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:

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Ferrosilicon waste heat power generation project

PDD Version: 1.0

Document Date: 13/06/2011

A.2. Description of the project activity:

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The ferrosilicon waste heat power generation project (hereafter referred to as the "proposed project") is developed by Qinghai Bai Tong High-Purity Material Development Co. Ltd. (hereafter referred to as the "Baitong"), which is located in Huangzhong County of Xining City, Qinghai Province, in the People's Republic of China (hereafter referred to as the "Host Country"). The proposed project will generate electricity through recovering and utilizing the waste heat. The electricity from the proposed project will be consumed by Baitong and will meet part of the electricity demand of the company thereby displacing the electricity that is currently generated by the fossil-fuel dominated Northwest China Power Grid (NWPG), consequently reducing CO_2 emissions.

The scenario existing prior to the start of the implementation of the Proposed project is waste heat from ferrosilicon furnaces of Baitong ferrosilicon production line is vented to the atmosphere. And the electricity consumed by Baitong is mainly supplied by NWPG, which is dominated by fossil fuel fired plants.

The proposed project scenario is the implementation of the waste heat power generation project through recovery and utilization of waste heat generated by the 16 ferrosilicon furnaces. The proposed project proposes to install 16 recovery boilers with 3 sets of turbine generator units. The installed capacity is 24 MW, consisting of 1×3 MW and 2×10.5MWunits. The annual power generation is 192,000 MWh, with net power supply to the ferrosilicon production facilities of 172,800 MWh.

The baseline scenario identified in section B.4 is the same as the scenario existing prior to the start of implementation of the proposed project i.e. the waste heat will be continuously vented and electricity will be supplied from NWPG.

The proposed project proposes to recover and utilize this waste heat to generate electricity. All the electricity generated by the Proposed project is used by Baitong itself to meet part of the electricity

demand so as to replace electricity from NWPG that is dominated by fossil fuel fired plants. Therefore it can generate an annual emission reduction of 145,368 tCO2e.

The Proposed project will reduce greenhouse gas emissions versus the baseline scenario, which is the continued supply from NWPG to meet the demand for power of the ferrosilicon.

Additionally the Project Activity will contribute to sustainable development in the following ways:
• Improve energy efficiency by recovering waste heat which would otherwise be emitted directly into the atmosphere. The recovered waste heat will be used for electricity generation.
• Significantly reduce harmful emissions (including SOx, NOx and particulate matter) by reducing fossil fuel consumption. The proposed project will replace electricity imported from fossil fuel dominated NWPG, therefore reducing fossil fuel consumption and related harmful emissions.
• Increase of local employment by about 76 persons[1]. The proposed project will provide extra clean tech job opportunities.

A.3. Project participants:

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Name of Party involved (host) indicates a Host Party)	Private and/or public entity (ies) Project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (Host)	Qinghai Bai Tong High-purity Material Development Co. Ltd. (Project Owner)	No
Switzerland	Swiss Carbon Assets Ltd. (Purchaser of GS CERs)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

[1] Feasibility Study Report (FSR) by Xining Engineering Consulting Institute

Qinghai Province

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

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Ganhe Industrial Park, Huangzhong County, Xining City

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

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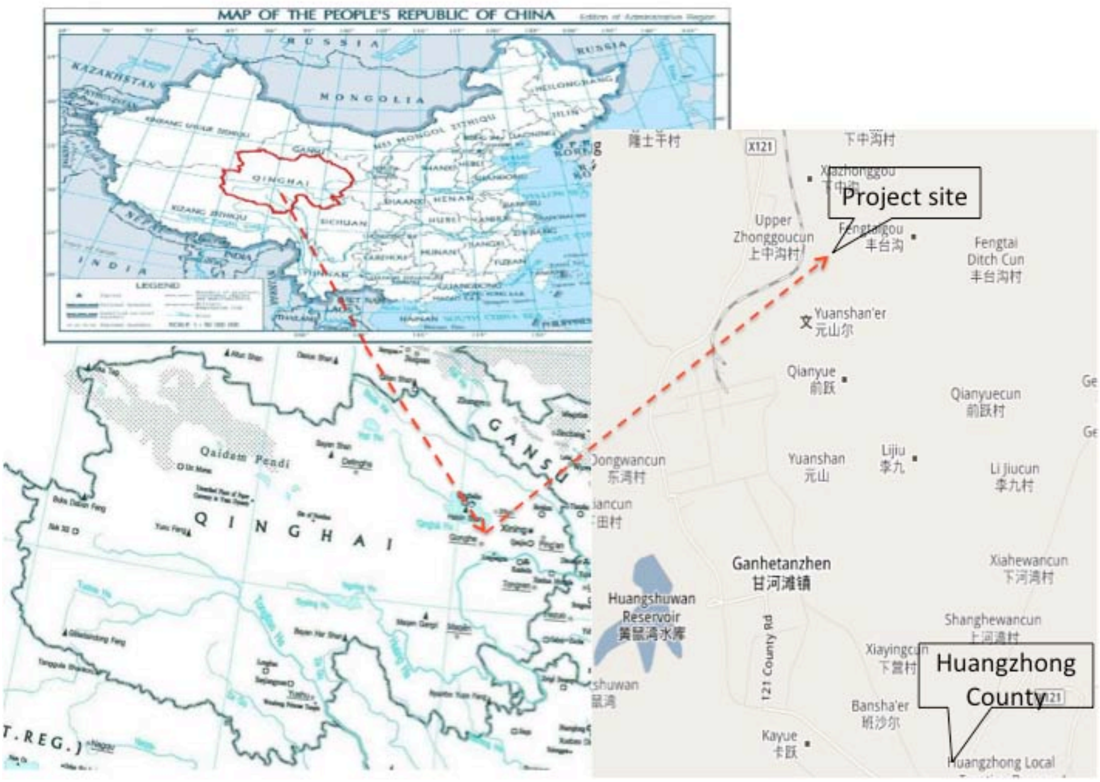
The proposed project is located in Ganhe Industrial Park, Huangzhong County, Xining City, Qinghai Province, P. R. China. The exact location of the plant is 36°38′0″N and 101°31′1″E.

Figure 1 Location of the proposed project



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

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The proposed project falls under Sectoral Scope 1-Energy Industries (renewable/non-renewable sources) and Scope Number 4-Manufacturing industries.

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

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Prior to the start of the implementation of the proposed project, the waste heat from 16 ferrosilicon furnaces of Baitong is vented to the atmosphere. The electricity consumed by Baitong is mainly supplied by NWPG, which is dominated by coal-fired power plants, which cause CO2 emissions. The information of NWPG is detailed in B.6 and Annex 3.

The project scenario is to install a waste heat recovery (WHR) power generation system to recover and utilize waste heat generated by the ferrosilicon production lines. The WHR system consists of 16 waste heat boilers, 3 condensed turbines, 3 electricity generation units, and other auxiliary equipments. The information of equipments is detailed in Table A.1.

The technology employed by the proposed project is dual-pressure low-temperature heat recovery technology, which can adapt fluctuations in waste heat supply and maintain compatibility with ferrosilicon lines operation. The waste heat boilers generate superheated steam, and then steam will be fed into the steam turbine through the steam pipe. The heat energy will be converted into kinetic energy in the steam turbine to enable the turbine rotor to rotate at high speed, and then will be converted into mechanical energy to drive the generator, and electricity will then be generated. The main process of the proposed project can be seen in Figure 2.

Figure 2 Thermodynamic system of the proposed project

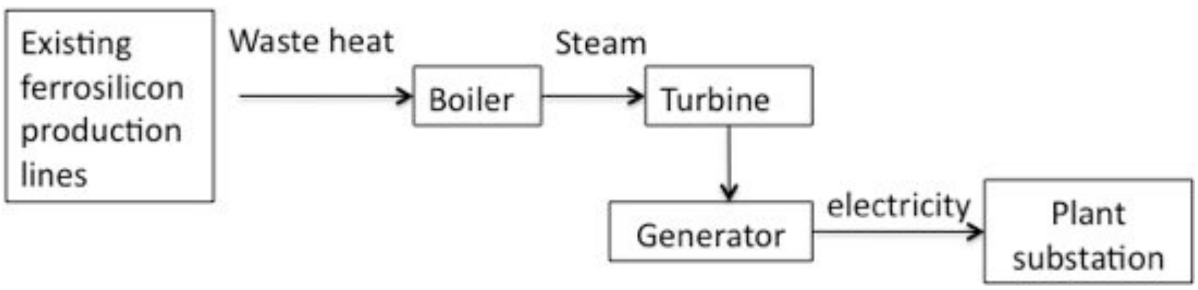

Table A.1 Technical parameter of the major facilities in project activity

Name	Quantity	Technical parameter

Boiler (for total 24MW)	16	Number of devices: 16 Inlet temperature: 400℃ Flow rate of waste gas: 81,152 Nm^3/h Main steam rate: 8500 kg/h Steam pressure 1.6 MPa Steam temperature 350℃ Supplier name: Jiangsu Taihu boiler Co. Ltd.
Turbine (for 3MW)	1	Number of devices: 1 Rated power: 3 MW Rated speed: 5600 r/min Rated inlet steam pressure: 1.275 MPa Rated inlet steam temperature: 280 ℃ Main steam flow: 20.4 t/h Rated exhaust pressure: 0.008 Mpa Supplier name: Luoyang Zhongzhong power generation eupments Co. Ltd.
Generator (for 3MW)	1	Number of devices: 1 Rated power: 3 MW Rated speed: 3000 r/min Rated voltage: 10500 V Rate frequency: 50 Hz Supplier name: Luoyang Zhongzhong power generation eupments Co. Ltd.
Turbine (for 10.5 MW)	2	Number of devices: 2 Rated power: 10.5 MW Rated speed: 3000 r/min Rated inlet steam pressure: 1.27 MPa Rated inlet steam temperature: 350 ℃ Main steam flow: 57.8 t/h Rated exhaust pressure: 0.0069 Mpa Supplier name: Qingdao Jieneng turbine Group Co. Ltd.
Generator (for 10.5 MW)	2	Number of devices: 2 Rated power: 10.5 MW Rated speed: 3000 r/min Rated voltage: 10500 V Rate frequency: 50 Hz Supplier name: Sichuan Dongfeng generator Co. Ltd.

As per ACM0012, CO2 emissions due to grid electricity consumption would be the main emission source in the baseline scenario. Project emissions include emissions from supplemental electricity consumption in the proposed project. For this project, baseline emission will only count net electricity supplied to the ferrosilicon[2] by the waste heat recovery power plant; for project emission, there is no fossil fuel

[2] Net electricity supply = total generation - supplemental consumption

consumption in the proposed project and calculation of baseline emission will take into account of supplemental electricity consumption, therefore, project emission is zero.

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

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The estimation of the emission reductions in the 10−year crediting period is presented in table A.3.

Table A.2 The estimation of the emission reductions in the crediting period

Years	Anuual estimation of emission reductions in tonnes of CO_{2e} (tCO_{2e})
Year 1	145,368
Year 2	145,368
Year 3	145,368
Year 4	145,368
Year 5	145,368
Year 6	145,368
Year 7	145,368
Year 8	145,368
Year 9	145,368
Year 10	145,368
Total estimated reductions (tonnes of CO_{2e})	1,453,680
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_{2e})	145,368

A.4.5. Public funding of the project activity:

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No public funding from parties included in Annex I is used to finance the proposed project.

SECTION B. Application of a baseline and monitoring methodology

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

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Title: "*Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects*"

Reference: UNFCCC Approved consolidated baseline and monitoring methodology ACM0012, version 04.0.0

Sectoral Scope: 01-Energy industries (renewable-/ non-renewable sources).
04-Manufacturing industries

The ACM0012 methodology refers to the version 02.2.0 of the "*Tool to calculate the emission factor for an electricity system*" and version 05.2 of the "*Tool for the Demonstration and Assessment of Additionality*".

