CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
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CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

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Title of document: Manasi River Stage I Hydropower Project of Hongshanzui Hydropower Plant, Xinjiang Tianfu Thermoelectric Co., Ltd.
Version of document: Version 05
The date of the document: 13/08/2007

Revision history of the document:

Version of document	Date of the document	Reason for revision
Version 01	08/08/2006	—
Version 02	31/10/2006	The document was revised based on the on-field investigation.
Version 03	11/12/2006	The document was revised according to the request of China's DNA.
Version 04	19/03/2007	The document was revised according to the resolution of corrective action and clarification requests of TÜV SÜD
Version 05	13/08/2007	The document was revised according to comments received from EB.

A.2. Description of the project activity:

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Xinjiang Manasi Hydropower Project is designed to construct a 50MW run-of-river hydropower project located on the Manasi River in Manasi County of Shihezi City, Xinjiang Uygur Autonomous Region, P. R. China, which will generate an annual on-gird electricity supply of 187.11 GWh from May 2007 to 2013 and subsequent 212.85 GWh starting from 2014[1]. The proposed project consists of an inhaul hinge, an intake power tunnel of 11.8km, a 50MW (9MW × 2 + 16MW × 2) powerhouse, an 110kV switchyard and 110kV transmission lines for power evacuation. The project will be connected to Xinjiang Grid, and then to Northwest China Grid which includes Shanxi Grid, Gansu Grid, Qinghai Grid, Ningxia Grid and Xinjiang Grid.

The area covered by Northwest China Grid is abundant with coal resources, and thermal power plant is the major power source the Grid. The proposed project is a combination of positive environmental, economic, and sustainable development benefits. The proposed project will displace part of thermal

[1] Kensiwate reservoir (which might be built in future on the upriver will be invested, constructed, operated and managed by some other investors, and hence is not under control of this proposed CDM project activity nor of the project owner and is excluded from the proposed project activity), will start operation since 2014. This reservoir will not increase the storage capacity of the Project but merely, as forecasted and anticipated, improve the stability of water inflow and assure output of the project. After its operation, the annual operation hours and annual on-grid power supply of the project will be increased to 4,300 hours and 212.85 GWh, respectively.

power in Northwest China Grid by making use of clean and renewable energy. The specific sustainable development benefits of this proposed project are described as below:

- The construction and operation of the proposed project will ease up the local shortage of power supply;
- The electricity generated by the proposed project will replace a part of the electricity originally generated by coal-fired generating units and thus the local environmental pollutions will be mitigated;
- The project creates job opportunities, an average labor force of 1,600 are available during the project construction period of 2.5 years, and 85 permanent staff positions are needed during the operation and maintenance period;
- The project will benefit the hharmonious development of the population, resources, environment and economy in the project area will be achieved; and
- The project can help reduce poverty, Xinjiang is a very important region regarding to poverty reduction for western region development.

In terms of environmental and power benefits, the proposed project supports China's policy of harnessing zero-impact renewable energy resources. The social, economic and environmental benefits contribute to the Strategy of Developing the Western Region, and emphasis on the important sustainable benefits of this proposed CDM activity to the country and region.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (Host)	Xinjiang Tianfu Thermoelectric Co., Ltd.	No
Japan	The Tokyo Electric Power Company Inc.	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Xinjiang Uygur Autonomous Region

A.4.1.3. City/Town/Community etc:

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Manasi County of Shihezi City, Xinjiang Uygur Autonomous Region, China.

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

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Figure 1 and 2 below shows the location of the proposed project site. The proposed project is located on the middle reaches of Manasi River, in Manasi County, Shihezi City, Xinjiang Uygur Autonomous Region. The project site is 45km away from Shihezi city center and 192km from the provincial capital of Urumqi City. The geographical coordinates of the headwork are east longitude 85° 57' and north latitude 43° 58'. The secondary road from Liangzhouchan Village to Nanshan Meadow stretches along the Manasi River, by which main road of G312 and regional road of S101 can be linked to.

Figure 1 Map of China Showing Location Of Xinjiang Uygur Autonomous Region

Figure 2 Location of The Proposed Project

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

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The proposed project falls into:
Sectoral Scope Number: 1. Energy Industry

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

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Xinjiang Manasi Hydropower Project is a run-of-river project which consists of building an inhaul hinge, an intake power tunnel, a powerhouse, a switchyard and 110kV transmission lines. The total installed capacity is 50MW (9MW × 2+16MW × 2) and the annual on-grid supply is 187.11 GWh from 2007~2013 and 212.85 GWh since 2014, respectively. The proposed project will be connected to Northwest Power Grid. Based on the preliminary design, its main components are as follows:

- An inhaul hinge designed for water intake, flood discharge and sediment deposition with a storage capacity of 0.85 million m^3 at normal pool level of 842.4 m (above the sea level)[2];
- An intake power tunnel of 11.8 km with intake flow of $62m^3/s$, and a rated water head of 104 m;
- A 50MW (9MW×2+16MW×2) powerhouse consisting of 4 generator sets, two of which are with an installed capacity of 9 MW and the others are 16 MW, a 50/10t bridge crane, an 110kV high voltage switchyard and 110kV transmission lines up to Xinjiang Power Grid. The selected four generating units are comprised of following components:

16MW × 2 units

Equipment	Type	Quantity	Manufacturer
Rotator wheel turbine	HLJF 2058-LJ-180	2	Fujian Nanping Nandian Hydropower Equipment Manufacturing Co., Ltd.[3]
Generator	SF 16-16/3550	2	

9MW × 2 units

Equipment	Type	Quantity	Manufacturer
Rotator wheel turbine	HLJF1606-LJ-155	2	Kunming Electric Machine Co., Ltd [4]
Generator	SF 9000-14/3300	2	

All the equipments all produced domestically and hence no technology introduction is induced.

Table 1 Time schedule of the implementation of the project

Progress Items	Stating Data	Expected Completing Data
Headwork	10/03/2005	30/06/2007
Intake open canal, aqueduct and canal system structure	10/03/2005	15/11/2006
Intake tunnel	20/07/2005	30/04/2007
Pivot, plant building, forebay and tailrace	23/02/2005	30/06/2007
Equipments installation	20/06/2005	30/05/2007
Metal structure installation	20/03/2005	30/05/2007

[2] The storage capacity of 0.85 million m^3 is only 18.28% of the designed daily inflow, which is much lower than the threshold of 30% to form daily-regulation function in accordance with definition of *daily regulation hydropower station* in China. Therefore, this project is constructed without regulation functions and is considered to be a *run-of-river station* in China. For this reason, the power density was not considered in the PDD.

In addition, with flooded surface area of 185,400 m^2, the power density is calculated to be 269.69 W/m^2 (50,000,000 W/185,400 m^2=269.69 W/m^2) which is much higher than the threshold of the requirement of the Methodology.

Relevant evidence is available for DOE.

[3] http://www.smenp.cn/smenp/co.asp?id=1916

[4] http://www.kem.com.cn/webpages/index.html

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

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The project chooses 7 ×3-year renewable crediting period, the emission reductions for the first 7-year crediting period are as following:

Years	Annual estimation of emission reductions in tonnes of CO_2 e
25/06/2007~ 24/06/2008	157,345
25/06/2008~ 24/06/2009	157,345
25/06/2009~ 24/06/2010	157,345
25/06/2010~ 24/06/2011	157,345
25/06/2011~ 24/06/ 2012	157,345
25/06/2012~ 24/06/2013	157,345
25/06/2013~ 24/06/2014	165,666
Total estimated reductions (tonnes of CO_2e)	1,109,735
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	158,534

A.4.5. Public funding of the project activity:

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No public funding is provided for this project.

SECTION B. Application of a baseline and monitoring methodology:

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

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The project applies ACM0002: "Consolidated baseline methodology for zero-emissions grid-connected electricity generation from renewable sources" (ACM0002/ Version 06, Sectoral Scope: 1, 19 May 2006); and Version 02 of the tool for demonstration and assessment of additionality, respectively. Please refer to UNFCCC website for the methodologies mentioned above:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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The proposed project is a grid-connected zero-emission renewable power generation activity and meets all the conditions stated in the methodology ACM0002 as the following:

- The proposed project is a run-of-river power plant applying to electricity additions.
- The proposed project is not an activity that involved switching from fossil fuels to renewable energy at the project site.
- The geographic and system boundaries for the relevant electricity grid (Northwest China Grid) can be clearly identified and information on the characteristics of the gird is available.

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

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	Source	Gas	Included?	Justification / Explanation
Baseline	Electricity generation in baseline (Northwest China Grid)	CO_2	Yes	Main emission source.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
Project Activity	Emission from reservoir of the proposed project (inside the project boundary).	CO_2	No	Zero-emissions grid-connected electricity generation from renewable energy.
		CH_4	No	As the project is a run-of-river hydropower project, there is no emission from reservoir.
		N_2O	No	Zero-emissions grid-connected electricity generation from renewable energy.

The project boundary of the proposed project is represented by NWCG. NWCG consists of several sub-grids including Shanxi, Gansu, Qinghai, Ningxia and Xinjiang, within which there is clearly defined spatial and geographical extent of the power plants connected with NWCG and transmission system, all electricity can be dispatched without significant transmission constraints. Moreover, NWCG is also defined as a regional grid according to the "Explain of confirming baseline emission factors of regional power grid in China" issued by China's DNA. Also, the geographic boundary of the NWCG is clear. Therefore, NWCG is considered as the project boundary for the proposed project for determining the build margin (BM) and operating margin (OM) emission factors.

According to China Electric Power Yearbook, there are no electricity imports and exports involved in NWCG in recent years. In addition, as a stable grid, the basic data (e.g. electricity generation, electricity dispatch and its grid connection information) of NWCG are available and have been well recorded historically, which are used for OM and BM calculation. Figure 3 below shows the structure of NWCG.

