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

CONTENTS

Annexes

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

Project title: Gansu Luqu Dazhuang Hydropower Station Project
PDD Version: 4.0
PDD completion date: 14/08/2008

Revision History:
Version 1.0: First draft
Version 1.1: Second draft, submitted for Host Country Approval
Version 2.0: Minor editorial changes; submitted for validation / global stakeholder comments
Version 3.0: Revised PDD, in response to draft validation protocol
Version 4.0: Revised PDD, in response to Request for Review

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

The Gansu Luqu Dazhuang Hydropower Station Project (hereafter referred to as 'the project' or 'project') involves the construction and operation of a new hydropower station at the main stream of the Tao River in Luqu 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 units with an individual installed capacity of 5.5 MW, amounting to a total installed capacity of 11 MW.

The project consists of a hydropower station with an overflow dam with a maximum height of 5.8 meters. Part of the water flow is diverted into the water intake after which it is led through a water diversion tunnel with a total length of 210 meters. The water then enters the powerhouse through 2 penstocks.

The expected operating hours are 4,241 hrs annually, expected annual power generation is 46.651 million kWh, and net expected annual power supply to the grid is 45.26 million kWh.

The project is connected to the grid through two on-site transformers that increase the voltage to 110kV. The project connects to Duosongduo 110kV switching station, which functions as a switching station to connect the project to the local grid, which connect to the Gansu Grid and finally to the North West China 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 Mingzhu Hydropower Development Co., Ltd. (as the Project Entity)	No
Switzerland	Private entity: Cargill International SA (as the Purchasing Party)	No

For more detailed contact information on participants in the project activities, please refer to Annex 1.

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

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

A.4.1.1. Host Party(ies):

People's Republic of China

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

Gansu Province

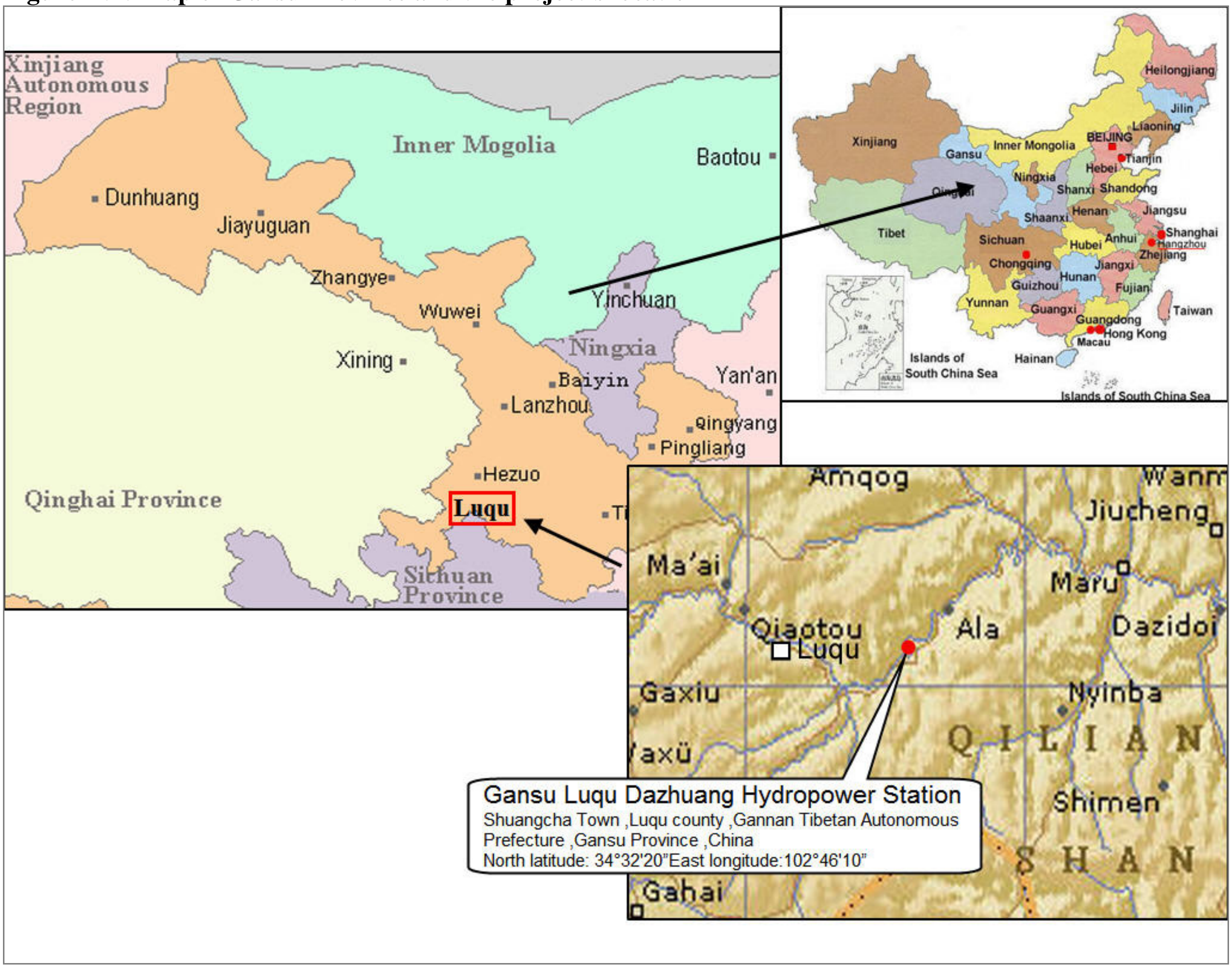
A.4.1.3. City/Town/Community etc:

Luqu County of Gannan Autonomous Tibetan Prefecture

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

The Gansu Luqu Dazhuang Hydropower Station is located at the main stream of the Tao River in Dazhuang Village of Shuangcha Township in Luqu County of Gannan Autonomous Tibetan Prefecture of Gansu province, China. The project is 40 kilometres away from Luqu County Seat and about 370 kilometres away from Lanzhou City, the provincial capital. The site location's approximate coordinates are east longitude of 102º46'10" and north latitude of 34º32'20". Figure A.1 shows the location of the project.

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



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

Type and category(ies) of the small-scale project activity

Category: I.D Grid connected renewable electricity generation
Sectoral scope: Energy industries (renewable - / non-renewable sources)

The project activity utilizes the hydro potential for power generation. Thus the project type is renewable energy. Since the capacity of the proposed project is 11 MW, it satisfies the requirement that the capacity of the project should be at most 15 MW and the project activity can be regarded as a small scale CDM project activity. The power generated is exported to the grid. Thus, according to the small-scale CDM modalities, the project activity falls under Type – I – Renewable Energy Projects and category I.D – Renewable Electricity Generation for a grid.

The project will not expand beyond 15 MW. For technical reasons, the project cannot expand beyond the current installed capacity of 11 MW; additionally, the approval of the Chinese authorities is based on the current technical design of the project; in other words, expansion beyond the current capacity would not be possible without further government approvals.

