ever since the start of the proposed project activity, the project entity has been taking real and concrete steps toward CDM registration, parallel to the project development. For example, the project activity applied for CDM services, signed a CDM contract with CDM consultants, a public bidding for CER buyers to purchase the CERs was organised, and a publicly announced stakeholder consultation meeting took place. An overview of key events after the start of the project activity is given in table B.7.b.

Table B.7.b: Overview of key events after the start of the project activity

Date	Key Event
13 October 2004	Gansu Ansheng Hydropower Development Co., Ltd formally decided on a loan and CDM application
28 October 2004	Gansu Ansheng Hydropower Development Co., Ltd applied for CDM development services from a local CDM consultant (i.e. Gansu Science & Technology Bureau).
May 2005	CDM consultants sent a draft agreement on CDM development to the PO
August 2005	Signing of equipment purchase contract
September 2004	Start of construction of dam site
September 2005	Start of construction of power house
November 2005	Formal CDM development contract signed
April 2006	Supplementary CDM development contract signed
June 2006	Completion construction dam site
September 2006	CDM stakeholder consultation organized after public notices were published in the local newspaper and websites
September 2006	Completion construction of water diversion system
November 2006	Public bidding for the purchase of CERs from the project activity started
May 2007	Memorandum of Understanding signed with the buyer
June 2007	Completion of construction of power house
July 2007	PDD uploaded for GSP and on-site validation took place
September 2007	Application for host country approval (LOA) from China DNA
21st of September 2007	First turbine operational
November 2007	Formal ERPA Signed
December 2007	Obtained China LOA
24th of January 2008	Second turbine operational
June 2008	Obtained final validation report from DOE

The above table B.7.a clearly demonstrate that the Project Entity was aware about the potential for CDM before the start of the CDM activity, and that it played a crucial role in overcoming the barriers towards the implementation of the proposed project activity. Additionally, table B.7.b clearly shows that parallel to the project development concrete and real steps were taken to secure registration as a CDM project activity.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

In accordance with the ACM0002 methodology, the baseline emission factor is calculated as a combined margin: a weighted average of the operating margin emission factor and the build margin emission factor. The latter is in this particular case calculated *ex ante* on the basis the latest additions to the grid.

This PDD refers to the Operating Margin (OM) Emission Factor and the Build Margin (BM) Emission Factor published by the Chinese DNA on 09 August 2007. We will refer to these emission factors as the 'published emission factors'.

For more information on the published OM and BM emission factors, please refer to:

http://cdm.ccchina.gov.cn:80/english/NewsInfo.asp?NewsId=1891

We calculate the OM and BM Emission Factors on the basis of the published emission factors but deviate at some points by using the original data sources. Our calculation results in the same combined margin emission factor as can be calculated based on the published OM (1.1257) and BM (0.5739).

The description below focuses on the key elements in the calculation of the published emission factors and the subsequent calculation of emission reductions. The full process of the calculation of the emission factors and all underlying data are presented in English in Annex 3 to this PDD.

Selection of values for net calorific values, CO_2 emission factors and oxidation rates of various fuels.

As mentioned above, the Chinese DNA has entrusted key experts with the calculation of the grid emission factors. In these calculations choices have been made for the values of net calorific values, CO2 emission factors, and oxidation rates. In the calculation files of the published emission factors, the net calorific values are based on the China Energy Statistical Yearbook, and the oxidation rates and the CO2 emission factors are based on IPCC 2006 default values. The following table summarizes the values used. Note that the table lists the carbon emission factor of the fuels, the CO2 emission factor has been obtained by multiplying with 44/12. Rounded figures have been reported but exact figures have been used in the calculations in this PDD.

Table B.6. Default values used for net calorific values, oxidation factors, and CO_2 emission factors of fuels

Fuel	Unit	NCV	Oxidation factor	Carbon emission factor	CO2 emission factor
		(TJ/unit)	(Fraction)	(TC/TJ)	(TCO_2e/TJ)
Raw coal	10^4 Tons	209.08	1	25.8	94.6
Clean coal	10^4 Tons	263.44	1	25.8	94.6
Other washed coal	10^4 Tons	83.63	1	25.8	94.6
Coke	10^4 Tons	284.35	1	29.2	107.1
Coke oven gas	10^8 m^3	1672.60	1	12.1	44.4
Other gas	10^8 m^3	522.70	1	12.1	44.4
Crude oil	10^4 Tons	418.16	1	20.0	73.3
Gasoline	10^4 Tons	430.7	1	18.9	69.3
Diesel	10^4 Tons	426.52	1	20.2	74.1
Fuel oil	10^4 Tons	418.16	1	21.1	77.4
LPG	10^4 Tons	501.79	1	17.2	63.1
Refinery gas	10^4 Tons	460.55	1	15.7	57.6
Natural gas	10^8 m^3	3893.1	1	15.3	56.1
Other petroleum products	10^4 Tons	383.69	1	20.0	73.3
Other coking products	10^4 Tons	284.35	1	25.8	94.6
Other E (standard coal)	10^4 Tce	292.70	1	0.0	0.0

Data source: All data are from the files mentioned above, and have been crosschecked against the original sources cited, as follows:

- Net calorific values: China Energy Statistical Yearbook, 2004 p. 302;
- Oxidation factors: IPCC default values; see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 (energy).
- Carbon emission factors: IPCC default values; see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 (energy).
- CO_2 emission factors: calculated from carbon emission factors

Description of the calculation process

The key methodological steps are:

1. Calculation of the Operating Margin (OM) Emission Factor
2. Calculation of the Build Margin (BM) Emission Factor
3. Calculation of the Baseline Emission Factor
4. Calculation of the Baseline emissions
5. Calculation of Emission Reduction

The methodology is applied to the North West China Power grid which is defined as including the grids of Gansu, Ningxia, Shaanxi, Qinghai and Xinjiang, as is further elaborated in Section B.3. Section B.3 also describes how the project boundary is decided.

Step 1. Calculation of the Operating Margin Emission Factor

The ACM0002 methodology offers several options for the calculation of the OM emission factor. Of these, the methodologically preferred one, dispatch analysis, cannot be used, because dispatch data, let alone detailed dispatch data, are not available to the public or to the project participants. For the same reason, the simple adjusted OM methodology cannot be used. The average OM cannot be used, because low cost/must run resources (hydropower and windpower) constitute less than 50% of total grid generation (see Table B.7). Therefore, the calculation method of simple OM is suitable for this project activity.

Table B.7 Installed capacity and electricity generation of the North West China Grid, 2001-2005

Year	Installed capacity (MW)					Electricity generation (GWh)				
	Thermal	Hydro	Others	Total	% Low cost/must run	Thermal	Hydro	Others	Total	% Low cost/must run
2001	16794.9	8872.4	na	25746.2	34.46	81148	27447	Na	108595	25.27
2002	17756.9	9199.9	105.1	27061.9	34.84	93428	27427	198	121053	22.82
2003	20492.7	9382	122.9	29997.6	31.69	113093	25899	242	139234	18.77
2004	22247.5	10835.2	276	33358.7	33.31	131939	34813	705	167457	21.21
2005	23514.5	11721.9	372.7	35609.1	33.96	128681	42777	944	172402	25.36

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

Accordingly, the OM emission factor is calculated as the generation-weighted average emissions per unit of electricity (measured in tCO_2/MWh) of all generating sources serving the system, excluding the low-operating cost and must run power plants.

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

With:

- $F_{i,j,y}$ the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in year(s) *y*. *j* refers to the power sources delivering electricity to the grid, not including low operating costs and must-run power plants, and including imports to the grid.
- $COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel i (tCO_2 / mass or volume unit of the fuel), taking into account the carbon content of fuels used by relevant power sources *j* and the percentage oxidation of the fuel in year(s) *y*;
- $GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source *j*.

The CO2 emission coefficient is equal to the net calorific value of fuel i, multiplied by the oxidation factor of the fuel and the CO2 emission factor per unit of energy of the fuel i.

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

With:

- NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel *i*,
- $OXID_i$ is the oxidation factor of the fuel,
- $EFC_{O2,i}$ is the CO_2 emission factor per unit of energy of the fuel *i*.

Data vintage selection

In accordance with the ACM0002 methodology and the choice for an ex ante calculation of the OM Emission Factor, the formula (B.1) is applied to the three latest years for which data are available, and a full-generation weighted average value is taken for the OM Emission Factor.

Choice of aggregated data sources

The published OM emission factor calculates the emission factor directly from published aggregated data on fuel consumption, net calorific values, and power supply to the grid and IPCC default values for the CO_2 emission factor and the oxidation rate. According to the ACM0002 methodology, the selection of aggregated data for the calculation of the emission factors should be used, but the disaggregated data needed for all three more preferred methodological choices is not publicly available in China.