Figure 3: Structure Of Northwest China Grid

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

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In the absence of the proposed project, the possible alternatives would be as the following:

1. Construction of a fossil fuel-fired power plant with equivalent amount of installed capacity or annual electricity output;
2. The proposed project activity not undertaken as a CDM project activity;
3. Provision of equivalent amount of annual power output by the grid (Northwest China Grid) that the proposed project is connected with.

For alternative 1, According to China's power regulations, coal-fired power plants of less than 135MW, if without special permission, are prohibited for construction in the areas covered by large grids[5] and the installation of thermal power units with less than 100MW is under tight control[6]. Thus, alternative 1 is not a realistic and credible alternative to the proposed project.

According to the Step 2 Investment Analysis in section B.5., this alternative 2 is not financially attractive. Also, it faces with many barriers influencing its implementation. Thus, this alternative is not a feasible baseline scenario.

[5] Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135MW or below

Issued by State Council Office, decree no. 2002-6, http://www.cct.org.cn/cct/content.asp?ID=5576

[6] The Temporary Stipulation of the Construction Management of Small Scale Units of Fuel-fired Power Generation(August, 1997), http://www.01hr.com/article.jsp?id=54

Alternative 3 "Provision of equivalent amount of annual power output by the grid (Northwest China Grid) which the proposed project is connected with" is in accordance with the regulations and policies that are currently governing the Chinese power market and economically feasible. Therefore, alternative 3 is the only feasible baseline scenario for the proposed project.

Until the end of 2004, the total power generation of NWCG was 169,253 GWh, among which thermal power was 131,939GWh, accounting for 78%[7]. During 2001-2004, the capacity addition for thermal power accounted for 71.63% of the total. It is expected that thermal power especially coal power with its most mature technologies and economically competitiveness in the power market will be the dominated power generation category in the Grid. This situation will not be changed in the near future. In the absence of the proposed project activity, the equivalent amount electricity would be produced by the continued use of fossil fuel based electricity from NWCG.

Therefore, according to methodology ACM0002, as the project activities does not modify or retrofit an existing electricity generation facility, the baseline scenario for the proposed project is the increased generation of grid-connected power plants and the addition of new generation sources[8] of NWCG, as reflected in the combined margin (CM) calculations.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

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The following steps are used to demonstrate the additionality of the proposed project according to latest version of the "Tool for the demonstration and assessment of additionality" agreed by the Executive Board.

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

It is not applicable as the starting date of crediting period of the proposed project is expected to start after the registration of the project as CDM activity.

The project owner seriously considered the incentive from the CDM in the decision to proceed with the project activity:

On Jan. 11th, 2004, representatives from the project owner-Xinjiang Tianfu Thermoelectric Co., Ltd took part in a CDM Workshop held by Science and Technology Bureau of the Production and Construction Crops[9]. The CDM concept, its application procedures and technical issues were comprehensively and intensively studied and reported to the Board of Executive Directors.

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[7] China Electric Power Yearbook 2005

[8] For project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the following: Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described below.

[9] The reference of *On the Notice of Holding the Clean Development Mechanism (CDM) Project Proseminar* is available for DOE.

On Feb. 23th, 2004, the project owner held a board meeting to discuss the proposal to develop the proposed project as a CDM project activity-almost one year before the project construction. All the attendants agreed that it is necessary to obtain CDM registration incentives to enhance the economic attractiveness of the proposed project[10].

And on Feb.18th, 2005, the project owner officially started the proposed project as a CDM project activity right after the Kyoto Protocol entered into force on Feb. 16th, 2005.

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

This step is to define realistic and credible alternatives to the proposed project activity that can be (part of) the baseline scenario through the following sub-steps:

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

In the absence of the proposed project, the possible alternatives would be as the following:

1. Construction of a fossil fuel-fired power plant with equivalent amount of installed capacity or annual electricity output;
2. The proposed project activity not undertaken as a CDM project activity;
3. Provision of equivalent amount of annual power output by the grid (Northwest China Grid) which the proposed project is connected with.

Substep 1b. Enforcement of applicable laws and regulations:

According to China's power regulations, coal-fired power plants of less than 135MW, if without special permission, are prohibited for construction in the areas covered by large grids[11] and the installation of fossil fuel-fired power units with less than 100MW is under tight control[12]. The annual electricity generation of the hydropower plant is greatly affected by the annual rainfall and drought period. Thus, annual operational hours for a fuel-fired power plant are greater than that of a run-of-river power plant. Therefore, under the equivalent amount of installed capacity of 50 MW, the power generation capacity for a thermal power plant should be much more than that of a run-of river power plant. Furthermore, if generating the same annual capacity of 189 GWh, the installed capacity of a fossil fuel-fired power plant should be much lower than that of a run-of-river power plant.

From this point, option 1 is not a realistic and credible alternative to the proposed project.

Step 2. Investment Analysis

This section is to analysis whether the proposed project activity is economically or financially less attractive than alternatives without an additional revenue/funding, possibly from CDM revenues.

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[10] The reference of the *Resolution of the Fourth Conference of the Second Board of Directors of Xinjiang Tianfu Thermoelectric Co., Ltd.* is available for DOE.
[11] Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135MW or below

Issued by State Council Office, decree no. 2002-6, http://www.cct.org.cn/cct/content.asp?ID=5576
[12] The Temporary Stipulation of the Construction Management of Small Scale Units of Fuel-fired Power

Generation(August, 1997), http://www.01hr.com/article.jsp?id=54

Substep 2a. Determine appropriate analysis method

According to the 'Tool for the demonstration and assessment of additionality", there are three options for investment analysis as following:

Option I: Simply cost analysis
Option II: Investment comparison analysis

Option III: Benchmark analysis

The simple cost analysis method (Option I) is not appropriate because the proposed project will get the revenues not only from the CDM but also from the electricity sales. The investment comparison analysis is also not applicable for the proposed project, as the project owner has no investment options to compare with. The baseline scenario of the proposed project is the Northwest China Grid rather than a similar investment project alternative to the proposed project, so investment comparison analysis method (Option II) is neither appropriate. As a result, Option III- Apply benchmark analysis is chosen to demonstrate and assess the additionality, since the data on the financial IRR of Chinese power industry is available.

Substep 2b. Option III - Apply benchmark analysis

According to *Economic evaluation code for small hydropower projects* (1995)[13], the financial benchmark IRR for small scale hydropower projects in China is at 10%. This benchmarks is currently used for financial appraisal of this project.

Substep 2c. Calculation and comparison of financial indicators

(1) Basic parameters for financial appraisal of the proposed project are as the following:

Installed capacity: 50 MW

Estimated annual on-gird power generation: 187.11 GWh (It will be increased to 213GWh starting from the year 2014)

Project lifetime: 28 yrs (3 years construction including preparation, 25 years for operation)

Total investment: RMB 346.66 million Yuan

Loan: RMB 250 million Yuan

Loan period: 15 years

Annual O&M cost: Around RMB 3.9 million Yuan

Prospective bus-bar tariff: 0.189 yuan /kWh (excluding VAT)

[13] http://www.cws.net.cn/guifan/bz/SL16-95/

VAT tax: 6 % (especially for small-scale hydropower project in China)

Income tax: 33%

(2) Based on benchmark analysis (Option III), if the financial indicators (such as IRR) of the proposed project is less than the benchmark, the proposed project is not attractive.

The financial IRR of the proposed project without CDM revenues are shown in Table 2 below. Without CDM, the IRR of is only at 6.75% obviously lower than the benchmark of 10%. Therefore, the proposed project is not financially attractive.

Sub-step 2d. Sensitivity analysis

The objective of sensitivity analysis is to conclude that whether the proposed project is unlikely to be financially attractive or be financially attractive.

Three parameters are used for sensitivity analysis of financial attractiveness:

- Total investment
- Annual O&M cost
- Annual sell revenue

Table 2 shows the impact of total investment, annual O&M cost and annual energy revenue on IRR.

Table 2 Financial IRR Sensitivity To Different Financial Parameters (Without CDM)

Parameter \ Range	-10%	-7.5%	-5%	-2.5%	0	+2.5%	+5%	+7.5%	+10%
Total Investment	7.47%	7.35%	7.14%	6.94%	6.75%	6.57%	6.40%	6.23%	6.07%
Annual O&M Cost	6.85%	6.83%	6.80%	6.77%	6.75%	6.72%	6.70%	6.67%	6.64%
Annual Sell Revenue	5.89%	6.11%	6.32%	6.54%	6.75%	6.96%	7.18%	7.39%	7.60%

Table 2 shows within a reasonable rang of fluctuation by the three parameters, the IRR of the proposed project is still lower than the benchmark, which obviously demonstrates that the proposed project is less financial attractive.

The above results show that the proposed project is not economically competitive. In conclusion, the proposed project is additional, not (part of) the baseline scenario. Without CDM support, the proposed project would unlikely occur.

Step 3. Barrier analysis

This step is to determine whether the proposed project activity faces barriers that;

(a) Prevent the implementation of this type of proposed project activity; and

(b) Do not prevent the implementation of at least one of the alternatives.

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:

Construction barriers

There is poor condition of transportation and communication around the project site that is very far away from Urumuqi and Shihezi cities. Without any necessary infrastructure including roads and communication facilities, the cost of the proposed project would be increased unexpectedly. The sand content in Manasi River is relatively higher, which would increase the damage of generator sets and costs for maintenance. Part of tunnel (4 km) of the proposed project will cross through IV wall rock with relatively more and layers and clay layers, which makes the relatively poor geological condition and requires high support quality for the wall rock and makes extra cost.

Sub-step 3b. Show that the identify barriers would not prevent the implementation of at least on of the alternatives (except the proposed project activity)

Barriers analyzed above don't prevent the baseline alternative (Provision of equivalent amount of annual power output by the grid where the proposed project is connected with) from implementation.

Based on the analysis above, without CDM revenue, the proposed project would face with financing risk and strong competition on power market.