Technology of the small-scale project activity

The project design has been prepared by the Water Conservation and Hydropower Survey and Design Institute of Gansu province. All technologies employed in the project are appropriate for the hydrological conditions and have been used in China before.

The project design consists of a new hydropower station with a low head of 15.3 meters. The project design mainly consists of a dam, a water diversion system, a power house, and a switching station. The dam consists of an overflow dam with a maximum height of 5.8 meters, 3 floodgates and 5 sand discharge gates. The dam will be constructed from a mixture of pebble rock and concrete and will have a length of 51 meters. The water diversion system consists of the water intake, a tunnel with a total length of 210 meters and 2 penstocks.

The surface area of the reservoir is 119,050 m^2 at full capacity and the power density is 92.4 W/m^2.

The project will install 2 turbines/generator units with an individual capacity of 5.5 MW. The units will be manufactured by Hangzhou Dalu Generation Equipments Manufacturing Co., ltd. The specific technical data of the turbines / generators units are listed in Table A.2.

Table A.2 Key technological parameters to be employed for the proposed project

Main Technical Data		**Value (per unit)**
Turbines	Units	2
	Type number	ZZK160-LH-250
	Type	Kaplan turbine
	Capacity	5.8 MW
	Nominal flow rate	41.51 m^3/s
	Maximum head	17.88m
	Nominal head	15.3m
Generators	Units	2
	Type number	SF5500-28/4250
	Type	Three pole, vertical axes
	Capacity	5.5 MW
	Nominal revolutions	214.3 rpm
	Power factor	0.8

The project is connected to the grid through two on-site transformers that increase the voltage to 110 kV. The project then connects to Duosongduo 110kV switching station, which functions as a switching station to connect the project to the local grid, which connects to the Gansu Grid and finally to the North West China Grid.

An indicative schedule of the project's implementation is provided by table A.3 which lists the main past and future events of construction.

Table A.3 Implementation schedule of the proposed project

Period / date	Main activity
April 01 2007	Received approval to start construction activities
April 2007 - October 2007	Construction of flood gates section of the dam.
Mar 2007 - Oct 2007	Construction of left embankment
April 2007 - March 2008	Construction of intake and water diversion system
April 2007 - March 2008	Construction of Powerhouse
November 2007	Construction of 2nd stage cofferdam
December 2007 - May 2008	Construction of overflow dam
December 2007 - May 2008	Construction of right embankment
January 2008 - May 2008	Installation of turbine and generator
June 2008	Test run / commissioning
1st, Jul 2008	Start power generation
Oct 2008	All construction completed

A.4.3 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 first crediting period is presented in Table A.4.

Table A.4 Estimation of the Emission Reductions in the First Crediting Period

Years	Annual estimation of emission reductions (tCO_2e)
Year 1: 26/09/2008 - 25/09/2009	38,462
Year 2: 26/09/2009 - 25/09//2010	38,462
Year 3: 26/09/2010 - 25/09//2011	38,462
Year 4: 26/09/2011 - 25/09//2012	38,462
Year 5: 26/09/2012 - 25/09//2013	38,462
Year 6: 26/09/2013 - 25/09//2014	38,462
Year 7: 26/09/2014 - 25/09//2015	38,462
Total estimated reductions (tCO_2e) of the first crediting period	**269,234**
Total number of the first crediting period years	7
Annual average reductions over the first crediting period (tCO_2e)	38,462

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

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

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

The project is a small-scale project activity of category I.D, because the capacity of the hydropower station is 11 MW. The project will not expand beyond 11 MW. Proof is that the project entity does not have government approval to expand the project above 15 MW; in other words, expansion beyond the current capacity would not be possible without further government approvals.

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

- With the same project participants;

- In the same project category and technology/measure;
- Registered within the previous 2 years; And
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

A proposed small-scale project activity shall not be deemed to be a debundled component of a large project activity if one of the criteria mentioned above does not apply to the project. It is possible to demonstrate that the project is not a debundled component of a larger project activity, because the project entity is not operating, developing or planning to develop another project in the direct vicinity of the project boundary.

Therefore, there is no other registered CDM project activity or another application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

Therefore, the project is not a debundled component of a larger project activity.

SECTION B. Application of a baseline and monitoring methodology

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

Title: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories: I.D 'Grid connected renewable electricity generation' (version 11)
Date of approval: 18 May 2007.
Reference: The methodology can be found at:
http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

The AMS-I.D. methodology refers to the ACM0002 methodology (Version 6) for the calculation of baseline emissions. This methodology can be found at:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

The AMS-I.D. methodology is applicable to small-scale project activities, under the following restrictions (see version 11 of AMS.I.D):

1. This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.
2. If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.
3. Combined heat and power (co-generation) systems are not eligible under this category.
4. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct[1] from the existing units.
5. Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.

The proposed project activity satisfies these applicability criteria:

- The project is a small-scale project activity; see Section A of this PDD. The project has an installed capacity of 11 MW. Therefore, the project will not surpass the threshold of 15 MW for the applicability of the AMS.I.D methodology. (Satisfying the general precondition for the use of an AMS methodology)
- The project involves hydro energy resources, one of the renewable energy generation technologies listed (see restriction 1 above).
- The project provides power to the power grid. The existing power grid partially utilizes fossil fuels as a power source, as described in Section A.2 and Section B.6 (see restriction 1 above).

[1] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

- The project does not have a non-renewable component, meaning that the restrictions mentioned under point 2 above are not applicable.
- The project does not involve combined heat and power systems, meaning that the restrictions mentioned under point 3 above are not applicable.
- The project does not involve the addition of renewable energy generation units at an existing renewable power generation facility, meaning that the restrictions mentioned under point 4 above are not applicable.
- The project does not seek to retrofit or modify an existing facility for renewable energy generation, meaning that the restrictions mentioned under point 5 above are not applicable.

We therefore conclude that the project satisfies all conditions for the application of small-scale methodology AMS.I.D.

B.3. Description of the project boundary:

The project boundary, as stated in Appendix B of the simplified modalities and procedures for small-scale CDM project activities, is limited to the physical project activity. Project activities that displace energy supplied by external sources shall earn certified emission reductions (CERs) for the emission reductions associated with the reduced supply of energy by those external sources.

The physical project boundary of the project includes the area occupied by the components of the hydropower station until the connection with the grid, which includes:

- Small reservoir at the dam site
- Dam structure including flood gates and water retaining section
- Water diversion structure including water intake, water diversion tunnel and penstocks
- Power house including turbines/generators and auxiliary equipment
- On-site switching / transformer station (owned by the project entity)
- transmission lines to the grid

The AMS.I.D methodology does not provide guidance on how the system boundary of the project is to be determined. We therefore have applied the guidance available for the ACM0002 methodology. 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.

As mentioned above, the boundary of the project is marked by the point where the project connects to the grid. The project is connected to the Gansu Grid, which 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. The geographical boundaries for the determination of the baseline emissions are therefore defined as the North West China Grid and direct emissions from all generation sources serving the grid. Figure B.1 shows a graphic representation of the North West China Power Grid.

