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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Project title: Xinjiang A'letai Hua'ning Hydropower Project
PDD Version: 4.1
Completion date: 24/05/2012

The revision history of the PDD is shown in Table 1.

Table 1: Revision history of the PDD

Version Number	Date	Description and reason of revision
1.0	28/11/2011	Prepared for CDM GSP
2.0	27/01/2012	Corrections made on the basis of corrective action requests in the validation protocol of DOE
3.0	30/03/2012	Corrections made on the basis of corrective action requests in the validation protocol of DOE
4.0	16/05/2012	Version revised according to DOE's request
4.1	24/05/2012	Version revised according to DOE's request

A.2. Description of the project activity:

The Xinjiang A'letai Hua'ning Hydropower Project (hereafter referred to as "the Project") is located in the middle stream of Sumudayilieke River, A'letai City, Xinjiang Uygur Autonomous Region, and P.R. China and is developed by XinJiang A'letai Hua'ning Hydropower Investment Developing Co., Ltd. The objective of the Project is the generation of zero carbon emission electricity from a renewable source (in this case, hydropower) and the displacement of the same amount of electricity from the Northwest China Power Grid (NWPG) that is mainly dominated by electricity derived from coal-fired power plants.

The Project is designed to install 2 sets of turbine generators with a unit capacity of 50 MW for each. The total installed capacity is 100 MW and the estimated net annual electricity supplied to the NWPG through Xinjiang power grid is about 324,920 MWh with average 3,322 hours operational hours per year. The main components of the Project include the dam on the river, factory buildings and substation.

The existing scenario prior to the start of the implementation of the Proposed Project is: the electricity generated by the project will be supplied by the Northwest China Power Grid (NWPG). The baseline scenario as identified in section B.4 is the same as this scenario.

Carbon dioxide (CO_2) emissions from fossil fuel-fired electricity generating plants connected to the NWPG are displaced due to the project activity and the CO_2 is the main emission source in the baseline. The Project will lead to an estimated annual greenhouse gases (GHG) emission reductions of 257,532 tCO_2e and a total of 1,802,724 tCO_2e of GHG emission reductions during its first 7-year crediting period.

The Project contribute to the sustainable development of the local area and the Host Country by enhancing the electricity supply capacity and improving the power infrastructure for the area as well as by

bringing positive social and environmental benefits to local communities. The specific sustainable development benefits of the Project are listed as follows:

- Reducing the reliance of the NWPG on exhaustible fossil fuels for power generation;
- Reducing air pollution by fossil fuel based electricity by clean, renewable power ;
- Improving the power mix of the NWPG by supplying clean energy;
- Improving the local energy generation infrastructure, bridging the gap between power supply and demand by increasing the electricity generation capacity to the local grid;
- Reducing the threat posed by air pollution to human health;
- Creating job opportunities for the local communities. The Project will bring about 50 job opportunities throughout the operating period, and these employment opportunities are helpful for the local people to improve their living standards.

In views mentioned above, the Project strongly contributes to the sustainable development in local area.

A.3. Project participants:

Name of Party involved(*) ((host) indicates a Host Party)	Private and/or public entity(ies) project participants(*)(as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	XinJiang A'letai Hua'ning Hydropower Investment Developing Co., Ltd	No
The United Kingdom of Great Britain and Northern Ireland	GFACC (IOM) Limited	No
The United Kingdom of Great Britain and Northern Ireland	Carbon & Energy Capital Co. LTD	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:

A.4.1.1. Host Party (ies):

People's Republic of China

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

Xinjiang Uygur Autonomous Region

A.4.1.3. City/Town/Community etc.:

A'letai City

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

The Project is located on the middle stream of Sumudayilieke River, A'letai City, Xinjiang Uygur Autonomous Region, and P.R. China. The distance from the location of the dam to A'letai city is about 110km. The geographical coordinates of the dam of the Project is 87°47′42"E, 48°13′23"N. The geographical coordinates of the plant of the Project is 87°56′00"E, 48°13′08"N. And the location of the Project is indicated in the maps below:

Map of China

Map of Xinjiang Uygur Autonomous Region

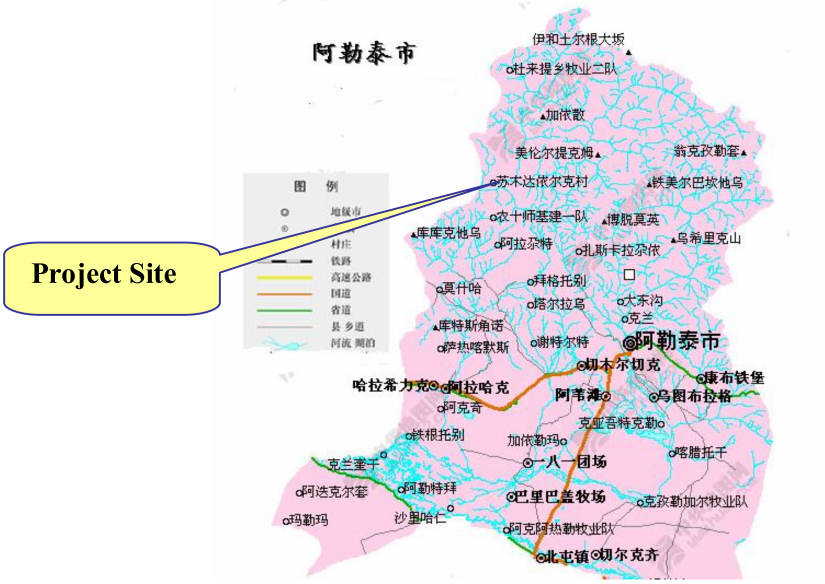


Figure A-1: Location of the Project

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

Sectoral scope 1: energy industries (renewable / non-renewable sources)

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

The scenario existing prior to the start of the implementation of the project activity is the same as the baseline scenario: In absence of the project activity, 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. The project will achieve greenhouse gas emission reductions by displacing equivalent electricity supplied by the NWPG, which is predominated by fossil fuel-fired power plants.

The project scenario:

The Project is an accumulation reservoir hydropower station with a total installed capacity of 100MW. The main manufacturing technology is to convert mechanical energy available in the water flow into electrical energy with the help of hydro turbines and generators. Main construction components of the Project include the new constructed dam and reservoir, the water release structure, the water intake system, factory buildings and step-up switchyard. The Project is a yearly regulation hydropower project. The area of the reservoir is 2.94km^2 with a corresponding power density of 34.01W/m^2, which is greater than 4 W/m^2. The Project is estimated to operate average 3,322 hours per year and the power load factor is 37.92%. After operating, the average gross electricity generated by the Project will reach 332,220 MWh annually, of which 324,920 MWh will be delivered to the NWPG.

The technical specifications of the key equipments of the proposed project (without transfer of technology) from Feasibility Study Report are listed as Tables below:

Table A-1 Key technical specifications of Hydro turbines

Parameters Name	Unit	Data
Model	/	HLFF151-LJ-216
Quantity	/	2
Rated Rotation Speed	r/min	375
Rated head	m	138
Rated flow	m^3/s	40.36
Equipment life time	year	30

Table A-2 Key technical specifications of Generators

Parameters Name	Unit	Data
Model	/	SF50-16/4650
Quantity	/	2
Installed capacity	MW	50
Rated Voltage	kV	10.5
Rated current	A	3,234.5
Rated frequency	Hz	50
Rated Rotation Speed	r/min	375
Rated Power Factor	/	0.85
Equipment life time	year	30

The electricity meter M (accuracy level >=0.5s) is a bidirectional power meter that will be installed at the Grid Company, which is treated as the main recording system that can monitor both the electricity supplied to the grid and electricity imported by the project plant from the grid in year, which is used for the calculation of net electricity generation supplied by the project plant to the grid in year y ($EG_{facility,y}$).The data will be cross-checked by the power invoice and power statement.

Detailed information regarding to monitoring system, please turn to section B.7.2.

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

The project activity employs the renewable crediting period (7years×3). During its first 7 years crediting period (estimated as 01/07/2013 to 30/06/2020) the Proposed Project is expected to generate a total amount of emission reductions of 1,802,724 tCO_2e, with an annual emission reduction of 257,532 tCO_2e. The estimated amount of emission reductions over the chosen crediting period is provided below.

Table A-3 Estimation of Emission Reductions in the 1st Crediting Period

Year	Annual estimation of emission reductions (tCO_2e)
01/07/2013-30/06/2014	257,532
01/07/2014-30/06/2015	257,532
01/07/2015-30/06/2016	257,532
01/07/2016-30/06/2017	257,532
01/07/2017-30/06/2018	257,532
01/07/2018-30/06/2019	257,532
01/07/2019-30/06/2020	257,532
Total estimated reductions(tCO_2e)	1,802,724
Total number of crediting years	7
Annual average of estimated reductions over the crediting period	257,532

A.4.5. Public funding of the project activity:

There is no public funding from Annex I parties 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:

The Project applies to the approved methodology: ACM0002 "Consolidated Baseline Methodology for grid-connected electricity generation from renewable sources" (Version 12.3.0).

Information regarding to the methodology could be found at:
http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT

In line with the approved methodology, the Project applies to the following tools:
"Tool for demonstration and assessment of additionality" (Version 06.0.0)

"Tool to calculate the emission factor for an electricity system" (Version 02.2.1)
"Combined tool to identify the baseline scenario and demonstrate additionality" (Version 04.0.0)

Information regarding to the tools could be found respectively at:
http://cdm.unfccc.int/Reference/tools/index.html

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

The methodology ACM0002 (Version 12.3.0) is applicable to the Proposed Project, because the Proposed Project meets all the applicability criteria stated in the methodology with relevance to Hydropower power plant:

- The Proposed Project is a grid-connected renewable power generation project activity that does not involve electricity capacity additions (i.e. hydropower);
- The Project results in a new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2;
- The geographic and system boundaries for the relevant electricity grid (i.e. the NWPG) can be clearly identified and information on the characteristics of the grid is available.
- The Proposed Project does not involve an on-site switch from fossil fuels to a renewable source.