For detailed information on the methodology and related tools please refer to:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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The approved consolidated methodology ACM0012 version 4.0 is applicable to the proposed project due to following reasons summarized in Table B.1 below:

Table B.1 Applicability of the Methodology to the Project

Serial No.	Applicable Conditions of the Methodology	Applicable or N/A	Conditions of the Proposed Project
1	The consolidated methodology is applicable to project activities implemented in an existing or Greenfield facility converting waste energy carried in identified WECM stream(s) into useful energy. The WECM stream may be an energy source for: Generation of electricity; Cogeneration; Direct use as process heat source;	Applicable	The proposed project is implemented at an existing facility, and will generate electricity from the waste heat.

	Generation of heat in element process; Generation of mechanical energy; or Supply of heat of reaction with or without process heating.		
2	In the absence of the project activity, the WECM stream: (a) Would not be recovered and therefore would be flared, released to atmosphere, or remain unutilized in the absence of the project activity at the existing or Greenfield project facility; or (b) Would be partially recovered, and the unrecovered portion of WECM stream would be flared, vented or remained unutilised at the existing or Greenfield project facility.	Applicable	In the absence of the project activity the waste heat released to atmosphere without recovery.
3	Project activities improving the WECM recovery may (i) capture and utilise a larger quantity of WECM stream as compared to the historical situation in existing facility, or capture and utilise a larger quantity of WECM stream as compared to a "reference waste energy generating facility"; and/or (ii) apply more energy efficient equipment to replace/modify/expand waste energy recovery equipment, or implement a more energy efficient equipment than the "reference waste energy generating facility".	N/A	No improvement of WECM as there is no recovery of waste heat prior the proposed project.
4	For project activities which recover waste pressure, the methodology is applicable where waste pressure is used to generate electricity only and the electricity generated from waste pressure is measurable;	N/A	The proposed project uses waste heat, not waste pressure.
5	Regulations do not require the project facility to recover and/or utilize the waste energy prior to the implementation of the	Applicable	There are no mandatory regulations that require the project facility to recover or utilize the waste energy

	project activity;		prior to the implementation of the project activity.
6	The methodology is applicable to both Greenfield and existing waste energy generation facilities. If the production capacity of the project facility is expanded as a result of the project activity, the added production capacity must be treated as a Greenfield facility;	Applicable	The proposed project is implemented in an existing waste heat generation facility. There is no production capacity expanded.
7	Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the project facility shall not be included in the emission reduction calculations.	Applicable	Only waste heat generated under normal conditions will be accounted for.
8	If multiple waste gas streams are available in the project facility and can be used interchangeably for various applications as part of the energy sources in the facility, the recovery of any waste gas stream, which would be totally or partially recovered in the absence of the project activity, shall not be reduced due to the implementation of CDM project activity. For such situations, the guidance provided in Annex 3 shall be followed.	N/A	There is just waste heat generated in Baitong, no multiple waste gas streams available in Baitong.
9	The methodology is not applicable to the cases where a WECM stream is partially recovered in the absence of the CDM project activity to supply the heat of reaction, and the recovery of this WECM stream is increased under the project activity to replace fossil fuels used for the purpose of supplying heat of reaction.	N/A	There is no waste heat recovery in the absence of the CDM project activity.
10	This methodology is also not applicable to project activities where the waste gas/heat recovery project is implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) to generate power. However, the projects recovering waste energy from single cycle and/or combined cycle power plants for the purpose of generation of heat only can apply this methodology.	N/A	The proposed project is ferrosilicon waste heat power generation project, and it is not implemented in a single-cycle power generation.

11	The emission reduction credits can be claimed up to the end of the lifetime of the waste energy generation equipment. The remaining lifetime of the equipment should be determined using the latest version of the "Tool to determine the remaining lifetime of equipment".	Applicable	The operation periods of the waste heat recovery related facilities including existing ferrosilicon production lines are longer than the crediting period of 10 years.
12	The extent of use of waste energy from the waste energy generation facilities in the absence of the CDM project activity will be determined in accordance with the procedures provided in Annex 1 (for Greenfield project facilities) and in Annex 2 (for existing project facilities) to this methodology.	Applicable	The proposed project applies Annex 2 guidelines to prove the extent of use of waste energy in the absence of the waste energy generation facilities.
13	The applicability conditions included in the tools referred to above apply.	Applicable	The applicability conditions included in the tools can satisfy above applicability.

It may therefore be concluded that the proposed project meets all applicability criteria of the methodolog ACM0012. Therefore, the methodology ACM0012 is applicable to the specific project.

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

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As per ACM0012, the geographical extent project boundary shall include the relevant WECM stream(s), equipment and energy distribution system in the following facilities:

(1) The "project facility";

(2) The "recipient facility(ies)", which may be the same as the "project facility".

The spatial extent of the grid is as defined in the "Tool to calculate the emission factor for an electricity system".

The relevant equipment and energy distribution system cover:

- In a project facility, the WECM stream(s), waste energy recovery and useful energy generation equipment, and distribution system(s) for useful project energy;
- In a recipient facility, the equipment which receive useful energy supplied by the project, and distribution system(s) for useful project energy.

For the proposed project, Project facility is Qinghai Bai Tong High-purity Material Development Co. Ltd., including the ferrosilicon production line where waste heat is generated, distribution system and waste heat recovery boilers, turbine generator unit.

For the proposed project, Recipient facility is Qinghai Bai Tong High-purity Material Development Co. Ltd., where electricity and heat generated includes the waste heat recovery auxiliary facilities, distribution systems and all of the electric power produced will be supplied to the ferrosilicon lines.

The spatial extent of the grid is China Northwest Power Grid (NWPG).

Overview of emission sources included in or excluded from the project boundary is provided in the following Table B.2:

Table B.2 Summary of Gases and Sources Included in the Project Boundary

	Source	Gas	Included/ Excluded	Justification / Explanation
Baseline	Electricity generation	CO_2	**Included**	Main emission source. Supplemental electricity consumption has been deducted from gross electricity generation.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Fossil fuel consumption in boiler for thermal energy	CO_2	Excluded	There is no thermal energy in the baseline
		CH_4	Excluded	There is no thermal energy in the baseline
		N_2O	Excluded	There is no thermal energy in the baseline
	Fossil fuel consumption in cogeneration plant	CO_2	Excluded	There is not a cogeneration plant.
		CH_4	Excluded	There is not a cogeneration plant.
		N_2O	Excluded	There is not a cogeneration plant.
	Generation of steam used in the flaring process, if any	CO_2	Excluded	There is no flaring process.
		CH_4	Excluded	There is no flaring process.
		N_2O	Excluded	There is no flaring process.
Project Activity	Fossil fuel consumption for supply of process heat and/or reaction heat	CO_2	Excluded	No fuels will be used in the proposed project.
		CH_4	Excluded	No fuels will be used in the proposed project.
		N_2O	Excluded	No fuels will be used in the proposed project.
	Supplemental fossil fuel consumption at the project plant	CO_2	Excluded	No supplemental fuels will be used in the project
		CH_4	Excluded	No supplemental fuels will be used in the project

		N_2O	Excluded	No supplemental fuels will be used in the project.
	Supplemental electricity consumption	CO_2	Excluded	Supplemental electricity consumption has been deducted from gross electricity generation.
		CH_4	Excluded	Supplemental electricity consumption has been deducted from gross electricity generation.
		N_2O	Excluded	Supplemental electricity consumption has been deducted from gross electricity generation.
	Electricity import to replace captive electricity, which was generated using waste energy in absence of project activity	CO_2	Excluded	No electricity was generated using waste heat in absence of project activity
		CH_4	Excluded	No electricity was generated using waste gas in absence of project activity
		N_2O	Excluded	No electricity was generated using waste gas in absence of project activity
	Energy consumption for gas cleaning	CO_2	Excluded	No project emissions are from cleaning of gas
		CH_4	Excluded	No project emissions are from cleaning of gas
		N_2O	Excluded	No project emissions are from cleaning of gas

Only net electricity generated by the waste heat recovery power plant will be counted in the baseline emissions. The project boundary is showed as the figure below:

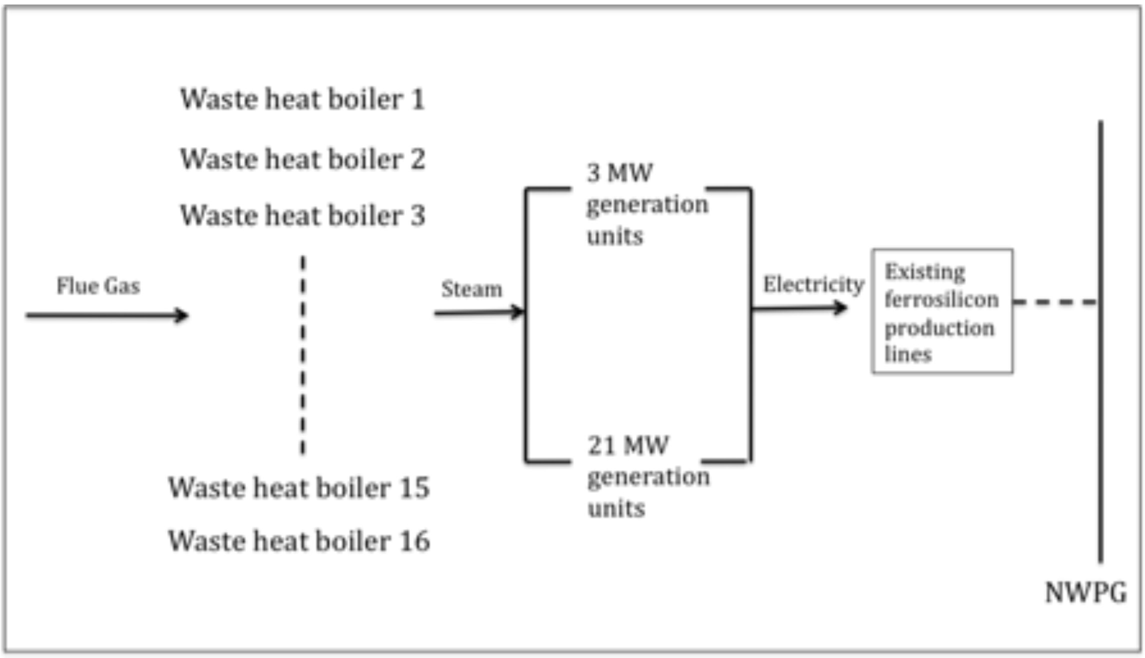

Figure 3 Project boundary

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

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As per ACM0012, the baseline scenario is identified as the most plausible baseline scenario among all realistic and credible alternative(s). Realistic and credible alternatives should be determined for:

- Waste energy use in the absence of the project activity;
- Power generation in the absence of the project activity for each recipient facility if the project activity involves electricity generation for that recipient facility;
- Heat generation (process heat and/or heat of reaction) in the absence of the project activity, for each recipient facility if the project activity involves generation of useful heat for that recipient facility; and
- Mechanical energy generation in the absence of the project activity, for each recipient facility if the project activity involves generation of useful mechanical energy for that recipient facility.

In line with the methodology ACM0012, a stepwise determination of the baseline scenario for the proposed project is determined as follows:

Step 1: Define the most plausible baseline scenario for the generation of heat, electricity and mechanical energy using the following baseline options and combinations.