Step 4 Common practice analyses

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

The hydropower projects existing in Xinjiang Uygur Autonomous Region similar to the proposed project are identified in the following table below:

Table Similar Hydropower Projects Existing in Xinjiang

No.	Name of Project	Location	Year of Starting Operation	Installed Capacity （MW）	Annual Power Generation (GWh)	Project Owner	Investor
1	Tiemenguan Hydropower Plant	Kongque Rive, Korla City	1971	47.4	240	Xinjiang Bazhou Power Company (state-owned)	State Investment
2	Kashi Stage II Hydropower Plant	Kezi River, Shufu County	1989	26.4	178	Xinjiang Jiangnan Power Company (state-owned)	Local Government Investment
3	Dashankou Hydropower Plant	Kadu River, Hejing County	1985	80	310	Xinjiang Bazhou Power Company (state-owned)	State Investment
4	Tuohai Hydropower Plant	Yili Kashi River, Nileike County	1984	50	248	Xinjiang Yili Power Company (state-owned)	State Investment
5	Heizi Hydropower Plant	Heizi River, Bay County	1985	26	134	Bureau of the department of water resources of Xinjiang Uygur Autonomous Region	State Investment

6	Wuluwati Water Control Project	Kalakashi River, Hetian Prefecture	2001	60	280	Bureau of the department of water resources of Xinjiang Uygur Autonomous Region&Bureau of Water Resources of Xinjiang Corps	State Investment
7	"635" Water Control Project	Irtysh river, Fumei	1997	32	125	Bureau of the department of water resources of Xinjiang Uygur Autonomous Region	State Investment

It can be seen that all of the hydropower projects shown above were invested by national or local government and owned by stated-owned enterprises or local government. Thus, for development of those projects, it is not necessary to consider the issues of principle repayment and payment of interest on loans and economic benefits.

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

There are essential distinctions between the proposed project and the above seven hydropower projects. The seven existing hydropower projects are all developed by state-owned enterprises or local government, which can easier access to finance and have stronger ability against financial risk. However, the proposed project needs seeking loans from bank and self-financing by project owner. It is uncommon in Xinjiang that the project is completely invested, constructed and operated mainly by the local-level enterprise, which bears higher risks such investment, pressures from principle repayment and payment of interest on loans, low profit return and etc.

Therefore, these distinctions demonstrates that the proposed project is not common in Xinjiang and the existence of those projects cannot bring any influence on the additionality of the project.

Step 5 Impact of CDM Registration

If the proposed project is registered as a CDM project, the project owner will get the following benefits:

1) Given the CERs price is at 8 Euro/tCO_2e, the financial IRR of the project could reach at 10.86% exceeding the benchmark (seeing table 3 below).

Table 3 Comparison of Financial Indicators of the Proposed Project With CDM Revenue And Without CDM Revenue

	IRR (BENCHMARK=10%)	**NPV** (ic=10%) (Million Yuan)
Without CDM	6.75%	-74.72
With CDM	10.86%	20.47

So, the CDM revenues can improve the poor IRR of the proposed project, and make the project more financial attractive;

2) The CDM revenues will increase the revenues of the proposed project, which can reduce the pressure from long-term investment needed by a hydropower project and cash flow risks;

3）The CDM revenues can help project owner to pay back the loan and cover the increased commodity prices in China (such as steel and concrete for the site preparation);
4）The CDM revenues can cover the extra cost of the proposed project construction due to the poor geological condition; and
5）The CDM revenues can reduce the risks of low bus-bar tariff and tariff change.

B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

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Emission reductions from the proposed project can be calculated based on the ACM0002 consolidated methodology. According to the ACM0002, it is required to estimate the Operating Margin (OM) and Build Margin (BM) emission factor ex-ante, and through weighted average of OM and BM, the Combined Margin baseline emission factor of the NWCG can be obtained and then the emission reductions from CDM project activity can be estimated based on the following 3 steps:

Step l - Calculation of the Operating Margin Emission Factor (OM)
Step 2 - Calculation of the Build Margin Emission Factor (BM)
Step 3 - Calculation of the Baseline Emission Factor (CM)

Step 1 - Calculation of the Operating Margin Emission Factor (*$EF_{OM,y}$*)
The ACM0002 provides four options to calculate the operating margin:

(a) Simple OM; or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

For the proposed project activity, because the dispatch data of the Grid (including the Northwest China Power Grid) in China is not available to the public, options (b) and (c) can't be adopted. Furthermore, since low-cost/must-run power sources constitute less than 50% of the Northwest China Grid, option (a) (simple OM) is the only reasonable and feasible method among the four options.

The Simple OM emission factor ($EF_{OM,\ simpley}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, excluding those low-operating cost and must-run power plants. The formula of $EF_{OM,\ simple,y}$ calculation is:

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

Where:
$F_{i,j,y}$ is the total amount of fuel i (in a mass or volume unit) consumed by all the relevant power sources j in year(s) y, j refers to the power sources serving the grid, excluding those low-operating cost and must-run power plants, and including imports to the grid,
$COEF_{i,j\,y}$ is the total amount of the CO_2 emission coefficient of fuel i (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources j and the oxidation rate of the fuel in year(s) y, and
$GEN_{j,y}$ is the electricity output (MWh) supplied to the grid by the sources j.

As the $GEN_{j,y}$ cannot be directly adopted from the *China Electric Power Yearbooks*, the following way is applied for its calculation:

$$GEN_{j,y} = EG_{j,y} g(1 - CPR_{j,y})$$

Where:
EG j,y is the electricity generation (MWh) by the sources j;
CPR j, y is the captive power rate by the sources j.

The CO_2 emission coefficient $COEF_i$ is then obtained as:

$$COEF_i = NCV_i \bullet EF_{CO2,i} \bullet OXID_i \quad (2)$$

Where:
NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel *i*, national value is used;
$OXID_i$ is the oxidation factor of the fuel, IPCC default is used.

This PDD calculates the Operating Margin (OM) emission factors of NWCG in 2002, 2003 and 2004, respectively. Then, the OM emission factor of NWCG is calculated as the weighted average of the three years.

STEP 2. Calculate the Build Margin Emission Factor ($EF_{BM,y}$)

As the generation-weighted average emission factor (tCO_2/MWh) of a sample power plants *m*, using equation:

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

Where
$F_{i,m,y}$ is the amount of fuel *i* (tce) consumed by plant *m* in year *y*.
$COEF_{i,m,y}$ is the CO_2 emission coefficient (tCO_2/tce) of fuel *i*, taking into account the carbon content of the fuels used by plant *m* and the percent oxidation of the fuel in year *y*.
$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by plant *m*, equals to generation minus plant self consumption.

In this PDD, the BM ex-ante method is employed. And because it is very difficult to obtain the data of five most recently built power plants as these data are considered as confidential business information in China, the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently is selected as as the sample group *m*. The power plants which are CDM projects are not included in sample group m.

However, even for those built most recently power plants that comprise 20% of the system generation, it is also difficult to obtain the specific data regarding to fuel consumption and electricity generation additions by each power sources as confidential reason. Considering this situation, the clarifications given by EB for deviation in use of methodology AM0005 and AMS-I.D by several project activities in China are employed when estimating *BM* emission coefficient.

Thus, the most recent built power plants are calculated as the difference of total installed power capacities in the year 2004 and 2001, respectively, which accounted for 22.82% of the total capacity in 2004. So the calculation by using the data in the years 2004 and 2001 satisfies the requirements of ACM0002.

According to ACM0002 and clarifications by EB, the main steps for BM calculation are as following:

Sub-step 1: Calculation of weights of CO_2 emissions by coal-fired, oil-fired and gas-fired plants in total CO_2 emissions of NWCG.

$$\lambda_{coal} = \frac{\sum_{ieCOAL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (4)$$

$$\lambda oil = \frac{\sum_{ieOIL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (5)$$

$$\lambda Gas = \frac{\sum_{ieGAS,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (6)$$

Where: is the total amount of fuel i (in a mass or volume unit) c

$F_{i,j,y}$: is the total amount of fuel *i* (in a mass or volume unit) consumed by Province j in NWCG for power generation in year y;

$COEF_{i,j\,y}$: is the total amount the CO_2 emission coefficient of fuel *i* (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources *j* and the oxidation rate of the fuel in year(s) y.

This PDD employs the CO_2 emission weights by coal-fired, oil-fired and gas-fired plants of total CO_2 emission of NWCG in 2004.

Sub-step 2: Calculation of emission factor of thermal power ($EF_{\text{thermal power}}$) of NWCG.

The $EF_{\text{thermal power}}$ is calculated as a weighted emission factor as the following formula:

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

Where:

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

According to the data issued by China DNA, the efficiency levels of domestic sub-critical 600 MW coal power unit and the efficiency level of 200 MW combined cycle power unit are taken as the efficiency level of the best technology for coal-fired power plants, and oil and gas fired power plants commercially available in China, which are at 36.53% and 45.87%, respectively.

Sub-step 3: Calculation of Build Margin (BM) emission factor of NWCG.

Finally, weighted average build margin emission factor (EF_BM,y) are calculated by multiplying the $EF_{\text{thermal power}}$ with the weight of new capacity addition by thermal power of total capacity addition in NWCG.

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

Where:

CAP_{Total} : the total capacity addition of NWCG between 2001~2004;

$CAP_{Therma:}$ the capacity addition by thermal power of NWCG between 2001~2004.

The method of OM and BM calculation above refer to the official website: http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1235 issued by China DNA, which takes the default values of $EF_{co2,\,i}$ and $OXID_i$ from *Revised 1996 Guidelines for National Greenhouse Gas Inventories: Workbook*, and the national values of NCV_i. The values of OM and BM was calculated at 1.0329 tCO_{2e}/MWh and 0.6491 tCO_{2e}/MWh. Thus, value of CM is at 0.8410 tCO_{2e}/MWh.