Calculation of the OM emission factor as a three-year full generation weighted average

On the basis of these data, the Operating Margin emission factors for 2003, 2004 and 2005 are calculated. The three-year average is calculated as a full-generation-weighted average of the emission factors. For details we refer to the publications cited above and the detailed explanations and demonstration of the calculation of the OM emission factor provided in Annex 3. We calculate the Operation Margin Emission Factor as 1.12559 tCO_2e/MWh.[6]

The calculation of the OM emission factor is done once (*ex ante*) and will *not* be updated during the first crediting period. This has the added advantage of simplifying monitoring and verification of emission reductions.

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

The Build Margin Emission Factor is, according to ACM0002, calculated as the generation weighted average emission factor (measured in tCO_2/MWh) of a sample of *m* power plants:

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

$F_{i,m,y}$, $COEF_{i,m}$ *and* $GEN_{m,y}$ in the formula above are analogous to those in equation 1, except for the fact that the index *m* is over specific power plants rather than types of power plants, and that low cost/must run sources are not excluded. The sample, according to the methodology, should be over the latest 5 power plants added to the grid, or over the last added power plants accounting for at least 20% of power generation, whatever is the greater.

A direct application of this approach is difficult in China. The Executive Board (EB) has provided guidance on this matter with respect to the application of the AMS-1.D and AM0005 methodologies for projects in China on 7 October 2005 in response to a request for clarification by DNV on this matter. The EB accepted the use of capacity additions to identify the share of thermal power plants in additions to the grid instead of using power generation. The relevance of this EB guidance extends to the ACM0002 methodology as 1) the AM0005 methodology has been discontinued and the ACM0002 methodology incorporates in terms of scope projects that would have been eligible to use AM0005, 2) the ACM0002 methodology is based, among others, on NM0023, which was the basis for AM0005, and thus ACM0002 among its possible calculation methods incorporates the AM0005 methodology,

[6] The published Operating Margin Emission Factor is 1.1257 tCO_2e/MWh.

and 3) the AMS-1.D methodology refers to the ACM0002 methodology for the baseline emission factor calculation method.

The calculation of the published BM Emission Factor is based on this approach and is described below:

First we calculate the newly–added installed capacity and the share of each power generation technology in the total capacity. Second, we calculate the weights of each power generation technology in the newly-added installed capacity.[7] Third, emission factors for each fuel group are calculated on the basis of an advanced efficiency level for each power generation technology, IPCC default oxidation factors and a weighted average carbon emission factor on the basis of IPCC default carbon emission factors of individual fuels.

Since the exact data are aggregated, the calculation will apply the following method: We calculate the share of the CO_2 emissions of solid fuel, liquid fuel and gas fuel in total emissions respectively by using the latest energy balance data available; the calculated shares are the weights.

Using the emission factor for advanced efficient technology we calculate the emission factor for thermal power; the BM emission factor of the power grid will be calculated by multiplying the emission factor of the thermal power with the share of the thermal power in the most recently added 20% of total installed capacity.

Detailed steps and formulas are as below:

First, we calculate the share of CO_2 emissions of the solid, liquid and gaseous fuels in total emissions respectively.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \tag{B.4}$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \tag{B.5}$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \tag{B.6}$$

with:

- $F_{i,j,y}$ the amount of the fuel i consumed in y year of j province (measured in tce;

7 Newly added capacity is determined as follows. First, the latest year (2005) for which data on total installed capacity are available is identified. Then, the last year is identified in which the total installed capacity was below 80% of the total installed capacity in 2005. This defines “newly added capacity”. Note that this approach does not follow the EB decision in response to the DNV request as mentioned in the main text to the letter, but the approach taken is the one that has been followed in numerous PDDs since the EB decision.

- $COEF_{i,j,y}$ the emission factor of fuel i (measured in tCO2/tce) while taking into account the carbon content and oxidation rate of the fuel *i* consumed in year *y*;
- *COAL,OIL* and *GAS* subscripts standing for the solid fuel, liquid fuel and gas fuel

Second, we calculate the emission factor of the thermal power

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad \text{(B.7)}$$

While $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ represent the emission factors of advanced coal-fired , oil-fired and gas-fired power generation technology, see detailed parameter and calculation in Annex 3.

Third, we calculate BM of the power grid

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad \text{(B.8)}$$

While CAP_{Total} represents the total newly-added capacity and $CAP_{Thermal}$ represents newly-added thermal power capacity.

The λs are calculated on the basis of the weight of CO2 emissions of each type of fuel in the total CO2 emissions from thermal power. Subsequent calculation of the Build Margin emission factor yields a baseline emission factor of 0.57399 tCO_2e/MWh.[8]

For details we refer to Annex 3.

The calculation of the BM emission factor is done once (*ex ante*) and will *not* be updated during the first crediting period. This has the advantage of simplifying monitoring and verification of emission reductions.

<u>Step 3. Calculation of the Baseline Emission Factor </u>(EF_y)

The Baseline Emission Factor is calculated as a Combined Margin, using a weighted average of the Operating Margin and Build Margin.

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \quad \text{(B.9)}$$

The latest version of ACM0002 (version 6) provides the following default weights: Operating Margin, $w_{OM} = 0.5$; Build Margin, $w_{BM} = 0.5$

Applying the default weights and the calculated emission factors, we calculate a Baseline Emission Factor of **0.8498** tCO_2e/ MWh.[9]

8 The published Build Margin Emission Factor is 0.5739 tCO2/MWh

9 Applying the published OM and BM results, we calculate an identical baseline emission factor after rounding.

Step 4. Calculation of Baseline Emissions

Baseline Emissions are calculated by multiplying the Baseline Emission factor by annual power generation.

$$BE_y = (EG_y - EG_{baseline}) \cdot EF_y \quad \text{(B.10)}$$

With:

- BE_y the baseline emissions in year *y*, EG_y the electricity supplied by the project activity to the grid,
- $EG_{baseline}$, the baseline electricity supplied to the grid in the case of modified or retrofit facilities and
- EF_y the emission factor in year *y*, calculated according to formulas (B.1)-(B.5). As the project involves the construction of a new hydropower station, $EG_{baseline}$ is zero and formula B.10 can be simplified as:

$$BE_y = EG_y \cdot EF_y \quad \text{(B.11)}$$

The estimated baseline emissions (see Section A.4.4) are based on expected power generation and an *ex ante* calculation of the emission factor, and will hence be revised during the implementation of the project activity on the basis of actual power supply to the grid. The baseline emission factor, however, is left unchanged during the first crediting period.

Step 5. Calculation of emission reductions

Emission reductions are calculated according to the following formula:

$$ER_y = BE_y - PE_y - L_y \quad \text{(B.12)}$$

With:

- ER_y, emission reductions in year y,
- BE_y, baseline emissions in year *y*,
- PE_y, project emissions in year *y*,
- L_y, leakage in year *y*

The project does not involve project emissions or leakage as further explained in section B.6.3, and therefore project emissions are equal to baseline emissions. Using the results of the preceding sections, we can calculate the emission reductions using formula B.13

$$ER_y = EG_y \cdot 0.8498 \quad \text{(B.13)}$$

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

Data / Parameter:	**Power generation by source**
Data unit:	GWh (per annum)

Description:	Provincial level power generation data by source
Source of data used:	China Electric Power Yearbook (Editions 2004, 2005 and 2006)
Value applied:	For detailed values: see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are the best data available, and have been published by the Chinese authorities.
Any comment:	

Data / Parameter:	**Internal power consumption of power plants**
Data unit:	Percentage
Description:	Internal consumption of power by source
Source of data used:	See the downloadable files mentioned above for the full data set. Original data are from China Electric Power Yearbook (Editions 2004, 2005 and 2006)
Value applied:	For detailed values, see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are the best and most recent data available, and use the same data publication as the calculation of the emission factors published by the Chinese authorities.
Any comment:	

Data / Parameter:	**Amount of each fossil fuel consumed by each power source**
Data unit:	10^4 tons, 10^8 m^3, 10^4 tce, depending on the specific fuel. We refer to Annex for details.
Description:	Physical amount of fuel input, for 17 different fuels
Source of data used:	China Energy Statistical Yearbook 2006, 2005 and 2004 Editions
Value applied:	For detailed values, see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are the best data available, and have been published by the Chinese authorities.
Any comment:	

Data / Parameter:	**Efficiency of advanced thermal power plant additions**
Data unit:	%
Description:	
Source of data used:	See the downloadable files mentioned above for the full data set. Data are based on the best technologies available in China.
Value applied:	Coal: 35.82%; Oil: 47.67%; Gas: 47.67%
Justification of the choice of data or	These data are the best data available, and have been published by the Chinese authorities.