Therefore, the Project activity is in accordance with the applicability of ACM0002 (Version 12.3.0).

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

As referred to the approved methodology ACM0002, the project boundary includes the Project plant itself and all the power plants connected to NWPG. According to the Baseline Emission Factors for Regional Power Grids in China published by China NDRC[1], NWPG covers Gansu Province, Qinghai Province, Shanxi Province, Ningxia and Xinjiang Autonomous Region.

The emissions sources included and excluded from the Project boundary for determination of both baseline and project emissions are listed below:

Table B-1 Basic parameters used for calculating baseline emissions

Source		Gas	Included?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source. Excluded for simplification. This is conservative.
		N_2O	No	Minor emission source. Excluded for simplification. This is conservative.

[1]China NDRC (20/10/2011), 2011 Baseline Emission Factors for Regional Power Grids in China. http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

Project Activity	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	Excluded by the methodology for hydro projects
		CH_4	No	The power density of the Project is 34.01W/m^2. According to ACM0002, if the power density is greater than 10 W/m^2, there is no need to calculate emission from water reservoirs.
		N_2O	No	Excluded by the methodology for hydro projects

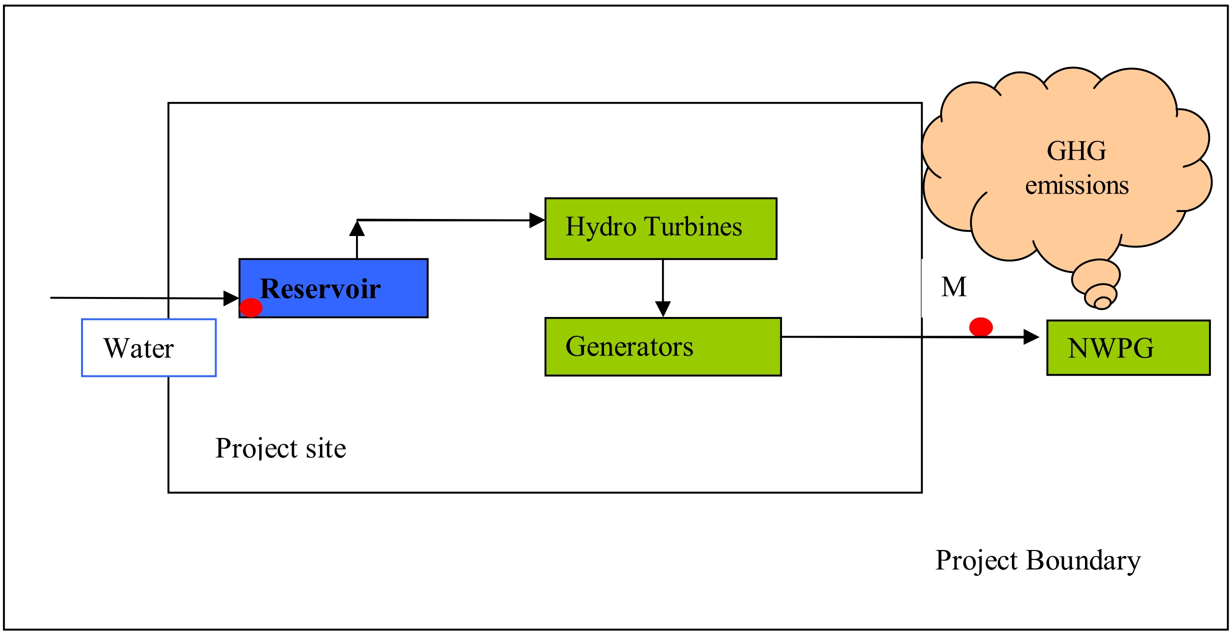


Figure B-1 Diagram of the project boundary

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

The Project involves the construction and operation of a new electricity generation facility, and does not involve the modification or retrofitting of an existing electricity generation facility; therefore, as described in the methodology ACM0002, the baseline is as follows:

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 in B.6. Section which follows "Tool to calculate the emission factor for an electricity system".

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):

Prior CDM consideration

The Feasibility Study Report (FSR) of the Project was completed on 01/2011 and approved by the Xinjiang Uygur Autonomous Region Development and Reform Commission on 15/07/2011. The financial indicator of investment in the FSR showed that the project IRR was lower than the benchmark 8%. To improve the financial attractiveness of the project, the project owner held a board meeting on 20/07/2011 to discuss this issue and finally members of board decided to take the Project as a CDM project. Then the project owner started to contact with some consulting companies and finally signed consulting agreement with Hangzhou Carbon Trade Environment Engineering Co., Ltd (HCTEE) on 22/08/2011. On 15/09/2011, the project owner signed the construction contract of power factory, diversion tunnel and dam, which are marked as the starting date of CDM project.

With the help of the consulting company, the project owner then proceeded to secure the CDM application for the project. In accordance with the "Guidelines on the demonstration and assessment of prior consideration of the CDM", the project owner submitted the notification of CDM consideration to Chinese DNA and CDM EB in October and November 2011 respectively.

Here followed a general implementation schedule of the Project to illustrate main events. An overview of key event is given in Table B-2.

Table B-2 Overview of key events in the development of the project

Date	Key events
28/08/2010	The stakeholder consultation meeting was organised
01/2011	The Feasibility Study Report was completed
05/2011	The Environmental Impact Assessment Report was completed
11/05/2011	The Environmental Impact Assessment Report was approved by the Xinjiang Department of Environmental Protection
15/07/2011	The Feasibility Study Report was approved by Xinjiang Uygur Autonomous Region Development and Reform Commission
20/07/2011	Board Decision for the project to apply for CDM
22/08/2011	CDM consultancy agreement signed by project owner and Hangzhou Carbon Trade Environment Engineering Co., Ltd.
15/09/2011	Construction contract of power factory, diversion tunnel and dam were signed(the earliest starting date of the Project)
18/10/2011	NDRC notification for the Project
18/11/2011	EB notification for the Project
23/11/2011	ERPA signed by the project owner and the buyer.

Additionality

The following steps demonstrate additionality for the Project according to *Tool for the demonstration and assessment of additionality (version 06.0.0)* as required by the methodology:

Step 1: Identification of alternatives to the project activity consistent with current laws and regulation

According to ACM0002 (Version 12.3.0), alternatives to the project activity do not need to be identified as the baseline scenario other than the one which has been prescribed.

The baseline scenario of the project is:
Continuation of the scenario existing prior to the start of the implementation of the proposed project. Electricity will continue to be generated by the existing generation mix operating in the grid, which is NWPG.

Step 2: Investment Analysis
Sub-step 2a: Determine appropriate analysis method

The *Tools for the Demonstration and Assessment of Additionality (V06.0.0)* recommends three investment analysis methods, including simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

The Project generates financial and economic benefits through the sales of electricity therefore the simple cost analysis (Option I) cannot be taken. The investment comparison analysis (Option II) is only applicable to projects where alternatives should be similar investment projects. The alternative baseline scenario of the Project is the electricity import from Northwest China Power Grid rather than a new investment project. Therefore the benchmark analysis (Option III) has been chosen.

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

According to *Interim rules on Economic Assessment of Electrical Engineering Retrofit Project* formulated by State Electric Power Corporation, the financial benchmark internal rate of return (IRR) of total investment for projects within the power sector is 8% (after tax). If the IRR of the Project is lower than 8%, the project can be considered financially unattractive. Thus, the project is additional. This benchmark will be used for the financial appraisal of the Project.

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

Followed parameters and financial analysis are all taken from Feasibility Study Report which was completed in January 2011. Basic data and parameters for the calculation of financial indicator of the Project are summarized in TableB-3:

TableB-3 Main parameters for the financial analysis

Parameters	Value	Unit	Source
Total Investment	91,330	10^4CNY	FSR
Fixed Asset Investment	84,444	10^4CNY	FSR
Installed Capacity	100	MW	FSR
Annual Power Generation	332,220	MWh	FSR
Effective Coefficient	0.98	/	FSR
The electricity consumed on site	0.2	%	FSR
Net electricity delivered to grid	324,920	MWh	FSR

Annual Operational costs	1,409.56	10^4CNY	FSR
Electricity Tariff	0.21	CNY/kWh(without VAT)	FSR
Value Added Tax	17	%	FSR
City maitenance & construction tax rate	5	%	FSR
Educational surtax	3	%	FSR
Income Tax	25	%	FSR
Signed CERs price	10	Euro /tCO_2	ERPA

TableB-4 shows the Project IRR with and without the revenue of CERs. Without the revenue of CERs, the Project IRR is 4.27% [6]which is clearly lower than benchmark IRR, which indicates that the Project is not financially attractive in normal investment fields. However, taking into account the CDM revenues, the Project IRR is 8.12%, which is higher than the benchmark IRR. Therefore, to make a conclusion, the CDM revenues could improve the economic feasibility of the Project.

TableB-4 IRR with and without the CERs revenues

	Without CERs	With CERs
IRR	4.27%	8.12%

Sub-step 2d: Sensitivity analysis

The sensitivity analysis shall show whether the conclusion regarding financial attractiveness is robust to reasonable variations in the critical assumptions.

The following key parameters have been selected as sensitive indicators to test the financial attractiveness of the Project.

