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# VALIDATION REPORT

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## POWER GENERATION FROM COKING WASTE HEAT UTILIZATION PROJECT AT QINYUAN COUNTY MINGYUAN COAL AND COKE Co., LTD IN SHANXI, CHINA

REPORT No. 2008-0142

REVISION No. 01



# VALIDATION REPORT

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Approved by:  <b>Mari Grooss Viddal, Head of Approval &amp; Service Centre, Norway EEA Fund Management Ltd.</b>	Organisational unit:  <b>Climate Change Services</b>
	Client ref.: <b>Des Godson</b>

**Project Name:** Power generation from coking waste heat utilization project at Qinyuan County Mingyuan Coal and Coke Co., Ltd in Shanxi, China  
**Country:** China  
**Methodology:** ACM0004  
**Version:** 02  
**GHG reducing Measure:** Waste heat recovery from the coking process for power generation  
**ER estimate:** 171 029 tCO<sub>2</sub>e per year  
**Size**  
☒ Large Scale  
☐ Small Scale  
**Validation Phases:**  
☒ Desk Review  
☒ Follow up interviews  
☒ Resolution of outstanding issues  
**Validation Status**  
☐ Corrective Actions Requested  
☐ Clarifications Requested  
☒ Full Approval and submission for registration  
☐ Rejected  
 In summary, it is DNV's opinion that the "Power generation from coking waste heat utilization project at Qinyuan County Mingyuan Coal and Coke Co., Ltd in Shanxi, China" as described in the PDD version 3 of 15 February 2008, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0004 version 02. DNV thus requests the registration of the project as a CDM project.

Report No.: <b>2008-0142</b>	Date of this revision: <b>2008-03-04</b>	Rev. No. <b>01</b>
Report title: <b>Power generation from coking waste heat utilization project at Shanxi Sanjia Coal &amp; Chemicals Co., Ltd in China</b>		
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Key words:  
**Validation**  
**Climate Change**  
**Kyoto Protocol**  
**Clean Development Mechanism**

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### Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EB	Executive Board
GHG	Greenhouse gas(es)
GWh	Giga Watt Hour
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate on Return
kWh	Kilo Watt hour
MW	Mega Watt
MP	Monitoring Plan
NCPC	North China Power Grid
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change




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Appendix A: Validation Protocol

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### 1 EXECUTIVE SUMMARY – VALIDATION OPINION

*Det Norske Veritas Certification AS (DNV) has performed a validation of the “Power generation from coking waste heat utilization project at Qinyuan County Mingyuan Coal and Coke Co., Ltd in Shanxi, China”. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.*

*The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.*

*The host Party is China and the Annex I Party is the United Kingdom. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants. The DNA from China confirmed that the project assists in achieving sustainable development.*

*The project correctly applies the methodology ACM0004 “Consolidated baseline/monitoring methodology for waste gas and/or heat and/or pressure for power generation”, version 2.*

*By utilizing waste heat for power generation, instead of venting it, the project results in reductions of CO<sub>2</sub> emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.*

*The total emission reductions from the project are estimated to be on the average 171 029 tCO<sub>2e</sub> per year over the selected 7 year renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.*

*Adequate training and monitoring procedures will be implemented before the starting date of the crediting period.*

*In summary, it is DNV’s opinion that the “Power generation from coking waste heat utilization project at Qinyuan County Mingyuan Coal and Coke Co., Ltd in Shanxi, China”, as described in the PDD of 15 February 2008, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0004. DNV thus requests the registration of the project as a CDM project activity.*



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## 2 INTRODUCTION

EEA Fund Management Ltd. has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “Power generation from coking waste heat utilization project at Qinyuan County Mingyuan Coal and Coke Co., Ltd in Shanxi, China” (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

### 2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

### 2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0004. The validation team has, based on the recommendations in the Validation and Verification Manual /4/ employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.



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### 3 METHODOLOGY

The validation consisted of the following three phases:

- I a desk review of the project design documents
- II follow-up interviews with project stakeholders
- III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

#### 3.1 Desk Review of the Project Design Documentation

The following table outlines the documentation reviewed during the validation:

- /1/ Qinyuan County Mingyuan Coal and Coke Co., Ltd.: *CDM Project Design Document* - "Power generation from coking waste heat utilization project at Qinyuan County Mingyuan Coal and Coke Co., Ltd in Shanxi, China" version 1, dated 30 April 2007, version 2 of 18 January 2008 and final version 3 of 15 February 2008.
- /2/ Letter of approval, DNA of the Republic of China, of 26 August 2007.
- /3/ Letter of approval, DNA of United Kingdom, of 1 October 2007.
- /4/ International Emission Trading Association (IETA) & the World Bank Carbon Finance Group / Prototype Carbon Fund (PCF): *Validation and Verification Manual*.  
<http://www.ieta.org/ieta/www/pages/index.php?IdSitePage=200>
- /5/ ACM0004: Consolidated methodology for waste gas and/or heat for power generation, version 2 of 3 March 2006.
- /6/ Revised Feasibility study report dated March 2006.  
The original feasibility study report (FSR) for the coking plant including the waste heat recovery, approved by Shanxi Renhe Electrical Engineering Design and Consulting Co., Ltd. on 29 August 2003
- /7/ Invoices from the grid company for electricity imported prior to the project implementation, dated 25 July 2007.
- /8/ Clarification letter from the Shanxi Province 21 Agenda Sustainable Development Office (under the Provincial Development and Reform Committee), April 2006.
- /9/ The EIA by the Shanxi Institute of Chemical Design, dated July 2005, and the approval letter by the Shanxi Environment Protection Bureau on 29 July 2005.
- /10/ CDM Executive Board: "Tool for the demonstration and assessment of additionality, version 4", EB 36 meeting.
- /11/ Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
- /12/ China Electric Power Yearbooks 2002-2006.
- /13/ China NDRC, the emission factor calculation for each power grid of China, published on 9 August 2007, NDRC official website:



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<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf>

- /14/ CDM Executive Board, Guidance for request for deviation titled "Application of AM0005 and AMS-I.D in China" (<http://cdm.unfccc.int/Projects/Deviations>).
- /15/ The General Office of the State Council, *Notice on Strictly Prohibiting the Installation of Fuel-fired Generation with the Capacity of 135MW or below*, decree No. 2002.6.
- /16/ Copies of the questionnaires distributed to the stakeholders, dated 30 March 2007, along with the responses.
- /17/ China energy statistical yearbook 2004-2006, Energy balance of Shanxi-2004.
- /18/ IRR calculation spreadsheet for the project activity, dated 15 February 2008.
- /19/ Agreement about start of construction of the plant, dated 1 March 2007.
- /20/ Values for the Operating margin, Chinese DNA,  
<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1052.xls>
- /21/ Shanxi Coking Installations Category of the Provincial Governmental Document [2005].
- /22/ Mott McDonald statement. 18 January 2008.

The main changes between the version of the PDD published for the 30 days stakeholder commenting period and the final version of the PDD submitted for registration are:

- The sensitivity analysis in section B.5 of the PDD has been updated to reflect variation in each of the main parameters that is required to reach the benchmark of 12% and the likelihood of that change to occur,
- Date of operation of the coking plant, date of consideration of the waste heat recovery project, and the date of construction of the proposed project activity were added in section B.5 of the PDD,
- Discussion on barrier analysis has been removed in section B.5 of the PDD,
- Starting date of project activity in section C.1.1 was updated from 1 January 2008 to 1 March 2007 which is the date of the agreement for the construction start
- Starting date of the first crediting period in section C.2.1.1 was updated from 1 January 2008 to 15 May 2008
- Issues related to the CARs and CLs identified during validation.

### 3.2 Follow-up Interviews with Project Stakeholders

On 18 April 2007 and 25 July 2007, DNV performed interviews with Ms. Pan Junxiang, Chief of the Economic Development Section of The Development and Reform Commission of Shanxi Province to confirm selected information and to resolve issues identified in the document review. On 18 April 2007 DNV performed an interview with Mr. Zhou Fentao, Engineer at The Environmental Impact Assessment Center of Shanxi Province.

Furthermore, all issues identified by DNV during the subsequent stages of validation have been clarified through continuous communications with Trading Emissions PLC. The project participants have also provided underlying documentation for review by DNV, confirming





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selected information and resolving issues identified in the validation. An overview of the reviewed documentation is listed in the references in section 3.1 above.