B.1 North West China Power Grid

B.4. Description of baseline and its development:

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

Leakage associated with the project does not have to be taken into account as the project employs new turbines / generators and does not involve the transfer of equipment from another activity. Furthermore, the project has no significant water storage capacity. In fact, the power station has a power density of approximately 92.4 W/m^2. Therefore, in accordance with the Executive Board decision on “Thresholds and criteria for the eligibility of hydroelectric power plants with reservoirs as CDM project activities” (EB23), the project emissions from the reservoir can be ignored. Thus, the emission reductions are equal to the baseline emissions.

In accordance with the small scale methodology I.D, baseline emissions are equal to power generated by the project activity and delivered to the grid, multiplied by the baseline emission factor. According to the small scale methodology I.D the baseline emission factor is calculated as either the “average of the approximate operating margin and the build margin”, or the “weighted average emissions (in kg CO2/kWh of the current generation mix)”. Power consumption in the North West China Grid is growing rapidly, which requires the construction of additional generating capacity. The Gansu Luqu Dazhuang Hydropower Station is therefore expected to displace predominantly new capacity that is added to the grid and power generated by plants at the operating margin. Therefore, the baseline emission factor has been calculated as the average of the approximate operating margin and the build margin.

The small scale methodology I.D refers to the ACM0002 methodology for the calculation of the operating margin and the build margin. We therefore refer to this methodology in the calculation of the baseline 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 small-scale CDM project activity:

Additionality

Hydropower has made significant contributions to the expansion of power supply in Gansu Province over the last few decades. However, new hydropower additions to the grid, in particular small hydropower stations, experience increasingly unattractive economic returns on investment. The reasons for this are that the most suitable locations for hydropower projects have already been used, and new projects are located in remote areas driving up the costs of hydropower per kWh. In addition, the engineering costs in China are rapidly rising. In the absence of the project activity, the North West China Grid is expected to expand through the least-cost expansion, which in the case of North West China is through predominantly coal-fired thermal power generation, excluding the proposed project activity.

According to Attachment A to Appendix B of the simplified modalities and procedures for CDM small-scale project activities the following categories of barriers are recognized as a basis for the additionality argument:
1. Investment barriers
2. Technological barriers
3. Barriers due to prevailing practice
4. Other barriers

The additionality argument is based on the proposition that the project faces an investment barrier that prevents the implementation of this type of project activity. The investment barrier is argued on the basis of two separate strands of argument: the project faces a barrier due to 1) poor economic return on investment, and 2) limited access to financial resources.

Return on investment

The project faces a barrier to implementation due to the poor returns on investment. To illustrate this, we performed a benchmark analysis in which we compare the Internal Rate of Return (IRR) of the proposed project activity to an industry benchmark. The parameters used in the calculation are presented in Table B.1.

Table B.1 Parameters used in the investment analysis.

Gansu Luqu Dazhuang Hydropower Station Project	
Parameter	**Value**
Static investment cost	80,575,100 RMB
Annual power supply	45,260,000 kWh
Annual Operation and Maintenance costs	2,080,000 RMB
Investment horizon	25 years
Grid price (gross)	0.227 RMB / kWh (inclusive 17% VAT)
Estimated CER price	8 EUR / tCO2

The main parameters of the project are based on the Preliminary Design Report and a supplementary statement prepared after review of the Preliminary Design Report by experts appointed by the local authorities during the approval process. The grid price for the project is the guidance tariff set by the government authorities and was communicated through a government notice issued in 2004. All data was available to the project entity before the decision to implement the project was taken.

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

Table B.2. The breakdown of the total static investment cost

Item	Unit (RMB Yuan)
Main construction cost	29,081,500
Electromechanical equipment	26,806,800
Metal structures	6,486,300
Temporary facilities	4,925,800
Flood prevention	37,500
Expropriation compensation	850,000
Basic preparation cost	3,736,700
Environmental protection	2,105,300
Others	6,545,200
Total static investment	***80,575,100***

The investment analysis compares the project on the basis of internal rate of return (IRR) to an industry benchmark for hydropower projects, which in the case of small-scale hydropower projects in China is set at 10% (see Economic Evaluation Code for Small Hydropower Projects, 1995). The results of the analysis for the Dazhuang hydropower station are provided in Table B.3a.

Table B.3a Results of economic analysis

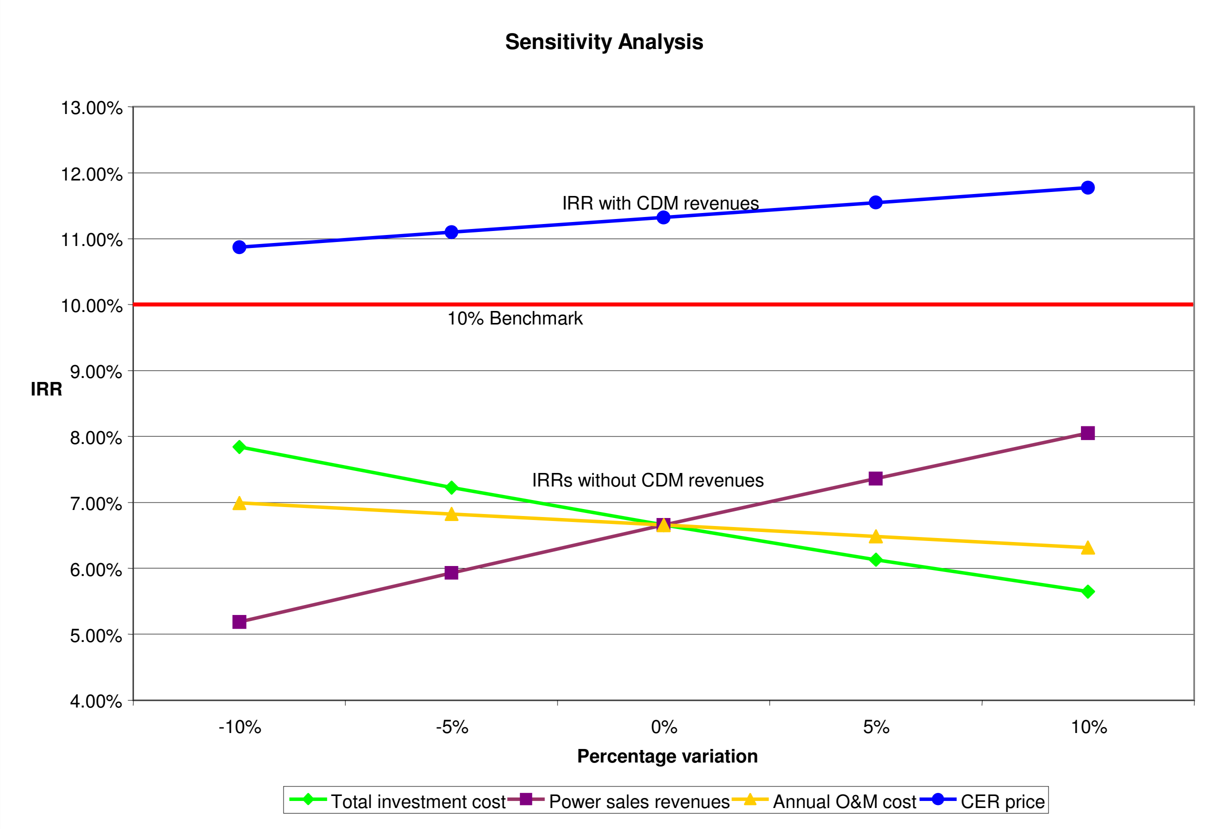
Dazhuang hydropower station		
Internal rate of return (IRR), over a 25 year period	Without CDM revenues	6.66%
	With CDM revenues	11.26%

The results clearly indicate that the return on investment of the Dazhuang hydropower station is below the 10% benchmark. To confirm this we have considered variation of 10% in the critical assumptions. Table B.3b and Figure B.2. show the results of variations in critical assumptions on the IRR with and without CDM revenues.