Judging from the context of the proposed project (the waste heat recovery power generation project), only discussion of use of waste energy and power generation are appropriate.
For the use of waste energy, ACM0012 provides four alternatives for consideration as described in Table B.3 below:

Table B.3 Discussion of Alternatives of use of waste enery

ID	Alternatives from ACM0012	Justification/Explanation	
W1	WECM is directly vented to the atmosphere without incineration	Waste heat in the proposed project is directly vented to the atmosphere, while it can not be flared and does not need incineration.	N
W2	WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste pressure energy is not utilized;	Waste heat released to the atmosphere is applicable. The waste heat to be utilized in the proposed project would not be used in the absence of the project activity, and would be released into the atmosphere.	Y
W3	Waste energy is sold as an energy source	As there are no additional users of heat near to the project area. This is analyzed as below: **Potential civil uses:** In the surroundings of the project site, there are no other potential civil demands for the waste heat. The proposed project is located in Ganhe Industrial Park, which is far away from villages, even further from Xining City. **Potential Industrial uses:** In order to sell waste heat of low NCV to another area, long distance pipelines of high level of insulation should be installed and it would require significant investment since it is out of Baitong's plant and require high insulation quality due to low NCV. Therefore this scenario is excluded. Therefore, W3 is eliminated.	N
W4	Waste energy is used for meeting energy demand at the recipient facility;	The scenario implies the use of waste heat for power generation. This is also in compliance with national laws and regulations, but is not compulsory under national or local governmental laws.	Y

		Therefore, this scenario is a plausible baseline alternative and it will be further discussed in step 3 and section B.5.	
W5	A portion of the quantity or energy of WECM is recovered for generation of heat and/or electricity and/or mechanical energy, while the rest of the waste energy produced at the project facility is flared/released to atmosphere/ unutilised;	All of the waste heat will be used to generate electricity in Baitong.	N
W6	All the waste energy produced at the facility is captured and used for export electricity generation or steam.	Electricity generated by the proposed project will be supplied to Baitong for self-use.	N

Conclusion: from the above discussion the alternative W2, waste heat is released to the atmosphere, and alternative W4, waste energy is used for meeting energy demand, are the possible baseline alternatives for the use of waste heat.

For power generation, the realistic and credible alternative(s) may include,

Table B.4 Discussion of Alternatives of Power Generation

ID	Alternatives from ACM0012	Justification/Explanation	
P1	Proposed project activity not undertaken as a CDM project activity;	This scenario conforms to Chinese law.	Y
P2	On-site or off-site existing fossil fuel fired cogeneration plant	Irrelevant, because the project activity does not have a heat supply component.	N
P3	On-site or off-site Greenfield fossil fuel fired cogeneration plant	As for P2	N
P4	On-site or off-site existing renewable energy based cogeneration plant	As for P2	N
P5	On-site or off-site Greenfield renewable energy based cogeneration plant	As for P2	N
P6	On-site or off-site existing	There is no existing fossil fuel based identified captive	N

	fossil fuel based existing identified captive power plant;	power plant. Baitong power demand can be purchased from NWPG or generated itself, no other supplier.	
P7	On-site or off-site existing identified renewable energy or other waste energy based captive power plant	There is no existing renewable energy or other waste energy based captive plant. As for P6, Baitong power supplier can just be the NWPG or its own captive power plant.	N
P8	On-site or off-site Greenfield fossil fuel based captive plant	If project owner could sets up a new captive power plant, which will provide the same electricity output as the proposed project, the capacity of power plant will be less than 135 MW. Then the project will be categorized as the small-scale thermal plant. According to the national regulations, the thermal power plant less than 135 MW is not allowed to construct[3]. Therefore, it is impossible for Baitong to construct a new captive thermal power plan to meet the demand to electricity.	N
P9	On-site or off-site Greenfield renewable energy or other waste energy based captive plant	The project location does not have sufficient renewable resources (hydro[4], wind[5]) to establish a power plant using these resources. For solar and biomass power, the cost is extremely high and thus not feasible[6,7]. Therefore, P5 cannot be regarded as an alternative.	N
P10	Sourced from grid-connected power plants	It is continuation of the current practice. Therefore, it is a plausible baseline alternative.	Y
P11	Existing captive electricity generation using waste energy (if the project activity is captive generation using waste energy, this scenario represents captive generation with lower	Low-temperature technology for ferrosilicon furnace is new and there are no other alternative low efficiency technologies available in the market. As analyzed in common practice, this is the first kind of ferrosilicon WHR projects in Qinghai Province. Therefore P7 cannot be regarded as a plausible baseline alternative.	N

3 The Notice on Strictly Prohibiting the Illegal Installation of Thermal Generators with the capacity of 135MW or below issued by the General Office of the State Council, Guo Ban Fa Ming Dian decree No. 2002-6.

4 The Water Shortage of Xining City http://www.waterchina.com/main/Web/Article/2005/10/17/1633010937C65621.aspx

5 the annual average wind speed is lower than 2 m/s http://www.weather.com.cn/html/cityintro/101150101.shtml

6 High collection cost of biomass power generation http://business.sohu.com/20100311/n270744114.shtml

7 Solar PV is not financially viable in China due to high cost http://news.xinhuanet.com/fortune/2008-04/01/content_7897537.htm

	efficiency or lower recovery than the project activity);		
P12	Existing cogeneration using waste energy, but at a lower efficiency or lower recovery	The project activity doesn't involve cogeneration, thus this scenario cannot therefore be regarded as a plausible baseline alternative.	N

Conclusion: alternative P1, the proposed project not undertaken as a CDM project activity, and alternative P10, import of electricity from the grid, are the possible baseline alternatives for power generation.

Outcome of Step 1:
There are two realistic and credible scenarios, which are summarized in the following matrix:

Table B.5 Realistic and Credible Scenarios

Scenario	Waste heat	Power	Description
1	W2	P10	It is the continuation of the current practice. Prior to the start of the implementation of the proposed project, the waste heat from ferrosilicon production lines of Baitong is vented to the atmosphere. The electricity consumed by Baitong is mainly supplied by the NWPG, which is dominated by coal-fired power plants and therefore leads to CO2 emissions. The information of NWPG is detailed in B.6 and Annex 3.
2	W4	P1	This scenario corresponds to the project activity not undertaken as a CDM project activity

Therefore, the methodology is applicable to the proposed project since the baseline scenario for all the waste energy generator(s) and the recipient plant(s) identified is one of the two scenarios described in Table 2 of ACM0012. From discussion above, it can be seen that two scenarios could be realistic and credible baseline scenario in terms of outcome of step1. These scenarios will be further discussed in the following steps.

STEP 2: Step 2 and/or Step 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality"

Section B.5 will demonstrate that Scenario 2 (W4/P1) identified above is clearly not economically attractive to the project owner without the CDM. Please refer to Section B.5 Step 2.

Therefore Scenario 1 (W2/P10), power from the grid combined with the non-utilization of waste heat, is the only scenario that can be selected as the baseline scenario of the project.

STEP 3: If more than one credible and plausible alternative scenario remain, the alternative with the lowest baseline emissions shall be considered as the most likely baseline scenario.

This step is skipped since only one credible and plausible scenario remains.

Conclusion: The baseline scenario of the proposed project is Scenario 1 (W2/P10) waste heat released to the atmosphere and power supplied by NWPG. As per ACM0012, regarding the proposed project type, only the combination of alternatives W2/P10 can be identified as the baseline, therefore it complies with methodology.

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

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Additionality of the Project is demonstrated based on version 05.2 of "*Tool for the demonstration and assessment of additionality*".

Prior consideration of CDM

The CDM will have, as its main impact, an increase in the commercial attractiveness of the proposed project, raising the IRR above the benchmark and thus make the proposed project feasible by helping to overcome the investment barrier.

In 06/2008, Baitong commissioned Xining Engineering Consulting Institute to perform the feasibility study for the project activity. The Feasibility Study Report (FSR) showed that only with CDM the proposed project is financially acceptable. In 01/2009, Baitong held board meeting and decided to seek CDM based on results of the FSR. Then Baitong signed the purchase contract of waste heat boiler in 04/2009, which is determined as the proposed project start date. In the following months, proposed project CDM development commercial negotiation was conducted between Baitong and Swiss Carbon Assets, and emission reduction purchase agreement (ERPA) was finally signed in 30/08/2010.

Table B.6 provides an overview of key events in the development of the proposed project

Table B.6 Overview of key events in the development of the project

Project activity	Date or expected date	CDM activity
Environmental Impact Form (EIF) completed	27/09/2008	It shows the proposed project is environmentally sound.
EIF approved by Qinghai Provincial Environmental Protection Bureau	06/10/2008	
FSR completed by Xining Engineering Consulting Institute	06/2008	The FSR shows only with CDM support, the proposed project is financially attractive
Board meeting	01/2009	The Board agreed to continue the project activity with CDM support.
FSR approval by Qinghai Economic Committee	01/04/2009	
Main WHR equipment purchase contract signed	25/04/2009	Project start date
	09/2009	Early notification of the CDM to NDRC
	31/08/2009	Prior consideration notification of the CDM by Swiss Carbon Assets to UNFCCC on behalf of Baitong
	30/08/2010	ERPA finally signed with Swiss Carbon
	03/2011	Documents submission to NDRC for LOA approval
Expected project commissioning	05/2011	

Application of additionality tool (Version 05.2)

As per ACM0012, the additionality of the proposed project will be demonstrated and assessed using the latest version of the "*Tool for the demonstration and assessment of additionality*" agreed by the Executive Board. version 05.2 of the tool is the latest one.

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

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

Based on the previous section, we conclude that the following two alternative combinations are realistic and credible baseline scenarios:

Scenario 1 (W2/P10) waste heat release in the atmosphere and power supply by NWPG

Scenario 2 (W4/P1) the proposed project not undertaken as a CDM project activity

The realistic and credible alternative scenarios to the project activity are scenario 1 and 2 stated above. Please refer to section B.4 for more details of options identification.

Sub-step 1b. Consistency with mandatory laws and regulations:

Both of the alternative combinations W4/P1 and W2/P6 are consistent with current mandatory laws and regulations.

As the project activity is not the only alternative amongst the ones considered above then the proposed project activity passes this Step.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

The "Tool for the Demonstration and Assessment of Additionality" provides three investment analysis methods for selection, which are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

Besides the revenue from the CDM, the project activity does generate financial and economic benefits through reduction of electricity purchase from NWPG. Therefore Option I "simple cost analysis" is not appropriate. The PDD here applies Option III "benchmark analysis" to perform the investment analysis and demonstrate that the proposed project activity is not likely to be the most financially attractive option.

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

The proposed project uses equity IRR after tax as the financial indicator and benchmark is derived from government-approved benchmark where such benchmarks are used for investment decisions; the official benchmark are publicly available. According to "*The Economic Assessment Method and Parameters for*

Construction Projects (version 03)[8]", benchmark for the ferrosilicon industry is 13% after tax.

The key figures and Equity IRR after tax with and without carbon revenue are listed in the following Table B.7.

Table B.7 Key Financial figures and equity IRR after tax with/without carbon revenue

<table>
<tr><th colspan="2">Parameter</th><th>Unit</th><th>Value</th><th>Source</th></tr>
<tr><td colspan="2">Total Investment</td><td>10000 RMB</td><td>17,100</td><td>FSR</td></tr>
<tr><td colspan="2">Operation and Maintenance Cost (O&M cost)</td><td>10000 RMB/year</td><td>2,562.65</td><td>FSR</td></tr>
<tr><td colspan="2">Installation Capacity</td><td>MW</td><td>24</td><td>FSR</td></tr>
<tr><td colspan="2">Net Power Generation</td><td>MWh</td><td>172,800</td><td>FSR</td></tr>
<tr><td colspan="2">Electricity Tariff (VAT excl.)</td><td>RMB/ kWh</td><td>0.288</td><td>FSR and purchase tariff invoices</td></tr>
<tr><td colspan="2">VAT</td><td>%</td><td>17%</td><td>FSR</td></tr>
<tr><td rowspan="2">VAT additional tax</td><td>Education surcharge</td><td>%</td><td>3%</td><td>FSR</td></tr>
<tr><td>City maintenance construction surcharge</td><td>%</td><td>7%</td><td>FSR</td></tr>
<tr><td colspan="2">Income Tax</td><td>%</td><td>25%</td><td>FSR</td></tr>
<tr><td colspan="2">Annual emission reduction</td><td>t CO2e/ year</td><td>145,368</td><td>FSR</td></tr>
<tr><td colspan="2">Project Lifetime</td><td>year</td><td>20</td><td>FSR</td></tr>
<tr><td colspan="2">IRR without carbons revenue</td><td>%</td><td>8.13%</td><td>FSR</td></tr>
<tr><td colspan="2">GS CER price</td><td>Euro</td><td>8</td><td>ERPA</td></tr>
</table>

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

Without carbon revenue, the equity IRR after tax of the proposed project is lower than the benchmark of 13%. While considering CDM revenue, the equity IRR after tax of the proposed project is higher than the benchmark.