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

Data / Parameter:	**Capacity by power generation source**
Data unit:	MW
Description:	For the different power generation sources, installed capacity in 2003, 2004 and 2005 in the North West China Grid. Calculated by summing provincial data.
Source of data used:	China Electric Power Yearbook (Editions 2004, 2005 and 2006)
Value applied:	For detailed values, see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are the best data available, and have been published by the Chinese authorities.
Any comment:	

Data / Parameter:	**Oxidation Factor**
Data unit:	Percentage
Description:	Oxidation factors for 17 different fuels
Source of data used:	Data used are IPCC default values. See 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied:	For detailed values see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	These are the most recent data.
Any comment:	

Data / Parameter:	**Fuel Emission Coefficients**
Data unit:	Tons C/TJ
Description:	Carbon emission factors for 17 different fuels
Source of data used:	Data used are IPCC default values. See 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Value applied:	For detailed values see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	These are the most recent data.
Any comment:	

Data / Parameter:	Electricity imports from connected grids
Data unit:	MWh (per annum)
Description:	Electricity imports of power from other grids
Source of data used:	Original data are from China Electric Power Yearbook (Editions 2004, 2005 and 2006)
Value applied:	For detailed values: see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are the best data available, and have been published by the Chinese authorities.
Any comment:	The North West China Grid does not import electricity; imports are zero

Data / Parameter:	Net Calorific Value
Data unit:	TJ/10^4 tons; TJ/10^4 tce; TJ/$10^8 m^3$
Description:	Net calorific values of 17 different fuels in TJ per unit.
Source of data used:	See the downloadable files mentioned above for the full data set. Original data are from China Energy Statistical Yearbook, (2004) p. 302.
Value applied:	For detailed values: see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are the best data available, and have been published by the Chinese authorities.
Any comment:	

Data / Parameter:	Surface area reservoir
Data unit:	m^2
Description:	Surface area at full reservoir level
Source of data used:	Gansu Province Water Conservancy and Hydropower Survey Design Institute
Value applied:	238,400 m^2
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is the best data available
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

The annual net power supply to the North West China Grid is estimated to be 138,740 MWh.

Application of the formulae presented in Section B to the baseline data presented in Section B.6.1 yields the following results:
EFOM = 1.1257 t CO2/MWh
EFBM = 0.5739 t CO2/MWh
EFy = 0.5*1.1257 + 0.5*0.5739 = 0.8498 tCO2/MWh

The annual baseline emissions BE_y are thus calculated to be 117,901 tCO2. We obtain the values for the baseline emissions during the first crediting period provided in Table B.10:

Table B.10 The estimation of the baseline emissions in crediting period

Year	**Year**	**Annual net power supply to the grid (EGy) (MWh)**	**Baseline emission factor (tCO_2/MWh)**	**Baseline emissions (tCO_2e)**
1	01/09/2008 - 31/08/2009	138,740	0.8498	117,901
2	01/09/2009 - 31/08/2010	138,740	0.8498	117,901
3	01/09/2010 - 31/08/2011	138,740	0.8498	117,901
4	01/09/2011 - 31/08/2012	138,740	0.8498	117,901
5	01/09/2012 - 31/08/2013	138,740	0.8498	117,901
6	01/09/2013 - 31/08/2014	138,740	0.8498	117,901
7	01/09/2014 - 31/08/2015	138,740	0.8498	117,901
	Total			**825,307**
	Average			117,901

In a given year, the emission reductions realized by the project activity (ER_y) is equal to baseline GHG emissions (BE_y) minus project direct emissions and leakages during the same year:

$$ER_y = BE_y - PE_y - L_y$$

Leakage:

The project activity involves the construction of a new hydropower station with a power density greater than 10 W/m2 and therefore emissions from the reservoir do not have to be taken into account. The project will install an on-site diesel generator with a capacity of at most 100 kW which will be maintained for emergency purposes in case all power lines to the grid are cut off. Government regulations require that the diesel generator is started up before every flood season.[10] The emissions of the diesel generator are significantly less than 1% of total emission reductions and are considered negligible.[11] In case of emergencies the project will not claim emission reductions and the use of the

[10] The *Hydropower Operation Safety Management Regulations (SERC document No.3),* issued by the State Electricity Regulatory Commission of the People's Republic of China states that "The back-up power sources should be re-commissioned before each flood season annually”. The regulation does not provide a guideline on the duration that the diesel generator should run each year, but the project entity has decided to operate the generator for four hours annually.

[11] Emissions by the diesel generator associated with the start-up for annual re-commissioning and maintenance requirements can be calculated as follows: The diesel generator will have a capacity of at most 120 kW. As the generator will be operating at max for 4 hours annually, the expected annual power generation can be calculated to be 480 kWh. For the emission factor of the diesel generator we refer to the AMS.ID (version 10) methodology which provides emission factors for diesel generator systems. We apply the highest value listed in the methodology which is 2.4 kgCO2e/kWh (generators below 15 kW), which is conservative considering the size of the generator used on-site. We estimate the annual emissions by the diesel generator

generator will be monitored. We conclude that the project does not involve leakage due to the presence of the emergency diesel generator.

In accordance with the ACM0002 methodology, leakage and project emissions are equal to zero, and hence, the emission reductions due to the project are equal to the baseline emissions. The emission reductions will be calculated *ex post* on the basis of actual power supply to the grid, using the baseline emission factor presented above in Section B.6.1.

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

Table B.11 ***Ex ante*** **estimate of emission reductions due to the project**

Year	Project Emissions (tCO2)	Baseline emissions (tCO2)	Leakage (tCO2)	Emission Reductions (tCO2)
Year 1: 01/06/2008 - 31/05/2009	0	117,901	0	117,901
Year 2: 01/06/2009 - 31/05/2010	0	117,901	0	117,901
Year 3: 01/06/2010 - 31/05/2011	0	117,901	0	117,901
Year 4: 01/06/2011 - 31/05/2012	0	117,901	0	117,901
Year 5: 01/06/2012 - 31/05/2013	0	117,901	0	117,901
Year 6: 01/06/2013 - 31/05/2014	0	117,901	0	117,901
Year 7: 01/06/2014 - 31/05/2015	0	117,901	0	117,901
Subtotal	**0**	**825,307**	**0**	**825,307**
Average	0	117,901	0	117,901

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**1. EG_y**
Data unit:	MWh
Description:	Electricity supplied to the grid by the project (net)
Source of data to be used:	Directly measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	138,740 MWh
Description of measurement methods and procedures to be applied:	The net supply of power to the grid by the proposed project is measured through national standard electricity metering instruments and calculated based on gross electricity supplied to the grid and electricity received from the grid through the back-up power line(s). For more details we refer to Section B.7.2. Metering instruments M2 and M3 will be recorded monthly and metering instrument M1 will measured hourly and recorded monthly. The metering instruments will be calibrated periodically in accordance with local law, i.e.*"Technical administrative code of electric energy metering (DL/T448－2000)"*.
QA/QC procedures to	These data will be directly used for calculation of emission reductions. The

as 1.15 tCO2e, which would reduce annual emission reductions with less than 0.0001% and can therefore be considered negligible.

be applied:	records of the grid company (evidenced by sales records) will be cross-checked by readings recorded by the project entity
Any comment:	See also Section B.7.2 for more details

Data / Parameter:	**8. surface area reservoir**
Data unit:	m^2
Description:	Surface area at full reservoir level
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	238,400 m^2
Description of measurement methods and procedures to be applied:	The surface area will be calculated using the design schematics and area maps. Photographs of the reservoir at several key locations will be taken when the project becomes operational to check whether the actual reservoir does not deviate substantially for the design.
QA/QC procedures to be applied:	The power density of the project is well above 10 W/m^2 and therefore substantial deviations from the calculated design surface area will not affect the calculation of emission reductions by the project. Therefore no further QA/QC procedures will be applied.
Any comment:	

Data / Parameter:	Operational hours of emergency back-up diesel generator
Data unit:	Hours / year
Description:	Annual hours that the emergency back-up diesel generator is running either for the purpose of commissioning/maintenance or actual emergencies
Source of data to be used:	Estimated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	4 hour / year. The Hydropower Operation Safety Management Regulations (SERC document No.3), issued by the State Electricity Regulatory Commission of the People's Republic of China states that "The back-up power sources should be re-commissioned before each flood season annually". The regulation does not provide a guideline on the duration that the diesel generator should run each year. The project entity has decided to operate the generator for four hours annually.
Description of measurement methods and procedures to be applied:	The project entity will record the operational hours in the daily operation logs.
QA/QC procedures to be applied:	The expected annual emissions associated with the operation of the emergency back-up diesel generator amount to about 0.0001% of total emission reductions and are therefore considered negligible. In case of actual emergencies the project entity will not claim emission reductions (see section B.7.2). Further QA/QC procedures are therefore not considered necessary.
Any comment:	