Table B.3.b Sensitivity analysis; impact of variations in assumptions on the IRR without CDM revenues

Critical assumption \ Percentage Variation	-10%	-5%	0%	+5%	+10%
Total investment	7.84%	7.22%	6.66%	6.13%	5.64%
Power sales revenues	5.18%	5.93%	6.66%	7.36%	8.05%
Annual O&M Cost	6.99%	6.82%	6.66%	6.49%	6.32%

Figure B.2 Result of variations in the critical assumptions



The sensitivity analysis confirms that the project's IRR without CDM revenues is substantially below the benchmark and that revenues from the sale of CERs are required to make the project financially attractive. Therefore, the proposed project activity faces an investment barrier due to its commercial unattractiveness.

Access to financial resources:

The Dazhuang hydropower station project also faces an investment barrier due to the limited access to financial resources. The financial services sector of Gansu Province is not well developed and lacks the instruments to deal with financing of high-risk projects. In addition to the poor economic return on investment as argued above, the project also faces several other obstacles that make it difficult to attract financial resources. The revenues through CDM are therefore considered to be an essential part in arranging financing for the project. The barriers to attract financial resources are discussed below:

- **Project location:** The project is located in Luqu County, a very poor and remote area of China, and designated as a national poverty county. Industry in Luqu County is not developed and there are very few companies with sufficient financial resources to develop a hydropower station, and few companies exist outside of the County that are willing to invest in hydropower projects in Luqu County.

- **Adverse lending policies by banks:** The banking sector is reluctant to extend loans to small hydropower stations unless special circumstances apply. The high risks and poor returns associated with small hydropower projects make it difficult for project developers to receive loans without putting up a high share of equity capital.

  The risk-adverse attitude of the banking sector was formalized in the summer of 2004, when under the guidance of the National Development and Reform Commission many banks adopted policies under which hydropower stations with a capacity under a certain threshold will not receive any loans or extensions of loans.[2]

Conclusion:

The above-mentioned obstacles present a prohibitive barrier to attract financing. To conclude, the project faces an investment barrier due to the unattractive return on investment and problematic access to financial resources.

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 6.66 to 11.26% which is above the benchmark.

Serious CDM Consideration

The project owner was aware of the possibilities of CDM in an early stage of the project and the prospect of CDM revenues has been an important factor in the decision to implement the project. The start of the project activity was in July 2006 when the project entity decided to go forward with the project by signing the equipment purchase contract for the turbine/generator sets. Prior to this date, the project entity, Gansu Luqu Duosongduo Hydropower Station Project was very knowledgeable about the possibilities offered by CDM and had incorporated CDM in its decision making from the first actions taken with regard to the project activity. The prospects of CDM revenues were considered in the Feasibility Study Report (i.e. July 2005) and the project entity took the first steps towards the application of the project under CDM in January 2006 by engaging its CDM consultants. An overview of key events is given in table B.4.

[2] A statement from the Industrial and Commercial Bank of China confirming that their restrictive policies were implemented from 2004 is available to the validator.

Table B.4: Overview of key events in the development of the project

Date	Key event
July 2005	Completion of the Preliminary Design Report which considered CDM revenues as an important source of revenues
25 November 2005	Supplemental report for government approval was prepared taking into account suggestions and comments from government appointed experts
December 19th, 2005	The project was approved by Gansu Development and Reform Commission on the basis of the Preliminary Design Report and supplemental report.
January 6th, 2006	The project owner signed a CDM development Agreement with Gansu Tonghe Investment Project Consulting Co., Ltd.
July 8th, 2006	Signature of equipment purchase contract
January 18th, 2007	Start of main construction activities
February 3rd, 2007	The project entity signed an agreement for the sale of CERs with Cargill international SA

In conclusion, the project faces economic and financial barriers to its implementation that will be overcome by the registration of the project under the CDM. In addition, the prospects of CDM revenues played a crucial role in the decision to implement the project activity.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

In accordance with the small scale methodology I.D, baseline emissions are equal to power generated by the project activity and delivered to the grid, multiplied by the baseline emission factor. According to the small scale methodology I.D the baseline emission factor is calculated as either the "average of the approximate operating margin and the build margin", or the "weighted average emissions (in kg CO2/kWh of the current generation mix)". Power consumption in the North West China Grid is growing rapidly, which requires the construction of additional generating capacity. The proposed project is therefore expected to displace predominantly new capacity that is added to the grid and power generated by plants at the operating margin. Therefore, the baseline emission factor has been calculated as the average of the approximate operating margin and the build margin.

The combined margin emission factor is in this particular case calculated *ex ante* on the basis of the latest additions to the grid. The small scale methodology I.D refers to the ACM0002 methodology for the calculation of the operating margin and the build margin.

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.

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.5. 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.6). Therefore, the calculation method of simple OM is suitable for this project activity.

Table B.6 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	108828	25.22
2002	17756.9	9199.9	105.1	27061.9	34.38	93428	27427	198	121053	22.82
2003	20492.7	9382.0	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	25362.6	12219.8	399.5	37981.9	33.22	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.

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

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.[3]

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:

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

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

$F_{i,m,y}$, $COEF_{i,m}$ *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, 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.[4] 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:

---

4 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.

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

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

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

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

with:

- $F_{i,j,y}$ the amount of the fuel i consumed in y year of j province (measured in tce;
- $COEF_{i,j,y}$ 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.[5]

For details we refer to Annex 3.

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

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.