### 3.3 Resolution of Outstanding Issues

The objective of this phase of the validation was to resolve any outstanding issues which needed to be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the "Power generation from coking waste heat utilization project at Qinyuan County Mingyuan Coal and Coke Co., Ltd in Shanxi, China" is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of CDM criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

- i) mistakes have been made with a direct influence on project results;
- ii) CDM and/or methodology specific requirements have not been met; or
- iii) there is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

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<b>Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities</b>				
<b>Requirement</b>	<b>Reference</b>	<b>Conclusion</b>		
<i>The requirements the project must meet.</i>	<i>Gives reference to the legislation or agreement where the requirement is found.</i>	<i>This is either acceptable based on evidence provided (<b>OK</b>), a <b>Corrective Action Request (CAR)</b> due to risk or non-compliance with stated requirements or a request for <b>Clarification (CL)</b> where further clarifications are needed.</i>		

  

<b>Validation Protocol Table 2: Requirement checklist</b>				
<b>Checklist Question</b>	<b>Reference</b>	<b>Means of verification (MoV)</b>	<b>Comment</b>	<b>Draft and/or Final Conclusion</b>
<i>The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.</i>	<i>Gives reference to documents where the answer to the checklist question or item is found.</i>	<i>Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.</i>	<i>The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.</i>	<i>This is either acceptable based on evidence provided (<b>OK</b>), or a <b>corrective action request (CAR)</b> due to non-compliance with the checklist question (See below). A request for clarification (CL) is used when the validation team has identified a need for further clarification.</i>

  

<b>Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests</b>			
<b>Draft report clarifications and corrective action requests</b>	<b>Ref. to checklist question in table 2</b>	<b>Summary of project owner response</b>	<b>Validation conclusion</b>
<i>If the conclusions from the draft Validation are either a CAR or a CL, these should be listed in this section.</i>	<i>Reference to the checklist question number in Table 2 where the CAR or CL is explained.</i>	<i>The responses given by the project participants during the communications with the validation team should be summarised in this section.</i>	<i>This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".</i>

**Figure 1: Validation protocol tables**

### 3.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participant. The final validation report underwent another technical review before requesting registration of the project activity. The technical reviews were performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.



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### 3.5 Validation Team

Role/Qualification	Last Name	First Name	Country
Team leader, CDM validator	Rescalvo	Miguel	Norway
CDM validator	Kutty	Mathsy	India
CDM validator	Yue	Mindy	China
GHG auditor	Molin	Peter	Norway
Sector expert	Lehmann	Michael	Norway
Technical reviewer	Brinks	Hendrik	Norway

The qualification of each individual validation team member is detailed in Appendix B to this report.



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### 4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation version 3 of 15 February 2008 /1/.

#### 4.1 Participation Requirements

The project participants are Qinyuan County Mingyuan Coal and Coke Co., Ltd from China and Trading Emissions PLC from the United Kingdom. The host Party China and the Annex I Party United Kingdom meet all the requirements to participate in the CDM.

The DNA of China has issued the letter of approval (LoA) on 26 August 2007 /2/, authorizing Qinyuan County Mingyuan Coal and Coke Co., Ltd. as project participant and confirming that the project contributes to the sustainable development in China. United Kingdom has issued the LoA on 1 October 2007 /3/, authorizing Trading Emissions PLC as project participant.

The project will not receive any public funding from Parties included in Annex I of the UNFCCC. The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funds towards China.

#### 4.2 Project Design

The project activity involves utilization for power generation of the waste heat generated during the coke production at an existing coking facility in Qinyuan Mingyuan Coking Facility. The coking facility is located in the Guodao Town, Qinyuan County in Changzhi City in the Shanxi province of China. The power generated from the plant is exported to the North China power grid (NCPG).

The project activity is to be located at a clean type non-chemical-recovery coke production facility, which has been in operation since 2005. In the absence of the proposed CDM activity the coking plant met all its electricity requirements from the grid, while the waste heat was directly emitted into the atmosphere.

The project envisages installation of four waste heat boilers (4\*35 t/h) and four steam turbines coupled to four generators (4\*6 MW generators). The project is expected to generate a gross annual amount of 195 GWh electricity. After meeting the auxiliary requirements for the project, the project will have a net generation of 166 GWh per year, which will be entirely exported to the grid. DNV was able to confirm the estimated total electricity generation against the feasibility study report (FSR) /6/. The electricity demand for coke washing, molding, conveying and quenching as well as the electricity needs of other auxiliary facilities will be imported from the grid in the project scenario as was done before the implementation of the project. The project activity helps utilize the waste heat from the coking unit for power generation, and thereby displace electricity generation by fossil fuel based power plants connected to the NCPG.

The starting date of the project activity is 1 March 2007. This is evidenced by the agreement of construction start/19/. The expected operational lifetime of the project is 20 years. The

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project proponent has selected a renewable crediting period of 7 years with the starting date 15 May 2008 or the date of CDM registration, whichever occurs later.

### 4.3 Baseline Determination

The project activity applies the approved consolidated baseline methodology ACM0004 version 2 “Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation” /5/. This methodology is applicable to the project activity since

- i) The electricity generated by the project will displace electricity in the North China power grid (NCPG) and
- ii) No fuel switch activity is carried out as a part of the project activity; coal remains the main fuel used in the coke production facility, while the power requirements come from the grid.
- iii) The current practice includes emissions of the waste heat into the atmosphere. Furthermore the power requirement currently is imported from the grid. The FSR /6/ confirms that the waste heat was released to the atmosphere and that the electricity used on site is imported from the grid, what has been also confirmed and the invoices from the grid company /7/.

The project’s system boundaries include the following:

		<i><b>GHGs involved</b></i>	<i><b>Description</b></i>
<i><b>Baseline emissions</b></i>	Grid electricity generation	CO <sub>2</sub>	Fossil fuel intense electricity generation in the grid.
<i><b>Project emissions</b></i>	None	-	The proposed project does not have any on-site fossil fuel consumption

The project boundary includes the coking oven, boiler, steam turbines and the generator in addition to all the power plants connected physically to the electricity grid.

The plausible baseline scenarios discussed for the project include:

- a. The proposed project activity not undertaken as a CDM project activity; utilization of waste heat and net export of electricity;
- b. Import of electricity from the grid and release of waste heat;
- c. Existing or new captive power generation on-site, using other energy sources than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind and release of waste heat;
- d. A mix of options (b) and (c), in which case the mix of grid and captive power should be specified;
- e. Other uses of the waste heat and import of electricity from the grid;

Alternative (a) faces financial barriers as discussed in section 4.4 below. Hence, this alternative scenario has been eliminated from the baseline scenario analysis.

Alternative (c) includes existing or new captive power generation onsite using energy sources other than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind. There were prior to the project no captive power plant on-site and the installation of a coal, diesel or natural gas based small scale power plants would not comply with Chinese regulations. DNV



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was able to confirm against the *Interim Rules on the Installation and Management of Small-scale Fuel-fired Generators* /15/ that the installation of fossil fuel-fired power units with a capacity of less than 100 MW are strictly prohibited. Furthermore, utilization of the hydro and wind resources for power generation as a baseline scenario is not an option to the project developer, given the unavailability of hydro and wind resources at the project site. The same was confirmed by DNV against the China energy statistical yearbook, energy balance for Shanxi /17/.

Alternative (d), which is a combination of alternative (b) and (c) has been excluded from the analysis since, alternative (c) is not a plausible scenario for the project activity.

Alternative (e) has been excluded from the baseline study because there are no other applications of the waste heat currently, since the project is not located in the vicinity of other facilities or accommodations, to which the waste heat can be sold to. The usual practice for the waste heat is to be emitted into the atmosphere without being utilized for any purposes. DNV was also able to confirm the same with the local representatives of the Development and Reform Commission, Shanxi, during the follow up interviews.

Alternative (b) involves the continuation of the current situation, which is import of power from the grid. This alternative faces no barriers as compared to other alternatives identified. This alternative does not require the project developer to make any additional investments unlike in case of the implementation of the project activity.

The baseline scenario thus selected for the project activity is an equivalent amount of grid based electricity generation. As the project activity exports the generated power to the NCPG; the baseline for this project activity is the function of the generation mix of the NCPG.

The baseline determination is considered transparent and reasonable by DNV.

### 4.4 Additionality

The project proponent has demonstrated the additionality of the project by applying the “Tool for demonstration and assessment of additionality” version 4 /10/ as follows:

Since the starting date (1 March 2007) of the project activity is before the start date of validation (5 May 2007), DNV requested and assessed evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity. The environmental impact assessment (EIA) for power generation from the “coking waste heat utilization at Power generation from coking waste heat utilization project at Qinyuan County Mingyuan Coal and Coke Co., Ltd” project was approved by the Environmental Protection Bureau of Shanxi /9/ on 29 July 2005. The original feasibility study report (FSR) for the coking plant including the waste heat recovery was approved by Shanxi Renhe Electrical Engineering Design and Consulting Co., Ltd. on 29 August 2003 /6/. Based on this, Qinyuan County Mingyuan Coal and Coke Co., Ltd decided to build the coking plant without the waste heat recovery. The revised FSR from March 2006 only covers the waste heat recovery project. This was approved by an independent body accredited for preparation of FSRs. The updated financial analysis clearly indicates that the project is financially unattractive and the FSR point to the fact that if considering CDM revenues, this will improve the financial conditions for the project activity. Hence, DNV confirms that CDM incentives were seriously considered in the revised FSR. The operation of the project had not started at the start of CDM validation.

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*Step 1: Identification of alternatives to the project activity consistent with current laws and regulations:* The project proponent has identified six alternatives to the project activity, i.e. (a) The proposed project activity not undertaken as a CDM project activity; utilization of waste heat and net export of electricity; (b) Import of electricity from the grid and release of waste heat; (c) Existing or new captive power generation on-site, using other energy sources than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind, and release of waste heat; (d) A mix of options (b) and (c), in which case the mix of grid and captive power should be specified; (e) Other uses of the waste heat and waste gas and import of electricity from the grid; (f) The continuation of the current situation: Import of electricity from the grid and release of waste heat.