Sub-step 2d. Sensitivity analysis:

The sensitivity analysis shall show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. For the proposed project, four parameters were selected as sensitive factors to check out the financial attractiveness:

1) Total investment
2) Cost of operation and maintenance (O&M cost)
3) Electricity tariff

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[8] Issued by the National Development and Reform Commission and the Ministry of Construction, published by China Planning Publishing House.

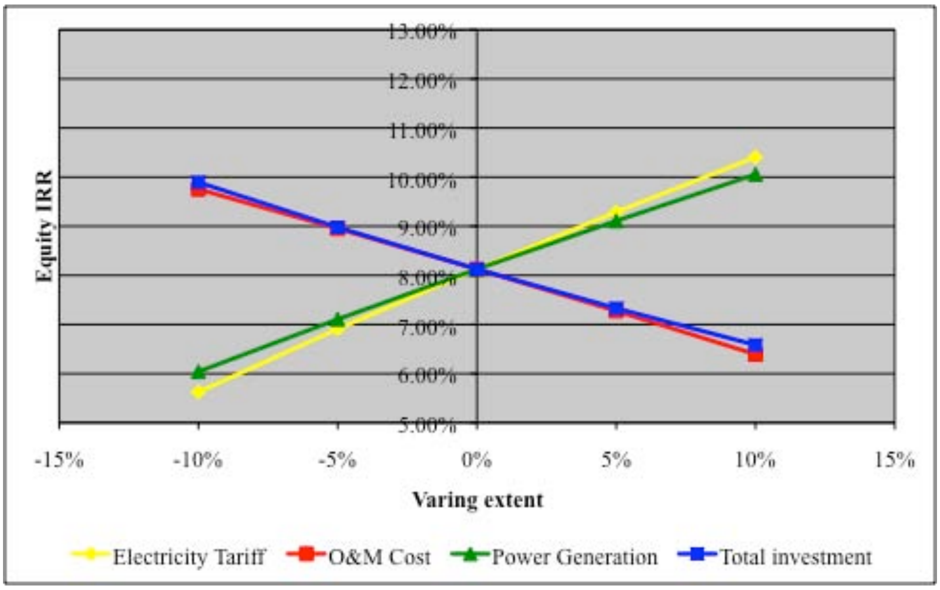
4) Net Power generation.

The results of sensitive analysis are shown in Table B.8 and Figure B.4 below.

Table B.8 Sensitive Analysis of the proposed project

	-10%	-5%	0%	5%	10%
Total investment	9.89%	8.98%	8.13%	7.33%	6.58%
O & M cost	9.75%	8.95%	8.13%	7.27%	6.39%
Electricity Tariff	5.62%	6.91%	8.13%	9.29%	10.41%
Net Power Generation	6.04%	7.11%	8.13%	9.11%	10.06%

Figure 4 Sensibility analysis of the proposed project



The sensitivity analysis examines the fluctuation of other parameters when the Equity IRR after tax reaches the benchmark, here is the result, see table B.9 given below.

Table B.9 Variation of financial parameters to make the Equity IRR after tax reach 13%

Variation of the parameters to make equity IRR after tax reach the benchmark 13%	Total investment	O & M cost	Electricity Tariff	Net Power generation
	-24%	-32%	22%	27%

These situations showed in above Table B.9 are extremely unlikely as the investment analysis is already conservative. This is explained below for each situation specifically.

Decrease in investment and O&M cost:

If the construction investments and O&M cost were respectively decreased by 24% and 32%, the IRR of the proposed project would exceed the benchmark. However, this is very unlikely to happen due to the trend of increasing prices in Qinghai province over last five years. All of the costs in Qinghai province where the proposed project is located such as for materials have been increasing with the average increasing rate is 5.2% per annum[9]. This shows an upwards trend. Therefore the total cost of this project is extremely unlikely to decrease.

A decrease in construction investment and O&M cost is considered to be extremely unlikely. Therefore the equity IRR after tax of the proposed project will remain below the benchmark.

Increase in Tariff

The equity IRR after tax would exceed the benchmark when tariff rate increased by 22%.

The electricity tariff is 0.288RMB/KWh（exclusive of VAT） in the FSR. This is the purchase tariff and therefore reflects the power cost savings and it has to increase by 22% to make equity IRR after tax cross benchmark. According to electricity invoices, the actual electricity tariff of 2008, 2009, 2010 are 0.272RMB/kWh, 0.271 RMB/kWh, 0.275RMB/kWh, and the average annual increase rate is 1%. Furthermore, as indicated in Power Purchase Contract with the grid company, the tariff will stay at level of 0.27 RMB/kWh for the following years. Even 1% increase rate is assumed for the whole operation period and no increase of O&M happens, the IRR will not cross the benchmark.

Therefore it will not increase significantly to make equity IRR after tax cross benchmark. The invoices will be provided to DOE during validation.

Increase in net power generation:

The IRR of the proposed project might be higher than the benchmark when operation hours increased by 27%. However, the net power generation capacity is limited due to limited waste heat amount by the existing ferrosilicon production line, and the installed capacity of the WHR generator is also fixed which cannot be steady operated in over-load status considering operation safety. The actual operation hours of

[9] The officially published increase rates are 2.8%, 4.44%, 10.4%, -0.2%, 8.6% in 2006, 2007, 2008, 2009 and 2010 respectively. (http://www.qhtjj.gov.cn/tjgb/ndgb/)

the ferrosilicon production lines are 6580, 7268, and 5804 hours in year 2008, 2009 and 2010 separately[10] and 8000 hours in FSR. The operation hour increasing by 27% means the total annual operation hours are 10160 hours, which is not only far over the actual value, but impossible. Moreover, China's ferrosilicon production was over capacity during these years[11]. The over-capacity of production and declined demand for ferrosilicon in the country will make the market more competitive and it is hard to increase the operation hour of ferrosilicon productions. Therefore, it is impossible to increase the electricity by 27% to reach the benchmark.

From the analysis above, it can be seen that the proposed project is not financially attractive to the Baitong. The proposed project cannot achieve the financial returns comparable to an investment in ferrosilicon production. Without further incentive, in this case from the CDM, Baitong would not invest in the proposed project.

Step 3. Barrier analysis

This step is skipped because investment analysis is discussed in step 2.

Step 4. Common practice analysis

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

Qinghai Province is selected as the region for the common practice analysis. The proposed project that apply low-temperature technology for ferrosilicon furnace are the first kind in Qinghai Province even in China[12]. Unlike other industries, the ferrosilicon dust in the waste gas is light and fine, then the dust would tightly stuck on the boiler, which are difficult to be removed. High altitude of the proposed project would affect the stability of boiler steam and power generation. The ferrosilicon WHR operation faces difficulties such as instability of boiler steam and boiler cleaning. Therefore, the waste heat utilization technology should have a reliability to ensure the operation of power generation and stable ferrosilicon production.

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

Search has been conducted based on public-accessible information. The common practice set out above clearly shows that the proposed project is additional and that the investment analysis are justified since there are no comparable projects in the ferrosilicon sector in Qinghai Province.

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[10] 2006-2008 Operation Record Sheets, 2007-2009

[11] http://www.ferroalloynet.com/analysis/ferrosilicon_market_gradually_ran_to_weak.html

[12] http://www.xining.gov.cn/html/112/116127.html

In summary, this project shows substantial barriers in financing and uncertainties in operation and most importantly it will not provide project owner with the returns that meet the benchmark. Thus the Project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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1. Baseline Emissions

As per ACM0012, the baseline emissions for the year *y* shall be determined as follows:

$\boldsymbol{BE_y = BE_{En,y} + BE_{flst,y}}$ (B-1)

Where:

BE_y = The total baseline emissions during the year *y* in tCO_2

$BE_{En,y}$ = The baseline emissions from energy generated by the project activity during the year *y* in tCO_2

$BE_{flst,y}$ = Baseline emissions from fossil fuel combustion, if any, either directly for flaring of waste gas or for steam generation that would have been used for flaring the waste gas in the absence of the project activity (tCO_2), calculated as per equation 26. This is relevant for those project activities where in the baseline steam is used to flare the waste gas

For proposed project, no waste gas is involved, therefore $\boldsymbol{BE_{flst,y}}$ is excluded.
The Project activity only generates electricity, therefore only baseline emissions from electricity generation by project activity is considered.

Calculation of $BE_{En,y}$

The calculation of baseline emissions ($\boldsymbol{BE_{En,y}}$) depends on the identified baseline scenario.

According to ACM0012, Baseline scenarios 1 and 2 represent the situation where the waste energy of WECM stream(s) used in the projects is released to atmosphere/ flared/ unutilised, the electricity is obtained from an identified existing or new power plant or from the grid, mechanical energy (displaced waste energy based mechanical turbines in project) is obtained by existing or new electric motors or steam turbines and heat from an existing identified or new fossil fuel based element process or process (e.g. steam boiler, hot water generator, hot air generator, hot oil generator, fossil fuel direct combustion in a process).

Baseline scenario of the proposed project is in Baseine *Scenario 1*. As per the methodology, equation (*B-2*) applies for calculation of $\boldsymbol{BE_{En,y}}$:

$\boldsymbol{BE_{En,y} = BE_{Elec,y} + BE_{Ther,y}}$ (*B-2*)

Where:

$BE_{Elec,y}$ = Baseline emissions from electricity during the year y in tCO_2

$BE_{Ther,y}$ = Baseline emissions from thermal energy (due to heat generation by elemental processes) during the year y (tCO_2)

For proposed project, no thermal energy is generated, therefore $BE_{Ther,y}$ is excluded.

The waste heat of this proposed project is belong to Case 1 and used to generate electricity, formula of case-1 should be used to calculate the baseline emission, as per the methodology:

(a) Baseline emissions from electricity ($BE_{elec,y}$) generation:

Case-1: Waste energy is used to generate electricity

$$BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_{j}\sum_{i}(EG_{i,j,y} * EF_{Elec,i,j,y}) \quad \text{(B-3)}$$

Where:

$BE_{elec,y}$ = Baseline emissions due to displacement of electricity during the year y (tCO_2)

$EG_{i,j,y}$ = The quantity of electricity supplied to the recipient j by generator, which in the absence of the project activity would have been sourced from source i (the grid or an identified source) during the year y in MWh. For the proposed project, the electricity would have been sourced from the grid in absence of the proposed project, expressed as EGy in equation B-4.

$EF_{elec,i,j,y}$ = The CO_2 emission factor for the electricity source i (gr for the grid, and is for an identified source), displaced due to the project activity, during the year y (tCO_2/MWh). For the proposed project, it is the grid emission factor, expressed as $EF_{grid,CM,y}$ in equation B-4.

f_{wcm} = Fraction of total electricity generated by the project activity using waste energy. This fraction is 1 if the electricity generation is purely from use of waste energy. Depending upon the situation, this factor is estimated using the equations in section 3.1

Note: For a project activity using waste pressure to generate electricity, the electricity generated from waste pressure should be measurable and this fraction is 1.