Step 3. Calculation of the Baseline Emission Factor (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.[6]

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:

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

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

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 emission reductions 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 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:	**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	These are the most recent data.

and procedures actually applied :	
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 :	Original data are from China Electric Power Yearbook (Editions 2004 and 2005) and statistics from the China State Grid Website (2006)
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; $TJ/10^8m^3$
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:	

B.6.3 Ex-ante calculation of emission reductions:

The annual net power supply to the North West China Grid is estimated to be 45,260 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 38,462 tCO2e. We obtain the values for the baseline emissions during the first crediting period provided in Table B.7:

Table B.7 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	26/09/2008 – 25/09/2009	45,260	0.8498	38,462
2	26/09/2009 – 25/09//2010	45,260	0.8498	38,462
3	26/09/2010 – 25/09//2011	45,260	0.8498	38,462
4	26/09/2011 – 25/09//2012	45,260	0.8498	38,462
5	26/09/2012 – 25/09//2013	45,260	0.8498	38,462
6	26/09/2013 – 25/09//2014	45,260	0.8498	38,462
7	26/09/2014 – 25/09//2015	45,260	0.8498	38,462
	Total			**269,234**
	Average			38,462

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 and Project emissions:

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 as project emissions.
The project will install an on-site diesel generator with a capacity of at most 30 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.[7] The emissions of the diesel generator are significantly less than 1% of total emission reductions and are considered negligible.[8] In case of emergencies the project will not claim emission reductions and the use of the

7 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 at max for ten hours annually for maintenance purposes.

8 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 30 kW. As the generator will be operating at max for 10 hours annually, the expected annual power generation can be calculated to be 300 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

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.8 provides the annual emission reductions in tabular form.

Table B.8 *Ex ante* estimate of emission reductions due to the project

Year	Project Emissions (tCO_2)	Baseline emissions (tCO_2)	Leakage (tCO_2)	Emission Reductions (tCO_2)
Year 1: 26/09/2008 - 25/09/2009	0	38,462	0	38,462
Year 2: 26/09/2009 - 25/09//2010	0	38,462	0	38,462
Year 3: 26/09/2010 - 25/09//2011	0	38,462	0	38,462
Year 4: 26/09/2011 - 25/09//2012	0	38,462	0	38,462
Year 5: 26/09/2012 - 25/09//2013	0	38,462	0	38,462
Year 6: 26/09/2013 - 25/09//2014	0	38,462	0	38,462
Year 7: 26/09/2014 - 25/09//2015	0	38,462	0	38,462
Subtotal	**0**	**269,234**	**0**	**269,234**
Average	0	38,462	0	38,462

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**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	45,260 MWh
Description of measurement methods and procedures to be applied:	The net supply of power to the grid by the Gansu Luqu Dazhuang Hydropower Station Project Project is measured through national standard electricity metering instruments. The metering instruments will be calibrated annually in accordance with the *"Technical administrative code of electric energy metering (DL/T448－2000)"*. The net amount of power supplied is measured and recorded monthly.
QA/QC procedures to be applied:	These data will be directly used for calculation of emission reductions. The records of the grid company (evidenced by sales

considering the size of the generator used on-site. We estimate the annual emissions by the diesel generator as 0.72 tCO2e, which would reduce annual emission reductions with about 0.000019% and can therefore be considered negligible.

	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:	**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	10 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 ten 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 0.000019% 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:

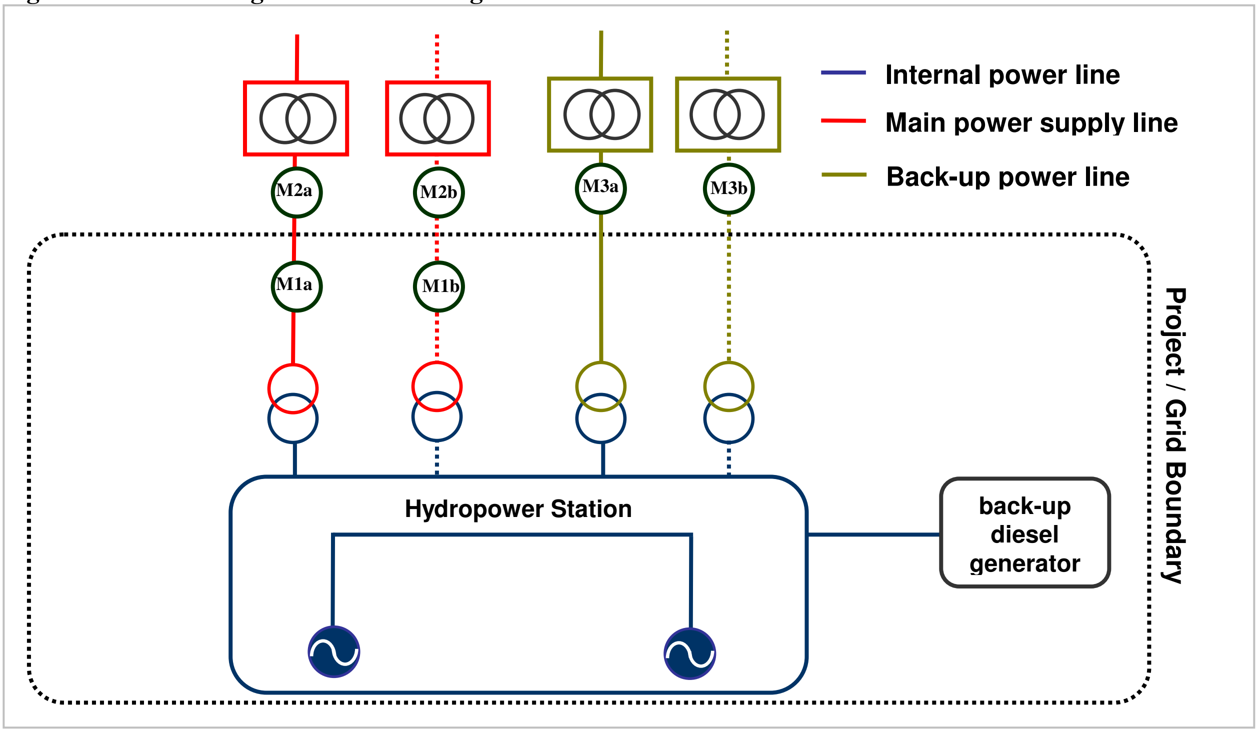
This monitoring plan outlines the principles which shall be followed in the monitoring of the parameters listed in section B.7.1. A monitoring manual with detailed procedures will be prepared on the basis of the principles outlined below. The monitoring manual may be updated to reflect the actual implementation 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 Duosongduo 110 kV Switching Station and might in the future also connect to the grid through other 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. An indicative grid connection diagram is provided in figure B.3.

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 annual 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.

- **Power received through back-up power lines:**
  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:
  - Grid company:
    The grid company will meter the power supplied to the project with its own metering equipment in accordance with national regulations.
  - Calibration:
    Calibrations are carried out by the grid company or by a certified company appointed by the grid company.

- **Power supplied by back-up emergency diesel generator:**
  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 ten hours every year for maintenance purposes and reliability checks in accordance with government regulations. The emissions associated with the diesel generator are calculated as 0.0019% 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 the metering instruments 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.9.

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.9 Details of metering instruments

Meter	Operated by	Electronic measurement	Manual logging	Recording	Calibration	Accuracy	Documentation
$M1_x$	Project entity	Hourly	Daily (optional) [9]	Monthly	Grid Company (Annually)	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 (Annually)	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.
$M3_x$	Grid company	-	-	Monthly	Grid Company (Annually)	Accuracy Class 1 or more accurate	Monthly billing invoices (for power received from the grid).