As explained in section 4.3 above, amongst the identified alternatives, thermal based power generation (coal, diesel and natural gas) under alternative (c) is not compliant with the regulations in China, which does not allow for the installation of fossil fuel-fired power units with a capacity of less than 100 MW/15/. Hydro, wind power and other uses of waste heat are not available to the project participants. The continuation of the current situation is the same as import of electricity from the grid. Hence, only a) the proposed project activity not undertaken as a CDM project activity and b) import of electricity from the grid are realistic alternatives.

*Step 2: Investment analysis:*

The project proponent has applied a benchmark analysis for the financial evaluation of the project activity. The benchmark analysis is adopted for the project since revenues are generated by the project and there are no investment alternatives. Project IRR was used.

There is only one potential developer for the project, so the project IRR is applied for the investment analysis. According to the “*Economic Assessment Method and Parameters for Project Construction* 03 edition (2006)”, the IRR benchmark in the coking industry is 12%. The feasibility study report (FSR) of the project indicates that the project IRR over 20 years without CDM is 8.19% which is lower than the benchmark of 12%. This shows that the project is not financially attractive for investors.

In China, a feasibility study report (FSR) is required for approval of any project in China, and it is developed by a third party which is accredited for this task directly by the government. The FSR is only approved after public assessment of the sector experts designated by the government. In this case the original FSR included both the coking plant and waste heat recovery. The financial analysis was updated in a revised FSR by an accredited party to determine the feasibility of the waste heat recovery project alone with the most recent information available. The original and revised FSRs are considered reliable information from an independent and recognized sources.

The IRR analysis has been carried out in a transparent way and the same were reviewed by DNV and deemed acceptable and conservative /18/. During assessment of this project, the parameters used in the IRR analysis were compared with the FSR and found to be consistent. All taxes were confirmed to be correctly applied. The electricity prices were in addition checked independently against electricity purchase invoices /7/. Also the reasonableness of the other input parameters used in the IRR was analysed. The investment per MW and operating cost as a fraction of investment costs were found to be in line with similar projects validated by DNV. The capacity factor of 92.8% is acceptable. The IRR calculation spreadsheet has been provided and checked by DNV. DNV was thus able to verify the IRR



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calculations, to verify that the parameters used in the IRR were consistent with the parameters used in the FSR and to confirm that the parameters used in the IRR are reasonable.

A sensitivity analysis was carried out considering variations in various key parameters like the investment cost, annual operation and maintenance cost and the income from sale of electricity. The sensitivity analysis was conducted by varying the different parameters until they reached the benchmark value, and then assessing the likelihood for this variation to occur. The results showed that the benchmark IRR of 12% was exceeded when:

- The capex is 29.06% below the assumption.

DNV was able to confirm that the values used in the total investment are taken from the FSR and are considered realistic. Given that the FSR is considered realistic, and observing a trend of increased prices in China, a variation of the capex of 29.06% below the values used is unlikely.

- The O&M costs are 56.55% below estimate.

The O&M costs are also taken from the FSR, and a 56.55% decrease compared to the estimate is considered unrealistic by DNV given that material and labour costs in China are expected to increase in the future.

- The electricity sales revenue is 21.17% higher than the assumption.

As the electricity price is agreed upon in the power purchase agreement, and the electricity tariff is regulated and controlled by the Chinese government, an increase of 21.17% is considered unrealistic by DNV. Furthermore, an increase in 21.17% in electricity sales revenue from increased generation would lead to a capacity factor above 100%, which is not possible.

DNV was thus able to confirm that the project activity is not the most financially attractive option to the project developer.

### *Step 3: Barrier analysis:*

This step has been excluded and only an investment analysis has been chosen.

### *Step 4: Common practice analysis:*

The coke production can either result in waste heat or waste gas generation. The coke production technology which results in only waste-heat is called a clean-type technology. As per the Chinese regulations, there are certain mandatory requirements for coking units to utilize waste gas from the coke production. However, there are no mandatory requirements for coking units to utilize the waste heat.

Shanxi Province is the largest producer of coke in China. Of the total 717 coking units in Shanxi province, only 35 use the clean-type technology for coke production, as opposed to the traditional technologies used by other plants. Out of these 35 coking units in Shanxi province, 10 are utilization waste heat, or are in the process of planning to utilize waste heat, for electricity generation including the proposed project activity. DNV was able to confirm this against a clarification letter from the Shanxi Province 21 Agenda Sustainable Development Office (under the Provincial Development and Reform Committee). This letter lists the projects utilizing the clean-type technology for coke production and lists the projects that are in the CDM pipeline for electricity generation projects /8/. The remaining 25 clean-type coke production facilities in Shanxi province are either emitting the waste heat in the atmosphere or





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are in the early stage of planning to utilize waste heat for electricity generation. However, through communication with a representative of the Shanxi Development and Reform Committee (DRC), it has been confirmed that the common practice in Shanxi province is to release waste heat in the atmosphere without its utilization for electricity generation. It has also been stated by the representative of the Shanxi DRC that many clean-type coke producers have received approvals for their feasibility study reports to utilize waste heat for electricity generation. However, they have not initiated the process and are only producing coke due to financial constraints. In addition, the letter from the Shanxi Province 21 Agenda Sustainable Development Office referred above encourages the project developers that are at planning stage to apply for CDM. All of the 10 projects currently utilizing waste heat for power generation and applying for CDM are being validated by DNV.

The consideration of only the clean-technology coking units has been accepted by DNV due to the fact that the two technologies are governed by different regulatory requirements. In addition, the two types of project technologies apply different types of boilers, viz.: the clean type technology uses waste heat recovery boilers, while the power generation in traditional technology type is using combined gas and steam turbines.

In conclusion, based on the investment barrier and the common practice analysis provided, it is demonstrated that the project faces financial barriers and that the emission reductions from the project can therefore be deemed additional.

### 4.5 Monitoring

The project applies the approved monitoring methodology, ACM0004 “Consolidated methodology for waste gas and/or heat and/or pressure for power generation”, version 2 /5/. The selected monitoring methodology is justifiably applicable for the project activity as it involves power generation using waste heat generated at the coking facility and there is no change in the process from which the waste gas is generated.

#### 4.5.1 Parameters determined ex-ante

The grid emission factor of the North China power grid (NCPG) has been fixed *ex-ante* for the first crediting period of seven years. The estimation has been done in a transparent and conservative manner by the combined margin approach outlined in the ACM0002 methodology.

#### 4.5.2 Parameters monitored ex-post

The parameters that will be monitored in the project activity include the total electricity generation, auxiliary consumption and the net electricity exported to the NCPG. This data is continuously monitored using the meters installed at the project site and recorded on a monthly basis. The data can be cross-checked against the recorded reading through a remote control system at the grid company. The electricity meter will be automatically recorded by remote control system. Receipts from electricity sales will also be obtained for cross checking. All data will be archived for a period of two years following the end of the crediting period.

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### 4.5.3 Management system and quality assurance

The authority and responsibility of the project management has been clearly described to include a CDM manager for the overall supervision of the monitoring plan, a technical department for the calibration, maintenance of equipments in addition to checking and archiving of data. The financial department will be mainly involved in the checking of data like the electricity sales records, copies of electricity sales receipt and electricity meter reading records. The responsibility of the data monitoring will involve monitoring data through the distributed control systems (DCS) which will be installed in the proposed project and can online measure, check and collect the meter data. Individual meters are installed at proper locations for monitoring of the auxiliary energy consumption, ( $EG_{aux}$ ) and for total electricity generated ( $EG_{gen}$ ). The electricity sold to the grid or the external entities, if any, is also monitored. The monitored data can be further verified against the receipts from the grid company. The local power grid also uses a remote control system to for measurement of the metered data.

The electric metering system will be equipped, installed and operated in line with the requirements of the *Technical Administrative Code of Electric Energy Metering* (DL/T448-2000). All meters will be calibrated in line with the relevant standards and regulation for the power sector. On calibration of the meters, the meters are sealed in the presence of both the project developer and the grid company. The sealed meters are not allowed to be opened, without both the parties being present.

The monitoring section will collect the information and data required by the monitoring plan. The collected information will be documented on a monthly basis, further to which the data is written stored electronically and a print out of the same is also taken. The copies of the electricity sales receipts from the grid company are also stored for the cross-verification.

### 4.6 Estimate of GHG Emissions

The emission reduction  $ER_y$  due to the project activity during the crediting period is estimated as the difference between the baseline emissions due to grid electricity generation with fossil fuels ( $BE_y$ ) and project emissions ( $PE_y$ ) and leakage ( $L_y$ ) as follows:

**Project emissions ( $PE_y$ ):** There is no auxiliary fuels utilized at the project site due to the project activity, and hence the project emissions are regarded as zero.

**Leakage ( $L_y$ ):** No leakage effects are required to be considered for the project activity as per the methodology. Hence leakage is taken as zero.

**Baseline emissions ( $BE_y$ ):** Baseline emissions in  $tCO_2$  is computed as a function of the baseline grid emissions factor of the North China regional power grid ( $EF_y$  in  $tCO_2/MWh$ ) and the net electricity exported to the grid by the project activity.