B.7.2 Description of the monitoring plan:

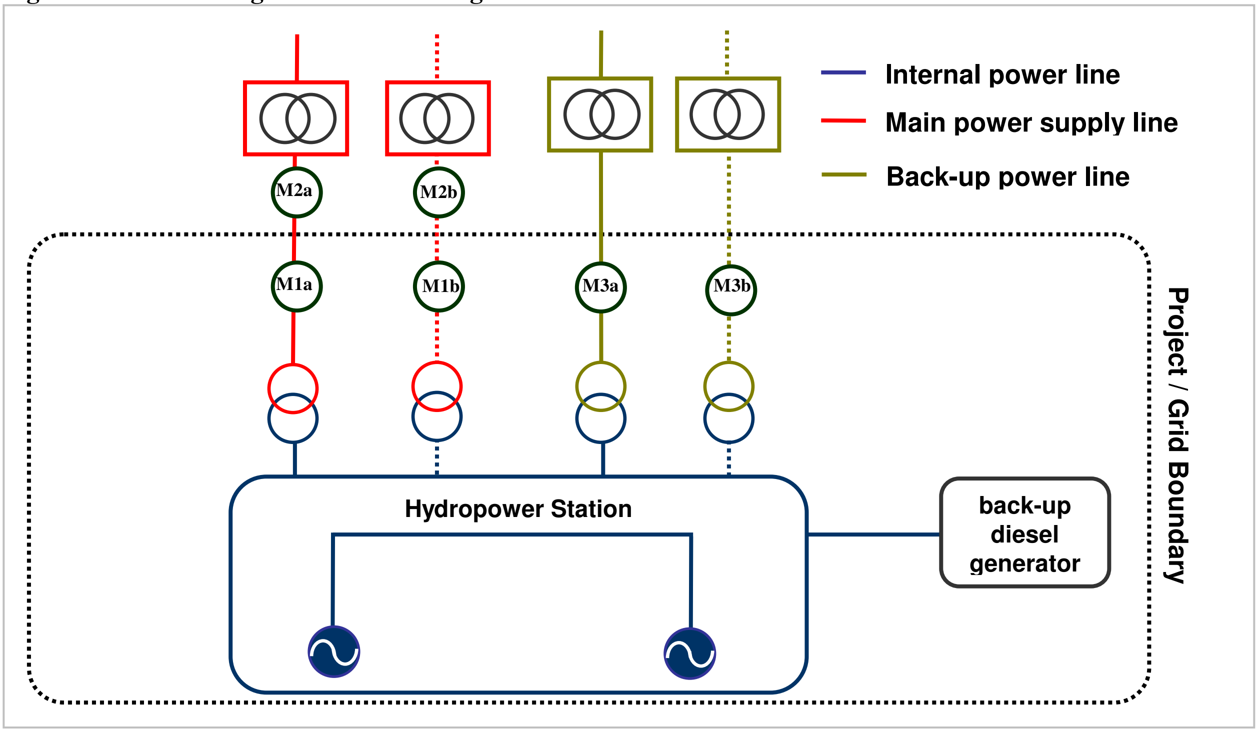
This monitoring plan outlines the principles which shall be followed in the monitoring of the parameters listed in section B.7.1. A monitoring manual with detailed procedures will be prepared on the basis of the principles outlined below. The monitoring manual may be updated to reflect the actual implementation of the project will not deviate from the monitoring plan as presented in this section.

Monitoring of net electricity supplied by the project to the grid

The proposed project activity is connected to the Gansu Provincial Power Grid through one or more on-site transformer stations. The project is connected to the Gansu Provincial Power Grid by a 110 kV line to the Zhouqu 110kV switching station and might in the future also connect to the grid through an additional optional main power lines. The project will furthermore be connected to at least one back-up power line to provide emergency power in case the project is not operational and might in the future connect to an additional optional power line. An indicative grid connection diagram is provided in figure B.3. Please note that the dotted lines are optional. In case these optional power lines will be constructed all monitoring principles, frequency, calibration and other requirements will be identical to the existing power lines.

The grid connection diagram indicates the principles for positioning of metering instruments that will be used in the monitoring of emission reductions. A separate monitoring manual is prepared with detailed procedures and a detailed grid connection diagram which is updated on the basis of the actual implementation of the project's grid connection and which will serve as the basis for periodic verification. The project entity will ensure that the actual implementation of grid connection will not deviate from the procedures outlined in this section.

Figure B.3 Indicative grid connection diagram



The project entity will meter electric power according to the following principles:

- <u>**Power supplied to the grid through main power lines:**</u>
  As indicated in Figure B.3 the project is connected by one or multiple main power supply lines (indicated in red) which will deliver power generated by the project to the grid. Net power supplied to the grid is metered as below:
    - <u>Project entity:</u> The power supplied to the grid is metered by the project entity at a point after power has been transformed to high voltage. Therefore, no further transformer losses will occur before the project is connected to the grid. The power supply of the project to the grid will be metered with standard electricity meters in accordance with national regulations. The metering instruments should record the net supply as the main power supply lines can transfer power in both directions. The metering instruments may record either a net figure of power delivered to the grid or two readings, i.e. power delivered to the grid and power received from the grid.
    - <u>Grid company:</u>
      The grid company will meter the power supply also at the high voltage side of the on-site transformer station with its own metering equipment. The regulations of the grid company require periodic calibrations of both metering instruments.
    - <u>Calibration:</u>
      Calibrations are carried out by the grid company or by a certified company appointed by the grid company. If there are any substantial discrepancies between the readings of the metering instruments throughout the year, both instruments will be recalibrated.

- **<u>Power received through back-up power lines:</u>**
  As indicated in Figure B.3 the project is connected by one or multiple back-up emergency power lines (indicated in brown) which will deliver power from the grid to the project in case of emergencies or when the turbines of the proposed project activity are not in operation. Net power received from the grid is metered as below:
  - Project entity:
    The power supplied to the project through the back-up emergency power lines will be metered by the project entity with standard electricity meters in accordance with national regulations.
  - Grid company:
    The grid company will read the same meters as the project entity and provide billing invoices to the project entity for electricity delivered to the project.
  - Calibration:
    Calibrations are carried out by the grid company or by a certified company appointed by the grid company.
- **<u>Power supplied by back-up emergency diesel generator:</u>**
  In addition to the monitoring of net power supply the project entity will also monitor the use of an emergency back-up diesel back-up by logging its operational hours in daily logs. It is expected that the generator will be started-up for no more than four hours every year for maintenance purposes and reliability checks in accordance with government regulations. The emissions associated with the diesel generator are calculated as 0.001% of total emission reductions and are therefore considered negligible.

The project entity will collect the sales receipts for power supplied to the grid and billing receipts for power received from the grid as evidence. The net supply (i.e. gross supply minus supply by the grid to the project) will be used in the calculations. In case of discrepancies between readings of the grid company and the project entity, the readings of the grid company will prevail. All records of power delivered to the grid, sales receipts and the results of calibration will be collated in a central place by the project entity.

An overview of detailed information on minimum accuracy requirements of the metering instruments, measuring intervals, recording form, calibration and available documentation is provided in Table B.12.

Determination of net power supply:

Net electricity supplied to the grid by the project (EG_y in section B.7.1.) is calculated on a monthly basis as:

$$EG_y = ES_y - ED_y$$

With:

- ES_y, electricity supplied by the project through the main power line(s) (in MWh) metered by the grid company (evidenced by monthly sales receipts) and cross-checked against the readings of metering instruments of the project entity.
- ED_y, electricity delivered to the project through back-up power line(s) metered by the grid company (evidenced by monthly billing receipts).

Table B.12 Details of metering instruments

Meter	Operated by	Electronic measurement	Manual logging	Recording	Calibration	Accuracy	Documentation
$M1_x$	Project entity	Hourly	Daily (optional) [12]	Monthly	Grid Company (Periodically in accordance with local law)	Accuracy Class 1 or more accurate	Print out of electronic record and optional paper log. Data will consist of two readings, i.e. power delivered to the grid and power received from the grid or combined as net supply.
$M2_x$	Grid company	-	-	Monthly	Grid Company (Periodically in accordance with local law)	Accuracy Class 1 or more accurate	Monthly sales receipts (for power delivered to grid) and billing invoices (for power received from the grid), or alternatively a single receipt which shows net power received.
$M3_x$	Project entity / Grid company	-	-	Monthly	Grid Company (Periodically in accordance with local law)	Accuracy Class 1 or more accurate	Print out of electronic records of the project entity and monthly billing invoices provided by the grid company (for power received from the grid).