9 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.

Reporting, archiving and preparation for periodic verification
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 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 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:

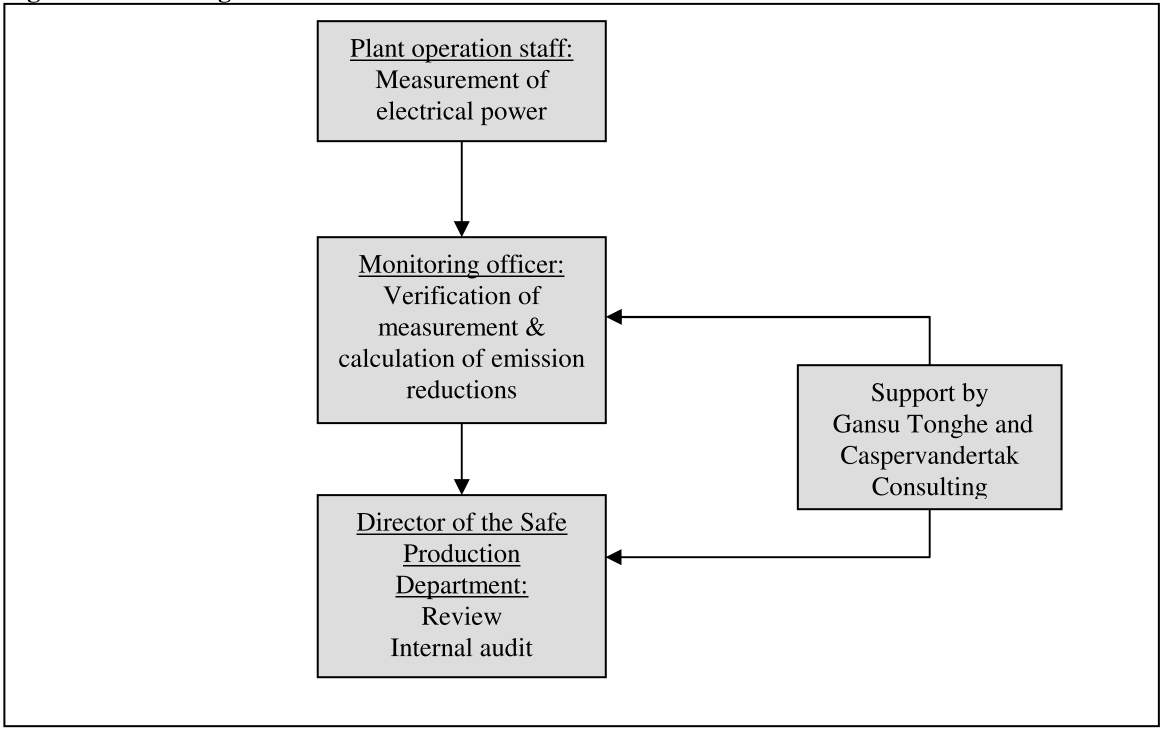
1. The project entity will ensure that all requirements for monitoring of emission reductions have been re-established.
2. The monitoring officer and the head of operations of the hydropower station will both sign a statement declaring the emergency situation to have ended and normal operations to have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

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



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

Date of completion of the baseline study and monitoring methodology: 24/12/2007

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
-Joost van Acht:	Chief Representative China:	Joost@caspervandertakconsulting.com
-Christophe Assicot:	Consultant:	Christophe@caspervandertakconsulting.com
-Casper van der Tak:	General Director:	Info@caspervandertakconsulting.com

Gansu Tonghe Investment Project Consulting Co., Ltd.

Tel: +86-931-4663436 / Fax: +86-931-4541296

-Zhao Yonghong:	Consultant:	mei.yang@126.com
-Jin Yuebing:	General Director:	jybing_gs@126.com; jybing_gs@163.com

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:

09/07/2006, this day marked the signature of the equipment purchase contract which can be considered the earliest potential start date of the proposed project activity

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:

26/09/2008 (or on the date of registration of the CDM project activity, whichever is later)

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

Not applicable, a renewable crediting period will be applied.

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

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

An Environmental Impact Assessment (EIA) was carried out and was accepted by the Environmental Protection Bureau of Gansu Province on the 23rd of June 2005 A summary of the main findings of the EIA is provided below:

SUMMARY OF ENVIRONMENTAL IMPACT ASSESSMENT

During the construction period, the main pollutants consist of wastewater, daily sewage, daily rubbish, waste gas from machines, and noise pollution. The impact on vegetation is mainly due to main construction excavation and quarry excavation. During the construction period, the average wastewater drainage per hour is $60m^3$ and daily drainage amounts to $480m^3$. During the peak construction period, daily sewage drainage caused by the construction staff is $7.6m^3$, average daily rubbish amounts to 380kg, fuel consumed by the machines is 120t, and 20t explosives will be used. During construction, desert grits and soil will not be produced. The permanent occupied land is 2.99 ha and temporary occupied land is 9.13 ha.
During operation, the main pollutants are daily sewage from the workers, daily rubbish, floating leaves and floating cadavers. The main impact on the ecosystem is caused by flooding of the reservoir. Daily drained sewage caused by the on-site workers is $1.1m^3$ and average generated daily rubbish is 30kg monthly.

Main positive impacts:

1) The project further develops and utilizes the water resources of the Tao River and provides clean energy to stimulate local economic development. Furthermore, the construction of the project provides electricity to replace the use of fuel and coal, improving local energy resources and protecting the forests, vegetation and environment.
2) The construction of the project improves the water quality of the downstream river. During the flood season, the station alleviates the flow and reduces sediment accumulation downstream. The project also provides opportunities for agricultural irrigation, improving productivity and the standard of living of local residents.
3) The construction of the project can provide electricity and water resources for forest preservation activities in the area.

Main negative impacts:

1) Daily pollutants caused by the construction staff during construction, such as SO2 and dust, will have an impact on the surrounding environment and local residents. The vehicles will also produce gas and dust, which will affect the air quality.
2) During construction, if not drained timely, the wastewater caused by excavation and washing grits could increase the sediment content of the water in the Tao River and increase the turbidity of the water during periods of low water.
3) The noise, generated mainly by explosions, machines, and vehicles during the construction period, could exceed the standard and impact local residents because the construction site is relatively close to the residential area and transporting vehicles pass through the villages.
4) During operation, the project will cause a reduction of the water level in the river section between the dam and the power station (about 4.6km). During low water periods, the reduction of the water level could cause negative impacts on the ecological environment of the river downstream.

Protective measures:

1) Water quality protection during construction:

The wastewater mainly comes from the grits-processing factory. Because the floating content in the wastewater is high, it will exceed the standard for drained waste water (GB8978-1996). Therefore, a natural distilling pond will be installed at the site of the processing factory. The sand will be reused after distilling, and sediments will be recycled to restore the soil of the grit quarry. Furthermore, due to the high content of BOD and COD in the daily sewage, the sewage cannot be drained directly into the river in order to assure that the water quality is maintained.