The baseline grid emission factor for the project is determined *ex-ante* as a combined margin, consisting of combination of the operating margin (OM) and build margin (BM) in line with ACM0002 version 06.

For calculation of the OM emission factor, the simple OM emission factor calculation method is selected because data are not available for applying the dispatch data analysis and low-cost/must-run projects constitute less than 50% of the total grid generation (3.1% for 2003, 3.5% for 2004 and 3.8% for 2005). The aggregated generation and fuel consumption data are

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used due to the more plant specific data not being available for the NCPG. Country specific data for net calorific value (NCV<sub>i</sub>) of each type of fossil fuel, the default values from IPCC 2006 guidelines /11/ for oxidation factor, national values for the emission factors of fossil fuel and the total electricity delivered to the NCPG selected are deemed reasonable. Data for the years 2003, 2004 and 2005, which is the latest data available at the time of submission of the PDD for validation, have been used for the estimation of the OM emission factor. The OM is estimated to be 1.1208 tCO<sub>2</sub>e/MWh. DNV was able to confirm all assumption used for the OM estimation against the relevant data sources and further confirmed against the values as published by the Chinese DNA and have been deemed conservative and acceptable /21/.

Because plant specific fuel consumption and electricity generation data is not public available in China, the EB guidance on the request for deviation titled “Application of AM0005 and AMS-I.D in China” /14/ has been applied as follows:

- Use of capacity additions from one year to another for estimating the build margin emission factor for grid electricity
- Use of weights estimated using installed capacity in place of annual electricity generation
- Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

The application of the above deviation is acceptable to the concerned project activity, since AM0005 has now been replaced and incorporated into ACM0002. In line with the EB's guidelines, the BM is estimated for the capacity additions from the years 2003 to 2005, which is 23.78%. The BM thus applying the deviation and as published by the DNA of China /21/ is estimated to be 0.9397 tCO<sub>2</sub>e/MWh. The combined margin thus works out to be 1.0303 tCO<sub>2</sub>e /MWh. The project is expected to export 166 GWh electricity annually after complete implementation /6/. The project is expected to result in an estimated emission reduction of 171 029 tCO<sub>2</sub>e per year and a total of 1 197 203 tCO<sub>2</sub>e in the first renewable crediting period from 2008 to 2014.

### 4.7 Environmental Impacts

An Environmental Impact Assessments (EIA) was conducted according to Chinese law & regulation, by the Shanxi Institute of Chemical Engineering Design and the EIA report was further approved by the Shanxi Environment Protection Bureau in July 2005 /9/. The project was however, further delayed due to the financial and investment barriers faced by the waste heat recovery project. It was only on consideration of CDM that the proposed project activity was further pursued as was confirmed by DNV against the FSR /6/. The potential environmental impacts have been sufficiently identified and adequate environment management measures have been defined. No significant environmental impacts are envisaged in the project activity.

### 4.8 Comments by Local Stakeholders

In addition to the stakeholder consultation process stipulated in the Chinese EIA regulation, the project developer conducted an additional stakeholder consultation process. Between 28 March 2007 and 5 April 2007, the project proponent sent out letters inviting comments from the local public and in addition to the questionnaires distributed to the identified



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stakeholders. The identified stakeholders included 30 people representing local government, and organizations and locals from the nearby villages. The related governments and organizations included Office of People's Government of Qinyuan County, Qinyuan County Environment Protection Bureau, Qinyuan Power Supply sub Company of Shanxin Province Power Company, Qinyuan County Development and Reform Bureau, Qinyuan County Economy and Trade Bureau, People's Government of Guodao Town Qinyuan County, the Commission of Guodao Village Guodao Town, The 2<sup>nd</sup> School of Qianyuan County, The Qinyuan County Hospital. The villager's representative is from Guodao Town. There were no adverse comments on the project activity and all comments were supportive of the project. A summary of comments was provided and reviewed by DNV /16/.

### **4.9 Comments by Parties, Stakeholders and NGOs**

The PDD of 30 April 2007 was made publicly available on DNV's climate change website ([http://www.dnv.com/focus/climate\\_change/projects/projectdetails.asp?ProjectId=1185](http://www.dnv.com/focus/climate_change/projects/projectdetails.asp?ProjectId=1185)) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 5 May 2007 to 3 June 2007.

No comments were received during the 30 day commenting period.

## **APPENDIX A**

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### **CDM VALIDATION PROTOCOL**

**Table 1: Mandatory Requirement for Clean Development Mechanism (CDM) Project Activities**

Requirement	Reference	Conclusion
<b>About Parties</b>		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	<del>CAR-1</del> OK
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	<del>CAR-1</del> OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK. No public funding involved in the project.
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK. China : DNA - National Development and Reform Commission of the People's Republic of China DNA of United Kingdom: DEFRA, Department for Environment, Food and Rural Affairs.
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto	CDM Modalities §30/31a	OK. China and United

Requirement	Reference	Conclusion
Protocol.		Kingdom are Parties to the Kyoto Protocol and have ratified the same on 30 August 2002 and 31 May 2002 respectively.
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	OK
<b>About additionality</b>		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	<del>CL</del> 4 OK
<b>About forecast emission reductions and environmental impacts</b>		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	<del>CL</del> 9 OK
<b>For large-scale projects only</b>		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
<b>About stakeholder involvement</b>		
13. Comments by local stakeholders shall be invited, a summary of these provided and	CDM Modalities and Procedures	OK

Requirement	Reference	Conclusion
how due account was taken of any comments received.	§37b	
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
<b>Other</b>		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies & circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK
19. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK



**Table 2: Requirements Checklist**

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV *</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<b>A. General Description of Project Activity</b> <i>The project design is assessed.</i>					
<b>A.1. Project Boundaries</b> <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	/1/	DR	Yes, the project's spatial boundaries have been clearly defined. The project is sited in Guodao Town, Qinyuan County, Changzhi City in Shanxi Province in China. The geographical coordinates are east longitude 111°58'03''□112°32'30'', and north latitude 36°20'20''□37°00'42''.		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR	The projects' system boundaries are defined clearly to include the waste heat recovery system, i.e.: waste heat boiler, electricity generation facilities such as the steam turbine and the generator, captive power generating equipment, any equipment used to provide auxiliary heat to the waste heat recovery process and all the power plants connected to North China Power Grid.  The coke oven should be included in the project boundary.	<del>CL-14</del>	OK
<b>A.2. Participation Requirements</b> <i>Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party,</i>					

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<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV *</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<i>Letter of Approval, Authorization and Project Participant.</i>					
A.2.1. Which Parties and project participants are participating in the project?	/1/	DR	Qinyuan County Mingyuan Coal and Coke Co., Ltd in China from the host Party China and Trading Emissions PLC from the United Kingdoms, the annex I Party are project participants for this project activity.		OK
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party?	/1/	DR	The letter of authorisation and the letter of approval for the project and its participants from the DNA of China and United Kingdom need to be submitted.	<b>CAR-1</b>	OK
A.2.3 Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1/	DR	The Republic of China has ratified in Kyoto Protocol on 30 August 2002, and established a DNA; National Development and Reform Commission of the People's Republic of China.  United Kingdom has also established a DNA "DEFRA, Department for Environment, Food and Rural Affairs" on ratification of the Kyoto Protocol on 31 May 2002.  The voluntary participation of the project needs to be confirmed against the letter of approval from the DNA.	<b>CAR-1</b>	OK
A.2.4 Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR	The initial validation of the project activity does not reveal any information indicating that the project can be seen as diversion of any ODA funding towards China. The same		OK

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV *</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
			needs to be confirmed against the DNA approval letter.		
<b>A.3. Technology to be employed</b> <i>Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.</i>	/1/	DR			
A.3.1. Does the project design engineering reflect current good practices?	/1/	DR	Yes, the project design engineering reflects current good practices.		OK
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/	DR	The project activity does not result in any technology transfer from other countries.		OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/	DR	Provisions for identifying and meeting training and maintenance requirements need to be established.	CL-9	OK
<b>A.4. Contribution to Sustainable Development</b> <i>The project's contribution to sustainable development is assessed.</i>	/1/				
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	/1/	DR	The letter of approval from the DNA confirming that the project assists in achieving sustainable development needs to be submitted.	CAR-1	OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/	DR	The project activity will help in contributing		OK

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			to the sustainable development in the region by utilization of the waste gas for energy purposes, reducing the dependency on the fossil fuels for power generation thereby also reducing environmental pollution due to avoidance of emission of SO <sub>2</sub> , NO <sub>x</sub> and total suspended particles and creation of employment for the locals in the region.		
<b>B. Project Baseline</b> <i>The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
<b>B.1. Baseline Methodology</b> <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	/1/	DR	Yes, the project rightly applies ACM0004, version 2, the approved consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation.		OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/1/	DR	The chosen methodology ACM0004 is applicable to the proposed project since it meets all the applicability criteria laid down by the methodology. The project involves utilization of the waste heat from the coking process with clean-type heat recovery coke ovens to generate electricity, and supply to the North China Grid. No fuel switch is		OK