Recently, the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* is published. So it is necessary to compare the default values between IPCC 1996 and 2006 and the lower values should be selected for the conservative calculation in this PDD. The comparison is shown as the following:

- All the $OXID_i$ values of different fuels in IPCC 2006 are increased to 1 higher than that in IPCC 1996, thus the $OXID_i$ values in IPCC 1996 are still used in this PDD;
- The $EF_{co2,\,i}$ values of coke, coke oven gas, other gas and refinery gas in IPCC 2006 are renewed to be less than that in IPCC 1996, which are selected for the calculation. And, other $EF_{co2,\,i}$ values have no changes between IPCC 1996 and 2006.

And, the NCV_i is taken the national values for the calculation.

The values of OM and BM are calculated at 1.0328 tCO_{2e}/MWh and 0.6491 tCO_{2e}/MWh by using the selected data above in the conservative way, respectively. As a result, the CM is at 0.840922 tCO_{2e}/MWh, which is lower than that issued by China's DNA and considered more conservative to be used for emission reductions calculation.

Step 3. Calculation of the Baseline Emission Factor

Based on ACM0002, the final step is to calculate the weighted average baseline emission factor of the proposed project as follows:

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \qquad (9)$$

where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$), and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above.

Step 4 Calculation of the Emission reduction (ER_y) by the proposed project activity

The proposed project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants. The emission reduction ER_y by the project activity during a given year *y*, according to the Methodology ACM0002, is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

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

According to ACM002, the project emissions for hydropower is zero and according to ACM0002, leakage need not be considered. So, the emission reduction is equal to baseline emission BE_y, which is the product of the baseline emissions factor (EF_y) calculated in Step 3, times the annul electricity supplied by the project activity to the grid (EG_y), i.e.:

$$ER_y = BE_y = EG_y \bullet EF_y \qquad (11)$$

However, a coal-fired boiler is used in order to heat the buildings at the project site in winter. If emissions are estimated to be less than 1% of the total emission reductions then it may not be included in the PDD. However, if the emissions are estimated to more than 1 % of the total emission reductions then they have to be included in the PDD and a deviation for this project activity has to be requested.

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

Data / Parameter:	$F_{i,j,\ 2002\sim2004}$
Data unit:	Ton or m^3
Description:	The total amount of fuel *i* (in a mass or volume unit) consumed by Province j in NWCG for power generation in year 2002,2003 and 2004.
Source of data used:	China Electric Power Yearbook
Value applied:	See table A1-2、A2-2 and A3-2 in Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with the ACM0002.
Any comment:	For OM and BM calculation.

Data / Parameter:	$EG_{j\ 2002\sim2004}$
Data unit:	MWh
Description:	The electricity generation by the Province *j* in NWCG in year 2002, 2003 and 2004.
Source of data used:	China Electric Power Yearbook
Value applied:	See table A1-1,A2-1,A3-1 in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with the ACM0002.
Any comment:	For GEN calculation.

Data / Parameter:	$CPR_{j\ 2002\sim2004}$
Data unit:	%
Description:	The captive power rate by the Province *j* in NWCG in year 2002, 2003 and 2004.
Source of data used:	China Electric Power Yearbook
Value applied:	See table A1-1, A2-1,A3-1 in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with the ACM0002.
Any comment:	For GEN calculation.

Data / Parameter:	GEN $_{j\ 2002\sim2004}$
Data unit:	MWh
Description:	The electricity output (MWh) supplied to the grid by the Province *j* in NWCG in year 2002, 2003 and 2004.
Source of data used:	Official website of China DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2006/2006121591157181.xls
Value applied:	See table A1-1,A2-1,A3-1 in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with the ACM0002.
Any comment:	For OM calculation.

Data / Parameter:	NCV i
Data unit:	kj/Kg or kj/m^3
Description:	the net calorific value (energy content) per mass or volume unit of a fuel *i*
Source of data used:	Page 365, China Energy Statistical Yearbook 2005
Value applied:	See table A1-2,A2-2,A3-2 in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ACM0002，the national value is used.
Any comment:	For OM and BM calculation.

Data / Parameter:	EF $_{co2,\ I}$
Data unit:	tC/Tj
Description:	CO_2 emission factor per energy unit of fuel i.
Source of data used:	The values of coke, coke oven gas, other gas and refinery gas are taken from IPCC 2006, and others are from IPCC 1996.
Value applied:	See table A1-2, A2-2, A3-2 in Annex.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The national value is unavailable, and the lower values between IPCC 1996 and 2006 are used for the conservative.
Any comment:	For OM and BM calculation.

Data / Parameter:	$OXID_i$
Data unit:	
Description:	The oxidation factor of the fuel.
Source of data used:	Page 1.29, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook
Value applied:	See table A1-2, A2-2, A3-2 in Annex 3.
Justification of the choice of data or description of	The national value is unavailable, and the lower values between IPCC 1996 and 2006 are used for the conservative.

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	Installed Capacity $_{j\ 2001,\ 2002,\ 2004}$
Data unit:	MW
Description:	The installed capacity of Province j in NWCG in year 2001, 2002 and 2004.
Source of data used:	China Electric Power Yearbook
Value applied:	See table B1-1,B1-2,B1-3 in Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with ACM0002.
Any comment:	For BM calculation.

Data / Parameter:	$PGCC_{Adv,\ I}$
Data unit:	%
Description:	the efficiency level of the best technology for each fuel type commercially available in China.
Source of data used:	Official website of China DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf
Value applied:	See table B2 in Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with ACM0002.
Any comment:	For BM calculation.

Data / Parameter:	λ_i
Data unit:	%
Description:	the proportion of emission from different fuel i power plant to the total emissions of NWCG.
Source of data used:	Official website of China DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf
Value applied:	See table B2 in Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with ACM0002.
Any comment:	For BM calculation.

Data / Parameter:	$EF_{OM,\ y}$
Data unit:	tCO_2/MWh
Description:	The operating margin emission factor in year y.

Source of data used:	See table B2 in Annex 3.
Value applied:	See table B2 in Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with ACM0002.
Any comment:	For CM calculation.

Data / Parameter:	$EF_{OM, simple}$
Data unit:	tCO_2/MWh
Description:	The simple operating margin emission factor of NWCG.
Source of data used:	See table B2 in Annex 3.
Value applied:	1.0328
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with ACM0002.
Any comment:	This data will be annual renewed based on the most recent data from Grids.

Data / Parameter:	EF_{BM}
Data unit:	tCO_2/MWh
Description:	Build Margin Emission Factor
Source of data used:	Official website of China DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf
Value applied:	0.6491
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with ACM0002.
Any comment:	This data will be annual renewed based on the most recent data from Grids.

Data / Parameter:	EF_{CM}
Data unit:	tCO_2/MWh
Description:	The baseline combine emission factor.
Source of data used:	See table B2 in Annex 3.
Value applied:	0.840922
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data selected comply with ACM0002.
Any comment:	This data will be annual renewed based on the most recent data from Grids.

B.6.3. Ex-ante calculation of emission reductions:

>>

1. $EF_{OM,simple}$ of Northwest Power Grid

According to the OM calculation of China DNA, the Simple OM emission factor of Northwest China Grid is at is 1.0328 tCO_{2e}/MWh (see details from Table A in Annex 3).

2. EF_{BM} of Northwest Power Grid

According to BM calculation of China DNA, based on the formula (6) and (7) in B.6.1, the $EF_{thermal\ powe}$ of NWCG is at 0.9062tCO2/MWh（See details in table B2 in Annex 3）.

The new capacity addition of thermal power in NWCG accounts for 71.63% of total capacity addition between 2001~2004. Thus, based on formula (8) above, the build margin emission factor is calculated as 0.6491tCO_{2e}/MWh (See details from table B in Annex 3).

3. EF of NorthwestPower Grid

According to equation 9, the baseline combine emission factor = (1.0328+0.6491)/2=0.840922 tCO_{2e}/MWh).

4. Emission reduction (ER_y) by the proposed project activity

According to formula (11):

ERy=BEy = EGy x EFy = 0.840922 x 187,110 = 157,345 tCO_{2e} (Before the year 2013)

ERy=BEy = EGy x EFy = 0.840922 x 212,850 = 178,990 tCO_{2e} (from the year 2014)

Based on the calculation, the CO_2 emissions generated by coal-fired boiler for the purpose of heating in winter are estimated to be less than 1% of the total emission reductions caused by the project, then it may be neglected. The calculation is available to DOE.

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

>>

Year	Estimation of project activity emission (tCO_2e)	Estimation of baseline emission (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of emission reductions (tCO_2e)
25/06/2007~ 24/06/2008	0	157,345	0	157,345
25/06/2008~ 24/06/2009	0	157,345	0	157,345
25/06/2009~ 24/06/2010	0	157,345	0	157,345
25/06/2010~ 24/06/2011	0	157,345	0	157,345
25/06/2011~ 24/06/2012	0	157,345	0	157,345
25/06/2012~ 24/06/2013	0	157,345	0	157,345
25/06/2013~ 24/06/2014	0	165,666	0	165,666
Total (tCO_2e)	0	1,109,735	0	1,109,735

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

>>

The monitoring plan applies ACM0002: "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources." (ACM0002/ Version 06, Sectoral Scope: 1, 19 May 2006).

B.7.1. Data and parameters monitored:

>>

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity
Source of data to be used:	Electricity of the proposed project supplied to the Northwest China Grid annually
Value of data applied for the purpose of calculating expected emission reductions in section B.5	187,110 MWh from 2007~ 2013 212,850 MWh from 2014~2027
Description of measurement methods and procedures to be applied:	Electricity will be measured directly and continuously by computed and precise ammeters, Recording frequency will be hourly measurement and monthly recording; Proportion of data to be monitored would be 100% throughout whole year; the data will be archived both in electronic and paper; Data monitored are to be kept for two years after the last issuance of CERs for the proposed project activity.
QA/QC procedures to be applied:	Set up a special CDM project team; constitute detailed rules on monitoring management; introduce precision ammeters; two ammeters proofread each other both in booster station and switching station; keep the invoice of electricity sales as a hard proof for data quality control.
Any comment:	For expected emission reductions calculation. Double check by receipt of sales. Electronic data will be kept for 2 years following the end of the crediting period

B.7.2. Description of the monitoring plan:

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The project owner is the user of this monitoring plan and will be responsible for this monitoring plan. The project owner must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to maintain the information required for an audit of an emission reduction project. These records and monitoring systems are needed to allow the selected DOE to verify project performance as part of the verification and certification process. This process also reinforces that CO_2 reductions are real and credible to the buyers of the Certified Emissions Reductions (CERs).