[12] The project entity intends to log the readings of meters M1x and M1x manually in daily logs, but these logs will not form a formal requirement during verification. The ACM0002 methodology only requires hourly electronic measurement and these manual log records will only be maintained for back-up purposes. The project entity may deviate from this procedure during actual operation of the project.

<u>**Monitoring of reservoir surface area**</u>

The project entity will monitor the surface area of the reservoir by collecting photographic evidence of the surface level when the project becomes operational. This photographic evidence will be compared with the design reservoir dimensions to confirm whether or not the actual surface area substantially deviates from the design surface area.

<u>**Reporting, archiving and preparation for periodic verification**</u>

The project entity will in principle report the monitoring data annually but may deviate to report at intervals corresponding to agreed verification periods and will ensure that these intervals are in accordance with CDM requirements. The project entity will ensure that all required documentation is made available to the verifier. Data record will be archived for a period of 2 years after the crediting period to which the records pertain.

PROCEDURES IN CASE OF DAMAGED METERING EQUIPMENT / EMERGENCIES

Damages to metering equipment:

In case metering equipment is damaged and no reliable readings can be recorded the project entity will estimate net supply by the proposed project activity according to the following procedure:

1. **In case metering equipment operated by project entity is damaged only:**
   The metering data logged by the grid company, evidenced by sales receipts/billing invoices will be used as record of net power supplied to the grid for the days for which no record could be recorded.
2. **In case metering equipment operated by the grid company is damaged only:**
   The metering data logged by the project entity, evidenced by a print out of electronic records, will be used as a record of net power supply to the grid for the days for which no sales receipts/billing invoices could be provided.
3. **In case both metering equipment operated by project entity and grid company are damaged:**
   The project entity and the grid company will jointly calculate a conservative estimate of power supplied to the grid. A statement will be prepared indicating
   ► the background to the damage to metering equipment
   ► the assumptions used to estimate net supply to the grid for the days for which no record could be recorded
   ► the estimation of power supplied to the grid
   The statement will be signed by both a representative of the project entity as well as a representative of the grid company.

The project entity will furthermore document all efforts taken to restore normal monitoring procedures.

Emergencies:

In case of emergencies, the project entity will not claim emission reductions due to the project activity for the duration of the emergency. The project entity will follow the below procedure for declaring the emergency period to be over:

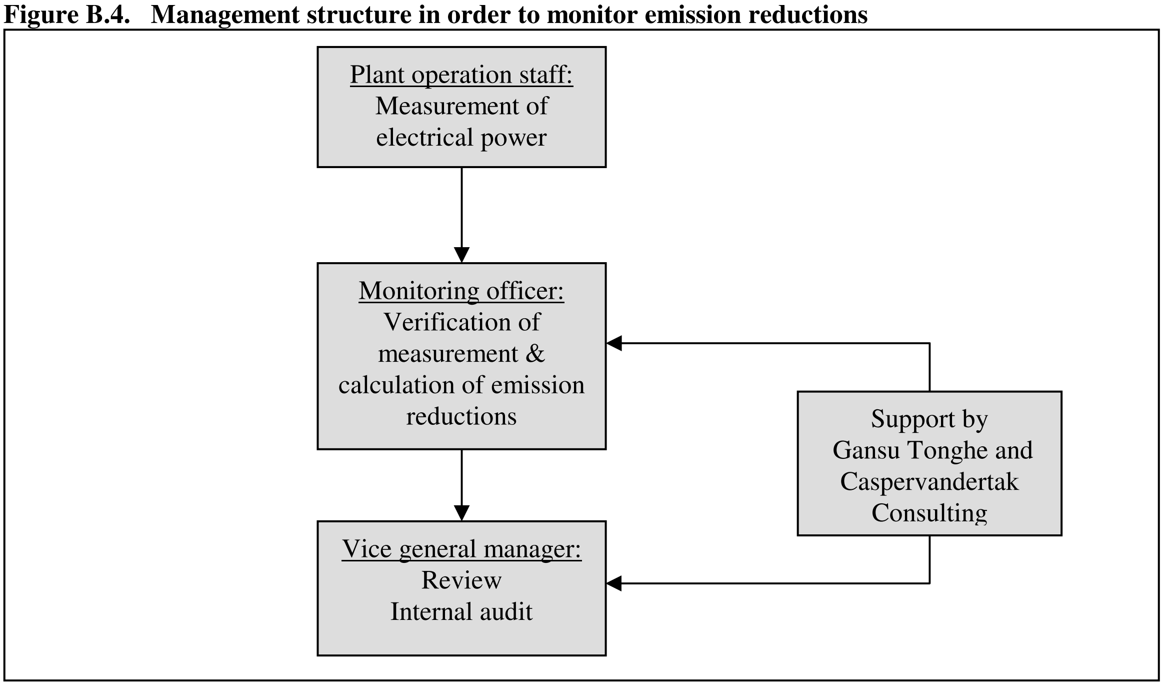
1. The project entity will ensure that all requirements for monitoring of emission reductions have been re-established.
2. The monitoring officer and the head of operations of the hydropower station will both sign a statement declaring the emergency situation to have ended and normal operations to have resumed.

OPERATIONAL AND MANAGEMENT STRUCTURE FOR MONITORING

The monitoring of the emission reductions will be carried out according to the scheme shown in Figure B.4. The Vice general Manager will hold the overall responsibility for the monitoring process, but as indicated below parts of the process are delegated. The first step is the measurement of the electrical energy supplied to the grid and reporting of daily operations, which will be carried out by the plant operation staff.

The project owner will appoint a monitoring officer who will be responsible for verification of the measurement, collection of sales receipts, collection of billing receipts of the power supplied by the grid to the hydropower plant and the calculation of the emissions reductions. The monitoring officer will prepare operational reports of the project activity, recording the daily operation of the hydropower station including operating periods, power delivered to the grid, equipment defects, etc. The selection procedure, tasks and responsibilities of the monitoring officer are described in detail in Annex 4. Finally, the monitoring reports will be reviewed by the Vice General manager.

Figure B.4. Management structure in order to monitor emission reductions



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)

Date of completion of the baseline study and monitoring methodology: 14/03/2008

Name of persons determining the baseline study and the monitoring methodology:

Caspervandertak Consulting

Tel: +86-10-84505756 / Fax: +86-10-84505758

-Meskes Berkouwer:	Consultant:	Meskes@caspervandertakconsulting.com
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Gansu Tonghe Investment Project Consulting Co., Ltd.

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-Zhao Yonghong:	Consultant:	mei.yang@126.com
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Caspervandertak Consulting and Gansu Tonghe Investment Project Consulting Co., Ltd. are both not project participants.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

01/07/2004

(This date marked the start of the constructions)

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

25 years 0 months

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

C.2.1. Renewable crediting period

A renewable crediting period will be used

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

01/09/2008 (or the date of registration, whichever is later)

C.2.1.2. Length of the first crediting period:

7 years 0 months

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

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

An Environmental Impact Assessment (EIA) was carried out and was accepted by the Gansu Environmental Protection Bureau on the 3rd of November 2003. A summary of the main findings of the EIA is provided below

SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT

1) **Impact on the ecological environment:**
During the construction period, the ecosystem is mainly impacted by road construction, excavation, and waste soil & grits dumping. These activities could cause some soil erosion and damage vegetation. To minimize the impact on the ecological environment, the following measures will be taken: Were possible avoid damaging existing vegetation; Minimize the area that will be excavated; Clear up temporarily excavated areas as soon as construction is over and green the site (i.e. plant trees and grass), and; Clear up large areas of excavated lands and turn them into small plots for growing grass or farming.
2) **Impacts on the air quality:**
Ambient air is mainly impacted during the construction period by waste gas emissions from the boiler used to boil water for construction workers, dust generated during construction, and waste gas from vehicles. The waste gas from the boiler will be treated with dust-removing equipment after which the main pollutants dust and SO2 satisfy the required standard (GB13271-2001). To minimise the impact of dust, the following measures will be taken: Contain excavation and dumping of waste sand and grit within a restricted area; Clear up the temporary excavated area as soon as construction is finished and green the site (i.e. plant trees and grass); Cover dusty materials; Cover vehicles transporting grits and sand, and; Spray water on the roads used for the transport of these materials. After taking the above measures, the impact of the dust on the ambient environment will not be significant.
3) **Waste water:**
The waste water generated during construction mainly consist of daily waste water, water used to wash vehicles, and water used to wash grits. The main contents of the waste water are CODcr, BOD5, SS and oil. The project will employ an on-land toilet, construct a collection pool to evaporate and recycle waste water, and plant trees to reduce the effect of water pollution. These measures are practical and sufficient to minimise the impact of waste water on the environment.
4) **Solid waste:**
During construction, the project will generate some daily waste and the water boiler will produce coal residues (coal is burned to generate heat). The project will collect daily rubbish in a designated area and burn it on a wasteland. The coal residues will be used to cover the road of the residential area and the road leading to the power house. After employing the above measures, the impact of solid waste in the natural environment is minimal.
5) **Noise impacts and preventive measures:**
Construction machines and vehicles will produce some noise in the range of 80 to 125dB(A). The project owner will take measures to reduce noise and avoid construction during the night, so the impact of the noise is not significant.
6) **Impact on the hydrology of the river:**

Because the hydropower station does not have a regulating function, it will not significantly raise the water level upstream of the dam and create a reservoir or change the flow of the river. The impact on the river's hydrology is small; the temperature of the river will not change, the amount of vegetation (mainly grass and scrubs) that will be flooded is small so local vegetation is not effected, and the level of phytoplankton propagate caused is not significant.