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV</b> *	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
			<p>envisaged in the waste heat production process, after the implementation of the proposed project, thus meeting all the applicability criteria.</p> <p>What was the fuel involved in the coking process, prior to the project implementation? The same needs to be included in the PDD.</p> <p>The PP needs to clearly state in the PDD if a coking facility had a captive power plant in order to meet the electricity requirements for the entire coking facility before the implementation of the project activity and which other energy resources are used in the plant. Furthermore, it needs to be justified how the energy demand will be satisfied after the project implementation for all energy sources.</p>	CL-2	
<b>B.2. Baseline Scenario Determination</b> <i>The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.</i>					
B.2.1. What is the baseline scenario?	/1/	DR	The baseline scenario arrived at is that an equivalent amount of energy would have been imported from the grid.		OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the	/1/	DR	The project proponent has identified the following alternatives to the project activity		OK

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV</b> *	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
most likely one?			to arrive at the baseline scenario: (a) The proposed project activity not undertaken as a CDM project activity; (b) Import of electricity from the grid; (c) Existing or new captive power generation on-site, using other energy sources than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind; (d) A mix of options (b) and (c), in which case the mix of grid and captive power should be specified (e) Other uses of the waste heat and waste gas (f) The continuation of the current situation, whether this is captive or grid-based power supply (if not already included in the options above) Option (a) has been eliminated based on the barriers faced by the project as discussed in the section B.3: additionality of the protocol. It is argued that option (c) is not the most probable baseline scenario since the project site is not ideal for tapping hydro power resources or wind power. Power generation using coal has been eliminated from being one of the plausible baseline scenarios since the regulations in the Republic of China do not allow for the construction of a coal fired	<del>CL1</del>	

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			<p>captive power plant with same capacity.</p> <p>Construction of a captive power plant of the same capacity using diesel oil or natural gas has been ruled out due to high operation costs and poor economic benefits. The same needs to be justified with data.</p> <p>No current uses of the waste heat recovery and utilisation have been identified. Also, it is stated that there are no regulatory obligations for recovery and utilisation of this waste stream. Hence, this scenario is eliminated from being the plausible baseline scenario. However, the same is contradicted while discussing additionality by stating that in cases where there is residential demand for gas, part of the waste gas is utilised as civilian gas. The same needs to be justified.</p> <p>Accordingly, the baseline scenario arrived at is that in the absence of the project activity, an equivalent quantity of power would have been imported from the grid.</p>	<del>CAR-2</del>	
B.2.3. Has the baseline scenario been determined according to the methodology?	/1/	DR	<p>Yes. The project proponent has determined baseline scenario as per the methodology which is the most economically attractive alternative amongst the alternative that faces no prohibitive barriers, emissions from a technology that represents economically attractable course of action, taking into</p>		OK

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV *</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
			account barriers to investment”.		
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Some clarifications as raised in section B.2.2 need to be addressed.	<del>CL-1</del> CAR-2	OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	See section B.2.2 The project developer is requested to justify the regulatory framework for coking plants and the different obligations for utilizing waste gas and heat.	CAR-2	OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	See section B.2.2.		OK
B.2.7. Have the major risks to the baseline been identified?	/1/	DR	Any risks associated with the chosen baseline needs to be addressed.	<del>CL-2</del>	OK
<b>B.3. Additionality Determination</b> <i>The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.</i>					
B.3.1. Is the project additionality assessed according to the methodology?	/1/	DR	Yes, the project applies tools of additionality (TOA), version 4 as per the methodology. <u>Step 1: Identification of alternatives:</u> All the plausible alternatives to the project activity have been identified as mentioned in section B.2.2 above. Only option (c), utilisation of the coal for captive power generation, does not meet the requirements as per the law and		OK



<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV</b> *	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
			<p>hence is eliminated.</p> <p><u>Step 2: Investment Analysis:</u> The project proponent has chosen benchmark analysis for the demonstration of the financial barriers to the project. The IRR for the project activity is stated to be 8.17% as opposed to the benchmark of 12.0% (sector specific benchmark for coking industries) considered for the project activity. The IRR shows an improvement to 16.52% with the CDM revenues.</p> <p>The PP has chosen to conduct a sensitivity analysis for the project with 5% and 10% variations (+ and -) using the following indicators: investment costs, operation and maintenance costs and returns from sale of electricity. The sensitivity analysis shows that even with about 10% variations in the above parameters, the IRR for the project remains below the benchmark of 12% and hence, project activity is not feasible.</p> <p>The calculation sheets for the IRR calculation and the sensitivity analysis need to be submitted.</p> <p>Also, the values considered for the IRR calculation for total investment cost, annual O&amp;M costs, electricity tariff need to be substantiated with data. In the case of the electricity price, the project developer is</p>	CL3	

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV</b> <b>*</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
			<p>requested to justify the price of the electricity displaced based on the historical electricity price paid by Qinyuan County Mingyuan Coal and Coke Co., Ltd in China and independent sources of price forecast.</p> <p><i>Step 3: Barrier analysis:</i> The project proponent has discussed barrier analysis using financial barriers, technological barriers and other barriers.</p> <p><i>Financial Barrier:</i> It is argued that owing to the Government's decision to clear up and regulate investments and production of coking industry, the project proponent faced barriers in obtaining finances for the project activity. Documentary evidences for difficulties faced in obtaining loans for the project activity along with the Government's decision for clear ups and regulating investments in the coking industry need to be provided. (e.g.: loan rejection letters, etc)</p> <p><i>Technology Barrier:</i> It is argued that the change in the type of coal used in the coking plant results in changes in the waste gas parameters such as pressure and temperature, which eventually affect the boiler operation.</p> <p><i>Other Barrier:</i> The project proponent faces additional barriers since they utilize clean type heat recovery coke ovens, which do not result in production of waste water, waste</p>	CL-4	

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV</b> <b>*</b>	<b>COMMENTS</b>	<b>Draft</b> <b>Concl.</b>	<b>Final</b> <b>Concl.</b>
			<p>residue or chemical products. These chemicals produced in the traditional coke ovens can be sold to acquire additional revenue. Also, it is argued that the traditional coking facilities are established technologies and that many companies refuse investing in the clean type due to higher risks and initial investment involved. It remains to be justified how this would be a barrier to the project activity since the project activity only involves utilization of the waste heat generated from the coking process, irrespective of the technology using which the waste heat is produced.</p> <p>It should be possible to reproduce the numbers in the IRR calculation, and the input data should be justified.</p> <p>The sensitivity analysis should be performed with variations until the benchmark is reached, not just +/- 10%.</p> <p><u>Step 4 Common practice analysis:</u> It is stated that the Shanxi Province is the largest producer of coke in China. The common practice in the region till now is stated to flaring of the gases. In cases where the coking facility is near a residential area, parts of the waste gas are utilized as civilian gas. It has been stated that the common practice in the region does not involve use of the waste</p>	<p><del>CL-5</del></p> <p>CL-17</p> <p>CL-19</p> <p>CL-20</p> <p>CL-21</p>	

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			gas for electricity generation. In view of this, the following information needs to be provided: How many coking facilities are present in the region or province? How many of them utilize the waste gas from the process for any purposes at all? How many among them use the same for electricity generation? The version of the additionality tool should be consistent throughout the PDD.	<del>CL-16</del>	
B.3.2. Are all assumptions stated in a transparent and conservative manner?	/1/	DR	Refer to section B.3.1		OK
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	Refer to section B.3.1		OK
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	/1/	DR	The start date of the project activity is the 1 March 2007. The project developer is requested to clarify the status of implementation of the project (contracted, construction started, etc). In case the project is already under development, it shall be justified that the incentive from the CDM was seriously considered in the decision to proceed with the project activity A timeline for the project should be provided.	<del>CL-14</del> <del>CL-15</del>	OK
<b>B.4. Calculation of GHG Emission Reductions – Project emissions</b>					

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV *</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
<i>It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	It is stated in the PDD that the project does not use any auxiliary fuels for the generation start ups, emergencies or additional heat gain before entering the waste heat recovery boiler. Hence, no project emissions have been included for emission reduction calculation.  It needs to be clarified as to what provisions have been made to meet the fuel requirements during emergencies and start ups.	CL-6	OK
B.4.2. Have conservative assumptions been used when calculating the project emissions?	/1/	DR	Same as above.		OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	/1/	DR	Same as above.		OK
<b>B.5. Calculation of GHG Emission Reductions – Baseline emissions</b>  <i>It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					

<b>CHECKLIST QUESTION</b> * MoV = Means of Verification, DR= Document Review, I= Interview	<b>Ref.</b>	<b>MoV *</b>	<b>COMMENTS</b>	<b>Draft Concl.</b>	<b>Final Concl.</b>
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	<p>The baseline emissions are calculated in line with the methodology, ACM0004 and ACM0002 (for emission factor calculation). The baseline emission factor is fixed <i>ex-ante</i>. The project has considered the North China power grid for the estimation of the emission factor. The emission factor is estimated as an average of the operating margin and the build margin. The operating margin is estimated as the simple operating margin of 1.1208 tCO<sub>2</sub>e/MWh and is fixed ex-ante during the entire crediting period.</p> <p>Because plant specific fuel consumption and electricity generation data is not public available in China, the project proponent adopts the deviation method as approved by the CDM EB as follows, which are deemed to applicable for this project.</p> <ul style="list-style-type: none"> <li>- Use of capacity additions for estimating the build margin emission factor for grid electricity</li> <li>- Use of weights estimated using installed capacity in place of annual electricity generation</li> <li>- Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of</li> </ul>	<b>CL-7</b>	OK