For the proposed project, this fraction is 1 because the electricity generation are purely from use of the waste heat.

f_{cap} = Factor that determines the energy that would have been produced in project year y using waste energy generated at a historical level, expressed as a fraction of the total energy produced using waste source in year y. The ratio is 1 if the waste energy generated in project year y is the same or less than that generated at a historical level. The value is estimated using the equations in section 3.2. For Greenfield facilities, f_{cap} is 1. If the procedure in Annex 1 concludes that the waste energy would have been partially utilised in the "reference waste energy generating facilities" this fact will be captured in the factor $f_{practice}$ (refer to equations 22, 23, 24 and 25 for the use of factor $f_{practice}$)

For the proposed project, equation (B-1) can be simplified as following:

$$BE_y = f_{cap} \times EG_y \times EF_{grid,CM,y} \quad (B\text{-}4)$$

Calculation of $EF_{grid,CM,y}$

Step 1. Identify the relevant electricity systems

P. R. China is divided into regional electricity systems which are defined by the DNA of P. R. China[13]. The Project is located in Qinghai Province which belongs to the Northwest China Power Grid (NWPG). Therefore, the relevant electric power system is identified as the NWPG.

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

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:
Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

The proposed project don't refer any off-grid plant, therefore, Option I is selected.

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

The "Tool to calculate the emission factor for an electricity system" offers four methods to calculate the OM emission factor ($EF_{grid,OM,y}$):

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

Of these procedures, Option (a) (Simple OM) is applied. This is because low-cost / must run resources constitute less than 50% of total grid generation in average of the five most recent years. During 2004-2008, the detailed information of the electricity generated in the NWPG came from low-cost / must run resources could be seen in following table.

Table B.10 Electricity Generation Proportion of NWPG 2004-2008[14]

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[13] The data obtained from China's Regional Grid Baseline Emission Factors (renewed on Dec. 20th, 2010) http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2552.pdf

Year	Electricity generation (10^5MWh)			Proportion of low-cost/must run etc.
	Total generation	Fuel-fired power	Low cost/ must run etc power	
2004	1692.53	1319.39	373.14	21.21%
2005	1845.62	1339.09	506.53	27.44%
2006	1984.92	1494.38	490.54	24.71%
2007	2440.00	1893.00	547.00	22.42%
2008	2670.10	2006.40	663.70	24.85%

Power plants registered as CDM project activities are included in the sample group that is used to calculate the OM as long as the criteria for including the power sources in the sample group apply.

The "Tool to calculate the emission factor for an electricity system" offers the choice between two data vintages calculate the Simple OM emission factor ($EF_{grid,OMsimple,y}$):

- *Ex-ante* option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.
- *Ex-post* option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

$EF_{grid,OMsimple,y}$ is calculated *ex-ante* using the data from 2006 to 2008, available in the China Energy Statistics Yearbooks 2007-2009 and the China Electric Power Yearbooks 2007-2009. This data vintage remains fixed during the crediting period.

Step 4. Calculate OM 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. It may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit, or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

(a) The necessary data for Option A is not available; and

(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and

[14] China Electric Power Yearbook 2005-2009

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 (i.e., if Option I has been chosen in Step 2).

For the proposed project, the data on fuel consumption, net electricity generation and the average efficiency of each power unit are unavailable, thus option A cannot be used. Nevertheless, the data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system are available, and, 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, therefore, Option B can be used.

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

$$EF_{Grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \cdot NCV_{i,y} \bullet EF_{CO2,i,y})}{EG_y} \qquad \text{(B-5)}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO2 emission factor in year y (tCO2/MWh)
$FC_{i,y}$	Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	CO2 emission factor of fossil fuel type i in year y (tCO2/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

$EF_{grid,OMsimple,y}$ = 0.9947 tCO_2/MWh

For detailed information, please see Annex 3.

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

According to "Tool to calculate the emission factor for an electricity system", there are two options regarding vintage of data choices:

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.

For the proposed project, option 1 is chosen to calculate Build Margin emission factor.
The BM emission factor ($EF_{grid,BM,y}$) is calculated *ex-ante* using the data from 2006 to 2008, available in the China Energy Statistics Yearbook 2007-2009 and the China Electric Power Yearbooks 2007-2009. This data vintage remains fixed during the first crediting period and will be updated for the second crediting period.

However, due to the fact that data on electricity generation of each power plant / unit in the grid is currently not available in P. R. China, EB guidance on the estimation of the build margin in P.R. China can be applied for the purpose of defining the sample group[15]. It is also in consistent with 'Tool to calculate the emission factor for an electricity system'. In accordance with the guidance, the build margin consists of the set of power capacity additions in the electricity system that comprises 20% of the system generation capacity (in MW) and that have been built most recently. Therefore, the set of power capacity additions included in the build margin is determined as follows:

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[15] EB guidance on estimating the build margin for AM0005, consolidated in ACM0002 which refers to the Tool to calculate the emission factor for an electricity system
http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM and
http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

$$\frac{\sum_j CAP_{j,y-n}}{\sum_j CAP_{j,y}} \geq 20\% \qquad \text{(B-6)}$$

$\sum CAP_{i,y-n}$ = The aggregate incrementally installed power capacity of all kinds of power generation sources *j* (MW) in year *y-n*

$\sum_j CAP_{j,y}$ = The aggregate incrementally installed power capacity of all kinds of power generation sources *j* (MW) in year *y*

n = The number of years (y-1, y-2, …, y-n) which have to be considered to comprise 20% of the system generation capacity (in MW) and that have been built most recently

In the period from 2006 to 2008 (2008 being the most recent year for which data is available), the amount of power capacity additions made up over 20% of the total NWPG generation capacity in 2008. Therefore $n = 2$.

Since data on the electricity generation of each individual power plant / unit in the grid is not available in P. R. China, power plants registered as CDM project activities cannot be isolated and are taken into account in the build margin.

According to the "Tool to calculate the emission factor for an electricity system", $EF_{grid,BM,y}$ is the generation-weighted average emission factor of all power units *m* during the most recent year *y* for which power generation data is available. However, due to the fact that data on both electricity generation and emission factor of each power plant / unit in the grid is currently not available in P. R. China, EB guidance on the estimation of the build margin in P.R. China can also be applied for the purpose of estimating the BM emission factor and $EF_{grid,BM,y}$ is calculated as follows:

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \cdot EF_{Thermal} \qquad \text{(B -7)}$$

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/MWh)

$CAP_{Thermal}$ = The incrementally installed power capacity of thermal power generation sources (MW) in the NWPG in year *y* compared to that of year *y-n*

CAP_{Total} = the aggregate incrementally installed power capacity of all kinds of power generation sources *j* (MW) in the NWPG in year *y-n* compared to that of year *y-n*

$EF_{thermal}$ = The emission factor of thermal power generation sources of the NWPG with the efficiency level of the best commercially available technology in P. R. China, for *y* the most recent historical year for which power generation data is available

$EF_{Thermal,Adv}$ is calculated as follows:

$$EF_{Thermal} = \lambda_{Coal} \cdot EF_{Coal,Adv} + \lambda_{Oil} \cdot EF_{Oil,Adv} + \lambda_{Gas} \cdot EF_{Gas,Adv} \qquad \text{(B-8)}$$

Where:

$EF_{i,Adv}$	=	The CO_2 emission factor of fuel *i* (tCO_2/MWh) using the best commercially available technology in P. R. China and taking into account the carbon content and the oxidation factor of fuel *i*
Coal, Oil and *Gas*	=	Solid fuel, liquid fuel and gaseous fuel respectively
λ_i	=	The weight of CO_2 emissions from fuel *i* fired power plants in the total CO_2 emissions from thermal power, using the most recent available data

And

$$\lambda_{Coal} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}} \qquad \text{(B-9)}$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}} \qquad \text{(B-10)}$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}} \qquad \text{(B-11)}$$

Where $FC_{i,y}$ and $EF_{CO2,i,y}$ are defined as in equation 1.

$EF_{grid,BM,y}$ = 0.6878 tCO_2/MWh

For detailed information, please see Annex 3.

Step 6. Calculate the combined margin(CM) emissions factor

The combined margin (CM) emissions factor ($EF_{grid,CM,y}$) is calculated as follows:

$$EF_{grid,CM,y} = w_{OM} \cdot EF_{grid,OM,y} + w_{BM} \cdot EF_{grid,BM,y} \qquad \text{(B-12)}$$

Where:

$EF_{grid,CM,y}$ = Combined margin CO_2 emissions factor in year *y* (tCO_2/MWh)
$EF_{grid,BM,y}$ = 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, which is 0.5 by default
w_{BM} = Weighting of build margin emissions factor, which is 0.5 by default

$EF_{grid,CM,y}$=0.5*0.9947+0.5*0.6878=0.84125 tCO_2/MWh

For detailed information, please see Annex 3.

Then baseline emissions (BE_y) are obtained as B-4:

$$\boldsymbol{BE_y = f_{cap} \times EG_y} \times EF_{grid,CM,y} \qquad \text{(B-4)}$$

Where:

BE_y = Baseline emissions in year *y* (tCO_2)
EG_y = Quantity of electricity supplied to the recipient plant by the project activity during the year y (MWh)
$EF_{grid,CM,y}$ = Combined margin CO_2 emissions factor in year *y* (tCO_2/MWh)
f_{cap} = Factor that determines the energy that would have been produced in project year *y* using waste energy generated at a historical level, expressed as a fraction of the total energy produced using waste source in year *y*.

Capping factors

As per Methodology ACM0012, the baseline emissions should be capped irrespective of planned/unplanned or actual increase in output of plant, change in operational parameters and practices, etc. The cap can be estimated using the three methods described below, following this hierarchy: (i) Method-1 can be used to estimate the capping factor if required data is available; (ii) if the project activities implemented in a Greenfield facility, or in existing facilities where the required data is unavailable Method-2 shall be used; (iii) If the project proponents demonstrate technical infeasibility in direct monitoring of waste heat / pressure of waste energy carrying medium (WECM), then Method-3 is used.

Method 3 is selected to calculate the cap of the project activity the reasons are as follows:

1. There is no historic data available therefore method 1 cannot be used.

2. For method 2, due to high temperature (between 400-500°C) and large quantity of flue gas from ferrosilicon furnace, it would be hard to monitor the waste energy carried by flue gas accurately and continuously[16]. Therefore, method 2 is dismissed.

Under method 3, there are two cases:

Case-1: The energy is recovered from WECM and converted into final output energy through a waste heat recovery equipment. For example, the useful energy (e.g., steam) is produced using waste energy generated by a chemical reaction. For such cases fcap should be the ratio of maximum energy that could be recovered (MER) by the waste heat recovery equipment implemented under the CDM project activity and the actual energy recovered under the project activity (using direct measurement). The MER should be based on information on the characteristics of the key product/by product. For existing facilities this can be obtained from historical information and for Greenfield facilities, manufacturer's specifications on these key parameters can be used.

Case-2: The energy is recovered from WECM in an intermediate energy recovery equipment using an intermediate source. For example, an intermediate source to carry energy from primary WECM may include the sources such as water, oil or air to extract waste energy entrapped in chemicals (heat of reaction) or solids (sensible heat), which is further recovered in the waste heat recovery equipment to generate final output energy. For such cases fcap should be the ratio of maximum energy that could be recovered (MER) by waste heat recovery equipment implemented under the CDM project activity (considering the losses due to exchange of energy) and actual intermediate energy recovered under the project activity (using direct measurement). The MER should be based on information on the characteristics of the key product/by product. For existing facilities this can be collected from historical information and for Greenfield facilities, manufacturers specifications on these key parameters can be used.

The proposed project is the case where waste heat recovered from WECM and converted into electricity through boilers and turbine-generator. According to the methodology, the case-1 is adopted for analysis capping of baseline emission.

For estimating the theoretical recoverable energy, manufacturer's specifications can be used. Under this method, following equations should be used to estimate f_{cap}.

$$f_{cap} = \frac{Q_{OE,BL}}{Q_{OE,y}} \qquad \text{(B-13)}$$

Where:

[16] http://baike.baidu.com/view/314027.htm

$Q_{OE,BL}$	=	Output/intermediate energy that can be produced (TJ), to be determined on the basis of maximum energy that could be recovered from the WECM (MER), which would have been released (or WECM would have been flared or energy content of WECM would have been wasted) in the absence of CDM project activity.
$Q_{OE,y}$	=	Quantity of actual output/intermediate energy generated during year *y* (TJ)

II. Project Emissions (PEy)

Project Emissions include emissions due to (1) combustion of auxiliary fuel to supplement waste gas/heat and (2) electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of energy or other supplementary electricity consumption.