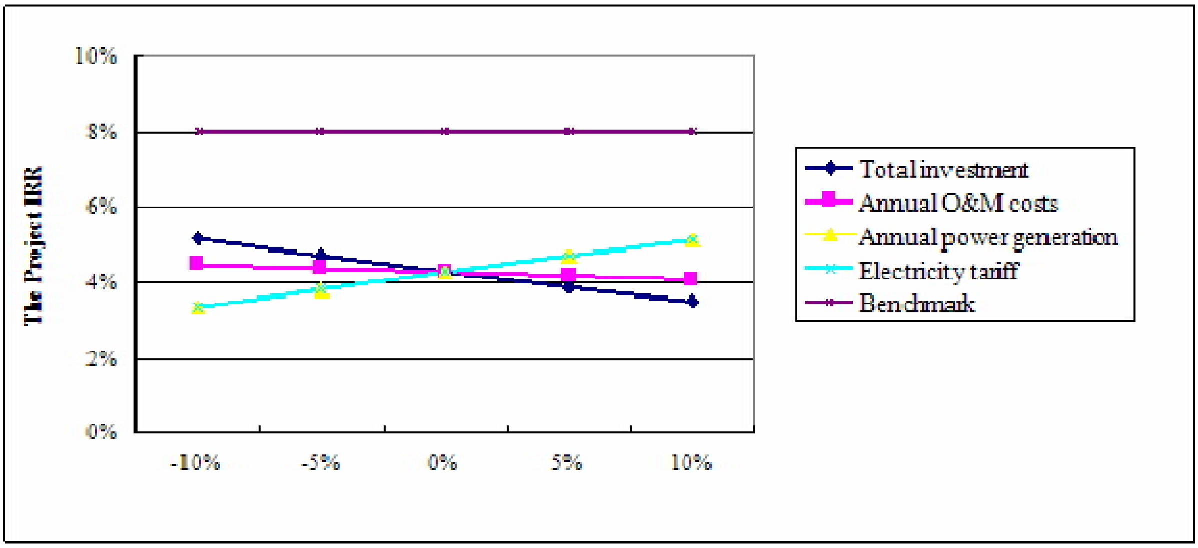
(1) Total Investment
(2) Annual O&M costs
(3) Annual power generation
(4) Electricity tariff

As we can see in TableB-5 followed, the above four financial indicators are varied in a range of ±10%. Although relative IRRs vary to different extent, they do not exceed benchmark IRR 8%.

TableB-5 IRR Sensitivity to Different Financial Indicators of the Project

Factors	Range				
	-10%	-5%	0	5%	10%
Total investment	5.16%	4.70%	4.27%	3.87%	3.50%
Annual O&M costs	4.46%	4.37%	4.27%	4.18%	4.08%
Annual power generation	3.35%	3.82%	4.27%	4.71%	5.13%
Electricity tariff	3.35%	3.82%	4.27%	4.71%	5.13%

[6] It is taken from *Project IRR spreadsheet with & without CDM revenue* which developed based on FSR.



The project IRR of the proposed project varies to different degrees in accordance with the fluctuation of four parameters within the range of -10% to +10%.

- **Total Investment:** In the case that the total investment decreased 34.53%, the IRR of the Project will reach the benchmark 8%. However, it is unlikely to occur because the construction materials prices in China have increased during the last few years. Please see followed Table B6 which taken from National Bureau of Statistics of China[7] in accordance with Purchasing Price Indices for Raw Materials, Fuels and Power kept rising from 2004. It predicted that prices had a strong tendency to rise.

TableB-6 Purchasing Price Indices for Raw Materials, Fuels and Power

(Preceding year=100)

Year	General Index	Fuel and Power	Ferrous Metals	Nonferrous Metals	Raw Chemical Materials	Timber and Paper Pulp	Building Materials
2004	111.4	109.7	120.4	120.1	108.9	102.8	105.1
2005	108.3	115.0	107.5	114.0	108.3	103.5	103.1
2006	106.0	111.9	98.3	130.8	102.1	102.6	101.9
2007	104.4	104.3	105.4	111.6	103.6	102.7	103.0
2008	110.5	120.6	118.4	98.6	105.2	105.2	109.5

[7] National Bureau of Statistics of China

"China Statistical Yearbook 2009", "http://www.stats.gov.cn/english/statisticaldata/yearlydata/#"

TableB-7 Similar registered CDM projects[8]

Ref. No.	Project name	Installed capacity (MW)	Unit investment cost (CNY/KW)	Unit O&M cost (CNY/KW)	Operating hours	Electricity price (without VAT) (CNY/KWh)
3768	Jilintai Stage II Hydropower Project, Nileke County, Xinjiang Uyghur Autonomous Region	50	9,063	507	5,784	0.21
4632	Burqin River Chonghuer Hydropower Project in Xinjiang Uygur Autonomous Region	110	7,673	152	3,555	0.21
4446	Xinjiang Kashi River Wenquan Hydropower Project	135	9,050	207	5,000	0.21
5131	Xinjiang Kalasuke 140MW Hydroelectric Project	140	4,860	138	3,707	0.17
1956	Xinjiang Uygur Autonomous Region Tekesi River Shankou Hydropower Station	141	7,759	160	4,049	0.17
3767	Xinjiang Uygur Autonomous Region Kashgar Tarim River Xiabandi Hydropower Station	150	5,400	102	3,059	0.21
4000	Xinjiang Hetian Bobona Hydropower Project	150	6,338	192	4,440	0.19

Furthermore, by compare with other similar registered CDM projects in Xinjiang, the Unit investment cost of the project activity is 8444 CNY/KW, fall within the range of similar projects and slightly lower than the average unit investment cost. However, even if the average unit investment cost of 7163 CNY/KW applied in the project activity, the IRR of the Project is 5.66% which is still lower than the benchmark.

Form what we analysis above, it can be concluded that there were a few possibilities of crossing the bench-mark ratio (8%) because a decline of investment cost was unlikely to happen.

- **Annual O&M costs:** When the annual operational and maintenance cost decreased 258.60%, the project IRR could reach 8%. Obviously, such decrease is impossible to happen. Furthermore, the Project IRR increases slightly with the decrease of O&M cost, and even if there is no O&M cost, the IRR would stay below the benchmark. Therefore, the project can't become commercially attractive through decrease of Annual O&M costs.

- **Annual power generation:** With annual power generation increase by 49.54%, the project IRR will reach the benchmark IRR 8%. However, this is improbable; as the power generation as well as the annual utilization hours and installed capacity were estimated based on 54 years of hydrological data which comes from adjacent hydrological measuring stations mentioned in the FSR and will change little. Furthermore, the power generation was calculated by the designing institute based on the on-site situation,

[8] http://cdm.unfccc.int/Projects/projsearch.html

including social environment, hydrological condition and power requirement which are relatively stable. Therefore, it is unlikely for the annual power generation of the project to increase 49.54%.

- **Electricity tariff:** With electricity tariff increase by 49.54 %(correspond to 0.314CNY/kWh without VAT), the Project IRR would reach to the benchmark 8%. However, the applied highest tariff power tariff (0.21CNY/kWh without VAT) of similar registered hydro power projects in Xinjiang Uyghur Autonomous Region is much lower than 0.314CNY/kWh without VAT. Moreover, the tariff is strictly regulated by the government and is kept in relatively stable in China. It is impossible that the IRR will exceed the benchmark by increasing the electricity. According to the Supervision Report on Power Tariff Application and Power Settlement of Northwest area in China in 2009[9], the average power tariff of hydro power projects in Xinjiang Uyghur Autonomous Region in 2009 is 0.23CNY/kwh with VAT. The power tariff in the PDD and FSR is reasonable and very conservative. As a result, it is very unlikely to make the IRR exceed the benchmark through the variation of tariff.

To conclude, the sensitivity analysis shows that without CER revenue, IRR of the project is difficult to reach the benchmark 8%, which supports the conclusion, that the proposed project is unlikely to be financially attractive.

Outcome of Step2: According to the sensitivity analysis, within the reasonable range of each indicator, the Project IRR is always lower than the investment benchmark IRR, thus it can be confirmed that the Project is unlikely to be financially attractive.

Step 3: Barriers Analysis

This step is not used for Project.

Step 4: Common practice analysis

Measure (for emission reduction activities) is a broad class of greenhouse gas emission reduction activities possessing common features. Four types of measures are currently covered in the framework:
(a) Fuel and feedstock switch;
(b)Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies);
(c) Methane destruction;
(d) Methane formation avoidance.
The hydropower project belongs to the second type of measure:

(b) Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies); According to the paragraph 47 of "Tool for the Demonstration and Assessment of Additionality" (version 06.0.0, EB65, Annex21), "for measures that are listed in paragraph 6", this part should analysis in the following:

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

According to the"Tool for demonstration and assessment of additionality" (Version 06.0.0) this part should be analysed in the following:

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[9] http://www.12398.gov.cn/html/information/770027373/770027373201000199.shtml

[10] http://www.xjzhengce.com/

Step 4a(1): Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

The applicable output range as+/-50% of the design capacity 100MW of the proposed project activity is from 50MW to 150MW.

Step4a(2): In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all} Registered CDM project activities shall not be included in this step;

According to the Tool for the Demonstration and Assessment of Additionally, projects are considered "similar" in case they are located in the "same county/region", are of "similar scale", and "take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc". Therefore, the applicable geographical area can be identified as below:

Xinjiang Uygur Autonomous Region with an area of 166.49 ten thousand km^2, is comparatively and considerably large. According to the requirements of common practice, the projects with similar conditions, such as investment conditions and natural conditions(including geographical conditions, climate conditions, development conditions and so on), are necessary to be analyzed. Projects located in different provinces have not the similar investment conditions[10][11][12] and natural conditions[13]. Xinjiang Uygur Autonomous Region is an autonomous region, which has more different conditions[14] from normal provinces like Shaanxi, Gansu and Qinghai provinces, located in the Northwest China Grid. Therefore, the PDD selects geographical area, i.e. Xinjiang Uygur Autonomous Region, as a common practice region.

According to the guideline, it's identified all plants that deliver the same output (electricity generation) in Xinjiang Uygur Autonomous Region and started commercial operation before the start date of the proposed project (15, September, 2011) without registered CDM projects. So, two categories of projects are identified as follow.