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			China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM). The BM thus has been calculated to be 0.9397 tCO <sub>2</sub> e/MWh. Hence, the emission factor for the North China power grid has been worked out to be 1.0303 tCO <sub>2</sub> e/MWh.		
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	The values considered in the emission factor calculation needs to be revised to use the latest IPCC 2006 values, for the oxidation factors.	<del>CL7</del>	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	Yes.		OK
<b>B.6. Calculation of GHG Emission Reductions – Leakage</b> <i>It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.6.1. Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	No leakage effects need to be addressed as per this methodology.		OK
B.6.2. Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	Not applicable		OK

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B.6.3. Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	Not applicable		OK
<b>B.7. Emission Reductions</b> <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i>					
B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	/1/	DR	The project activity is estimated to result in a total of 1 197 203 tCO <sub>2</sub> e emission reductions over the 7 year renewable crediting period.		OK
<b>B.8. Monitoring Methodology</b> <i>It is assessed whether the project applies an appropriate monitoring methodology.</i>					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	Yes, the monitoring methodology adopted for the project activity is in accordance with approved methodologies ACM0004 version 2. The monitoring plan has been documented in a transparent manner.		OK
B.8.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	Yes		OK
<b>B.9. Monitoring of Project Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete project emission</i>					



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<i>data over time.</i>					
B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/	DR	No auxiliary consumption of fuels is involved in the project activity and hence no parameter needs to be included in the monitoring plan.  However, it needs to be confirmed how the energy requirements are met during emergencies and start ups.	<del>CL</del> 6	OK
<b>B.10. Monitoring of Baseline Emissions</b> <i>It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.</i>					
B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	The monitoring plan provides for collection and archiving of most of the necessary data for estimation of GHG emissions within project boundary.  However, the net electricity delivered to the different facilities needs to form a part of the monitoring plan.	<del>CL</del> 8	OK
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/	DR	Yes.		OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/	DR	Yes, the measurement method has been clearly stated for each baseline parameter.		OK
B.10.4. Is the measurement <i>equipment</i> described and	/1/	DR	Yes.		OK

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deemed appropriate?					
B.10.5. Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR	Procedures for dealing with erroneous measurements are in place. However, the measurement accuracy for meter readings needs to be addressed.	<del>CL9</del>	OK
B.10.6. Is the measurement <i>interval</i> for baseline data identified and deemed appropriate?	/1/	DR	Yes.		OK
B.10.7. Is the registration, <i>monitoring</i> , <i>measurement</i> and <i>reporting</i> procedure defined?	/1/	DR	Yes, procedures for registration, monitoring, measurements and reporting have been defined.		OK
B.10.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR	Procedures for maintenance of monitoring equipments and installations need to be identified. Calibration of the various meters is carried out as per the regulations issued by the China Government.	<del>CL9</del>	OK
B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	Yes, procedures for handling of the day to day records have been addressed in the PDD.		OK
<b>B.11. Monitoring of Leakage</b> <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
B.11.1. Does the monitoring plan provide for the	/1/	DR	No leakage effects need to be addressed as		OK

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collection and archiving of all relevant data necessary for determining leakage?			per the methodology, ACM0004.		
B.11.2. Are the choices of project leakage indicators reasonable and conservative?	/1/	DR	Not applicable		OK
B.11.3. Is the measurement method clearly stated for each leakage value to be monitored and deemed appropriate?	/1/	DR	Not applicable		OK
<b>B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts</b> <i>It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	It needs to be clarified if the host country laws require for the monitoring of sustainable development indicators / environmental impacts for the project activity.	CL40	OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Same as above.		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	Same as above.		OK

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<b>B.13. Project Management Planning</b> <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
B.13.1. Is the authority and responsibility of overall project management clearly described?	/1/	DR	Yes, the authority and responsibility of the overall project management has been clearly defined.		OK
B.13.2. Are procedures identified for training of monitoring personnel?	/1/	DR	Procedures for identifying training needs of the monitoring personnel need to be defined.	<del>CL9</del>	OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	Procedures for emergency preparedness during situations that can lead to unintended emissions need to be defined.	<del>CL9</del>	OK
B.13.4. Are procedures identified for review of reported results/data?	/1/	DR	Procedures for review of the reported data need to be defined.	<del>CL9</del>	OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	Procedures for corrective actions in order to provide for more accurate future monitoring and reporting need to be clearly defined.	<del>CL9</del>	OK
<b>C. Duration of the Project/ Crediting Period</b> <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	/1/	DR	The project's starting date is 1 March 2007 with an operational lifetime of the project activity of 21 years. It needs to be confirmed if the start date is the	<del>CL11</del>	OK

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			commissioning date and proof for start date of the project activity need to be provided.		
C.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR	The project proponent has chosen a renewable crediting period of 7 years with the start date of the crediting period being 28 March 2008, or the date of registration, whichever is the latest.		OK
<b>D. Environmental Impacts</b> <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>					
D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	Yes, the project proponent has sufficiently described the environmental impacts of the project activity in the PDD.		OK
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/	DR	The EIA study has been conducted for the project activity in line with the host Party requirements. The EIA and the feasibility study report in addition to their letters of approval need to be submitted.	CL-12	OK
D.1.3. Will the project create any adverse environmental effects?	/1/	DR	The main environmental impact due to the project implementation is the noise generated and the waste water. The other environmental impacts include the waste gas from the process the SO <sub>2</sub> and the gypsum from the desulphurisation plant.		OK
D.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	Yes.		OK

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D.1.5. Have identified environmental impacts been addressed in the project design?	/1/	DR	The plant has implemented a desulphurisation unit (with 80% SO <sub>2</sub> reduction rate) and dust removal unit for removal of SO <sub>2</sub> and dust respectively before the gas is emitted into the atmosphere. Also, waste water generated is treated in the septic tank. The gypsum generated in the desulphurisation plant and the solid wastes generated are collected and transported outside the power plant to be treated. It needs to be confirmed how the gypsum and solid waste generated and finally disposed.	<del>CL-12</del>	OK
D.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR	Approval for the project activity from the Department of Environment may be submitted. The various consents for establishment and/or operation of the project from the pollution control agencies in China need to be submitted. Approvals for the use and operations of the boiler need to be reviewed. These approvals or licenses need to be submitted.	<del>CL-12</del>	OK
<b>E. Stakeholder Comments</b> <i>The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i>					
E.1.1. Have relevant stakeholders been consulted?	/1/	DR	The project proponent has identified relevant stakeholders to this project. The stakeholders	<del>CL-13</del>	OK

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			identified include government bodies and local population as below: Office of People's Government of Qinyuan County, Qinyuan County Environment Protection Bureau, Qinyuan Power Supply sub Company of Shanxin Province Power Company, Qinyuan County Development and Reform Bureau, Qinyuan County Economy and Trade Bureau, People's Government of Guodao Town Qinyuan County, the Commission of Guodao Village Guodao Town, The 2 <sup>nd</sup> School of Qianyuan County, The Qinyuan County Hospital. The villager's representative is from Guodao Town. Documentary evidence for the stakeholder consultation process conducted for the project activity needs to be provided. Please make sure the numbers regarding the stakeholder's consultation are consistent.	CL18	
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	Between 28 March 2007 and 5 April 2007, the project proponent sent out letters and questionnaires to all identified stakeholders to opine on the project activity. Copies of the letter sent out need to be provided.	CL13	OK
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out	/1/	DR	It needs to be confirmed during the follow up interviews, if a stakeholder consultation process is mandated by the laws of the host	CL13	OK

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in accordance with such regulations/laws?			Party, and if applicable, has it been conducted as per the requirements of the law.		
E.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	Yes, the comments received from the stakeholders have been sufficiently addressed in the PDD.		OK
E.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	No negative or adverse comments were received for the project activity.		OK



**Table 3: Resolution of Corrective Action and Clarification Requests**

<b>Draft report clarifications and corrective action requests by validation team</b>	<b>Ref. to checklist question in table 2</b>	<b>Summary of project owner response</b>	<b>Validation team conclusion</b>
<b>CAR 1</b> The letter of authorisation and the letter of approval for the project and its participants from the DNA of China and United Kingdom need to be submitted.	A.2.2 A.2.3 A.4.1	Please find the attached LOA from China and United Kingdom.	The LoA for China and United Kingdom have been submitted.  <b>This CAR is closed.</b>
<b>CAR 2</b> No current uses of the waste heat recovery and utilisation have been identified and hence, this option is eliminated from being the plausible baseline scenario. However, the same is contradicted while discussing additionality by stating that in cases where there is residential demand for gas, part of the waste gas is utilised as civilian gas. The same needs to be clarified.	B.2.2	The PDD has been revised accordingly for clarification. Refer to section B.4 and B.5.  Firstly it is clarified that there is no residential demand for gas in the surrounding area of project. Secondly, it is technically infeasible for waste heat collection until the installation of the project's recovery system (Section A.4.3 has been revised to clarify this matter).	OK. DNV was able to confirm that the regulatory requirements for utilization of the waste gas are applicable to the coking units using the traditional coking ovens, where the by-product recovery is a possibility. i.e.: for utilization of waste "gas". However, for the project activity, this requirement does not apply since the project only involves utilization of waste "heat" and not the waste gas. DNV was also able to confirm this with the local representative of the Development and Reform commission, Shanxi. <b>This CAR is closed.</b>
<b>CL 1</b> <u>Baseline Determination:</u> Construction of a captive power plant of the similar capacity as the project using diesel oil	B.2.2	It is clarified that construction of a captive power plant using diesel oil or natural gas is ruled out due to legal	DNV was able to confirm against the interim rules on Installation and Management of small-scale fossil fired generator, that installation of new