The proposed project activity does not generate project emissions as:

- No auxiliary fuel will be combusted to supplement waste heat;
- No gas will be cleaned as the proposed project utilizes waste heat;

III. Leakage

According to ACM0012, no leakage is applicable under this methodology.

IV. Emission Reductions (ERy)

The emission reductions, ER_y, from the project activity during a given year *y* is the difference between the baseline emissions and project emissions (PE_y), as follows:

$ER_y = BE_y - PE_y$ (B-14)

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

Data / Parameter:	***$Q_{OE,BL}$***
Data unit:	*MWh*
Description:	Output energy (i.e. electricity) that can be theoretically produced (in MWh),to be determined on the basis of maximum recoverable energy from the WECM, which would have been released in the absence of project activity.
Source of data used:	Feasibility Study Report
Value applied:	172,800 MWh

Justification of the choice of data or description of measurement methods and procedures actually applied:	Based on equipment specifications and FSR
Any comment:	This is to determine the f_{cap}

Data / Parameter:	f_{WCM}
Data unit:	*MWh*
Description:	Fraction of total energy generated by the project activity using waste energy. This fraction is 1 if the energy generation is purely from use of waste energy in the project generation unit.
Source of data used:	FSR and Ex-ante estimation of intermediate energy produced
Value applied:	100%
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	None

Data / Parameter:	$F_{i,j,y}$
Data unit:	**t, m^3**
Description:	The amount of fuel *i* consumed by relevant power source *j* in years *y*.
Source of data used:	China Energy Statistics Yearbooks (2007-2009)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$FC_{i,y}$
Data unit:	**t, m^3**
Description:	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
Source of data used:	China Energy Statistics Yearbooks (2007-2009)
Value applied:	See Annex 3
Justification of the choice of data or	Official released statistics; publicly accessible and reliable data source

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

Data / Parameter:	$NCV_{i,,y}$
Data unit:	**MJ/t, kJ/m^3**
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data used:	China Energy Statistics Yearbook 2009
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	**tCO_2/TJ**
Description:	CO2 emission factor of fossil fuel type i in year y
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	

Data / Parameter:	$GEN_{j,y}$
Data unit:	**MWh**
Description:	The electricity generation by source *j* in year *y* of each province connected to the NWPG (this includes electricity imports to the NWPG)
Source of data used:	China Electric Power Yearbooks (2007-2009)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually	Official released statistics; publicly accessible and reliable data source

applied :	
Any comment:	

Data / Parameter:	***Rate of internal use by the power station***
Data unit:	**%**
Description:	The rate of internal use of power source *j* in each province connected to the NWPG.
Source of data used:	China Electric Power Yearbooks (2007-2009)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$CAP_{j,y}$
Data unit:	**MW**
Description:	The aggregate incrementally installed power capacity of all kinds of power generation sources *j* (MW) in the NWPG in year *y*
Source of data used:	China Electric Power Yearbooks (2007-2009)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$CAP_{thermal,y-n,y}$
Data unit:	**MW**
Description:	The aggregate incrementally installed power capacity of thermal power generation sources (MW) in the NWPG in year *y* compared to that of year *y-n*
Source of data used:	China Electric Power Yearbooks (2007-2009)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

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

>>

Step 1 Baseline Emissions (BEy)

According to the feasibility study report, the annual power generation of the proposed project is estimated to be 172,800MWh (all used by the ferrosilicon plant).

f_{cap} is decided with case 2 of method-3 for the following reasons,

- It is very difficult and inaccurate to measure the waste energy contained in the 16 streams of exhaust gas from the furnaces.
- There is no historic data available for the proposed project.

As a construction project, the data in FSR by a professional institute are deemed as manufacturer's specifications. According to the feasibility study report for the proposed project, the theoretical power output for the project is 172,800MW.h/year, and the actual power output in year y will be monitored.

$\mathbf{f_{cap}=Q_{OE,BL}/Q_{OE,y}=}$ **1**72,800/172,800=1

According to ACM0012, f_{cap} = 1 if f_{cap} >=1.

Therefore, according to the formula for baseline emissions given in section of B.6, the proposed project's baseline emissions (BE_y) are estimated to be:

$BE_y = f_{cap} \times EG_y \times EF_{grid,CM,y} = 1 \times 1 \times 172{,}800 \times 0.84125 = 145{,}368$ tCO_2e

Step 2: Project emission

No auxiliary fossil fuel will be used in the proposed project

No additional electricity will be used to clean the gas in the proposed project

Therefore, the proposed project's annual GHG emission $PE_y = 0$.

Step 3: Leakage

According to ACM0012, no leakage is applicable under this methodology.

Step 4: Emission reduction

Therefore, the annual emission reduction (ERy) of the proposed project are estimated to be

$ER_y = BE_y - PE_y$

Therefore the annual emission reduction is 145,368ton/y.

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

>>

Table B.11 Summary of the ex-ante estimation of emission reductions

Year	Estimation of project activity emissions (tonnes of CO2 e)	Estimation of baseline emissions (tonnes of CO2 e)	Estimation of leakage (tonnes of CO2 e)	Estimation of overall emission reductions (tonnes of CO2 e)
Year 1	0	145,368	0	145,368
Year 2	0	145,368	0	145,368
Year 3	0	145,368	0	145,368
Year 4	0	145,368	0	145,368
Year 5	0	145,368	0	145,368
Year 6	0	145,368	0	145,368
Year 7	0	145,368	0	145,368
Year 8	0	145,368	0	145,368
Year 9	0	145,368	0	145,368
Year 10	0	145,368	0	145,368
Total (tonnes of CO2e)	**0**	1,453,680	**0**	1,453,680

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

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Quantity of electricity supplied to the recipient plant by the project activity during the year y in MWh
Source of data to be used	Measurement records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	172,800
Description of measurement methods and procedures to be applied:	Calculated and recorded monthly **:** $EG_y = EG_{export,y} - EG_{import,y}$
QA/QC procedures to be applied:	The calculation result will be crosschecked with data measured at generation plant. (Please refer to B 7.2)
Any comment	

Data / Parameter:	$EG_{export, y}$
Data unit:	MWh
Description:	Electricity exported by the project activity during year y in MWh which is used to calculate emission reduction
Source of data to be used:	Power meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	172,800
Description of measurement methods and procedures to be applied:	Direct measurements by project participants through standard power meters. The electricity generation amount will be monitored continuously and recorded monthly.
QA/QC procedures to be applied:	The meters would be calibrated every year according to national Technical Administrative Code of Electric Energy Metering (DL/T448－2000*)*. All the data must be kept for at least two years after the end of the crediting period,
Any comment	

Data / Parameter:	$EG_{import, y}$
Data unit:	MWh
Description:	Electricity imported by the proposed project during year y in MWh which is used to calculate emission reduction.
Source of data to be used:	Power meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Direct measurements by project participants through standard power meters. The electricity generation amount will be monitored continuously and recorded monthly.
QA/QC procedures to be applied:	The meters would be calibrated every year according to national Technical Administrative Code of Electric Energy Metering (DL/T448－2000*)*. All the data must be kept for at least two years after the end of the crediting period.
Any comment	

Data / Parameter:	$Q_{OE,y}$
Data unit:	MWh
Description:	Quantity of actual output during year y
Source of data to be used	Generation plant measurement records
Value of data applied for the purpose of calculating	172,800

expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Direct measurements by electricity meter at the power plant. The electricity generation amount will be monitored continuously and recorded monthly.
QA/QC procedures:	The meters would be calibrated every year according to national Technical Administrative Code of Electric Energy Metering (DL/T448－2000*)*. All the data must be kept for at least two years after the end of the crediting period.
Any comment	

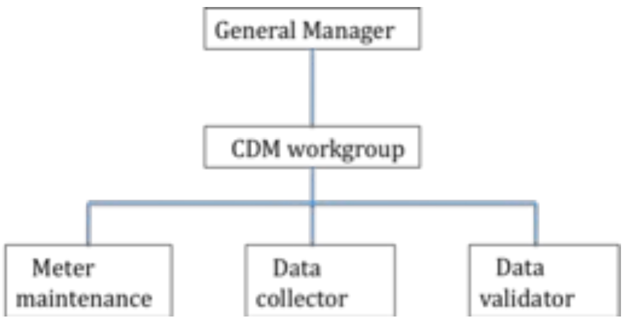
B.7.2. Description of the monitoring plan:

>>

The monitoring plan aims to ensure that all the emission reductions can be successfully realised during crediting period, and will be implemented by Baitong

1. Monitoring organization

Baitong will set up a special group to take charge of data collection, supervision, Verification and recording. The group director will be trained and supported in technology by the consultation. The organization of the monitoring group is as follows:



2. Monitoring system design

Quantity of electricity supplied to the recipient plant by the project activity during the year *y* in MWh is applied to calculate emission reduction in year y（EGy).

The main meter(s) will be installed at the power generation plant to measure power supplied to the ferrosilicon plant by the Project ($EG_{export,y}$) and Electricity imported to the proposed project from the NWPG. Also meters will be installed the generation plant for cross check.

The meters would be installed then calibrated every year according to national Technical Administrative Code of Electric Energy Metering (DL/T448－2000*)*. The accuracy of meters is no worse than 0.5. All the data must be kept for at least two years after the end of the crediting period

3. Training, Record Keeping, Error handling and Reporting Procedures

Training

Members of staff who are involved in the proposed project will be given training on the GS CDM and reporting requirements, prior to registration of the proposed project. New members of staff joining the GS CDM project team will also be given training in relation to their responsibilities. Full training procedures and a training plan will be detailed in the GS CDM Manual.

Record Keeping and Internal Reporting Procedure

The group appointed by Baitong should keep the monitoring data in electronic archives at the end of every month, electronic documents should also be printed, to archive as a written document. Written documents, such as maps, forms, EIA reports etc, should be used with a monitoring plan to check the authenticity of the data. All of the written data and information should be kept in the archives by the GS CDM group; all of the documents should have a backup copy. All of the data should be saved for 2 years after the crediting period.

Error Handling Procedure

In the event that a meter goes wrong, the data recorded from this meter since the last successful calibration shall be ignored and will not be claimed for CERs. At the same time, the technician will be notified to repair or replace the meter. The repaired meter or new meter will be calibrated and the maintenance records will be kept for Verification.

The abnormal operation of the ferrosilicon plants will be recorded and electricity generation during that period will not be accounted for credits calculation as per the meth.

The check of the proposed project Officer and then the third party verifier prior to issuance of the emission reduction is considered adequate for errors in the calculations. Where errors in the calculations are discovered by either of these Parties, the monitoring report shall be modified and the corrected version shall be resubmitted to the verifier.

External Reporting Procedure

After agreed by the Project Officer, the report is sent to the 3rd party verifier who is contracted to verify the emissions reductions during the crediting period of the project.

Procedure for corrective actions arising

The Project Officer is responsible for identifying corrective actions arising from the above procedures and for liaising with the purchaser, the 3rd party verifiers and other stakeholders to take necessary steps to implement the corrective actions.

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

>>

Date of completion of the baseline study and monitoring methodology: 13/06/2011

Name of persons determining the baseline and monitoring methodology:

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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:

>>

The starting date of the proposed project refers to 25/04/2009 (3MW turbine generator unit purchase contract was signed). Please refer to Table B.6 "Overview of key events in the development of the project" of PDD and the waste heat boiler signature date is the earliest date at which the implementation of the project activity begins. [17]

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

>>

18 years

[17] 3MW turbine generator unit purchase contract is considered as the starting date, in line with the CDM Glossary definition that the starting date of a CDM project activity as the earliest date at which either the implementation or construction or real action or a project activity begins.