2) Water protection during operation:

When construction of the project is finished, the number of workers in the project area will decrease and the daily sewage will be treated in a cesspool and then used as agricultural fertilizer to plant trees on the banks of the reservoir area.

3) Protection of the water flow:

In order to protect the water flow downstream of the dam during low water periods, the discharged water can not be lower than 15% of the average monthly flow during low water periods, which equals $1.99m^3/s$. The project owner will be responsible for guaranteeing the minimum water flow of $1.99m^3/s$ and the Environmental Protection Bureau of Luqu County will monitor the minimal water flow at least once a year.

4) Other protection measures during construction:

1) Noise prevention:

To prevent noise, the project should use building materials that prevent noise from spreading and place noise-preventive walls. The vehicles should obey the standard for noise generated by vehicles (GB1495-79). Also operation hours should be adjusted to avoid operating at night.

2) Solid waste disposal:

During construction, the maximum amount of staff will be 756, including managerial staff. The estimated daily generation of rubbish is 756kg during the peak construction period. To protect the ambient environment and reduce pollution, the rubbish should be disposed of in designated waste disposal sites and cleared up timely (recycling or burying). Vehicle will be available to transport the rubbish.

3) Waste gas and dust prevention:

In order to reduce air pollution, counter measures should be taken. The project should employ systems that limit dust when transporting grits and cement and employ wet processing production methods. The waste gas from vehicles should satisfy the standard. Finally, the ground will be watered to reduce dust.

4) Health protection:

During construction, the following measures will be taken to protect the worker's health: Disposal of daily pollutants; Sterilization and killing of mosquitoes, flies and mice; Providing a health check and information of construction workers; Strengthen food sanitary management and supervision; and finally, protecting construction workers from noise and dust.

The project makes full use of local water resources and turns resource advantages into economic advantages, aiding economic development. Management should be strengthened during construction and operation. Necessary environmental protection and water protection measures need to be taken. The Tao River Dazhuang Hydropower Station is practical and feasible in terms of environmental protection.

Recommendations

(1) To optimize design plan, protect local ecosystem and reduce agricultural flood.

(2) To strengthen management of environment protection, to assure the water protection investment and environment protection investment, to minimize the environment impacts during construction and operation phases.
(3) Strict management of the construction activities and ensure that the construction workers follow the ground rules. No plants may be destroyed intentionally.
(4) Establishment of an environmental protection unit to supervise the implementation of the environmental protection measures.

Impact on aquatic animals:
Besides the Environmental Impact Assessment, a separate "Report of the assessment of impact on aquatic life and corresponding protection measures" has been written. The report assesses the influence of the proposed project activity and another hydropower station (i.e. Gansu Luqu Duosongduo Hydropower Station Project) on the aquatic animals. The main recommendations involve; Catchment of fish upstream of Dahzuang hydropower station and downstream of Duosongduo hydropower station. Fish from both locations will be released into the Duosongduo reservoir to ensure the continued survival of existing fish species; Catchment of juvenile fish from Duosongduo Reservoir which will be released to the river section upstream of Dazhuang Reservoir and downstream of Duosongduo Reservoir to avoid in-breeding, and; Selective catchment of fish to control the fish population of Dazhuang and Duosongduo reservoir to stimulate the positive development of the species in the reservoir in accordance with scientific and reasonable fish management practices. The project entity will make a financial contribution of 160,000 RMB. The monitoring of aquatic life will be implemented three times a year for a period of five years on several locations by the "Gansu Province Agriculture & Ecology Environment Protection Management Station" for a period five years.

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 approved by the Environment Protection Bureau of Gansu Province on the 23rd of June 2005.

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 23rd of January to the 23rd of February of 2007, 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: 30th of January 2007, from 14:30 till 16:30.
  Location: First floor meeting room of Shuangcha clinic of Luqu County

  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 January 24th, 2007, in the Gansu Daily (Gansu's leading daily newspaper)
- Online announcement on the Gansu Economic News Site: www.gsei.com.cn on the 23rd of January, 2007.

The stakeholder meeting was combined with the stakeholder meeting of another hydropower project, the "Gansu Luqu Duosongduo Hydropower Station Project", which is currently being constructed by the same project entity and is also located at the main stream of the Tao River in Luqu County of Gannan Autonomous Tibetan Prefecture in Gansu Province, China (more than 1 km removed from the proposed project activity). The majority of stakeholders are therefore the same but the meeting was divided into two sessions. Both table E.1 and Section E.2 are specific to the proposed project, the "Gansu Luqu Dazhuang Hydropower Station".

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	Name	Position
1	Environmental Protection Bureau of Luqu County	Wu Xiaorong	Vice General Director
2	Land Resource Bureau of Luqu County	Jiang Yingchun	Department Director
3	Merchant Bureau of Luqu County	Yang Shuguang	General Director
4	Township Government, Shuangcha Town, Luqu	Ma Fulian (Tibetan)	Leader of Township
5	Township Government, Shuangcha Town, Luqu	Dougejia (Tibetan)	Secretary
6	Dazhuang Village of Shuangcha Town of Luqu	Sangmuzhi (Tibetan)	Vice Team Leader
7	Dazhuang Village of Shuangcha Town of Luqu	Zhuoma (Tibetan)	Villager
8	Dazhuang Village of Shuangcha Town of Luqu	Raoluo (Tibetan)	Leader of Village
9	Jini Village of Shuangcha Town of Luqu County	Zha Xi (Tibetan)	Local Villager
10	Jini Village of Shuangcha Town of Luqu County	Cairang Dongzhi (Tibetan	Local Villager
11	Jini Village of Shuangcha Town of Luqu County	Agong (Tibetan)	Local Villager
12	Installation and Maintenance Company of Gansu Liujiaxia Hydropower Station Construction	Fan Jiancai	General Engineer
13	Duosongduo Project Department of Beijing An'neng Project Supervision Company	Ji Silong	General Supervisor
14	Tao River Luqu Branch of Mingzhu Hydropower	Wang Junmin	Manager
15	Tao River Luqu Branch of Mingzhu Hydropower	Huang Zhihu	Director
16	Caspervandertak Consultiung	Joost Van Acht	Consultant
17	Caspervandertak Consultiung	Christophe Assicot	Consultant
18	Caspervandertak Consultiung	Sun Cuicui	Interpreter
19	Gansu Tonghe Investment Project Consulting .Co.ltd	Zhao Yonghong	Project Manager
20	Gansu Tonghe Investment Project Consulting .Co.ltd	Zhao Dianhui	Consultant

E.2. Summary of the comments received:

Comments and opinions received at stakeholder consultation meeting:

Each attendant of the stakeholder consultation meeting expressed his or her opinion on the proposed project. During the meeting many stakeholders asked general questions about the CDM procedures, these comments were omitted from the comments stated below.