Emission reductions will be achieved through avoided power generation of fossil fuel electricity due to the power generated by the proposed project. The grid-connected output is therefore defined as the key data to monitor.

Operational and Management Structure For Monitoring

The project owner has assigned a Monitoring Team from Hongshanzui Hydropower Plant (HHP)[14] to carry out the whole monitoring process according to the Figure 4 below.

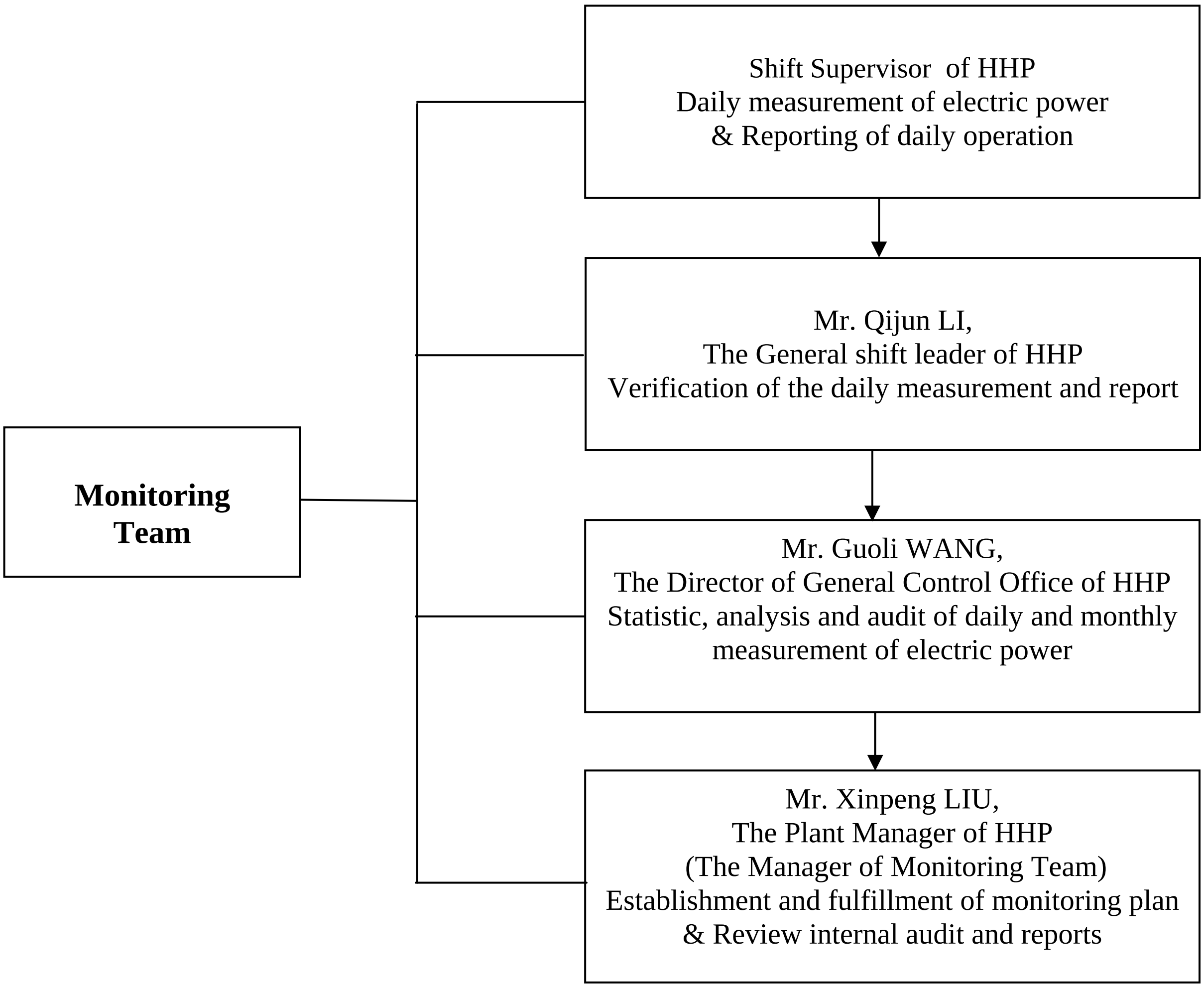

Figure 4 Monitoring and Management Structure

Mr, Xinpeng LIU, the plant manager of the proposed project will establish the monitoring plan, and hold the overall responsibility for the monitoring process. The first step is the measurement of the daily electrical energy supplied to the grid and reporting of daily operation, which will be carried out by shift supervisor. Secondly, the general shift leader, Mr. Qijun LI, will verify the daily measurement and operation report. Then, the data and report will be submitted to the director of general control office, Mr. Guoli WANG, who will be responsible for statistic, analysis and audit the daily and monthly measurement, collection of sales receipts provided by the grid of the power supply, and prepare monitoring report of the project activity including operating periods, power generation, power delivered to the grid, equipment defects, etc. Finally, the plant manager will review the internal audit and monitoring reports.

Monitoring Plan

[14] HHP is a subsidiary company of the project owner, who is responsible for the operation and management of hydropower projects developed by the project owner.

The approved monitoring methodology ACM0002 is used for developing the monitoring plan.

Monitoring tasks must be implemented according to the monitoring plan in order to ensure that the real, measurable and long-term greenhouse gas (GHG) emission reduction for the proposed project is monitored and reported.

1. Responsibility
Overall responsibility for daily monitoring and reporting lies with the project owner. A monitoring team will be established by the project owner to carry out the monitoring tasks.

2. Installation of meters
The power delivered to the grid will be mainly monitored by three main Meters(M5,M6 and M7) installed in the substation. The total amount of electricity supply will be calculated as the sum of the data measured from the three main meters. There are four backup Meters (M1, M2, M3 and M4) which will be installed at each generator site to measure the electricity generation by the proposed project. Another two backup meters (M9 and M10) are installed at the project site for measurement of the electricity self-consumed by the proposed project. When the main meter is out of order, the readings from the backup meters will be used for reference (the electricity supply to the grid can be calculated as the difference between the electricity generation and self-consumption by the proposed project). The location of the meters is shown in Figure 5 below.

The metering equipments will be properly configured and checked annually according to the requirement from technical administrative code of electric energy metering (DL/T448－2000).

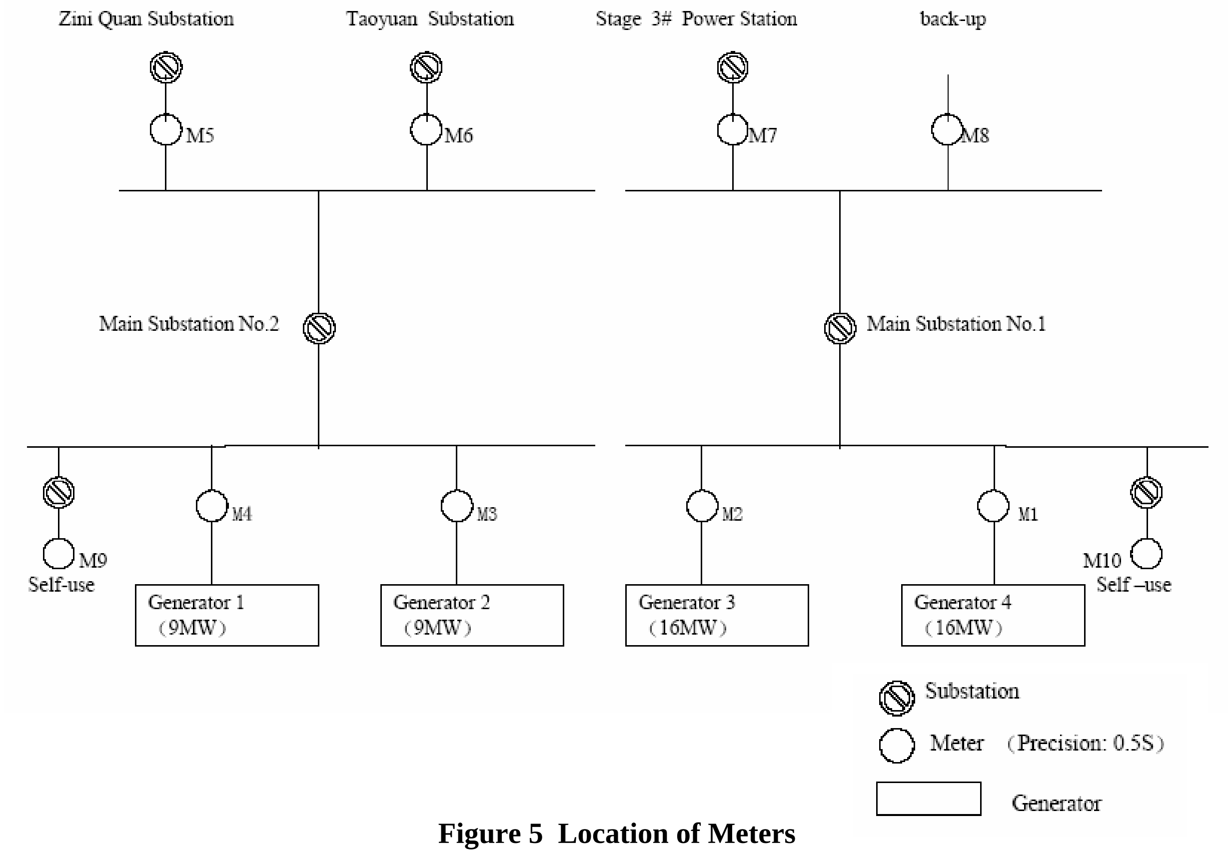

Figure 5 Location of Meters

3. Reporting
The specific steps for data collection and reporting are listed below:

- Project owner reads the main meter and backup meters and records data everyday, and prepare monthly data report;
- Grid company, together with the project owner reads the main meter and records data on the date of 26th of every month. Then, Grid company supplies readings to the project owner and provides invoice;
- Project owner provides reports, readings and photocopies of invoices to DOE for verification.