-Category 1: Hydropower projects between 50MW to 150 MW in Xinjiang Uygur Autonomous Region, Note their number $N_{all,hydropower}$

-Category 2: Power generation projects other than hydropower with the applicable output range in Xinjiang Uygur Autonomous Region. Note their number $N_{all,other}$

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[11] http://www.cqvip.com/Read/Read.aspx?id=1000605721

[12] http://www.gstj.gov.cn/doc/ShowArticle.asp?ArticleID=198

[13] http://www.hydrochina.com.cn/fdsd/slzy.jsp

[14] http://www.gov.cn/test/2005-07/29/content_18338.htm

Therefore: $N_{all} = N_{all,hydropower} + N_{all,other}$

Refer to the Yearbook of China water resources 2002~2011 and the website of State Power Information Network, http://www.sp.com.cn/zgsd/tjzl/gsstj/200805/t20080515_104323.htm, all the hydropower plants were identified in Xinjiang Autonomous Region. Among the projects identified according to situation described above and criteria, there are four similar non-CDM hydro power project with installed capacity between 50MW and 150MW operated before 15, September, 2011 (the start date of the proposed project) within Xinjiang Autonomous Region according to "Tool for the Demonstration and Assessment of Additionality (version 06.0.0)".

All CDM projects which are excluded in line with "Tool for the Demonstration and Assessment of Additionality (version 6.0.0)", so it can be concluded that below projects have been completely identified in the applicable geographical area as N_{all} without registered CDM project activities.

Table B.7 Identified hydropower projects

No	Project name	Capacity (MW)	Year of construction
1	Yili Tuohai Hydropower Project	50	1984 [15]
2	Dashankou Hydropower Project	80	1987 [16]
3	Wuluwati Hydropower Project	60	1995[17]
4	Tianchi Hydropower Project	100	1998[18]

Therefore, the $N_{all} = N_{all,hydropower} + N_{all,other} = 4 + N_{all,other}$

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

Step 4a(3): Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}

Different technologies are technologies that deliver the same output and differ by at least one of the following (as appropriate in the context of the measure applied in the proposed CDM project and applicable geographical area):
(i) Energy source/fuel;
(ii) Feed stock;
(iii) Size of installation (power capacity):
(iv) Investment climate in the date of the investment decision, inter alia:
-Access to technology;
-Subsidies or other financial flows;
-Promotional policies;
-Legal regulations;
(v) Other features

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[15] http://www.sp.com.cn/zgsd/tjzl/gsstj/200805/t20080515_104323.htm

[16] http://www.sp.com.cn/zgsd/tjzl/gsstj/200805/t20080515_104323.htm

[17] http://www.mwr.gov.cn/ztpd/2009ztbd/xjwlwtslsngcjgyshy/bjcl/2009091516073392d11e.aspx

[18] http://www.fk.gov.cn/10030/10030/00007/00005/2006/11257.htm

[19] *Electricity Reform Program* was implemented by the State Council.
http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm

Category 1 projects:
Investment climate & Other features
Projects commissioned prior to the year 2002 are excluded because they were developed by the state under a market environment that was substantially different from the current market environment, which is, the first Power System Reform Blue Print has been published by State Council in February 2002, and the *Electricity Reform Program*[19] content mainly include: Power plants separating from the power grid, reforming enterprises for power plants and power grids; bidding to power grid, building a competitive and open power market initially; changing the current situation of all power purchased by the state owned grid enterprises. Thus, these identified four hydropower projects between 50MW to 150 MW in Xinjiang Uygur Autonomous Region are all commissioned before 2002 and are different from the proposed project. Thus $N_{diff,hydropower}$=4 is included in N_{diff}.

Category 2 projects:
The energy sources of projects in category 2 are different from the proposed project which uses water sources for power generation. So the projects in Category 2 apply technologies different that the technology applied in the proposed project activity. So $N_{diff,other}$ is included in N_{diff}.

As analysed above, Thus $N_{diff} = N_{diff,hydropower} + N_{diff,other} = 4 + N_{diff,other}$

Step 4a(4): Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

All plants using different energy souce/fuel with the project ($N_{diff,other}$) are considered different from the proposed CDM project activity, thus $N_{all,other} = N_{diff,other}$

Accordingly, the factor $F = 1 - N_{diff}/N_{all} = 1 - (4+N_{diff,other}) / (4+N_{all,other}) = 1-1=0<0.2$
and$N_{all} - N_{diff} = (4+N_{all,other}) - (4+N_{diff,other}) = 0<3$
According to the "Tool for demonstration and assessment of additionality” (Version 06.0.0), As analysis above, the factor F is less than 0.2, and $N_{all} - N_{diff}$ is less than 3. The proposed project is not a common practice.

In conclusion,the proposed project is not a common practice. It is clear from the analysis in step 2 that the Project is financially and economically unattractive. Taking into account the financial difficulty faced by the project owner in the construction of the Project and the project's poor rate of return, the project owner decided to proceed with the implementation of the Project only if it could be registered as a CDM project. Thus, the proceeds of CERs are a key element for the Project.

Therefore, the Project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The project is the installation of a new grid-connected renewable power plant/unit; therefore the baseline scenario is the following:

Electricity delivered to the grid by the project activity 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 in the *Tool to calculate the emission factor for an*

electricity system(Version 02.2.1).

According to ACM0002 (Version 12.3.0), project emissions, baseline emissions, leakage emissions and emission reductions are calculated as follows:

Project emissions

According to ACM0002 (Version 12.3.0), the project emission is calculated as follows:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad (11)$$

Where:

PE_y	=	Project emissions in year *y* (tCO_2e/yr)
$PE_{FF,y}$	=	Project emissions from fossil fuel consumption in year *y* (tCO_2/yr)
$PE_{GP,y}$	=	Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e/yr)
$PE_{HP,y}$	=	Project emissions from water reservoirs of hydro power plants in year *y* (tCO_2e/yr)

The project is a hydro project, so $PE_{FF,y}$ and $PE_{GP,y}$ are considered zero according to methodology ACM0002(Version12.2.0). Moreover, as described in the methodology, hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoir.

In order to define calculation method, the power density is calculated bellow:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}} \quad (22)$$

Where:

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

For the Project,

PD =(100,000,000-0)/(2,940,000-0)=34.01 (33)

According to the ACM0002 (Version 12.3.0), if the power density of the project activity is greater than 10 W/m^2, the Project emissions ($PE_{HP,y}$) is zero. Through above calculation, the power density of the Project is 34.01W/m^2, therefore:

$$PE_y = 0 \quad (44)$$

Baseline emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants within Northwest China Power Grid that are displaced due to the project activity. The baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (55)$$

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ for greenfield plants is described below:

(a) Greenfield renewable energy power plants

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y} \quad (66)$$

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

According to ACM0002 (Version 12.3.0), *Tool to calculate the emission factor for an electricity system (Version02.2.1)* is used in the PDD. The following procedure is adopted to determine $EF_{grid,CM,y}$.

Step 1: Identify the relevant electricity systems

The DNA of China has published a delineation of the project electricity system and connected electricity systems, therefore these delineations will be used in the Project. The electricity generated by the Project is connected to the Northwest China Power Grid, which includes Gansu Province, Qinghai Province, Shanxi Province, Ningxia and Xinjiang Autonomous Region. Power plants within the Northwest China Power Grid can be dispatched without significant transmission constraints but transmission to the grid has significant transmission constrains. Therefore the Northwest China Power Grid can be determined as the connected electricity system of the Project. And the Project electricity system is the spatial extent of the power plants including in the Northwest China Power Grid.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

No off-grid power plant included in the Project, so the Project choose Option I: Only grid power plants are included in the calculation, to calculate the operating margin and build margin emission factor.

Step 3: Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

a) Simple OM, or
b) Simple adjusted OM, or
c) Dispatch data analysis OM, or
d) Average OM.

In China, the dispatch information is not available to the public, furthermore, since the low-cost/must run resources constituted less than 50% of total power generation of the Northwest China Power Grid. Hence, 'Simple OM' option has been chosen.

In between *Ex ante* option and *Ex post* option, *Ex ante* option of a 3-year generation-weighted average is chose. For the calculation, data in 2007, 2008 and 2009 are chose as these are the most recent available data.

Step 4: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. In the Project, it is calculated based on the total net electricity generation of all power plants serving the system, the fuel types and total fuel consumption of the project electricity system (option B). The reason for choosing option B is presented below:

(a) The necessary data for Option A is not available; and
(b) Nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
(c) Off-grid power plants are not included in the calculation.

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

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y} \right)}{EG_y} \qquad (77)$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$FC_{i,y}$ = Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i = All fossil fuel types combusted in power sources in the project electricity system in year *y*
y =The relevant year as per the data vintage chosen in Step 3

For this approach (simple OM) to calculate the operating margin, the subscript *m* refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units, and including electricity imports to the grid. Electricity imports should be treated as one power plant *m*.

According to the above steps and the emission factor of NWPG published by Chinese DNA on 20/10/2011, a 3-year average Simple OM Emission Factor of NWPG is:

$EF_{grid,OM,y}$=1.0001 tCO_2e/MWh

The detailed calculation is shown in Annex 3.

Step 5: Calculate the build margin (BM) emission factor

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, *ex post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ante*, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The option chosen should be documented in the CDM-PDD.

Project participants have chosen Option 1, which requires the project participant to calculate the build margin emission factor *EFgrid ,BM ,y ex-ante* based on the most recent information available already built for sample group m at the time of PDD submission.

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently (SET5-units) and determine their annual electricity generation (AEGSET-5-units, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEGtotal, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEGtotal (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET≥20%) and determine their annual electricity generation (AEGSET-≥20%, in MWh);

(c) From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation (SETsample);
Identify the date when the power units in SETsample started to supply electricity to the grid.
If none of the power units in SETsample started to supply electricity to the grid more than 10 years

ago, then use SETsample to calculate the build margin. In this case ignore steps (d), (e) and (f). Otherwise:

(d) Exclude from SETsample the power units which started to supply electricity to the grid more than10 years ago. Include in that set the power units registered as CDM project activities, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set (SETsample-CDM) the annual electricity generation (AEGSET-sample-CDM, in MWh);
If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. AEGSET-sample-CDM ≥ 0.2 × AEGtotal), then use the sample group SETsample-CDM to calculate the build margin. Ignore steps (e) and (f).
Otherwise:

(e) Include in the sample group SETsample-CDM the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units m used to calculate the build margin is the resulting set (SETsample-CDM->10yrs).