The project entity was represented by:
- Mr. Wang Junmin (Manager)
- Mr. Huang Zhihu (Director)

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

Name: Dougejia
Position / Affiliation: Communist Party Secretary of Shuangcha Town of Luqu County
Comments:
Mr. Dougejia expressed that in terms of long-term development, hydropower is a clean resource which has long-term economic benefits. In terms of environmental protection, the project entity should make efforts to protect the environment during construction and minimise the impact on the environment. He added that the environmental protection work is supervised by the local government and that work is done well at the moment, so the impacts on environment are minimal. In addition, the township government will actively supervise the environmental impacts caused by the project.

Name: Yang Shuguang
Position / Affiliation: General Director of Merchant Bureau of Luqu County
Comments:
Mr. Yang Shuguang stated Luqu County is a minority county and that the main source of income is stockbreeding. There is little agriculture and economic development is very slow. The construction of Dazhuang hydropower station can increase local incomes and standards of living through employment opportunities.

Name: Wu Xiaorong
Position / Affiliation: Vice general director, Environmental Protection Bureau Luqu County
Comments:
Wu Xiaorong expressed the project will have some impact on the aquatic life in the Tao River during construction, but that this impact is minimal. He added the Environmental Protection Bureau of Luqu County has signed an environment protection agreement with the project entity and that they will supervise.

Name: Mr. Dougejia
Position / Affiliation: Secretary, Communist party's Commission of Shuangcha Town, Luqu County
Mr. Dougejia, who was requested to speak on behalf of the local villages who do not speak Chinese well, informed that the local villagers believe the Dazhuang project does not affect their life. As the project will not expropriate additional land in the future, they do not foresee any problems.

Name: Mr. Zhao Yonghong
Position / Affiliation: Project Manager Gansu Tonghe Investment Project Consulting Co., ltd.
Comments:
Mr. Zhao Yonghong enquired about how much land has been expropriated in Dazhuang Village. He also wanted to know what kind of land has been expropriated and whether the construction of the project has a negative impact to the local villagers' lives. In addition, he wanted to know what the main source of income is for local villagers.

Response by local villagers:
Mr. Dougejia, requested to translate the response made by local villagers, responded that altogether 20,000 m2 of land has been expropriated at the village. All expropriated land consists of plow land. The project does not affect local villagers' lives.

Response by Mr. Dougejia (Secretary, Communist party's Commission of Shuangcha town, Luqu County):
Mr. Dougejia added that altogether, there are around 133,333m^2 of plow lands at Dazhuang Village. There are no statistics available on the amount of grassland. The amount of plow land at another village (i.e. Jini village) is not affected by the project. Total land area at Shuangcha Town is 887.6km^2, the plow land accounts for 7.73km^2 and usable grassland are 196km^2. The main agricultural crops grown are Tibetan wheat and cole. Tibetan wheat has an output of about 50 kg per 667m^2, which is worth 80 RMB. Plow land accounts for less than 5% of the total area. Nearly 70% of total income is earned by breeding stock.

Response by Mr. Wang Junmin (Manager of Tao River Branch of Gansu Mingzhu Hydropower Development Co., Ltd.):
Mr. Wang Junmin added that in order to support the local villagers, the project owner decided to provide each family with a financial donation equal to 50 kWh of electricity. This fund will be

transferred to the township government, which will invest it in public welfare in accordance with local villagers' demand. The compensation for expropriated land is around RMB 4300 per 667m^2.

Name: Mr. Christophe Assicot
Position / Affiliation: Consultant, Caspervandertak Consulting
Comments:
Mr. Christophe Assicot asked if local villagers can pass the river through the dam of Dazhuang hydro power station.

Response by Mr. Wang Junmin (Manager of Tao River Branch of Gansu Mingzhu Hydropower Development Co., Ltd.):
Mr. Wang Junmin answered that local villagers can pass the river through the dam of the project. In addition, the project owner invested 300,000RMB to build a bridge downstream of the hydropower station for the convenience of local villagers. The construction of the bridge is organized by the local government.

Name: Mr. Christophe Assicot
Position / Affiliation: Consultant, Caspervandertak Consulting
Comments:
Mr. Christophe Assicot asked if local villagers have access to reliable electricity supply. He also enquired about the main purpose of power (i.e. what do local villagers use the electricity for).

Response by local villagers:
Mr. Dougejia, requested to translate the response made by local villagers, responded that the local villagers have available access to electricity, but that the voltage up to now has not been stable. Local villagers mainly use electricity for lighting and TV sets, although only few families have TV sets.

Response by Mr. Wang Junmin (Manager of Tao River Branch of Gansu Mingzhu Hydropower Development Co., Ltd.):
Mr. Wang Junmin added that the village lies at the end part of the grid, which explains the voltage is not stable. He explained this situation will change when the Dazhuang hydropower station will start to operate.

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

Given the generally positive (or neutral) nature of the comments received, no action will been taken to solve the comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

The Project Entity:

Organization:	Gansu Mingzhu Hydropower Development Co,.ltd.
Street/P.O.Box:	475 Xijin east road of Qilihe district of Lanzhou city of Gansu province
Building:	/
City:	Lanzhou City
State/Region:	Gansu province
Postfix/ZIP:	730030
Country:	China
Telephone:	+86 - (0)931−2952873
FAX:	+86 - (0)931−2652046
E-Mail:	/
URL:	/
Represented by:	Wang Junmin
Title:	manager of subsidiary company
Salutation:	Mr.
Last Name:	Wang
Middle Name:	/
First Name:	Junmin
Department:	Tao River Luqu Branch of Gansu Mingzhu Hydropower Development Co,.ltd.
Mobile:	+86 - 13609382488
Direct FAX:	+86 – (0)931−2652046
Direct tel:	+86 – (0)931−2952873
Personal E-Mail:	lyfanyaling@sina.com, lyfanyaling2007@163.com

The Purchasing Party:

Organization:	Cargill International SA
Street/P.O.Box:	14 Chemin De-Normandie
Building:	/
City:	Geneva
State/Region:	/
Postfix/ZIP:	CH-1211
Country:	Switzerland
Telephone:	0041 22 703 2050
FAX:	0041 22 703 2955
E-Mail:	Michael_dwyer1@cargill.com
URL:	/
Represented by:	Michael Dwyer
Title:	Trader
Salutation:	Mr.
Last Name:	Dwyer
Middle Name:	/
First Name:	Michael
Department:	Power & Gas
Mobile:	/
Direct FAX:	0041 22 703 2955
Direct tel:	0041 22 703 2050
Personal E-Mail:	Michael_dwyer1@cargill.com

Annex 2

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)	(tCO_2)
							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.[10]

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
Other petroleum products	10^4 Tons	0	383.69	0	1	20	0

10 Data are from Table A4a.

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 Yearbooks.

Annex 4

MONITORING INFORMATION

Selection procedure:
The monitoring officer will be appointed by the general manager of Gansu Mingzhu 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: Wang Junmin
Position: Manager of Tao River Luqu Branch of Gansu Mingzhu 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.
- **Supervise preparation of photographic evidence reservoir surface area**
  The monitoring officer will ensure that photographic evidence of the reservoir surface area is prepared and will provide the design dimensions of the reservoir to a DOE to allow for comparison
- **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 report