Besides the issues discussed above, the EIA states that the reduction of the water level of the river during the construction period is temporary will bring some inconvenience to the villagers of Anziping but will not impact irrigation. The operation of the project on the other hand promotes local economic development, improves the social-economic environment and will increase local standards of living. The hydropower station fully utilizes local water resources and converts them into economic advantages.

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:

The environmental impacts of the project are not considered significant by the Chinese government and the project participants. The Environmental Impact Assessment Form (EIA) was accepted by the Gansu Environmental Protection Bureau.

SECTION E. Stakeholders' comments

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

The project entity carried out a separate stakeholder consultation to confirm the impacts of the project on the relevant stakeholders. The consultation lasted for one month, from the 19th of September to the 19th of October 2006, and consisted of the following elements:

- **Establishment of a website:**
  The website (http://www.cdmasia.org/CDMprojects.htm) contained information on the project, CDM, the stakeholder consultation process and provided an opportunity to post comments by e-mail or by telephone.
- **Organization of a stakeholder consultation meeting near project site:**
  Date / time: 27th of September 2006, from 16:00 till 18:00
  Location: Second floor meeting room of the Hujia'ai hydropower station, Zhouqu County of Gannan Autonomous Tibetan Prefecture, Gansu province

  Agenda of the meeting:
  - Opening of the meeting
  - Introduction of the project
  - Introduction of the Clean Development Mechanism
  - Explanation of the stakeholder consultation process
  - Round of comments by each participant
  - Further questions and answers
  - Closing of the meeting

To ensure wide participation of stakeholders, announcements of the stakeholder consultation meeting and website were made through the following channels:

- Newspaper announcement on September 19th, 2006, in the Gansu Daily (Gansu's leading daily newspaper)
- Online announcement on the Gansu Economic News Site: www.gsei.com.cn

In addition to the above announcements, important stakeholders received personal invitations to attend the meeting. See for attendance of the meeting Table E.1. A report of the main comments and outcomes of the meeting is provided in section E.2.

Table E.1 List of stakeholders that attended the stakeholder consultation meeting

No.	Organization	Position / occupation
1	Water & Soil Conservation Bureau f Zhouqu County	Vice General Director
2	Water & Soil Conservation Bureau f Zhouqu County	Technician
3	Electric Power Bureau of Zhouqu County	Vice General Director
4	Water Affair & Hydraulic Power Bureau of Zhouqu County	Staff
5	Water Affair & Hydraulic Power Bureau of Zhouqu County	Staff
6	Environment Protection Bureau of Zhouqu County	Monitor of the Supervision Team
7	Environment Protection Bureau of Zhouqu County	Vice monitor of the Supervision Team
8	Nanyu Village of Nanyu Town	Villager
9	Nanyu Village of Nanyu Town	Chairman of the Party Commission
10	Xieliupo Village of Dachuan Town	Villager
11	Electric Power Bureau of Zhouqu County	Director
12	Henan Village of Jiangpan Town	Director of the Villager's Committee
13	Henan Village of Jiangpan Town	Assistant of the Party Commission
14	Xieliupo village of Dachuan town	Secretary of the Party Commission
15	Gansu Ansheng Hydropower Development Co., Ltd.	Director
16	Gansu Tonghe investment project consulting Co., Ltd.	Project Manager
17	Gansu Tonghe investment project consulting Co., Ltd.	Translator
18	Gansu Tonghe investment project consulting Co.,Ltd.	Project Engineer
19	Caspervandertak Consulting	Project consultant

E.2. Summary of the comments received:

Comments received at stakeholder consultation meeting:

The project entity was represented by Mr. Kong Xiangren, Director, Gansu Ansheng hydropower development Co., Ltd. All participants approved the project for its contribution to local economic development as well as for the positive measures taken by the project owner. The latter includes the construction of a bridge for villagers' convenience, and the erecting of a dike to protect plough land and avoid risks of landslide.

An overview of the main comments/questions expressed during the meeting is provided below:

Name: Mr. Yang Fuming

Position / Affiliation: Villager, Xieliupo Village, Dachuan Town, Zhouqu County
Comments:
Mr. Yang explained that his village was in the past subject to numerous landslides with direct consequences on habitation. He said that the construction of a 760 meters long dike on the river's left bank has undoubtedly reduced exposure to such natural disaster.

Name: Mr. Lan Jianhua,
Position / Affiliation: General Director, Water and Soil Conservation Bureau, Zhouqu County
Comments:
Mr. Lan underlined the efforts made by the project owner to consolidate the existing dike on the river's right bank, and to construct a bridge that facilitates communication. He then confirmed that villagers were compensated according to National regulations.

Name: Mr. Yang Qinghuai
Position / Affiliation: Vice Monitor, Supervision Team, Environment Protection Bureau, Zhouqu County
Comments:
Mr. Yang confirmed that the construction is in accordance with the requirements in the EIA report. He noted that the project owner also donated teaching facilities to the local school.

Name: Mr. Wang Duxing
Position / Affiliation: Secretary, Nanyu village's committee
Comments:
Mr. Wang declared that villagers were originally worried that the waste generated by construction would jam the river channel, which might increase the risk of landslides. He feels he received satisfactory guarantees from the project owner and therefore supports the project. He further stated compensation for expropriated land has been received. Finally, he adds that farming is not affected by land expropriations since the designated land is mainly uncultivated.

Name: Mr. Liu Hougao
Position / Affiliation: Director, Henan village's committee
Comments:
Mr. Liu expressed his and Henan villagers' support for the project. He stated that the village's total income has increased by 220,000 RMB since the construction of the dam, because many residents have been given jobs on the site. 45 people from Henan village were employed during first year and 70 people the second year.

Other comments:
Other comments discussed by various people included:
- Support for the project, since the project will improve the reliability of the power supply
- Support for the project since fossil fuel power will be replaced by renewable energy, which in return will lead to less GHG emissions
- Support from the villagers for the compensation for expropriated land, which is in accordance with the national standard, since the project will benefit the local power supply and local economic development

The overall comments with regards to the project were positive; the project will benefit the local residents by replacing fossil fuel power by hydropower. The environmental damages are limited, since effects on the vegetation are minimal.

Comments received through website:

No comments were received by e-mail through the stakeholder consultation website or by telephone.

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

Response to comments:

The attendants of the stakeholder consultation meeting are listed in Table E.1 (names withheld). The overall comments with regards to the project were positive as the project will benefit the local residents and displace fossil fuel fired power generation with clean renewable hydropower. The environmental impact is limited, the project entity provided satisfactory explanations and answers to the questions / comments. Therefore additional measures other than already planned by the project entity are not considered necessary.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

The Project Entity:

Organization:	Gansu Ansheng Hydropower Development Co., Ltd.
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The Purchasing Party:

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Represented by:	Mr. Hokari, Takeshi
Title:	General manager ,Environmental Business Department
Salutation:	Mr.
Last Name:	Hokari
Middle Name:	/
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Personal E-Mail:	T.Hokari@mitsui.com

<u>Annex 2</u>

INFORMATION REGARDING PUBLIC FUNDING

The project does not receive any public funding from Annex I countries.

Annex 3

BASELINE INFORMATION

Our baseline calculation follows the methodology used in the OM and BM emission factors baseline calculation published by the office of national coordination committee on climate change on the Internet. Full information on this can be found at their website:

http://cdm.ccchina.gov.cn:80/english/NewsInfo.asp?NewsId=1891

For more detailed information, please see:
-Baseline emission factors: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf
-Calculation of OM: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1358.xls
-Calculation of BM: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1365.pdf

Below we provide the main data used in the calculation of the baseline emission factor. Please note that all primary data are from the files downloaded and mentioned above, crosschecked against the data sources mentioned in these documents. For example, if we cite below the China Energy Statistical Yearbook, then that is the primary data source used in the published calculations. Where the primary data source differed from the data used in the calculation of the published emission factor, we have relied on the primary data source. Our final result (the calculated combined margin emission factor) after rounding is equal to the baseline emission factor that can be calculated based on the published OM and BM emission factors.