Identify the date when the power units in SETsample started to supply electricity to the grid. If none of the power units in SETsample started to supply electricity to the grid more than 10 years ago, then use SETsample to calculate the build margin. In this case ignore steps (d), (e) and (f). In China, the steps (d), (e) and (f) can be ignored because none of the power units in SETsample started to supply electricity to the grid more than 10 years ago.

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (88)$$

Where

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

Currently in China, the build margin data of sample plants group *m* are not available publicly. Taking notice of this situation, CDM Executive Board accepts the following deviation in application of methodology ACM0002 in China.

1) Calculate the build margin emission factor $EF_{grid,BM,y}$ ex-ante based on the recent years available data at the time of PDD submission.
2) For the first crediting period, the Build Margin emission factor $EF_{grid,BM,y}$ is updated annually ex-post for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{grid,BM,y}$ is calculated *ex-ante*, as described in option 1 above.

Taking into account of data availability, the following conservative calculation has been approved by the CDM Executive Board. Using this modified method, newly-built capacity is weighted by the composition of power generation technologies and then emission factors are calculated using the efficiencies of the best available technologies.

Because capacities of technologies using coal, oil and gas cannot be separated from the total thermal power generation from publicly available statistics, the following method is used for the calculation: first, use the energy balance data of the most recent year available and calculate the percentages of CO_2 emissions of power generation using solid, liquid and gas fuel in the total CO_2 emission. Second, calculate grid thermal power emission factors, using the percentages (as weights) and emission factors of technologies corresponding to best available efficiencies. Last, the thermal power emission factor is multiplied by the percentage of thermal power in the newest 20% capacity in the grid, and the result is the Build Margin emission factor of the grid.

The steps and equations are as follows:

a) Percentage of CO_2 emitted, λ, for each solid, liquid and gas power generation:

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co2,i,j,y}} \quad (9)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co2,i,j,y}} \quad (10)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co2,i,j,y}} \quad (11)$$

Where:

$F_{i,j,y}$ =the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in year(s) *y*, while *j* refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid.

$NCV_{i,y}$ =the fuel i net caloric value in the year y (for solid and liquid fuel for the GJ / t, for fuel gas for GJ/m3)

$EF_{CO2,i,j,y}$ =the fuel emission factors (tCO_2/GJ)

COAL, OIL and *GAS* are footnote group for solid fuels, liquid fuels and gas fuels.

b) Calculate $EF_{Thermal,y}$

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (12)$$

Where $EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ respectively represent the efficiency level of the best coal-based, oil-based and gas-based power generation technology commercially available in China.

c) Calculate $EF_{grid,BM,y}$

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (13)$$

Where CAP_{Total} is total capacity additions while $CAP_{Thermal}$ is capacity additions to thermal power.

The calculation of the $EF_{grid,BM,y}$ is done as indicated in the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on 20/10/2011. The result is followed:

$$EF_{grid,BM,y} = 0.5851 \text{ tCO}_2\text{/MWh} \quad (14)$$

Step 6: Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (15)$$

Where:

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

* w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period.

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (16)$$

$$=1.0001 \text{ tCO}_2\text{/MWh} \times 0.5 + 0.5851 \text{ tCO}_2\text{/MWh} \times 0.5$$

$$=0.7926 \text{ tCO}_2\text{/MWh}$$

<u>**Leakage emissions**</u>

According to ACM0002 (Version 12.3.0), no leakage emissions are considered.

$$L_y = 0 \text{ CO}_2\text{e/yr} \quad (17)$$

<u>**Emission reductions**</u>

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (18)$$

Where:

ER_y = Emission reductions in year *y* (tCO_2e/yr)
BE_y = Baseline emissions in year *y* (tCO_2/yr)
PE_y = Project emissions in year *y* (tCO_2e/yr)

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

The following data and parameters are related to the calculation of the grid emission factor in accordance with the "Tool to calculate the emission factor for an electricity system":

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2e/MWh
Description:	Build Margin Grid Emission Factor
Source of data used:	Calculated ex-ante (see Annex 3)
Value applied:	0.5851
Justification of the choice of data or description of measurement methods and procedures actually applied:	Calculated ex-ante. For more information see Section B.6.1 and Annex 3.
Any comment:	-

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO_2e/MWh
Description:	Operating Margin Grid Emission Factor
Source of data used:	Calculated ex-ante (see Annex 3)
Value applied:	1.0001
Justification of the choice of data or description of measurement methods and procedures actually	Calculated ex-ante. For more information see Section B.6.1 and Annex 3.
measurement methods	
Any comment:	-

Data / Parameter:	$EF_{,grid, CM,y}$
Data unit:	tCO_2/MWh
Description:	Combined Margin Emission Factor of NWPG
Source of data used:	2011 Baseline Emission Factors of Power Grids in China published by NDRC.
Value applied:	0.7926
Justification of the choice of data or description of measurement methods and procedures actually	As per the procedures described in the "Tool to calculate the emission factor for an electricity system"

measurement methods	As per the "Tool to calculate the emission factor for an electricity system"
Any comment:	

Data / Parameter:	***$FC_{i,y}$***
Data unit:	Mtons, Mm^3
Description:	Amount of fossil fuel type *i* comsumed in the project electricity system in year *y*
Source of data used:	*Chinese Energy Statistical Yearbook*, 2008-2010 editions Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on 20/10/2011. (http://cdm.ccchina.gov.cn)
Value applied:	Varies for each fuel and year, see Annex 3 for detail.
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is official released statistic. The data source is reliable.
Any comment:	-

Data / Parameter:	***$NCV_{i,y}$***
Data unit:	TJ/ton or TJ/m^3
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data used:	*Chinese Energy Statistical Yearbook*, 2008-2010 editions Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on 20/10/2011. (http://cdm.ccchina.gov.cn)
Value applied:	See Annex 3 for detail.
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is official released statistic. The data source is reliable.
Any comment:	-

Data / Parameter:	***$EF_{CO2,i,y}$***
Data unit:	tCO_2
Description:	CO_2 emission factor of fossil fuel type *i* used in year *y*
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2 Energy Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on 20/10/2011. (http://cdm.ccchina.gov.cn)
Value applied:	See Annex 3 for detail.
Justification of the choice of data or description of measurement methods	This is IPCC default value.

and procedures actually applied :	
Any comment:	-

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity generated in the project electricity system in year *y*
Source of data used:	"Chinese Electricity Yearbook" 2005~2008 editions Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on 20/10/2011. (http://cdm.ccchina.gov.cn)
Value applied:	Varies with province and year, see Annex 3 for detail.
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is official released statistic. The data source is reliable.
Any comment:	-

Data / Parameter:	Cap_{BL}
Data unit:	W
Description:	Installed capacity of the hydro power plant before the implementation of the project activity
Source of data used:	Project site
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Due to it is a new hydro power plant, according to ACM0002 (Version12.3.0), this value is zero.
Any comment:	-

Data / Parameter:	A_{BL}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2).
Source of data used:	Project site
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Due to it is a new reservoir, according to ACM0002 (Version12.3.0), this value is zero.
Any comment:	-

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

As explained in B.6.1, the project emissions and leakage emissions of the Project are all considered as zero. The baseline emissions in year *y* (BE_y) are calculated as

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

The net electricity of the project is 324,920MWh as estimated in FSR.

The emission factor of NWPG is 0.7926tCO_2e/MWh.

Thus the baseline emission is

$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$ =324,920 MWh * 0.7926 tCO_2e/MWh=257,532 tCO_2e

The emission reductions for a given year are calculated as baseline emissions minus the project emissions:

$ER_y = BE_y - PE$ =257,532tCO_2e-0 tCO_2e=257,532tCO_2e

Therefore, the Project will have an emission reduction estimated at 257,532tCO_2e.

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

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of emission reductions (tonnes of CO_2e)
01/07/2013-30/06/2014	0	257,532	0	257,532
01/07/2014-30/06/2015	0	257,532	0	257,532
01/07/2015-30/06/2016	0	257,532	0	257,532
01/07/2016-30/06/2017	0	257,532	0	257,532
01/07/2017-30/06/2018	0	257,532	0	257,532
01/07/2018-30/06/2019	0	257,532	0	257,532
01/07/2019-30/06/2020	0	257,532	0	257,532
Total(tCO_2e)	0	1,802,724	0	1,802,724

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{facility,\ y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant to the grid in year y
Source of data to be used:	Measured by meter and calculated
Value of data applied for the purpose of calculating expected	324,920

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Measured by bidirectional meters and calculated by the electricity supplied to the grid minus electricity imported by the project plant from the grid. The data will be measured continuously and monthly aggregated.
QA/QC procedures to be applied:	According to Technical administrative code of electric energy metering (DL/T448 – 2000), meters will be calibrated annually by an independent inspection authority. Data measured by meters will be cross checked by the electricity sales documents.
Any comment:	100% of data will be kept for two years after the end of the last crediting period or the last issuance of CERs for this Project, whichever occurs later.

Data / Parameter:	Cap_{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100,000,000
Description of measurement methods and procedures to be applied:	It is determined based on nameplate and will be verified on site yearly.
QA/QC procedures to be applied:	The data will be crosschecked using specification manual.
Any comment:	Data are to be kept for two years after the end of the last crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter:	A_{PJ}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the implementation of the Project activity, when the reservoir is full.
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2,940,000
Description of measurement methods and procedures to be applied:	Measured from topographical surveys. It will be monitored yearly. The measurement will be carried out by a qualified third party following latest national standard.
QA/QC procedures to	The data resulted from topographical surveys will be crosschecked with last

be applied:	year's to see if there is any inconsistence.
Any comment:	Data are to be kept for two years after the end of the last crediting period or the last issuance of CERs for this project activity, whichever occurs later.

B.7.2. Description of the monitoring plan:

The monitoring plan is made according to *ACM0002 Consolidated Baseline Methodology for grid-connected electricity generation from renewable sources"(Version 12.3.0)*. Monitoring procedure should be implemented firmly according to monitoring plan to ensure real, measurable and long-term greenhouse gas (GHG) emission reduction of the Project is monitored and reported.