Should any previous months reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the grid-connected electricity supplied by the proposed project shall be determined by reading the backup meters, unless a test by either party reveals it is inaccurate:

- If the backup system is not with acceptable limits of accuracy or is otherwise performing improperly the proposed project owner and grid company shall jointly prepare an estimate of the correct reading; and
- If the proposed project owner and the grid company fail to agree the estimate of the correct reading, then the matter will be referred for arbitration according to agreed procedures.

4. Calibration
The metering equipments are calibrated and checked annually for accuracy. The metering equipments shall have sufficient accuracy so that any error resulting from such equipments shall not exceed 0.5% of full-scale rating. Calibration is carried out by the grid company with the records being supplied to the project owner, and these records will be maintained by the project owner and the appointed third party. Both meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be interfered with by either party except in the presence of the other party or its accredited representatives.

All the meters installed shall be tested by a third party within 10 days after:
(a) Detection of a difference larger than the allowable error in the readings of both meters;
(b) The repair of all or part of meter caused by the failure of one or more parts to operated in accordance with the specifications.

5. Data management system
Physical document such as paper-based maps, diagrams and environmental assessments will be collated in a central place, together with this monitoring plan. In order to facilitate auditors' reference of relevant literature relating to the project, the project material and monitoring results will be indexed. All paper-based information will be stored by the technology department of the project owner and all the material will have a copy for backup. And all data including calibration records is kept until 2 years after the end of the total credit time of the CDM project.

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

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The baseline study and monitoring plan of the proposed project were completed on 31 October 2006 by the Beijing Changjiang River International Holding.

Ms. Shunrong LIN, linnet2001@hotmail.com, Beijing Changjiang River International Holding, No.1, Baiguang Road 2nd Alley, Xuanwu District, Beijing 100761, P.R. China.

Mr. Zheng KANG E-mail: ponykang@yahoo.com.cn ,Beijing Changjiang River International Holding, No.1, Baiguang Road 2nd Alley, Xuanwu District, Beijing 100761, P.R. China.

The above persons and entity are not the project participant.

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:

>>
18/02/2005

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

>>
25 years

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

>>

C.2.1. Renewable crediting period

>>

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

>>
25/06/2007 or the date of registration whichever is later.

C.2.1.2. Length of the first crediting period:

>>
7 years.

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>>
Not applicable.

C.2.2.2. Length:

>>
Not applicable.

SECTION D. Environmental impacts

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

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According to the Environmental Protection Law of the People's Republic of China which statements that the Environment Impact Assessment (EIA) must be approved by competent department of environmental protection administration before project construction, the project developer delegated the Exploration-Survey Design Institution of Xinjiang Production and Construction Crops to conduct the required EIA in April 2004. This Institution has qualification for EIA consultancy services certified by State Environmental Protection Administration (SEPA) in 2003 and is independent from the project owner. The EIA report was approved by the Environmental Protection Bureau of Xinjiang Production and Construction Crops in Sep. 2004.

According to the EIA report, the impacts rising from the proposed project were identified, the mitigation measures were suggested and defined in the following two phase:

Construction Phase

Wastewater
In order to protect the soil and the surface water from being polluted, the wastewater from sand and rock processing and concrete mixing is not allowed to be discharged into the river directly. In stead the wastewater will be retained in the sedimentation pond before recycled or released for irrigation. The oil water from vehicles must be disposed in the oil filter and sedimentation tank set far away from the river. During the project construction period, the domestic sewage has to be disposed using treatment equipment such as septic tank with anti-seepage engineering to meet the standard of irrigation and Integrated Wastewater Discharge Standard of the People's Republic of China (GB8978-1996).

Dust
The greatest threat of air quality will be the dust rising from the proposed project construction and transportation, which has short-term negative impacts on air quality during the construction period. Attribute to the absence of atmosphere pollution source, low density of population, sound background atmosphere condition and the adopted effective dustproof measures including watering in accordance with Standard of Air Pollutants Discharge of the People's Republic of China (GB16297-1996), the negative impacts mentioned above are limited.

Noise
Noise is mainly caused by the machines and vehicles during construction period. The construction personnel will take precautionary measures during the construction to avoid the negative impacts from noise. In addition, the construction will run under the Noise Limits for Construction Site of the People's Republic of China (GB12523-90) and the high-noise machines will be installed 200m away from the temporarily livelihood area. And furthermore, the proposed construction site is located in semi-desert grassland area with seldom residents resulting in no quarrels of "disturbing of sweet dreams". Hence the noise impact of the proposed project is insignificant.

Solid waste
The solid waste generated from earth-rock excavation will be backfilled and piled up in 8 permanent wasteyards in 10m height from the river, which are sheltered with afforestation to avoid soil losses. During the construction period, the daily solid waste will be collected in the designated dumpsites near

the proposed construction site which will be covered with thick soil. Meanwhile, anti-seepage engineering works will be conducted at the bottom of the dumpsites to protect the underground water from pollution.

Ecosystem impact
During the construction period, 108.69hm^2 area will be occupied temporarily，which mainly covers area with the nature of low utility of vegetation for construction and transportation. In order to restore and retain the ecosystem, afforestation projects will be carried out to cover the temporarily occupied area after the construction, which will also contribute to the soil and water conservation.

18.54hm^2 area will be submerged permanently due to the construction of inhaul hinge. This area mostly covers wasteland without cultivation area, plantation, inhabitants, cultural relic and mineral resources, and with hardly any trees and grassland. As a result, the vegetation to be submerged by the reservoir will be minimal. Clearing of the reservoir area is one of the procedures that the proposed project developer must follow before reservoir being filled. Hence the potential methane emission is negligible.

As mentioned above, there is lack of vegetation and no precious varieties within the project site. And, as the noises rising from the operation and transportation of the construction machines, the wild animals living there will migrate to comparatively silent areas, but this negative impact will be eliminated once the construction completed. Also, there are no precious animals around the project site. So the impact on ecosystem can be neglected.

Impacts on Land Use
The proposed project is located on a semi-desert region with seldom resident. Thus, the proposed project will not lead to displace of local population and flooding of cultivation area.

Operation phase
During the operation phase, solid waste and domestic sewage will be generated by the permanent staffs. It is planned that the solid waste will be transported to the dumpsite near the proposed construction site and the domestic sewage will be disposed in the septic tank to protect the surface water from being polluted if discharged directly. The noises resulting from the generators can be minimized by settling generators 200 m away from living area of staffs.

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 proposed project are not considered to be significant due to the mitigation methods referred to above.

SECTION E. Stakeholders' comments

>>

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

>>

Xinjiang Production and Construction Crops carried out a project specific survey about the proposed project on local environment when preparing the EIA report. The investigation was carried out by distributing a questionnaire (see the below Table 4) to local stakeholders including representatives of residents of the project affected areas, delegates from local People's Congress and Consultative Conference, experts from relative industries, officials from local government, managers and employees of Hongshanzui Hydropower Plant. The responses to the questionnaire were collected and included in the EIA report. Some small-sized conferences and secondary interviews were also launched among the representatives of the stakeholders.

Table 4: Spot Check Questionnaires for the Public on the Environment Impact Assessment of Manasi Hydropower Station Project

Name		**Gender**		**Age**		**Education**	
Company				**Vocation**			

Name of project: Manasi River Stage I Hydropower Project of Hongshanzui Hydropower Plant, Xinjiang Tianfu Thermoelectric Co., Ltd.

Location: The proposed project is located on the middle reaches of Manasi River in Manasi County of Shihezi City, Xinjiang Uygur Autonomous Region, P. R. China.

Construction activities: The construction of an inhaul hinge, an intake power tunnel, a 50MW powerhouse, an 110kV switchyard and 110kV transmission lines are involved.

Project scale: The total installed capacity will be 50 MW (9MW × 2 + 16MW × 2), and the rated water head and rated intake flux are designed to be 104 m and 62 m^3/s respectively.

Beneficiary: Shihezi City and affiliated shepherd yards and Nanshan Mineral Zone will benefit from this proposed project.

Construction tasks:

1) To increase an additional installed capacity of 50 MW to the existing grid mix, and to optimize the power supply structure by the operation of renewable power sources;
2) To generate an annual output of 187.11 GWh to mitigate the power shortage in local area, and to balance the energy supply and actual demand up to 2010 together with other power sources within the grid;
3) To contribute to the operational stability of local grid once regulation ponds were established and in turn functioned as regulation energy source.

Environmental impacts: The construction activities may have negative impacts on local air quality, sound environment and aquatic organism. The living condition of local residents and the operation environment of the other four hydropower stations downstream would be impacted during the construction period. However, the negative influences are deemed to be short-lived and will disappear once the construction phase ended. The impact on water sources will not be significant.

Total investment: The total investment will be RMB 346.66 million yuan.

<table>
<tr><td>1. What is your altitude towards the proposed project?</td><td>A. Support</td><td>B. Oppose</td><td>C. Indifferent</td></tr>
<tr><td>2. Do you understand the impacts of the proposed project on you life?</td><td>A. Yes</td><td>B. A little</td><td>C. No</td></tr>
<tr><td>3. How do you think of the impacts of the proposed project on the local economic development and the improvement of living standard of local people?</td><td>A. Positive</td><td>B. No impact</td><td>C. Negative</td></tr>
<tr><td>4. How are the impacts of the proposed project on the local environment?</td><td>A. No</td><td>B. Yes, but acceptable</td><td>C. Yes, not acceptable</td></tr>
<tr><td rowspan="2">5. What is the major environment issue during the operation period?</td><td>A. Noises</td><td>B. Waste Pollution</td><td>C. Air pollution</td></tr>
<tr><td>D. Ecosystem Impact</td><td colspan="2">E. Socio impact</td></tr>
<tr><td colspan="4">6. What are the impacts of the proposed project on the other four hydropower stations downstream?</td></tr>
<tr><td colspan="4">7. What are your suggestions about mitigating the negative impacts on water environment, ecosystem and social environment caused by the proposed project, what measures will be involved according to your opinion?</td></tr>
<tr><td colspan="4">8. How do you think the feasibility of the proposed project, including the selected site and the project scale, and etc? And explain the reason.</td></tr>
</table>

E.2. Summary of the comments received:

>>

155 copies were received. The following is a summary of the key findings:

1) 100% of the respondents support the proposed project, who believed that the project will generate additional electricity, promote the reliability and quality of the supplied electricity, and accelerate the economic development.