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

Table A1. Calculation of the Combined Margin Emission Factor

	Emission factor A	Value and Source B	Weight C	Weighted value D = B * C
1	EF_{OM}	1.12559 Table A2	0.5	0.5628
2	EF_{BM}	0.57399 Table A5, C	0.5	0.2870
3	CM			0.8498 D1 + D2

Table A2. Calculation of the Operating Margin Emission Factor

	Variable	2003 A	2004 B	2005 C	Total D
1	Supply of thermal power to North West China grid (MWh)	105,651,775	122,605,243	125,496,682	353,753,700
		Table A3c, C6	Table A3b, C6	Table A3a, C6	D1 = A1 + B1 + C1
2	Imports of power from other grids (MWh)	0	0	0	0
		Files cited above	Files cited above	Files cited above	D2 = A2 + B2 + C2
3	Total power supply for calculation EF_{OM} (MWh)	105,651,775	122,605,243	125,496,682	353,753,700
		A3 = A1 + A2	B3 = B1 + B2	C3 = C1 + C2	D3 = D1 + D2
4	CO2 emissions associated with thermal power generation on North West China grid (tCO2)	112,051,963	138,705,098	147,425,979	398,183,040
		Table A4c, E	Table A4b, E	Table A4a, E	D4 = A4 + B4 + C4
5	CO2 emissions associated with power imports from other grids (tCO2)	0	0	0	0
		Table A9c, E	Table A9b, E	Table A9a, E	D5 = A5 + B5 + C5
6	Total CO2 emissions for calculation EF_{OM} (tCO2)	112,051,963	138,705,098	147,425,979	398,183,040
		A6 = A4 + A5	B6 = B4 + B5	C6 = C4 + C5	D6 = D4 + D5
7	EFOM (tCO2/MWh)	1.06058	1.13131	1.17474	1.12559
		A6 / A3	B6 / B3	C6 / C3	D6 / D3

Table A3a. Calculation of thermal power supply to North West China Grid, 2005

	Grid	Thermal Power generation (MWh) A	Losses (%) B	Thermal power supply (MWh) C = A * (100 - B) / 100
	Shaanxi	41,100,000	7.16	38,157,240
	Gansu	33,106,000	4.23	31,705,616
	Qinghai	5,500,000	2.69	5,352,050
	Ningxia	27,643,000	5.73	26,059,056
	Xinjiang	26,560,000	8.80	24,222,720
	Total			125,496,682
				C6 = C1 + C2 + C3 + C4 + C5

Source: Files mentioned above, original data are from China Electric Power Yearbook 2006, p. 559,560 and 568.

Table A3b. Calculation of thermal power supply to North West China Grid, 2004

	Grid	Thermal Power generation (MWh) A	Losses (%) B	Thermal power supply (MWh) C = A * (100 - B) / 100
1	Shaanxi	44,439,000	7.50	41,106,075
2	Gansu	33,242,000	6.21	31,177,672
3	Qinghai	6,208,000	7.96	5,713,843
4	Ningxia	25,298,000	5.45	23,919,259
5	Xinjiang	22,752,000	9.07	20,688,394
6	Total			122,605,243
				C6 = C1 + C2 + C3 + C4 + C5

Source: Files mentioned above, original data are from China Electric Power Yearbook 2005, p. 472 and 474.

Table A3c. Calculation of thermal power supply to North West China Grid, 2003

	Grid	Thermal Power generation (MWh) A	Losses (%) B	Thermal power supply (MWh) C = A * (100 - B) / 100
1	Shaanxi	38,144,000	6.94	35,496,806
2	Gansu	29,494,000	6.35	27,621,131
3	Qinghai	6,446,000	4.5	6,155,930
4	Ningxia	19,175,000	5.25	18,168,313
5	Xinjiang	19,834,000	8.19	18,209,595
6	Total			105,651,775 C6 = C1 + C2 + C3 + C4 + C5

Source: Files mentioned above, original data are from China Electric Power Yearbook 2004, p. 670 and 709

Table A4a. Calculation of CO2 emissions from fuels for thermal power production, North West China Grid, 2005.

Fuel	Unit	Gansu	Shaanxi	Ningxia	Qinghai	Xinjiang	Northwest China Grid	NCV	Oxidation factor	Carbon coefficient	CO2 emissions
								(TJ/unit)	(Fraction)	(TC/TJ)	(tCO2)
							A	B	C	D	E = A*B*C*D*44/12
Raw coal	10^4 Tons	1,597.00	2,461.28	1,467.70	345.1	1,358.09	7,229.17	209.08	1	25.8	142,985,522
Clean coal	10^4 Tons	0	16.22	0	0	0	16.22	263.44	1	25.8	404,225
Other washed coal	10^4 Tons	0	35.56	101.95	0	10.2	147.71	83.63	1	25.8	1,168,593
Coke	10^4 Tons	0	3.23	0	0	0	3.23	284.35	1	29.2	98,335
Coke oven gas	10^8 m^3	0	0	0	0	0	0.00	1672.6	1	12.1	0
Other gas	10^8 m^3	0	0	0	0	0	0.00	522.7	1	12.1	0
Crude oil	10^4 Tons	0	0	0	0	0.18	0.18	418.16	1	20.0	5,520
Gasoline	10^4 Tons	0	0.02	0	0	0.01	0.03	430.7	1	18.9	895
Diesel	10^4 Tons	0.46	2.24	0	0.06	0.5	3.26	426.52	1	20.2	102,986
Fuel oil	10^4 Tons	0.57	0.01	0	0	0.25	0.83	418.16	1	21.1	26,852
LPG	10^4 Tons	0	0	0	0	0	0.00	501.79	1	17.2	0
Refinery gas	10^4 Tons	0	0	0	0	7.71	7.71	460.55	1	15.7	204,410
Natural gas	10^8 m^3	0.52	1.46	0	1.33	7.81	11.12	3893.1	1	15.3	2,428,640
Other petroleum products	10^4 Tons	0	0	0	0	0	0.00	383.69	1	20.0	0
Other coking products	10^4 Tons	0	0	0	0	0	0.00	284.35	1	25.8	0
Other E (standard coal)	10^4 Tce	1.3	8.24	0	0	0	9.54	292.7	1	0	0
Total											147,425,979
											$\Sigma(E_i)$

Data source: Fuel consumption data are from China Energy Statistical Yearbook 2006. Net calorific values are from the files mentioned above and crosschecked against China Energy Statistical Yearbook, 2004 p. 302; Oxidation factors and fuel emission coefficients are from the files mentioned above and crosschecked against IPCC default values, see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 (energy).

Table A4b. Calculation of CO2 emissions from fuels for thermal power production, North West China Grid, 2004.

Fuel	Unit	Gansu	Shaanxi	Ningxia	Qinghai	Xinjiang	Northwest China Grid	NCV	Oxidation factor	Carbon coefficient	CO2 emissions
								(TJ/unit)	(Fraction)	(TC/TJ)	(tCO2)
							A	B	C	D	E = A*B*C*D*44/12
Raw coal	10^4 Tons	1,595.90	2,428.70	1,270.10	322.8	1,240.90	6,858.40	209.08	1	25.8	135,652,074
Clean coal	10^4 Tons	-	-	-	-		0.00	263.44	1	25.8	0
Other washed coal	10^4 Tons	-	-	102.64	-	10.5	113.14	83.63	1	25.8	895,096
Coke	10^4 Tons	-	0.78	-	-		0.78	284.35	1	29.2	23,747
Coke oven gas	10^8 m^3	0.3	-	-	-		0.30	1672.6	1	12.1	22,262
Other gas	10^8 m^3	1.26	0.74	-	-		2.00	522.7	1	12.1	46,381
Crude oil	10^4 Tons	-	0.01	-	-	0.06	0.07	418.16	1	20.0	2,147
Gasoline	10^4 Tons	-	0.02	-	-		0.02	430.7	1	18.9	597
Diesel	10^4 Tons	0.36	2.16	0.05	-	0.41	2.98	426.52	1	20.2	94,141
Fuel oil	10^4 Tons	0.69	0.01	-	-	0.3	1.00	418.16	1	21.1	32,352
LPG	10^4 Tons	-	-	-	-		0.00	501.79	1	17.2	0
Refinery gas	10^4 Tons	-	-	-	-	3.26	3.26	460.55	1	15.7	86,430
Natural gas	10^8 m^3	0.59	1.61	-	-	6.27	8.47	3893.1	1	15.3	1,849,873
Other petroleum products	10^4 Tons	-	-	-	-		0.00	383.69	1	20.0	0
Other coking products	10^4 Tons	-	-	-	-		0.00	284.35	1	25.8	0
Other E (standard coal)	10^4 Tce	6.17	-	-	-	3.46	9.63	292.7	1	0	0
Total											138,705,098
											$\Sigma(E_i)$

Data source: Fuel consumption data are from China Energy Statistical Yearbook 2005. Net calorific values are from the files mentioned above and crosschecked against China Energy Statistical Yearbook, 2004 p. 302; Oxidation factors and fuel emission coefficients are from the files mentioned above and crosschecked against IPCC default values, see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 (energy).