1. Monitoring Objective

Since the emission factor is calculated as *ex-ante* and according to the Monitoring Methodology ACM0002 (Version 12.3.0), the following data should be monitored:

a) Net electricity delivered by the Project to the Grid ($EG_{facility, y}$)

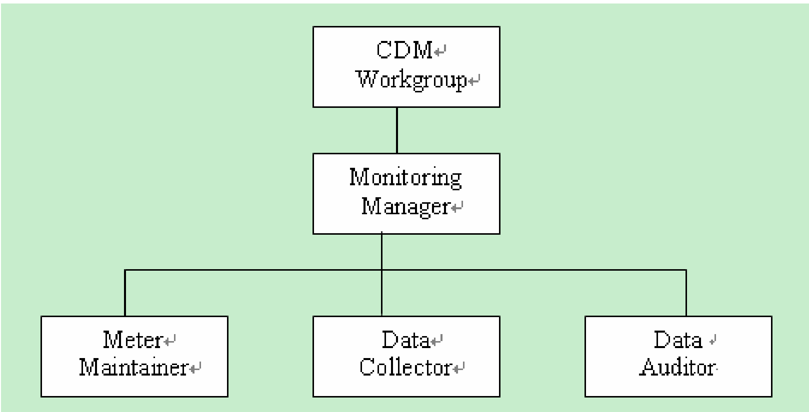
b) Installed capacity of the hydro power plant after the implementation of the project activity (Cap_{pj})

c) Area of the reservoir measured in the surface of the water, after the implementation of the Project activity, when the reservoir is full (A_{pj}).

2. Monitoring Organization

A CDM group will be established to carry out the monitoring plan. The project owner will designate a CDM manager to responsible for daily monitoring and reporting. Under the CDM manager, there will be three positions involved, respectively referred as meter maintainer, data collector and data auditor.

Followed figure shows the CDM group structure:



The CDM Manager is fully responsible for implementing monitoring plan and reviewing monitoring results.

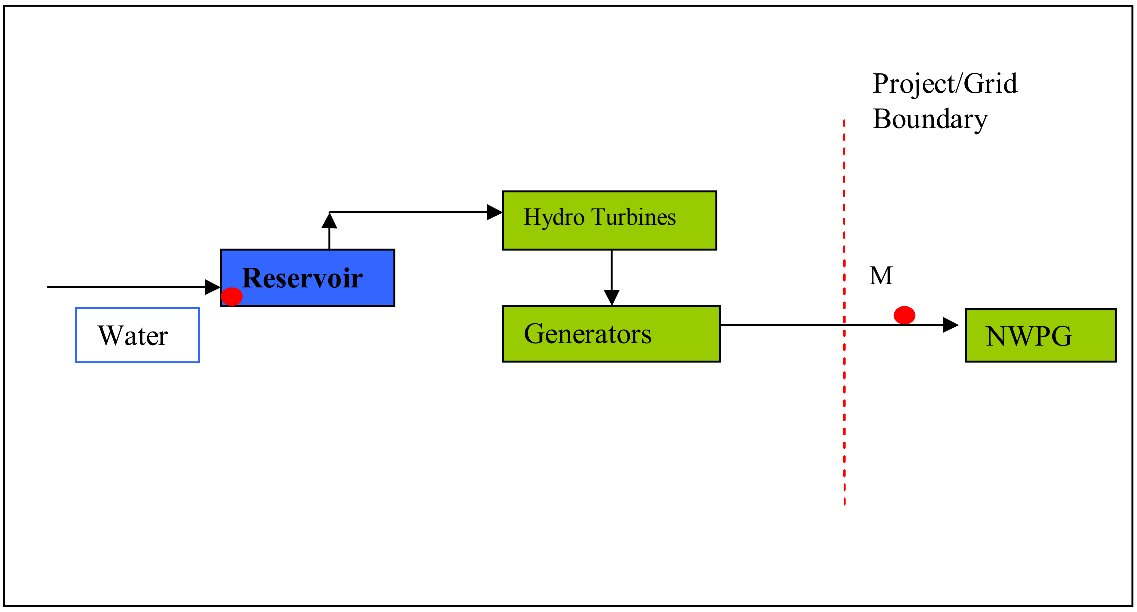
The maintainer is in charge of the organization of calibration tasks and regular maintenance of the meters equipped in the Project. The meters will be calibrated by specific technical staff and third party verification in accordance to relevant regulation and standard.

The Data collector is responsible for regular collecting of the financial data, including meters reading records and the electricity sales invoices or receipts. Those data will be audited and verified by the CDM group.

The Data Auditor will check the validity of the data by comparing with previous recorded data and data from third party such as the Power Corporation. If an obvious discrepancy does exist, it should be reported to Monitoring Manager. The validated data will be archived electronically in CDM data management system by the Data auditor.

3. Installation of meters

The metering equipment will be properly configured and checked annually according to the requirement from Technical administrative code of electric energy metering (DL/T448 — 2000).The metering equipment will be checked by the Project owner and Grid Company before operation. The diagram of the meters' position is shown as following:



As the baseline emission factor has been ex-ante calculated, the main monitoring object is Net electricity delivered by the Project to the Grid. Besides, the area of the reservoir measured in the surface of the water will also be monitored by qualified organization and the installed capacity of the project will be monitored in accordance with the nameplate of the generators.

The electricity meter M (accuracy level >=0.5s) is a bidirectional power meter that will be installed at the Grid Company, which is treated as the main recording system that can monitor both the electricity supplied to the grid and electricity imported by the project plant from the grid in year, which is used for the calculation of net electricity generation supplied by the project plant to the grid in year y ($EG_{facility,\ y}$). The data will be cross-checked by the power invoice and power statement.

4. Data Collection

The meter data collection process is presented as follow:

a) The power gird read electricity meter M (meter accuracy level >= 0.5s) on a specific day of every month;

b) The surface area of the reservoir at full reservoir level will be measured by competent Authority yearly and the installed capacity of the project will be monitored in accordance with the nameplate of the generators. The data will be recorded and archived in electronic form annually.

The QA&QC procedures
All monitoring equipment will be maintained and calibrated in line with manufacturers' instruction and/or national standards. Calibration will be implemented at least once a year. These activities will assure that the equipment operates at the stated level of accuracy. Data collected by collector will be cross-checked by monitoring manager to detect and correct errors in accordance with the predetermined procedure. In order to check if daily monitoring activities are implemented in compliance with the CDM monitoring manual, and to continuously improve monitoring practice, internal audit will also be implemented on at least once a year. In the internal audit, document survey concerning procedures of data collection, management and archiving, status of calibration, education and training, etc. and onsite audit are made. Corrective action will be taken on any deviations from the manual identified though the internal audit.

In Case of Emergency:
If the error of the meter is out of the permissible limits, then the electricity generated during this period will be neglected for conservative approach.

5. Calibration
The metering equipment are calibrated and checked annually for accuracy. Calibration is carried out by Grid Company with records being supplied to Project owner, and these records will be maintained by Project owner and designated third party. The entire meter records shall be jointly inspected and sealed with the present of all parties involved, and shall not be interfered with by either party except the other party or its accredited representatives are present.

6. Data management system
All the data monitored under the monitoring plan will be kept in electronic and hard copy format for 2 years after the end of the last crediting period or the last issuance of CERs for this Project, whichever occurs later. The monitored data will be presented to DOE to for verification.

7. Monitoring Report
At the end of each crediting year, a monitoring report will be compiled including the metering results and evidence (i.e. sales receipts).

8. Personnel training
The monitoring plan needs to be executed by qualified professionals, thus the project owner will train the relevant personnel.

The training will make sure the relevant personnel to master the necessary mechanical, electric and installing knowledge, know well the working principle and the fundamental structure of generator, understand the reasons of common malfunction and the corresponding solving methods, expertly use the monitoring system. If personnel alternation happens, the worker taking over should be ensured to receive the same training.

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

The study of the baseline and monitoring methodology was concluded on 24/05/2012.
Name of person/entity determining the baseline:
Hangzhou Carbon Trade Environment Engineering Co., Ltd
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Contact person：Tina Wang

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The entity is not one of the Project Participants listed in Annex 1 of the document.

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:

15/09/2011 (the date of Construction contract of power factory, diversion tunnel and dam) is used as the starting date of the project activity.

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

30 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:

01/07/2013 or the registration date whichever the later one

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A

SECTION D. Environmental impacts

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

According to China Environmental Protection Law, the Project owner entrusted Xinjiang Academy of Environmental Protection Science compile Environmental Impact Assessment (EIA) report for the Project.

The Project EIA report was completed in May 2011 and approved by the Xinjiang Department of Environmental Protection on 11/05/2011[20]. The main assessment conclusions are provided below:

Waste water

The impact on water environment is divided into two parts, respectively construction period and operation period. In construction period, the waste water will be generated in aggregate processing, concrete mix system, mechanical maintenance and clean, tunnel and domestic sewage. For aggregate processing, tunnel and concrete mixing waste water, it will be treated in sedimentation tank and then used recycling. For mechanical maintenance and cleaning oily waste water, it will be treated through sedimentation tank and oil removal method. The treated water will be used for road sprinkler. Domestic sewage waster water will be treated in digestion tank. After the above treating, the water will meet the discharge standard.

During operation phase, the main waste water is domestic sewage generated by staffs which will be treated through buried sewage treatment facility. The treated water will be used for irrigation.

Air

The impact on air environment mainly happens during the construction period. Those pollutant sources are from construction machinery, fuel, coal, explosive, sandstone break up, cement concrete and vehicle transport. Some alleviation measures will be adopted to protect the working staff and local residents, including watering regularly, use cross ventilation method in the tunnel drilling, adopt hybrid type airiness remove dust in explosion, protect the working personnel with mask and glasses etc. These impacts will disappear after the completion of the Project.