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:

>>

C.2.1.2. Length of the first crediting period:

>>

N/A

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

30/05/2012 or registration date, whichever is later

C.2.2.2. Length:

>>

10 years

SECTION D. Environmental impacts

>>

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

>>

According to the clauses 13 and 19 of the Environmental Evaluation Law of the P. R. China, for projects with little impacts on the environment, only Environmental Impact Form(EIF) is required. Qinghai Environmental Protection Bureau approved the EI form of the proposed project on 06/10/2008.

The main conclusions are as follows:

Noise impacts

The proposed project locates far from the nearest village. The daytime and night noise value during construction period is below noise limit value of the *Standard of noise at boundary of industrial enterprises*（GB12348-90), thus the noise sensitive points (residential area) will not be influenced.

During operation the major sources of noise pollution will be the power equipment (for example steam turbines, generators, and boilers). Strong noise sources such as blowers and gas discharge ports are equipped with noise abatement devices; and boilers and generators rooms are located in the closed workshop, which can reduce noise value by 70 dB(A). Thus no significant noise impact out of the proposed project boundary will occur.

Ambient air impact

The major ambient air pollutant during construction period is dust. Water spray and mound covers will be taken on the project construction site on regular basis.

During the operation period, the proposed project uses the technology of waste heat recovery for power generation without fuel supplement which will limit new pollution and dust emission sources on the site. In fact, the implementation of the proposed project will improve the dust removing effect of the already existing dust removal equipment, so the proposed project will actually decrease the existing dust levels. This will have a positive impact on the local air quality.

Water Usage Impacts

During operation period, the domestic wastewater will be treated by an septic tank prior to be drained into municipal sewage system and will lead no further impacts on environment.

Land Use Impacts

There are no land use impacts as the Project Activity is within the existing sites, which have already been converted to industrial use for the construction of the ferrosilicon plants of the project activity.

The proposed project will therefore have a net environmental benefit due to the greenhouse gas emission reductions.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

The environmental impacts of the proposed project will be properly controlled and will have a net environmental benefit due to the greenhouse gas emission reductions.

SECTION E. Stakeholders' comments

>>

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

>>

The stakeholder consultation for the proposed project took place in 10/03/2009, before the start date of construction. The local stakeholders were invited to submit comments on the Project activity filling a questionnaire sent out by Baitong.

The questionnaires included a technical description of the proposed project as well as a brief explanation of how the project activity mitigates climate change through the Clean Development Mechanism of the Kyoto Protocol and brings sustainable development benefits. The questions asked were as follows:

- What impacts do you think the Project activity will have on the local environment?
- What impacts do you think the Project activity will have on employment and social welfare in the local area?
- Are there any negative impacts on your livelihood during the construction of the proposed project?
- What would be the overall positive effects of the construction and operation of the proposed project?
- What would be the overall negative effects of the construction and operation of the proposed project?
- What is your attitude towards the construction of the proposed project?

30 questionnaires were sent to the stakeholders by Baitong. The stakeholders included local governmental officials (2 people), local residents (18 people) and related employees (10 people). A full list of stakeholders consulted is available from Baitong.

On 16/03/2011, the project proponents have held the second round stakeholder consultation. In this consultation, the plant employees and local residents were invited by poster and phone invitations, which were posted on the billboard of villages and Baitong plant two weeks prior to the meeting. Following are the list of participants respectively:

Table B.12 List of interviewees

Position	Gender	Contact details
Local resident	Male	13734664423
Local resident	Male	13111736001
Baitong employee	Male	13619713042
Baitong employee	Male	13897355953
Baitong employee	Male	13997111703
Local resident	Male	13997280995
Local resident	Male	13639713284
Baitong employee	Male	13897427718

Baitong employee	Female	13909785371
Baitong employee	Male	18797187172
Baitong employee	Male	15809784242
Local resident	Male	18997018283
Local resident	Female	13734682757
Local resident	Male	13519774107
Local resident	Male	13709717707
Baitong employee	Female	15597040818
Baitong employee	Female	13639769528
Baitong employee	Female	13897213919
Baitong employee	Female	18609790193

In this meeting, the project proponents have described the main information and non-technical Environmental Impact Assessment of the proposed project, then answered questions from stakeholders and invited stakeholders for comments; finally, the stakeholders completed blind sustainable development exercise, and discuss about the monitoring sustainable development.

E.2. Summary of the comments received:

>>

In the first round, totally 30 questionnaires including the questionnaires answered in 10/03/2009 were collected, of which the major conclusions are summarized as follows:

	Positive /Yes	Negative /No	Unknown/Indifferent
Impacts on local employment and social living	30	0	0
Impacts on the living in the process of construction	30: No evident impact		
Holistic influence on the construction and implementation of the proposed project	30	0	0
Support of the proposed project	30	0	0

For the second round, all 20 participants noted that they had a good impression of the meeting and Project. All feedback about the proposed project was positive and it was noted by participants that the proposed project will:

- Reduce the emission of GHGs and thermal pollution;
- Reduce coal consumption and reduce air pollution;
- Increase job positions and income;
- Result in prompt pay and increase the livelihoods for the employees;

- Provide capacity building and supply more training opportunities for the employees;
- Promote waste energy usage.

There were no negative opinions of the proposed project.

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

>>

The Project Entity has carried out relevant measures to solve the concerns of the stakeholders who were interviewed during the investigation for the project activity, including suggestions in the Environmental Impact Form (EIF).

Regarding to the mitigation measures suggested in the EIF, Baitong will ensure to achieve harmonization of environmental, social and economical benefits.

At the same time, Baitong will keep stakeholders informed regularly regarding the progress made in project construction and operation.

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 countries involved in the project activity.

Annex 3

BASELINE INFORMATION

Database used for combined margin emission factor calculation.
Baseline Information: NWPG (including Shanxi, Gansu, Qinghai, Ningxia, Xinjiang).
The table list used for calculation the emissions reduce and combined margin ($EF_{grid,CM,y}$) (including data, data resources and course of calculation)is as follow:

Table 3-1. Low calorific values, CO_2 emission factors and oxidation factors of fuels
Table 3-2. Operating Margin Emission Factor of China Northwest Power Grid (2006)
Table 3-3. Electricity Generation of China Northwest Power Grid (2006)
Table 3-4. Operating Margin Emission Factor of China Northwest Power Grid (2007)
Table 3-5. Electricity Generation of China Northwest Power Grid (2007)
Table 3-6. Operating Margin Emission Factor of China Northwest Power Grid (2008)
Table 3-7. Electricity Generation of China Northwest Power Grid (2008)
Table 3-8. Operating Margin Emission Factor of China Northwest Power Grid
Table 3-9. Calculating of the CO_2 emissions factor of fuel i (tCO_2/MWh)
Table 3-10. Calculating the percentage of CO_2 emission caused by of fuel i
Table 3-11. Installed Capacities of NWPG in 2008
Table 3-12. Installed Capacities of NWPG in 2007
Table 3-13. Installed Capacities of NWPG in 2006
Table 3-14. Installed Capacities of NWPG from 2006 to 2008
Table 3-15. Baseline Emissions Factor of China Northwest Power Grid (tCO_2/MWh)

The propose project will use the result and course of calculation which is the official statistical data published by China DNA, the details is shown as follow:

- **Calculation of Operation Margin Emission Factor of Northwest China Power Grid**

Table 3-1.Low calorific values, CO_2 emission factors and oxidation factors of fuels

Fuels	**Low Calorific Values**	**Emission Factor ($kgCO_2/TJ$)**	**Oxidation Rate**
Raw Coal	20,908 kJ/kg	87,300	1
Cleaned Coal	26,344 kJ/kg	87,300	1
Mould Coal	20,908 kJ/kg	87,300	1
Other Washed Coal	8,363 kJ/kg	87,300	1
Coke	28,435 kJ/kg	95,700	1

Crude Oil	41,816 kJ/kg	71,100	1
Gasoline	43,070 kJ/kg	67,500	1
Diesel Oil	42,652 kJ/kg	72,600	1
Fuel Oil	41,816 kJ/kg	75,500	1
Other Oil Products	41,816 kJ/kg	72,200	1
Natural Gas	38,931 kJ/m^3	54,300	1
Coke Oven Gas	16,726 kJ/m^3	37,300	1
Other Gas	5,227 kJ/m^3	37,300	1
LPG	50,179 kJ/kg	61,600	1
Refinery Gas	46,055 kJ/kg	48,200	1

Data Source: The net calorific values are quoted from <China Energy Statistical Yearbook 2009>, Page 507-508.The emission factors are quoted from " 2006IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy, as the lower value of 95% confidence interval.

Table 3-2. Operating Margin Emission Factor of NWPG (2006)

Fuel	Unit	shanxi	gansu	qinghai	ningxia	xinjiang	Total	Carbon Content	Carbon Oxidation Rate	Fuel Emission Factor	Average Low Calorific Value	CO2 Emission（ tCO_2e）
								tc/TJ	%	$kgCO_2/TJ$	MJ/t,m3	L=G×J×K/100000（mass unit）
		A	B	C	D	E	G=A+B+C+D+E	H	I	J	K	L=G×J×K/10000 (volume unit)
Raw Coal	10^4 t	2834.44	1660.92	421.86	1833.72	1547.69	**8298.63**	25.8	100	87,300	20,908	151,472,271
Cleaned Coal	10^4 t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4 t				112.7	8.45	**121.15**	25.8	100	87,300	8,363	884,504
Moulded Coal	10^4 t	0					**0**	26.6	100	87,300	20,908	0
Coke	10^4 t				0.01		**0.01**	29.2	100	95,700	28,435	272
Coke Oven Gas	10^8 m^3	0.2				0.08	**0.28**	12.1	100	37,300	16,726	17,469
Other Gas	10^8 m^3	0.1					**0.1**	12.1	100	37,300	5,227	1,950
Crude Oil	10^4 t					0.02	**0.02**	20	100	71,100	41,816	595
Gasoline	10^4 t	0.01					**0.01**	18.9	100	67,500	43,070	291
Diesel Oil	10^4 t	1.14	0.24	0.61		1.25	**3.24**	20.2	100	72,600	42,652	100,328
Fuel Oil	10^4 t		0.6			0.11	**0.71**	21.1	100	75,500	41,816	22,415
LPG	10^4 t						**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4 t						**0**	15.7	100	48,200	46,055	0
Natural Gas	10^8 m^3	1.59	0.56	1.06		7.49	**10.7**	15.3	100	54,300	38,931	2,261,930
Other Petroleum Products	10^4 t						**0**	20	100	75,500	41,816	0
Other Coking Products	10^4 t	1.86					**1.86**	25.8	100	95,700	28,435	50,615
Other Energy	10^4 t Standard Coal	33.57	8.81			2.2	**44.58**	0	0	0	0	0

		Total	154,812,639

Data Source: <China Energy Statistical Yearbook 2007>

Table 3-3. Electricity Generation of China Northwest Power Grid (2006)

Province	Electricity Generation	Electricity Generation	Internal Use rate	Supplied Electricity
	(10^8 kWh)	(MWh)	（%）	（MWh)
shanxi	544.82	54,482,000	6.97	50,684,605
gansu	357.38	35,738,000	4.29	34,204,840
qinghai	72.04	7,204,000	2.57	7,018,857
ningxia	367.31	36,731,000		36,731,000
xinjiang	299.01	29,901,000	8.02	27,502,940
Total				156,142,241

Data Source: <China Electric Power Yearbook 2007>

Table 3-4. Operating Margin Emission Factor of China Northwest Power Grid (2007)