2) The respondents concerned that the construction activities would have certain impacts on vegetation and ecosystem. 50% of the respondents believed that negative influences on the other four hydropower stations downstream would emerge if the waste not being disposed properly.

3) With regard to the major environment issue during the operation period, only 5% of the respondents concerned about the generated noises on nearby workers.

4) The experts believed that the decreased sediment concentration will mitigate the abrasion of the generators downstream, the ice hazards will be lessened due to the blocking effect by the hydro station located on the upper stream.

Conclusion

The survey shows that the proposed project receives strong support from local people. The respondents generally deemed that the project will generate reliable electricity, accelerate the economic development, and induce some other multiple benefits relating to their livelihoods. As the EIA demonstrated, proper methods have been employed, the negative impacts are minimal within the construction site during the construction period.

The influence on ecosystem due to the noises resulting from the generators are considered to be the key issue during the operation phase. Since afforestation projects will be carried out after the construction on necessary areas such as the powerhouse, the impact on ecosystem can be minimized. The proposed project is located on a semi-desert region with hardly any residents, the noise impact is, as a matter of fact, a perceived issue rather than a real problem.

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

>>

The local residents and authorities are all supportive of the proposed project, and proper mitigation methods have been involved in the EIA report, therefore there is no need to modify the project due to the comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Represented by:	Chao HUANG
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Postfix/ZIP:	105-8560
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Telephone:	81-3-4216-1111
FAX:	81-3-3504-1570
E-Mail:	carbonteam@tepco.co.jp
URL:	http://www.tepco.co.jp/en/index-e.html
Represented by:	Manabu Hirano
Title:	Group manager, International Environmental Business Group
Salutation:	Mr.
Last Name:	Hirano
Middle Name:	-
First Name:	Manabu
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the proposed project.

Annex 3
BASELINE INFORMATION

>>

Please refer to the following official websites issued by DNA for the procedure of OM and BM calculation of Northwest China Grid:
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1052.xls
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf

Table A Calculation of simple OM emission factor of NWCG

Table A1-1 Electricity generation by thermal power in NWCG in 2002

Province	Electricity generation and supply by thermal power plants		
	Electricity generation （MWh）	Captive power rate (%)	Power supply to the Grid (MWh)
Shanxi	31,941,000	7.87%	29,427,243
Gansu	23,504,000	6.83%	21,898,677
Qinghai	4,980,000	8.40%	4,561,680
Ningxia	15,505,000	6.54%	14,490,973
Xinjiang	17,498,000	10.24%	15,706,204.80
Sum	93,428,000	—	86,084,778
Electricity Import (MWh)	0	Total power supply (MWh)	86,084,778
Data source: China Electric Power Yearbook 2003			

Table A1-2 Calculation of simple OM emission factor of NWCG in 2002

	Fi						Carbon Emission Factors (tC/Tj)	$EF_{CO2,i}$ (tCO_2/Tj)	NCV (Kj/Kg) (Kj/m^3)	OXIDi	Emission (tCO_2e)
	Shanxi (10^4t) (10^8m^3)	Gansu (10^4t) (10^8m^3)	Qinghai (10^4t) (10^8m^3)	Ningxia (10^4t) (10^8m^3)	Xinjiang (10^4t) (10^8m^3)	Total (10^4t) (10^8m^3)					
	A	**B**	**C**	**D**	**E**	**F=A+B+C+D+E**	**F**	**G=F*44/12**	**H**	**I**	**J=E*G*H*I*10^-2**
RAW COAL	1,607.50	1,156.02	278.66		981.75	4,023.93	25.80	94.60	20,908.00	0.98	77,997,399.05
Clean Coal		0.91				0.91	25.80	94.60	26,344.00	0.98	22,224.93
OTHER WASHED COAL						0.00	25.80	94.60	8,363.00	0.98	0.00
COKE						0.00	29.20	108.17	28,435.00	0.98	0.00
COKE OVEN GAS		0.40				0.40	12.10	47.67	16,726.00	0.995	2,953.47
Other gas		0.80				0.80	12.10	47.67	5,227.00	0.995	1,845.96
Crude oil						0.00	20.00	73.33	41,816.00	0.99	0.00
Gasoline						0.00	18.90	69.30	43,070.00	0.99	0.00
Diesel	1.96				1.12	3.08	20.20	74.07	42,652.00	0.99	96,327.02
Fuel oil		1.70			1.27	2.97	21.10	77.37	41,816.00	0.99	95,123.54
Natural gas		5.30			23.30	28.60	15.30	56.10	38,931.00	0.995	621,509.16
LPG						0.00	17.20	63.07	50,179.00	0.995	0.00
Refinery gas						0.00	15.7	66.73	46,055.00	0.995	0.00
Other petroleum products*						0.00	20.00	73.33	38,369.00	0.99	0.00
Other energy		5.07			1.74	6.81	0.00	0.00	0.00	0.00	0.00
Total emission of the South China Power Network (tCO2e)	78,837,383.12										
Fossil power generation of the South China Power Network(MWh)	86,084,777.90										
OM emission factor of the South China Power Network(tCO2e/MWh)	0.9158										

Data source: China Energy Statistical Yearbook (2000-2002);

Table A2-1 Electricity generation by thermal power in NWCG in 2003

Province	Electricity generation and supply by thermal power plants		
	Electricity generation （MWh）	Captive power rate (%)	Power supply to the Grid (MWh)
Shanxi	38,144,000	6.94%	35,496,806
Gansu	29,494,000	6.35%	27,621,131
Qinghai	6,446,000	4.50%	6,155,930
Ningxia	19,175,000	5.25%	18,168,313
Xinjiang	19,834,000	8.19%	18,209,595.40
Sum	113,093,000	—	105,651,775
Electricity Import (MWh)	0	Total power supply (MWh)	105,651,775
Data source: China Electric Power Yearbook 2004			

Table A2-2 Calculation of simple OM emission factor of NWCG in 2003

	Fi						Carbon Emission Factors (tC/Tj)	$EF_{CO2,i}$ (tCO_2/Tj)	NCV (Kj/Kg) (Kj/m^3)	OXIDi	Emission (tCO_2e)
	Shanxi (10^4t) (10^8m^3) **A**	Gansu (10^4t) (10^8m^3) **B**	Qinghai (10^4t) (10^8m^3) **C**	Ningxia (10^4t) (10^8m^3) **D**	Xinjiang (10^4t) (10^8m^3) **E**	Total (10^4t) (10^8m^3) **F=A+B+C+D+E**	**F**	**G=F*44/12**	**H**	**I**	**$J=E*G*H*I*10^{-2}$**
RAW COAL	2,002.26	1,479.62	330.67	682.00	1,065.75	5,560.30	25.80	94.60	20,908.00	0.98	107,777,455.85
Clean Coal						0.00	25.80	94.60	26,344.00	0.98	0.00
OTHER WASHED COAL				27.00	3.64	30.64	25.80	94.60	8,363.00	0.98	237,557.13
COKE						0.00	29.2	108.17	28,435.00	0.98	0.00
COKE OVEN GAS		15.40				15.40	12.1	47.67	16,726.00	0.995	113,708.44
Other gas		1.20				1.20	12.1	47.67	5,227.00	0.995	2,768.94

Crude oil						0.00	20.00	73.33	41,816.00	0.99	0.00
Gasoline						0.00	18.90	69.30	43,070.00	0.99	0.00
Diesel	3.12			0.04	0.40	3.56	20.20	74.07	42,652.00	0.99	111,339.02
Fuel oil		1.19			1.02	2.21	21.10	77.37	41,816.00	0.99	70,782.16
Natural gas	1.00	5.40			59.50	65.90	15.30	56.10	38,931.00	0.995	1,432,078.80
LPG						0.00	17.20	63.07	50,179.00	0.995	0.00
Refinery gas					3.48	3.48	15.7	66.73	46,055.00	0.995	91,801.59
Other petroleum products*						0.00	20.00	73.33	38,369.00	0.99	0.00
Other energy		5.86			2.30	8.16	0.00	0.00	0.00	0.00	0.00
Total emission of the South China Power Network (tCO2e)	109,837,491.94										
Fossil power generation of the South China Power Network(MWh)	105,651,775.30										
OM emission factor of the South China Power Network(tCO2e/MWh)	1.0396										

Data source: China Energy Statistical Yearbook 2004;

Table A3-1 Electricity generation by thermal power in NWCG in 2004

Province	Electricity generation and supply by thermal power plants		
	Electricity generation （MWh）	Captive power rate (%)	Power supply to the Grid (MWh)
Shanxi	44,439,000	7.50%	41,106,075
Gansu	33,242,000	6.21%	31,177,672
Qinghai	6,208,000	7.96%	5,713,843
Ningxia	25,298,000	5.45%	23,919,259
Xinjiang	22,752,000	9.07%	20,688,393.60
Sum	131,939,000	—	122,605,243

Electricity Import (MWh)	0	Total power supply (MWh)	122,605,243
Data source: China Electric Power Yearbook 2004			