Noise

Noise source of the Project is mainly from earthwork during the construction phase and motor vehicles. In order to minimize the impact, the project owner will adopt machines and vehicles with lower noises. Besides, there are little noise-sensitive points near the project site, so the impacts are mainly on the construction personnel. In order to protect construction personnel, earplugs, earmuffs, or helmets etc. will be provided for the sake of personnel.

Ecological environment

Some terrestrial vegetation will be affect during construction period. The forest and grassland occupation should be strictly according to "The Regulation on the Implementation of the Forests of the People's Republic of China" and "Grassland Law of the People's Republic of China". The surface soil including humus should be place singly for surface earth up after the construction period. Furthermore, Vegetation in the construction area should be recovered after the construction period.

As a whole, there is no significant environmental impact caused by the Project.

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:

According to EIA results and reply from Xinjiang Department of Environmental Protection, the impact on the environment is not significant.

[20] The EIA Approval of the Project issued by Xinjiang Department of Environmental Protection (11/05/2011), No. [2011]383

SECTION E. Stakeholders' comments

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

In order to investigate the impacts on local socio-economy and environment and to make public better know the proposed project and acquired the public's attitude and comment toward the proposed project, the project owner conducted a survey in the form of distributing questionnaires to local stakeholder, including the representative of local authorities and experts, local entities, social entities and local residents containing following questionnaire example:

Table E.1 Questionnaire example

o you support the construction of the hydropower station?	Support ☐ Not care ☐ Object ☐
1. What is the positive influence of the hydropower station to local economy?	Improve the local economic conditions ☐ Bring more job and increase earnings ☐ Others ☐
2. Will the proposed project improve your life?	Yes ☐ NO ☐ Don't know ☐
3. If the project occupies your forest or grass land, do you agree to transfer with compensation?	Yes ☐ No ☐
4. What do you think about the project to local environment?	Improve the environment ☐ Nothing change ☐ Slight influence ☐ Heavy damage ☐
5. What is the most important environment impact of the project?	Dust☐ Wastewater☐ Slag ☐ Noise ☐ Disease☐ Landscape damage ☐
6. What is the influence of the project to irrigation water and household water?	Nothing change ☐ Slight influence ☐ Heavy damage ☐ Don't know ☐
7. What do you think about the project to local animals and plants?	Nothing change ☐ Slight influence ☐ Heavy damage ☐ Don't know ☐
8. What is the negative influence of the project to local environment?	Influence on vegetation and aquatic life ☐ Influence on the forest land ☐ Influence on the soil and water loss and original vegetation ☐ Others ☐
9. What is your attitude to the construction of the project?	Very Support ☐ Support, but need to take measure to protect the environment ☐ Not care ☐ Object ☐

E.2. Summary of the comments received:

60 questionnaires were delivered and 55 of them were collected back. Based on 55 questionnaires, the summary of the comments are listed as follows:

1) All of respondents support the Project construction, no against response found;

2) 52.7% of the respondents think that the proposed project will improve the local economic conditions, and 32.7% of them think the project will bring more job and increase earnings;

3) 92.7% of the respondents think the construction of the project will have little impact to local environment;

4) 18.2% of the respondents think ecology and 21.8% think the dust is the most important environment impact of the project;

5) 85.5% of the respondents think there is little impact on local animals and plants; 14.5% have no idea;

6) 38.2% of the respondents think they will not transfer the grassland without satisfied amount of compensation;

7) 16.4% of the respondents think the proposed project will improve the condition of irrigation water and household water, and 25.5 % think there no influence at all, 36.4% think there is slight influence while 21.8% think it may have negative influence on the environment.

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

As for the concerns of ecology and dust, irrigation water and household water, compensation, the project owner promised that:

--- The forest and grassland occupation should be strictly according to “The Regulation on the Implementation of the Forests of the People’s Republic of China” and “Grassland Law of the People’s Republic of China”. The surface soil including humus should be place singly for surface earth up after the construction period. Vegetation in the construction area should be recovered after the construction period.

--- The impact on dust mainly happens during the construction period. Some alleviation measures will be adopted to protect the working staff and local residents, including watering regularly, use cross ventilation method in the tunnel drilling, adopt hybrid type airiness remove dust in explosion, protect the working personnel with mask and glasses etc.

--- As to irrigation water and household water, the project owner made an explanation that the proposed project will not have any influence on irrigation water and household water as irrigation water and household water are sourced from the stream, mountain spring, which means the project activity will not influence it. There is no negative big influence on vegetation and aquatic life, the forest land, the soil and water loss and original vegetation, also the local animals and plants as the project owner will strictly follow the methods mentioned in the section D.1 to protect the environmentt during construction and operation of the Project.

--- The negotiations on compensations would be held directly between the project owner and local people living in the place who are potentially negatively affected due to the project. The negotiation

on compensations is based on the compensation rates regulated by the government. The compensation rate and schedule are then approved and supervised by the local authorities. The affected people present their needs and rights during the negotiations and also direct contacts with the project owner if there are any issues. The project gave a commitment to compensate adequately for any lands and damages caused by the project as regulated by governmental guidelines. The entire land acquisition compensation process for surveillance and appraisal according to the Regulation on Land Requisition compensation and Resettlement of Migrants for Large and Medium Water Conservation and Hydropower Construction Projects.

The project developer has an overall environment-friendly plan to guarantee that the project has the minimum negative impact on the environment during construction and operation of the Project.

After the project owner gave a details response to stakeholders' concerns, they all felt satisfied and hope the project will put forward quickly.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I Parties from this Project.

Annex 3

BASELINE INFORMATION

Data recommended in the 2011 Baseline Emission Factors for Regional Power Grids in China for the Northwest China Power Grid is adopted for the Project.
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

Tables A3-1 Fossil Fuel-fired Power Generation of NWPG in 2009

Regions	Power Generation	Electricity Generation	Rate of Electricity Consumption	Electricity Supply to Grid
	（10^8kWh)	（MWh)	（%）	（MWh)
Shanxi	774	77,400,000	7.24	71,796,240
Gansu	441	44,100,000	6.88	41,065,920
Qinghai	107	10,700,000	7.01	9,949,930
Ningxia	447	44,700,000	7.76	41,231,280
Xinjiang	452	45,200,000	5.16	42,867,680
Total		222,100,000		206,911,050

Total CO_2 emission (tCO_2)	208,481,441
Total power supply of ECG (MWh)	206,911,050
Emission Factor	1.00759

Data source: China Electric Power Yearbook 2010

Table A3-2 Calculate the Operating Margin Emission Factor of NWPG in 2009

Fuel	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Subtotal	Carbon Content	Oxidation	Emission factor	LHV	CO_2 emission(tCO_2e)
								(tc/TJ)	(%)	($kgCO_2/TJ$)	（MJ/t,km3)	K=F×I×J/100000(mass)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J	K=F×I×J/10000 (Volume)
Raw Coal	10^4t	3949.22	2060	467.05	2350.13	2380	**11206.4**	25.8	100	87,300	20,908	204,546,878
Cleaned Coal	10^4t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4t	8.34			56.01	6.66	**71.01**	25.8	100	87,300	8,363	518,437
Moulded coal	10^4t						**0**	26.6	100	87,300	20,908	0
Coke	10^4t						**0**	29.2	100	95,700	28,435	0
Coke Oven Gas	10^8m^3	0.49	0.8			0.12	**1.41**	12.1	100	37,300	16,726	87,967
Other Gas	10^8m^3	18.37	0.44				**18.81**	12.1	100	37,300	5,227	366,733
Crude Oil	10^4t						**0**	20	100	71,100	41,816	0
Gasoline	10^4t	0.02					**0.02**	18.9	100	67,500	43,070	581
Diesel Oil	10^4t	0.6	0.52	0.2	0.07	0.7	**2.09**	20.2	100	72,600	42,652	64,718
Fuel Oil	10^4t		0.25	0.08		0.06	**0.39**	21.1	100	75,500	41,816	12,313
PLG	10^4t	0.02					**0.02**	17.2	100	61,600	50,179	618
Refinery Gas	10^8m^3					8.56	**8.56**	15.7	100	48,200	46,055	190,019
Nature gas	10^4t	0.91	0.07	3.93		7.83	**12.74**	15.3	100	54,300	38,931	2,693,177
Other Coking Products	10^4t						**0**	20	100	72,200	41,816	0
Other Petroleum Products	10^4t						**0**	25.8	100	95,700	28,435	0
Other Energy	10^4tce	73.76	18.52		18.08		**110.36**	0	0	0	0	0
											total	208,481,441

Data source: China Electric Power Yearbook 2010

Table A3-3 Fossil Fuel-fired Power Generation of NWPG in 2008

Regions	Power Generation	Electricity Generation	Rate of Electricity Consumption	Electricity Supply to Grid
	（10^8kWh)	（MWh)	（%）	（MWh)
Shanxi	715	71,500,000	6.95	66,530,750
Gansu	468	46,800,000	6.4	43,804,800
Qinghai	107	10,700,000	7.14	9,936,020
Ningxia	440	44,000,000	7.57	40,669,200
Xinjiang	397	39,700,000		39,700,000
Total				200,640,770

Total CO_2 emission (tCO_2)	197,137,915
Total power supply of NWCG (MWh)	200,640,770
Emission Factor	0.98254