Fuel	Unit	shanxi	gansu	qinghai	ningxia	xinjiang	Total	Carbon Content	Carbon Oxidation Rate	Fuel Emission Factor	Average Low Calorific Value	CO2 Emission（tCO_2e）
								（tc/TJ）	（%）	($kgCO_2/TJ$)	（MJ/t,m3）	L=G×J×K/100000（mass unit）
		A	B	C	D	E	G=A+B+C+D+E	H	I	J	K	L=G×J×K/10000 (volume unit)
Raw Coal	10^4 t	3303.44	1969.03	470.85	2165.8	1762.11	**9671.23**	25.8	100	87,300	20,908	176,525,905
Cleaned Coal	10^4 t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4 t	3.73			124.31	7.73	**135.77**	25.8	100	87,300	8,363	991,243
Moulded Coal	10^4 t	3.53					**3.53**	26.6	100	87,300	20,908	64,432
Coke	10^4 t						**0**	29.2	100	95,700	28,435	0
Coke Oven Gas	10^8	0.52	0.65			0.26	**1.43**	12.1	100	37,300	16,726	89,215

	m^3											
Other Gas	10^8 m^3	14.14	0.71				**14.85**	12.1	100	37,300	5,227	289,526
Crude Oil	10^4 t					0.09	**0.09**	20	100	71,100	41,816	2,676
Gasoline	10^4 t	0.02					**0.02**	18.9	100	67,500	43,070	581
Diesel Oil	10^4 t	1.12	0.26	0.42		1.77	**3.57**	20.2	100	72,600	42,652	110,546
Fuel Oil	10^4 t	0.01	1.05	0.04		0.05	**1.15**	21.1	100	75,500	41,816	36,307
LPG	10^4 t						**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4 t					5.99	**5.99**	15.7	100	48,200	46,055	132,969
Natural Gas	10^8 m^3	1.68	0.49	1.93		8.66	**12.76**	15.3	100	54,300	38,931	2,697,404
Other Petroleum Products	10^4 t						**0**	20	100	75,500	41,816	0
Other Coking Products	10^4 t						**0**	25.8	100	95,700	28,435	0
Other Energy	10^4 t	94.36	9.73				**104.09**	0	100	0	0	0
											Total	180,940,805

Data Source: <China Energy Statistical Yearbook 2008>

Table 3-5. Electricity Generation of China Northwest Power Grid (2007)

Province	**Electricity Generation**	**Electricity Generation**	**Internal Use rate**	**Supplied Electricity**
	(10^8 kWh)	**(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

Data Source: <China Electric Power Yearbook 2008>

Table 3-6. Operating Margin Emission Factor of NWPG (2008)

Fuel	Unit	shanxi	gansu	qinghai	ningxia	xinjiang	Total	Carbon Content	Carbon Oxidation Rate	Fuel Emission Factor	Average Low Calorific Value	CO2 Emission（ tCO_2e）
								（tc/TJ）	（%）	($kgCO_2/TJ$)	（MJ/t,m3）	L=G×J×K/100000（mass unit）
		A	B	C	D	E	G=A+B+C+D+E	H	I	J	K	L=G×J×K/10000 (volume unit)
Raw Coal	10^4 t	3620	2216.9	507.44	2330.72	1924.9	**10599.96**	25.8	100	87,300	20,908	193,477,720
Cleaned Coal	10^4 t						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4 t	9.22			53.85	8.2	**71.27**	25.8	100	87,300	8,363	520,335
Moulded Coal	10^4 t						**0**	26.6	100	87,300	20,908	0
Coke	10^4 t						**0**	26.6	100	95,700	28,435	0
Coke Oven Gas	10^8 m^3	0.35	0.74			0.13	**1.22**	29.2	100	37,300	16,726	76,113
Other Gas	10^8 m^3	18.38	0.2				**18.58**	12.1	100	37,300	5,227	362,249
Crude Oil	10^4 t						**0**	12.1	100	71,100	41,816	0
Gasoline	10^4 t	0.05				0.01	**0.06**	20	100	67,500	43,070	1,744
Diesel Oil	10^4 t	1.03	0.44	0.26	0.05	1.64	**3.42**	18.9	100	72,600	42,652	105,902
Fuel Oil	10^4 t		0.86	0.04		0.02	**0.92**	20.2	100	75,500	41,816	29,045
LPG	10^4 t						**0**	21.1	100	61,600	50,179	0
Refinery Gas	10^4 t					7.25	**7.25**	17.2	100	48,200	46,055	160,939
Natural Gas	10^8 m^3	0.94	0.24	2.99		7.2	**11.37**	15.7	100	54,300	38,931	2,403,565
Other Petroleum Products	10^4 t					0.01	**0.01**	15.3	100	72,200	41,816	302
Other Coking Products	10^4 t						**0**	20	100	95,700	28,435	0
Other Energy	10^4 t	93.67	10.58		21.24		**125.49**	25.8	100	0	0	0
							0	0	100	0	0	197, 137, 915

Data Source: <China Energy Statistical Yearbook 2009>

Table 3-7. Electricity Generation of NWPG (2008)

Province	Electricity Generation	Electricity Generation	Internal Use rate	Supplied Electricity
	(10^8 kWh)	**(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

Data Source: <China Electric Power Yearbook 2009>

Table 3-8. Operating Margin Emission Factor of Northwest China Power Grid

	2006	2007	2008
Total CO_2 Emission (tCO_2e)	154,812,639	180,940,805	197,137,915
Total Electricity generation (MWh)	156,142,241	178,920,940	200,640,770
$EF_{OM, Simple}$	1.08486	0.99148	1.01129
Average OM (tCO2/MWh)	**0.99475**		

➢ **Calculation of Building Margin Emission Factor of Northwest China Power Grid**

Table 3-9. Calculating of the CO_2 emissions factor of fuel i (tCO_2/MWh)

	Parameter	Efficiency of Power Suppy	Emission Factor of Fuel (kgCO2/TJ)	Carbon oxidation rate	Emission Factor (tCO_2/MWh)
		A	B	C	D=3.6/A/1,000,000*B*C
Coal-fired Power Plant	$EF_{Coal,Adv}$	39.08	87,300	1	0.8042
Oil-fired Power Plant	$EF_{Oil,Adv}$	51.46	75,500	1	0.5282
Gas-fired Power Plant	$EF_{Gas,Adv}$	51.46	54,300	1	0.3799

Data source: *Notification on Determining Baseline Emission Factor of China's Grid*

Table 3-10. Calculating the percentage of CO_2 emission caused by of fuel i

		shanxi	gansu	qinghai	ningxia	xinjiang	Total	Average Low Calorific Value	Fuel Emission Factor ($kgCO_2/TJ$)	Carbon oxidation rate	CO_2 Emission (tCO_2e)
Fuel	**Unit**	**A**	**B**	**C**	**D**	**E**	G=A+..+F	H	I(kgCO2/TJ)	J	K=G*H*I*J/100,000
Raw Coal	10^4 t	3,620.00	2,216.90	507.44	2,330.72	1,924.90	10,599.96	20,908	87,300	1	193,477,720
Cleaned Coal	10^4 t	0	0	0	0	0	0	26,344	87,300	1	0
Other Washed Coal	10^4 t	9.22	0	0	53.85	8.20	71.27	8,363	87,300	1	520,335
Mould Coal	10^4 t	0	0	0	0	0	0	20,908	87,300	1	0
Coke	10^4 t	0	0	0	0	0	0	28,435	95,700	1	0
Other Coking Products	10^4 t	0	0	0	0	0	0	28,435	95,700	1	0
Subtotal											193,998,055
Crude Oil	10^4 t	0	0	0	0	0	0	41,816	71,100	1	0
Gasoline	10^4 t	0.05	0	0	0	0.01	0.06	43,070	67,500	1	1,744
Diesel Oil	10^4 t	1.03	0.44	0.26	0.05	1.64	3.42	42,652	72,600	1	105,902
Fuel Oil	10^4 t	0	0.86	0.04	0	0.02	0.92	41,816	75,500	1	29,045

Other Petroleum Products	10^4 t	0	0	0	0	0.01	0.01	41,816	72,200	1	302
Subtotal											136,993
Natural Gas	10^7 m^3	9.40	2.40	29.90	0	72.00	113.70	38,931	54,300	1	2,403,565
Coke Oven Gas	10^7 m^3	3.50	7.40	0	0	1.30	12.20	16,726	37,300	1	76,113
Other Gas	10^7 m^3	183.80	2.00	0	0	0.00	185.80	5,227	37,300	1	362,249
LPG	10^4 t	0	0	0	0	0.00	0.00	50,179	61,600	1	0
Refinery Gas	10^4 t	0	0	0	0	7.25	7.25	46,055	48,200	1	160,939
Subtotal											3,002,866
Total											197,137,915

Data source: <China Electric Power Yearbook 2009>

From upper table, λ_{Coal} =98.41%, λ_{Oil} =0.07%, λ_{Gas} =1.52%
The final $EF_{Thermal}$ is calculated as follow:

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.7975 \ tCO_2/MWh$$

Table 3-11. Installed Capacities of NWPG in 2008

Installed Capacity	Unit	shanxi	gansu	qinghai	ningxia	xinjiang	Total
Fuel-fired (MW)	MW	17,850	8,980	2,000	7,540	8,200	44570
Hydro (MW)	MW	1,810	5,440	5,910	430	2,190	15780
Nuclear (MW)	MW	0	0	0	0	0	0
Wind & Others (MW)	MW	0	600	0	170	510	1280
Total	MW	19,660	15,020	7,910	8,140	10,900	61,630

Data Source: <China Electric Power Yearbook 2009>

Table 3-12. Installed Capacities of NWPG in 2007

Installed Capacity	Unit	shanxi	gansu	qinghai	ningxia	xinjiang	Total

Fuel-fired (MW)	MW	12,290	7,840	1,900	7,030	6,560	35,620
Hydro (MW)	MW	1,790	4,400	5,830	430	2,140	14,590
Nuclear (MW)	MW	0	0	0	0	0	0
Wind & Others (MW)	MW	73	346	0	50	330	799
Total	MW	14,153	12,586	7,730	7,510	9,030	51,009

Data Source: <China Electric Power Yearbook 2008>

Table 3-13. Installed Capacities of NWPG in 2006

Installed Capacity	**Unit**	**shanxi**	**gansu**	**qinghai**	**ningxia**	**xinjiang**	**Total**
Fuel-fired (MW)	MW	9,723	6,448	1,517	6,002	5,937	29,627.0
Hydro (MW)	MW	2,165	4,291	5,423	429	1,766	14,074.0
Nuclear (MW)	MW	0	0	0	0	0	0
Wind & Others (MW)	MW	0	199	0	11	189	399
Total	MW	11,888	10,938.0	6,940.0	6,442.0	7,892.0	44,100.0

Data Source: <China Electric Power Yearbook 2007>

Table 3-14. Installed Capacity from Year 2006-2008

	2006	**2007**	**2008**	**New Capacity Additions from Year2006-2008**	**New Capacity Additions from Year2007-2008**	**Percentage of newly added installed Capacity**
	A	B	C	D=C-A	E=C-B	
Fuel-fired (MW)	29,627	35,620	44,570	16,216.0	9,609.0	86.24%
Hydro (MW)	14,074	14,590	15,780	1,706.0	1,190.0	9.07%
Nuclear (MW)	0	0	0	0.0	0.0	0.00%
Wind & Others (MW)	399	799	1,280	881.0	481.5	4.69%

Total	**44,100**	**51,009**	**61,630**	**18,803.0**	**11,280.5**	**100.00%**
Percentage of installed capacity in 2008	**71.56%**	**83%**	**100%**			

The Build Margin Emission Factor in Northwest China Power Grid is:
$EF_{grid,BM,y}$ =0.6878 tCO_2/MWh

Table 3-15. Baseline Emissions Factor of China Northwest Power Grid (tCO_2/MWh)

Operating Margin Emission Factor	0.9947
Build Margin Emission Factor	0.6878
Combined Emission Factor	0.84125

Annex 4

MONITORING INFORMATION

Please refer to relative information in section B7.2.