Table A3-2 Calculation of simple OM emission factor of NWCG in 2004

	Fi						Carbon Emission Factors (tC/Tj)	$EF_{CO2,i}$ (tCO_2/Tj)	NCV (Kj/Kg) (Kj/m^3)	OXIDi	Emission (tCO_2e)
	Shanxi (10^4t) (10^8m^3) A	Gansu (10^4t) (10^8m^3) B	Qinghai (10^4t) (10^8m^3) C	Ningxia (10^4t) (10^8m^3) D	Xinjiang (10^4t) (10^8m^3) E	Total (10^4t) (10^8m^3) F=A+B+C+D+E	F	G=F*44/12	H	I	$J=E*G*H*I*10^{-2}$
RAW COAL	2,428.70	1,595.90	322.80	1,270.10	1,240.90	6,858.40	25.80	94.60	20,908.00	0.98	132,939,032.65
Clean Coal						0.00	25.80	94.60	26,344.00	0.98	0.00
OTHER WASHED COAL				102.64	10.50	113.14	25.80	94.60	8,363.00	0.98	877,193.66
COKE	0.78					0.78	29.20	108.17	28,435.00	0.98	23,271.70
COKE OVEN GAS		3.00				3.00	12.1	47.67	16,726.00	0.995	22,150.99
Other gas	7.40	12.60				20.00	12.1	47.67	5,227.00	0.995	46,149.01
Crude oil	0.01				0.06	0.07	20.00	73.33	41,816.00	0.99	2,125.09
Gasoline	0.02					0.02	18.90	69.30	43,070.00	0.99	590.98
Diesel	2.16	0.36		0.05	0.41	2.98	20.20	74.07	42,652.00	0.99	93,199.52
Fuel oil	0.01	0.69			0.30	1.00	21.10	77.37	41,816.00	0.99	32,028.13
Natural gas	16.10	5.90			62.70	84.70	15.30	56.10	38,931.00	0.995	1,840,623.28
LPG						0.00	17.20	63.07	50,179.00	0.995	0.00
Refinery gas					3.26	3.26	15.7	66.73	46,055.00	0.995	85,998.04
Other petroleum products*						0.00	20.00	73.33	38,369.00	0.99	0.00
Other energy		6.17			3.46	9.63	0.00	0.00	0.00	0.00	0.00
Total emission of the South China Power Network (tCO2e)	135,962,363.05										
Fossil power generation of the South China Power Network(MWh)	122,605,242.60										

OM emission factor of the South China Power Network(tCO2e/MWh)	1.1089

Data source: China Energy Statistical Yearbook 2005

Table A4 Simple OM emission factor of NWCG

Year	Annual CO_2 Emission (tCO_2)	Annual Electricity Supply (MWh)
2002	78,837,383	86084777.9
2003	109,837,492	105651775
2004	135,962,363	122605243
Sum	324,637,238	314341796
EF_OM（tCO_2/MWh）		1.0328

Table B Calculation of BM emission factor of NWCG

Table B1-1 Installed capacity of NWCG in 2001

	Installed capacity（MW）				
	Hydro power	Fuel-fired power	Nuclear power	Other	Total
Shanxi	1,450.70	6,302.40			7,753.10
Gansu	3,118.30	3,874.80		8.40	7,001.50
Qinghai	3,127.40	766.80			3,894.20
Ningxia	307.90	2,046.00			2,353.90
Xinjiang	868.10	3,804.90		70.60	4,743.60
Sum	8,872.40	16,794.90	0.00	79.00	25,746.30
Share	34.46%	65.23%	0.00%	0.31%	100.00%

Data source: China Energy Statistical Yearbook (2000-2002);

Table B1-2 Installed capacity of NWCG in 2002

	Installed capacity（MW）				
	Hydro power	Fuel-fired power	Nuclear power	Other	Total
Shanxi	1,462.30	6,735.40			8,197.70
Gansu	3,238.60	3,881.80		8.40	7,128.80
Qinghai	3,206.30	803.80			4,010.10
Ningxia	307.90	2,386.00			2,693.90
Xinjiang	984.80	3,949.90		96.70	5,031.40
Sum	9,199.90	17,756.90	0.00	105.10	27,061.90
Share	34.00%	65.62%	0.00%	0.39%	100.00%

Data source: China Energy Statistical Yearbook 2003

Table B1-3 Installed capacity of NWCG in 2004

	Installed capacity（MW）				
	Hydro power	Fuel-fired power	Nuclear power	Other	Total
Shanxi	1,876.50	7,640.40			9,516.90
Gansu	3,566.10	4,975.60		138.20	8,679.90
Qinghai	4,053.40	889.80			4,943.20
Ningxia	366.20	3,782.00		42.50	4,190.70
Xinjiang	973.00	4,959.70		95.30	6,028.00
Sum	10,835.20	22,247.50	0.00	276.00	33,358.70
Share	32.48%	66.69%	0.00%	0.83%	100.00%

Data source: China Energy Statistical Yearbook 2005

Table B2 Emission factor of thermal power in NWCG

	Carbon Emission Factors (tC/Tj)[1)]	EF_{CO2} (tCO2/Tj)	OXIDi	Power Supply Efficiency of The Best Power Technology (%)	Emission Factor of Best Techonology (tCO2e/MWh)	The mix of thermal power capacity of South China Power Grid in 2004	$EF_{thermal\ power}$ (tCO2e/MWh)
	A	**B=A*44/12**	**C**	**D**	E=**3.6/D/1000*B*C**	**H**	**I**
Standard Coal	25.8	94.60	0.98	36.53%	0.9136	98.43%	0.9062
Fuel Oil/diesel	21.10	77.37	0.99	45.87%	0.6011	0.09%	
Natrual Gas	15.30	56.10	0.995	45.87%	0.4381	1.48%	

Table B3 Weighted Average Build Margin Emission Factor of NWCG

	Installed Capacity 2001 (MW)	Installed Capacity 2002 (MW)	Installed Capacity 2004 (MW)	New Capacity Additions (MW)	Split of Electricity generation from New Capacity	Emission Factor of Thermal Power (tCO2e/MWh)	Weighted Average Build Margin Emission Factor *EFBM,y* (tCO2e/MWh)
	A1	A2	B	C	D	E	F
Source	Table B1-1	Table B1-2	Table B1-3	C=B-A1	D=C/Total C1)	Table B2	F=E*D
Hydro Power Plant	8, 872. 40	9, 199. 90	10, 835. 20	1, 962. 80	25. 78%	0. 000	0. 000
Thermal Power Plant	16, 794. 90	17, 756. 90	22, 247. 50	5, 452. 60	71. 63%	0. 9062	0. 6491
Nuclear Power	0. 00	0. 00	0. 00	0. 00	0. 00%	0. 000	0. 000
Others	79. 00	105. 10	276. 00	197. 00	2. 59%	0. 000	0. 000
Total	25, 746. 30	27, 061. 90	33, 358. 70	7, 612. 40	100. 00%		0. 6491
Percentage of the Installed Capacity of 2004	77. 18%	81. 12%	—	22. 82%			

Table C Baseline emission factor of the proposed project

EF_OM (tCO2e/MWh)	EF_BM (tCO2e/MWh)	EF (tCO2e/MWh)
1.0328	0.6491	0.8409

Annex 4

MONITORING PLAN

>>
See section B.7.2.

Annex 4

CALCULATION OF EMISSIONS GENERATED BY COAL-FIRED BOILER

>>

1. Parameters of coal-fired boiler

Rated capability (ton/hour)	1
Nominal steam pressure (Mpa)	1.0
Nominal steam temperature (°C)	183
Heat efficiency	78%
Feed-water temperature (°C)	20

2. Other parameters

NCV $_{standard\ coal}$(MJ/ton)	29307
Winter heating period (month)	5
Steam enthalpy(MJ/ton) (under the condition of 1.0Mpa pressure and 183°C temperature)	2,785.46
Feed-water enthalpy (MJ/ton) (under the condition of 0.1Mpa pressure and 20°C temperature)	84.01

3. Calculation of daily coal consumption

Daily coal consumption = (Steam enthalpy — Feed-water enthalpy)÷Heat efficiency

÷NCV $_{standard\ coal}$ ×Rated capability×24 hours (1)

= (2785.46－84.01)÷78%÷29307×1×24

= 2.836 tons standard coal

4. Calculation of annual coal consumption

Annual coal consumption = Daily coal consumption×30 days×5 months (2)

= 2.836×30×5

= 425.4 tons standard coal

5. Calculation of annual emissions generated by the coal-fired boiler

The annual emissions are obtained as the following formula:

Annual emissions = Annual coal consumption×COEF$_{standard\ coal}$ (3)

Where:

$COEF_{standard\ coal}$ is the total amount of the CO_2 emission coefficient of coal consumed by the coal-fired boiler (tCO_2/mass).

$$COEF_{standard\ coal} = NCV_{standard\ coal} \times EF_{c,standard\ coal} \times 44 \div 12 \times OXID_{standard\ coal} \quad (4)$$

The NCV is taken as the local value at 29,307 MJ/ton. The values of OXID and EF_c are IPCC default values. As the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* is published. So it is necessary to compare the default values between IPCC 1996 and 2006 and the higher values should be selected for the conservative calculation. The comparison is shown as the following:

	IPCC 1996	**IPCC 2006**
OXID	0.98	1.00
EF_c (tC/Tj)	25.8	25.8

Therefore, the default value of OXID in IPCC 2006 is taken for the calculation. And, the value of EF_c is still applied as 25.8 tC/Tj as there is no change between IPCC 1996 and 2006.

According to formula 3 and 4, the annual emissions generated by the coal-fired boiler are calculated as:

$$\text{Annual emissions} = 425.4\ \text{tons} \times 29{,}307\ \text{MJ/ton} \times 25.8\ \text{tC/Tj} \times 44 \div 12 \times 1.00 \times 10^{-6}$$

$$= 1{,}179\ tCO_{2e}$$

Provided that the annual emission reductions generated from the proposed project is at least at 157,345tCO_{2e}, the annual emission generated by the coal-fired boiler is just accounted for 0.75% of the emission reductions, therefore, which could be neglected.