Data source：The China Energy Statistical Yearbook 2009

Table A3-4 Calculate the Operating Margin Emission Factor of NWPG in 2008

Fuel	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Subtotal	Carbon Content	Oxidation	Emission factor	LHV	CO_2 emission(tCO_2e)
								(tc/TJ)	(%)	($kgCO_2$/TJ)	(MJ/t,km3)	K=F×I×J/100000(mass)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J	K=F×I×J/10000 (Volume)
Raw Coal	10^4t	3620	2216.9	507.44	2330.72	1924.9	**10599.96**	25.8	100	87,300	20,908	193,477,720
Cleaned Coal	10^4t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4t	9.22			53.85	8.2	**71.27**	25.8	100	87,300	8,363	520,335
Moulded coal	10^4t						**0**	26.6	100	87,300	20,908	0
Coke	10^4t						**0**	29.2	100	95,700	28,435	0
Coke Oven Gas	10^8m^3	0.35	0.74			0.13	**1.22**	12.1	100	37,300	16,726	76,113
Other Gas	10^8m^3	18.38	0.2				**18.58**	12.1	100	37,300	5,227	362,249
Crude Oil	10^4t						**0**	20	100	71,100	41,816	0
Gasoline	10^4t	0.05				0.01	**0.06**	18.9	100	67,500	43,070	1,744
Diesel Oil	10^4t	1.03	0.44	0.26	0.05	1.64	**3.42**	20.2	100	72,600	42,652	105,902
Fuel Oil	10^4t		0.86	0.04		0.02	**0.92**	21.1	100	75,500	41,816	29,045
PLG	10^4t						**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^8m^3					7.25	**7.25**	15.7	100	48,200	46,055	160,939
Nature gas	10^4t	0.94	0.24	2.99		7.2	**11.37**	15.3	100	54,300	38,931	2,403,565
Other Coking Products	10^4t					0.01	**0.01**	20	100	72,200	41,816	302
Other Petroleum Products	10^4t						**0**	25.8	100	95,700	28,435	0
Other Energy	10^4tce	93.67	10.58		21.24		**125.49**	0	0	0	0	0
											total	197,137,915

Data source：The China Energy Statistical Yearbook 2009

Table A3-5 Fossil Fuel-fired Power Generation of NWPG in 2007

Regions	Power Generation	Electricity Generation	Rate of Electricity Consumption	Electricity Supply to Grid
	（10^8kWh)	（MWh)	（%）	（MWh)
Shanxi	591	59,100,000	6.77	55,098,930
Gansu	424	42,400,000	5.89	39,902,640
Qinghai	97	9,700,000	7.19	9,002,570
Ningxia	435	43,500,000		43,500,000
Xinjiang	346	34,600,000	9.2	31,416,800
Total				178,920,940

Total CO_2 emission (tCO_2)	180,940,805
Total power supply of NWCG (MWh)	178,920,940
Emission Factor	1.01129

Data source: China Electric Power Yearbook 2008

Table A3-6 Calculate the Operating Margin Emission Factor of NWPG in 2007

Fuel	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Subtotal	Carbon Content	Oxidation	Emission factor	LHV	CO_2 emission(tCO_2e)
								(tc/TJ)	(%)	($kgCO_2$/TJ)	（MJ/t,km3)	K=F×I×J/100000(mass)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J	K=F×I×J/10000 (Volume)
Raw Coal	10^4t	3303.44	1969.03	470.85	2165.8	1762.11	**9671.23**	25.8	100	87,300	20,908	176,525,905
Cleaned Coal	10^4t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4t	3.73			124.31	7.73	**135.77**	25.8	100	87,300	8,363	991,243
Moulded coal	10^4t	3.53					**3.53**	26.6	100	87,300	20,908	64,432
Coke	10^4t						**0**	29.2	100	95,700	28,435	0
Coke Oven Gas	10^8m^3	0.52	0.65			0.26	**1.43**	12.1	100	37,300	16,726	89,215
Other Gas	10^8m^3	14.14	0.71				**14.85**	12.1	100	37,300	5,227	289,526
Crude Oil	10^4t					0.09	**0.09**	20	100	71,100	41,816	2,676
Gasoline	10^4t	0.02					**0.02**	18.9	100	67,500	43,070	581
Diesel Oil	10^4t	1.12	0.26	0.42		1.77	**3.57**	20.2	100	72,600	42,652	110,546
Fuel Oil	10^4t	0.01	1.05	0.04		0.05	**1.15**	21.1	100	75,500	41,816	36,307
PLG	10^4t						**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^8m^3					5.99	**5.99**	15.7	100	48,200	46,055	132,969
Nature gas	10^4t	1.68	0.49	1.93		8.66	**12.76**	15.3	100	54,300	38,931	2,697,404
Other Coking Products	10^4t						**0**	20	100	72,200	41,816	0
Other Petroleum Products	10^4t						**0**	25.8	100	95,700	28,435	0
Other Energy	10^4tce	94.36	9.73				**104.09**	0	0	0	0	0
											total	180,940,805

Data source：The China Energy Statistical Yearbook 2008

Table A3-7 The Operating Margin Emission Factor of NWPG in 2007~2009

	2007	2008	2009	Weighted mean of 2007-2009
Emission factor (tCO_2/MWh)	1.01129	0.98254	1.00759	1.00015

Table A3-8 $EF_{Coal, Adv}$, $EF_{Oil, Adv}$ and $EF_{Gas, Adv}$

	Variation	Efficiency of power supply (%)	Fuel EF ($kgCO_2$/TJ)	Oxidation rate	Emission factor (tCO_2/MWh)
		A	B	C	D=3.6/A/10,000×B×C
Coal-fired power plant	$EF_{Coal,Adv,y}$	39.45	87,300	1	0.7967
Oil-fired power plant	$EF_{Oil,Adv,y}$	51.77	75,500	1	0.5250
Gas-fired power plant	$EF_{Gas,Adv,y}$	51.77	54,300	1	0.3776

Table A3-9 Calculation of Ratio of Solid, Liquid and Gas fuel in total CO_2 Emissions

		Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	NCVi	$EFCO_2$,i	OXIDi	Emission of CO_2(tCO_2e)
Fuel	Unit	A	B	C	D	E	G=A+…+E	H	I	J	K=G×H×I×J/100,000
Raw coal	10^4t	3,949.22	2,060	467.05	2,350.13	2,380	11,206.4	20,908	87,300	1	204,546,513
Cleaned coal	10^4t	0	0	0	0	0	0	26,344	87,300	1	0
Other washed	10^4t	8.34	0	0	56.01	6.66	71.01	8,363	87,300	1	518,437
Moulded coal	10^4t	0	0	0	0	0	0	20,908	87,300	1	0
Coke	10^4t	0	0	0	0	0	0	28,435	95,700	1	0
Other coke products	10^4t	0	0	0	0	0	0	28,435	95,700	1	0
Total											205,064,950
Crude oil	10^4t	0	0	0	0	0	0	41,816	71,100	1	0
Gasoline	10^4t	0.02	0	0	0	0	0.02	43,070	67,500	1	581
Disesel	10^4t	0.6	0.52	0.2	0.07	0.7	2.09	42,652	72,600	1	64,718
Fuel oil	10^4t	0	0.25	0.08	0	0.06	0.39	41,816	75,500	1	12,313
Other oil products	10^4t	0	0	0	0	0	0	41,816	72,200	1	0
Total											77,612
Natural gas	10^8m3	9.1	0.7	39.3	0	78.3	127.4	38,931	54,300	1	2,693,177
Coke oven gas	10^8m3	4.9	8	0	0	1.2	14.1	16,726	37,300	1	87,967
Other coal gas	10^8m3	183.7	4.4	0	0	0	188.1	5,227	37,300	1	366,733
Liquefied Petroleum	10^4t	0.02	0	0	0	0	0.02	50,179	61,600	1	618
Refinery gas	10^4t	0	0	0	0	8.56	8.56	46,055	48,200	1	190,019
Total											3,338,514
											208,481,076

Data Source: China Energy statistical Yearbook 2010

Thus $\lambda_{Coal,y}$ =98.36%，$\lambda_{Oil,y}$ =0.04%，$\lambda_{Gas,y}$ =1.60%

$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,\ Adv,y} + \lambda_{Oil,y} \times EF_{Oil,\ Adv,y} + \lambda_{Gas,y} \times EF_{Gas,\ Adv,y} =$ 0.7899 tCO_2/MWh

Table A3-10 The Installed Capacity of NWPG in 2009

Capacity	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Fuel-fired power	MW	19,900	10,990	1,930	8,820	9,520	51,160
Hydropower	MW	1,920	5,940	8,740	430	2,430	19,460
Nucleus power	MW	0	0	0	0	0	0
Wind power and others	MW	0	750	0	270.3	860	1,880
Total	MW	21,820	17,680	10,670	9,520	12,810	72,500

Data source： China Energy Statistical Yearbook 2010

Table A3-11 The Installed Capacity of NWPG in 2008

Capacity	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Fuel-fired power	MW	17,850	8,980	2,000	7,540	8,200	44,570
Hydropower	MW	1,810	5,440	5,910	430	2,190	15,780
Nucleus power	MW	0	0	0	0	0	0
Wind power and others	MW	0	600	0	170	510	1,280
Total	MW	19,660	15,020	7,910	8,140	10,900	61,630

Data source： China Energy Statistical Yearbook 2009

Table A3-12 The Installed Capacity of NWPG in 2007

Capacity	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Fuel-fired power	MW	12,290	7,840	1,900	7,030	6,560	35,620
Hydropower	MW	1,790	4,400	5,830	430	2,140	14,590
Nucleus power	MW	0	0	0	0	0	0
Wind power and others	MW	72.5	346	0	50	330	798.5
Total	MW	14,152.5	12,586	7,730	7,510	9,030	51,008.5

Data source： China Energy Statistical Yearbook 2008

Table A3-13 The Calculation of BM EF of NWPG

	Installed Capacity of 2007	Installed Capacity of 2008	Installed Capacity of 2009	New Additions from 2007 to 2009*	New Additions from 2008 to 2009*	Cumulative increase (%)
	A	B	C	D*	E*	F
Fuel-fired power(MW)	35,620	44,570	51,160	16,998	7,389	74.07%
Hydropower(MW)	14,590	15,780	19,460	4,870	3,680	21.22%
Nucleus power	0	0	0	0	0	0.00%
Wind power and others (MW)	798.5	1,280	1,880.3	1,081.8	600	4.71%
Total(MW)	**51,008.5**	**61,630**	**72,500.3**	**22,949.8**	**11,669**	**100.00%**
Share in total installed capacity of 2009				31.65%	16.10%	

* Considering installed capacity, capacity for shutdown power units and capacity for pumped storage power units.

$EF_{BM,y}$=0.7899×74.07%= 0.5851 tCO_2/MWh

Annex 4

MONITORING INFORMATION

No other additional information.

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