Table A4c. Calculation of CO2 emissions from fuels for thermal power production, North West China Grid, 2003.

Fuel	Unit	Gansu	Shaanxi	Ningxia	Qinghai	Xinjiang	Northwest China Grid	NCV	Oxidation factor	Carbon coefficient	CO2 emissions
								(TJ/unit)	(Fraction)	(TC/TJ)	(tCO2)
							A	B	C	D	E = A*B*C*D*44/12
Raw coal	10^4 Tons	1,479.62	2,002.26	682	330.67	1,065.75	5,560.30	209.08	1	25.8	109,976,996
Clean coal	10^4 Tons	-	-	-	-		0.00	263.44	1	25.8	0
Other washed coal	10^4 Tons	-	-	27	-	3.64	30.64	83.63	1	25.8	242,405
Coke	10^4 Tons	-	-	-	-		0.00	284.35	1	29.2	0
Coke oven gas	10^8 m^3	1.54	-	-	-		1.54	1672.6	1	12.1	114,280
Other gas	10^8 m^3	0.12	-	-	-		0.12	522.7	1	12.1	2,783
Crude oil	10^4 Tons	-	-	-	-		0.00	418.16	1	20.0	0
Gasoline	10^4 Tons	-	-	-	-		0.00	430.7	1	18.9	0
Diesel	10^4 Tons	-	3.12	0.04	-	0.4	3.56	426.52	1	20.2	112,464
Fuel oil	10^4 Tons	1.19	-	-	-	1.02	2.21	418.16	1	21.1	71,497
LPG	10^4 Tons	-	-	-	-		0.00	501.79	1	17.2	0
Refinery gas	10^4 Tons	-	-	-	-	3.48	3.48	460.55	1	15.7	92,263
Natural gas	10^8 m^3	0.54	0.1	-	-	5.95	6.59	3893.1	1	15.3	1,439,275
Other petroleum products	10^4 Tons	-	-	-	-		0.00	383.69	1	20.0	0
Other coking products	10^4 Tons	-	-	-	-		0.00	284.35	1	25.8	0
Other E (standard coal)	10^4 Tce	5.86	-	-	-	2.3	8.16	292.7	1	0	0
Total											112,051,963
											$\Sigma(E_i)$

Data source: Fuel consumption data are from China Energy Statistical Yearbook 2004. Net calorific values are from the files mentioned above and crosschecked against China Energy Statistical Yearbook, 2004 p. 302; Oxidation factors and fuel emission coefficients are from the files mentioned above and crosschecked against IPCC default values, see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 (energy).

Table A5. Calculation of the BM Emission Factor, North West China Grid

$EF_{thermal}$ (tCO2/MWh)	Share of thermal power in added capacity, 2005-2003	EF_{BM} (tCO2/MWh)
A	B	C = A * B
0.94107	60.99%	0.57399
Table A6	Table A9	

Table A6. Calculation of EF thermal

		λ A	EF_{adv} B	$EF_{thermal}$ calculation C = A * B
1	Coal	98.12%	0.95083	0.93297
		Table A8	Table A7	
2	Gas	1.79%	0.42450	0.00758
		Table A8	Table A7	
3	Oil	0.09%	0.56360	0.00052
		Table A8	Table A7	
4	$EF_{thermal}$			0.94107

Table A7. Calculation of Emission factors of fuel using advanced technologies

Fuel	Efficiency (%) A	Carbon coefficient (tc/TJ) B	Oxidation factor C	EF_{adv} (tCO2/MWh) D=(3.6/(A*1000))*B*C*44/12
		Table A8		
Coal	35.82%	25.80	1	0.9508
Gas	47.67%	15.33	1	0.4245
Oil	47.67%	20.35	1	0.5636

Source: Files downloaded and mentioned above. Carbon emission factors are from table A8.

Table A8. Calculation of λs for the calculation of the BM, North West China Grid.[13]

Fuel	Unit	Northwest China Grid	NCV	Total energy consumption	Oxidation factor	Carbon coefficient	CO2 emissions
			(TJ/unit)	(TJ)	(Fraction)	(TC/TJ)	(tCO2)
		A	B	C=A*B	D	E	E = A*B*D*E*44/12
Raw coal	10^4 Tons	7229.17	209.08	1,511,475	1	25.8	142,985,522
Clean coal	10^4 Tons	16.22	263.44	4,273	1	25.8	404,225
Other washed coal	10^4 Tons	147.71	83.63	12,353	1	25.8	1,168,593
Coke	10^4 Tons	3.23	284.35	918	1	29.2	98,335
Other coking products	10^4 Tons	0	284.35	0	1	25.8	0
Coal, total				***1,529,019***			***144,656,676***
Coke oven gas	10^8 m^3	0	1672.6	0	1	12.1	0
Other gas	10^8 m^3	0	522.7	0	1	12.1	0
LPG	10^4 Tons	0	501.79	0	1	17.2	0
Refinery gas	10^4 Tons	7.71	460.55	3,551	1	15.7	204,410
Natural gas	10^8 m^3	11.12	3893.1	43,291	1	15.3	2,428,640
Gas total				***46,842***			***2,633,050***
Crude oil	10^4 Tons	0.18	418.16	75	1	20	5,520
Gasoline	10^4 Tons	0.03	430.7	13	1	18.9	895
Diesel	10^4 Tons	3.26	426.52	1,390	1	20.2	102,986
Fuel oil	10^4 Tons	0.83	418.16	347	1	21.1	26,852

[13] Data are from Table A4a.

Other petroleum products	10^4 Tons	0	383.69	0	1	20	0
Oil total				***1,826***			***136,253***
Total							***147,425,979***
							$\Sigma(E_i)$

Share of fuel group in total CO2 emissions	
λcoal	98.12%
λgas	1.79%
λoil	0.09%

Weighted average carbon emission factors (tc/TJ)	
Coal	25.80
Gas	15.33
Oil	20.35

<u>Note:</u> We have used the results of the above calculation for λ for the respective fuels in subsequent calculation of the BM. This is conservative. The carbon emission factor of the fuel groups (coal, gas and oil) have been calculated as a weighted average with the share of the fuels in terms of energy contents as weights. This yields slightly lower carbon emission factors and is conservative

Table A9. Calculation of the share of thermal power in recently added capacity

Installed capacity	2003 A	2004 B	2005 C	Capacity added in 2003-2005 D=C-A	Share in added capacity
Thermal (MW)	20492.7	22247.5	25362.6	4869.9	60.99%
Hydropower (MW)	9382	10835.2	12219.8	2837.8	35.54%
Nuclear (MW)	0	0	0	0	0.00%
Other (MW)	122.9	276	399.5	276.6	3.46%
				0	
Total (MW)	29997.6	33358.7	37981.9	7984.3	100.00%
Percentage of 2005 capacity	78.98%	87.83%	100%		

Source: China Electric Power Yearbook 2006, p. 571; China Electric Power Yearbook 2005, p. 473; and China Electric Power Yearbook 2004, p. 670, p.709

Annex 4

MONITORING INFORMATION

Selection procedure:

The monitoring officer will be appointed by the general manager of Gansu Ansheng Hydropower Development Co., ltd. 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 monitoring requirements and procedures by Caspervandertak Consulting and Gansu Tonghe Investment Project Consulting Co., Ltd.

The selection of the initial monitoring officer has taken place and the following person was appointed:
Name: Kong Xiangren
Position: Office leader of Gansu Ansheng Hydropower Development Co., ltd.

Tasks and responsibilities:

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

- **Supervise and verify metering and recording:**
  The monitoring officer will coordinate with the plant manager 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 entity to ensure that calibration of the metering instruments is carried out periodically in accordance with regulations of the grid company.
- **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.

Support:

The monitoring officer will receive support from Caspervandertak Consulting and Gansu Tonghe Investment Project Consulting Co., Ltd in his/her responsibilities through the following actions:

- Initial training on CDM, monitoring methodology, monitoring procedures and requirements and archiving
- Provide the monitoring officer with a calculation template in electronic form for calculation of annual emission reductions
- Continuous advice to the monitoring officer on a need basis
- Review of monitoring reports