<sup>1</sup> <http://www.chinavalue.net/wiki/showcontent.aspx?titleid=61180>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>or natural gas has been ruled out from being the baseline scenario due to high operation costs and poor economic benefits. The same needs to be justified with data.</p>		<p>reason.</p> <p>According to <i>Interim Rules on the Installation and Management of Small-scale Fuel-fired Generators</i> (issued in August 1997)<sup>1</sup>, the fossil fuel-fired power units with less than 100MW is strictly regulated for installation. So building a coal-fired, or diesel oil-fired, or natural gas-fired power plant of the same capacity as the proposed project is prohibited by the national regulation.</p> <p>It is revised in section B.4 of the PDD.</p>	<p>thermal power plants with capacity less than 100 MW is strictly prohibited in China.</p> <p><b>OK. This CL is closed.</b></p>
<p><b>CL 2</b></p> <p>1) Any risks associated with the chosen baseline needs to be addressed</p> <p>2) Also, the following points need to be addressed:</p> <ul style="list-style-type: none"> <li>The PP needs to clearly explain in the PDD how the client was meeting his energy needs (for the entire coking facility) before the implementation of the project activity. Was it import from grid or captive power plant?</li> <li>Also, if they had a captive power plant already, what was the fuel used in the captive plan</li> </ul>	<p>B.2.1</p> <p>B.2.7</p>	<p>1) There are no regulatory requirements for the clean-type <i>non-chemical-recovery</i> coking facilities to make use of the waste heat, unlike the traditional <i>by-product</i> coking plants which are required to utilize the waste gas to maximize resource utilization and economic performance.</p> <p>2) The coking facility has been importing from the North China Power Grid. It is clarified there is no captive power plant in the baseline scenario;</p> <p>Section B.2 of the PDD is revised to clarify the above.</p>	<p>1) OK. The coking units imported power from the grid. The same was confirmed by DNV against the invoices /7/ from the grid company.</p> <p>2) OK. It has been explained that no external heat source is required in the process.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>3) The PDD states there will not be fuel switch after the project implementation. The project developer is requested to demonstrate that waste heat was not being utilized before the project activity. This needs to be based on an analysis of the energy demand in the plant before the project implementation and a demonstration of how that energy demand was being supplied (grid invoices, fuel invoices, etc).</p>		<p>3) The grid electricity expense record is provided to demonstrate that the energy demand of coking plant is met from grid electricity. Waste heat was emitted to atmosphere directly before the project. After the project is implemented waste heat will be captured and utilized for power generation. Moreover, the waste heat collection was technically infeasible until the installation of the project. Further clarification on 'no fuel switch' has been elaborated in Section A.4.3 of PDD.</p>	<p>3) OK. The plant utilizes the electricity from the grid for all operations in the plant since its start of operation in 2005.</p> <p><b>OK. This CL is closed.</b></p>
<p><b>CL 3</b></p> <p>1) The calculation sheets for the IRR calculation and the sensitivity analysis need to be submitted.</p> <p>2) Also, the values considered for the IRR calculation for total investment cost, annual O&amp;M costs, electricity tariff need to be substantiated with data.</p> <p>3) In cases where the source is not the approved Feasibility Study Report, the deviation from the approved values needs to be explained and substantiated.</p>	B.3.1	<p>1) The IRR spreadsheet has been submitted for review.</p> <p>2) The values are quoted from the official feasibility study report (FSR). The FSR has been prepared by Shanxi Guanghai Electric Power Survey Design Institute. The relevant approval has been obtained from the Shanxi Economic and Trade Committee. Please find the FSR in the attachment.</p> <p>3) All the values are quoted from the</p>	<p>1) OK. The IRR calculation has been reviewed by DNV. OK when the points as addressed in "CL 3 continued" are substantiated with documentary evidence.</p> <p>2) OK. The specific data source and the documentary evidence for the assumptions used for the IRR calculations were provided to DNV.</p> <p>3) OK. The FSR has been reviewed by DNV and source of data confirmed.</p> <p><b>OK. This CL is closed.</b></p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		official feasibility study report (FSR).	
<p><b>CL 4</b>  <u>Additionality:</u> Documentary evidences for difficulties faced in obtaining loans for the project activity along with the Government's decision for clear ups and regulating investments in the coking industry need to be provided. (e.g.: loan rejection letters, etc). Also, it is stated that the project proponent is one of the pathfinders in adopting clean-type and heat recovery coke ovens for electricity generation. The same needs to be elaborated</p>	B.3.1	<p>1) The proposed project has adopted the investment analysis in line with the tool to demonstrate the additionality. It is sufficient to demonstrate the additionality of the project. As per the tool's instruction, the barrier approach can therefore be optional. To avoid confusion, the discussions on barriers have been removed from the PDD.</p> <p>2) Please refer to section B.5 in the PDD.</p>	<p>The financial barriers have been excluded from the additionality discussion.  <b>OK. This CL is closed.</b></p>
<p><b>CL 5</b>  <i>Other barriers:</i> It remains to be justified how this use of clean type heat recovery ovens as opposed to traditional coke ovens would be a barrier to the project activity since the project activity only involves utilization of the waste heat generated from the coking process, irrespective of the technology through which the waste heat is produced</p> <p>Also, it has been stated that the common practice in the region does not involve use of the waste gas for electricity generation. In view of this, the following information needs to be provided: How many coking facilities are present in the region or province? How</p>	B.3.1	<ul style="list-style-type: none"> <li>As discussed in the response to CL 4, investment analysis is used. The barrier approach is removed from the PDD.</li> <li>The discussion of "common practice" has been revised in the PDD to clear confusion.</li> </ul> <p>Firstly the waste heat recovery (WHR) projects on the traditional coke ovens are excluded from the list of similar activities, due to technical and legal difference. The summary is as below:</p> <ul style="list-style-type: none"> <li>WHR on traditional coke ovens</li> </ul>	<ul style="list-style-type: none"> <li>OK. The technological barriers discussed for additionality have been excluded from the PDD.</li> <li>It is discussed in the PDD that there are 717 coking units in Shanxi province. Currently only 35 of them, which use clean-technology, have been considered for the common practice analysis. The consideration of only the clean-technology coking units has been justified and accepted by DNV due to the fact that the two technologies are governed by different regulatory requirements. It</li> </ul>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>many of them utilize the waste gas from the process for any purposes at all? How many among them use the same for electricity generation</p>		<p>has regulatory obligation. Gas and steam turbines are required for such projects.</p> <ul style="list-style-type: none"> <li>- WHR on clean-type coke ovens do not have regulatory obligation since the only by-product is non-combustible waste heat. Heat recovery boilers and steam turbines are required for this project type.</li> </ul> <p>Secondly given the exclusion of the waste heat recovery of the traditional coke ovens, only 35 coking facilities (using clean-type ovens) are identified with potential for waste heat recovery. (Source: the Annex 2 table of the <i>Shanxi Coking Installations Category of the Provincial Governmental Document [2005] no.13</i>)</p>	<p>is mandated by the law in Shanxi province that all coking units utilize the waste gas generated in the unit. The coking units using clean type technology however, do not utilize the waste gas but only the waste heat and there are no expectations for the waste heat utilization in the region. Also, technically the two types of project technologies apply different types of boilers.</p> <p>DNV was also able to confirm against a clarification letter from the Shanxi Province 21 Agenda Sustainable Development Office (under the Provincial Development and Reform Committee) /8/ the list of projects utilizing the clean type technology. All the projects currently implemented or in the pipeline are depending on CDM revenues.</p> <p><b>OK. This CL is closed.</b></p>
<p><b>CL 6</b> It is stated in the PDD that the project does not use any auxiliary fuels for the generation start ups, emergencies or additional heat gain</p>	<p>B.4.1 B.9.1</p>	<p>It has been confirmed there are no auxiliary fuels in the project boundary. The waste heat is continuously supplied to boiler to produce the steam by heat</p>	<p><b>OK. This CL is closed.</b></p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
before entering the waste heat recovery boiler. It needs to be clarified as to what provisions have been made to meet the fuel requirements during emergencies and start ups		exchanging, and then power the steam turbines and generators. It does not need other fuels for start up.	
<b>CL 7</b> 1. The values considered in the emission factor calculation needs to be revised to use the latest IPCC 2006 values, for the oxidation factors. 2. The data vintage for the calculation of the OM and BM are the China Electric Power Yearbook 2003- 2005 and the 2002-2005. At the time of the PDD submission for validation most recent data for year 2005 was available. The project developer is requested to modify the calculations accordingly.	B.5.1 B.5.2	The oxidation factors have been revised according to the IPCC 2006 values in the PDD.  Most recent published data has been used for the grid emission coefficient calculation. Please refer to Annex 3 of the revised PDD.	1. The oxidation factors have been revised to be in line with the latest IPCC 2006 guidelines. 2. OK. The PDD has now been revised to include data from China Electric Power yearbook 2004-2006 and China Energy Statistical Yearbook 2004-2006 for the emission factor estimation.  <b>OK. This CL is closed.</b>
<b>CL 8</b> The net electricity exported to the grid needs to form a part of the monitoring plan.	B.10.1	The net electricity exported is revised to be included in the monitoring plan. Refer to section B.7.1 in the PDD. The values of $EG_{AUX}$ and $EG_{sales,i}$ have been filled up.	OK. The section B.7.1 of the PDD has been revised to include $EG_{sales,i}$ . <b>OK. This CL is closed.</b>
<b>CL 9</b> Procedures for the following need to be identified: 1. Procedures for maintenance of monitoring equipments and installations.	B.10.5 B.10.8 B.13.3 B.13.5	The detailed monitoring plan and procedures will be ready prior to the start of crediting period. It is stated in PDD in section B.7.	The monitoring plan in the PDD must be supplemented with the updated procedures before the monitoring period starts.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>2. The measurement accuracy for meter readings needs to be addressed.</p> <p>3. Provisions for identifying and meeting training and maintenance requirements need to be established</p> <p>4. Procedures for emergency preparedness during situations that can lead to unintended emissions need to be defined</p> <p>Procedures for review of the reported data and corrective actions need to be clearly defined.</p>			<b>OK. This CL is closed.</b>
<p><b>CL 10</b></p> <p>It needs to be clarified if the host country laws require for the monitoring of sustainable development indicators/environmental impacts for the project activity.</p>	B.12.1	<p>There is no requirement on monitoring of sustainable development indicators or environmental impacts for the project activity. The project will be implemented strictly comply with the State regulations.</p>	<b>OK. This CL is closed.</b>
<p><b>CL 11</b></p> <p>It needs to be confirmed if the start date is the commissioning date and proof for start date of the project activity need to be provided.</p>	C.1.1	<p>The construction of the project started on 01/03/2007. The construction start report is provided as evidence.</p> <p>CDM has been seriously considered before the start of the project. It has been included in the FSR.</p>	<p>OK. The choice of the start date from the construction start report has been found acceptable to DNV.</p> <p><b>OK. This CL is closed.</b></p>
<p><b>CL 12</b></p> <p>1) The EIA and the feasibility study report in</p>	D.1.2 D.1.5	<p>1. Evidence is submitted.</p> <p>2. Minimum amount of the wastes are</p>	<p>1. The FSR and the EIA have been submitted to DNV.</p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
<p>addition to their letters of approval need to be submitted.</p> <p>2) Also, It needs to be confirmed how the gypsum and solid waste generated and finally disposed</p> <p>3) Additionally, the approval for the project activity from the Department of Environment may be submitted. The various consents for establishment and/or operation of the project from the pollution control agencies in China need to be submitted. Approvals for the use and operations of the boiler need to be submitted</p>		<p>expected from the process. Measures have been studied in the EIA and will be implemented for the waste treatment. The EIA approval has been granted by the Environmental Protection Bureau (EPB) of Shanxi Province.</p> <p>3. The EIA report and the approval from the EPB have been submitted. The EIA approval has been recognized by the Chinese DNA at the National Development and Reform Committee. The EIA approval is a part of the required documents submitted for the Chinese LOA application.</p>	<p>2. OK.</p> <p>3. The EIA has been submitted to DNV.</p> <p><b>OK. This CL is closed</b></p>
<p><b>CL 13</b></p> <p>Documentary evidence for the stakeholder consultation process conducted for the project activity needs to be provided. e.g.: Copies of the letter sent out need to be provided.</p> <p>Also, it needs to be confirmed, if a stakeholder consultation process is mandated by the laws of the host Party, and if applicable, has it been conducted as per the requirements of the law.</p>	<p>E.1.2</p> <p>E.1.3</p>	<p>The documents of stakeholder consultation have been submitted.</p> <p>The stakeholder consultation is a part of the process of Environmental Impact Assessment and need to be in line with the procedures specified in the Chinese environmental regulations. Otherwise it would not have been approved by the EPB.</p> <p>Stakeholder consultation for CDM project activity is not required by the</p>	<p>OK. A stakeholder consultation as required for EIA, has been carried out by the project proponent.</p> <p><b>OK. This CL is closed.</b></p>



Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		Chinese authority.	
<b>CL 14</b> The coke oven should be included in the project boundary.		The coke oven is included in the project boundary in Section B.3.	OK. The project boundary has been updated to include the coke oven. <b>OK. This CL is closed.</b>
<b>CL 15</b> Please provide a timeline on the following events: <ol style="list-style-type: none"> <li>1. Construction start date of coke plant</li> <li>2. Operation start date of coke plant</li> <li>3. (Planned) Installation start date of the WHR system</li> </ol> (Planned) Operation start date of the WHR system		The Mingyuan coking plant has been operational since 2005. The construction of the coking facility started one year prior to the operation.  The construction of the project started in March 2007. The operation of the WHR system was planned to start in October 2007.	<b>OK. This CL is closed.</b>
<b>CL 16</b> The version of the additionality tool used should be consistent throughout the PDD.		It is confirmed that version 04 of the additionality tool is used in the PDD. The inconsistency has been corrected.	OK. The PDD is corrected. <b>OK. This CL is closed.</b>
<b>CL 17</b> Common practise analysis. It has been observed by DNV that the technology provider claims that the all WHR projects using the same technology either produce electricity or recover the waste heat ( <a href="http://www.ssit.com.cn/lista.asp?sid=1286">http://www.ssit.com.cn/lista.asp?sid=1286</a> ). It should be clarified what recovery the other projects they apply and why that scenario (what would reduce the investment to be		The common practice analysis is conducted in accordance with the additionality tool. According to the additionality tool (version 04), “projects are considered similar if they are in the same country/region and/or reply on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment	OK. A clarification letter from the Shanxi Province 21 Agenda Sustainable Development Office has been reviewed, along with interview with a representative of Shanxi Development and Reform Committee. The information obtained demonstrated that the project activity is not common practice. <b>OK. This CL is closed.</b>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
considered for the project scenario) is not the baseline.		<p>climate, access to technology, access to financing, etc.”</p> <p>Similar projects are identified in Shanxi Province are taken into consideration, given the similarity of local regulations, access to resources/technology and income level, etc. The similar projects have been identified based on official source (A clarification letter from the Shanxi Province 21 Agenda Sustainable Development Office has been submitted for review).</p> <p>10 projects were identified with the said information accessible to the project participant at the time of PDD development. In addition to these 10 projects, the webpage indicates another 6 coke plants with electricity generation capacity in Shanxi.</p> <p>Given DNV’s concern, the Shanxi Development and Reform Committee (DRC) has been consulted to clarify the list of existing projects in Shanxi. It has been confirmed by the representative that these 6 coking plants with clean-type ovens are at the early planning</p>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		stage to start installing waste heat recovery with CDM development (without official submission to the local government). The contact details of the Shanxi DRC representative is provided as follows for reference: Ms Pan Jun Xiang, telephone/fax: +86 351 319 4604.	
<b>CL 18</b> Please make sure that the numbers stated in the description of the stake holder's comments (E.1) are consistent.		The inconsistency has been corrected in the PDD.	The PDD has been corrected. <b>OK. This CL is closed.</b>
<b>CL 19</b> The details provided in the IRR spreadsheet does not allow to reproduce the calculations (please refer to the additionality tool and requests from the EB). The following inputs are requested: - depreciation method applied to be able to confirm the taxes considered.		The design institute has been consulted to clarify the cashflow. In the FSR depreciation was not included in the cashflow model.  As per DNV's request, the model is revised to include depreciation in the calculation of taxable income. This results in lower tax charges and these lower charges improve the net cashflow for the project.  This adjustment has resulted in an increase in the project IRR to 8.17%  Depreciation is over a 20 year period on	OK. Revised financial analysis of 19 February 2008 has been reviewed by DNV and it has been confirmed that the depreciation was included in tax calculations. In addition DNV is able to reproduce the financial analysis with same results.  <b>OK. This CL is closed.</b>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		a straight line basis. Chinese regulations allow for depreciation over a minimum of 10 years with common practice in the energy sector ranging from 12 to 20 years.	
<p><b>CL 20</b></p> <p>The following inputs used for the IRR calculation are requested to be justified:</p> <ul style="list-style-type: none"> <li>- investment required.</li> <li>- operation and maintenance costs.</li> <li>- taxes considered.</li> <li>- timeframe of the investment analysis of 21 years.</li> <li>- electricity price at the time of the decision making used as input for the FSR.</li> </ul>		<p>Investment-</p> <p>The total investment costs include the equipment, installation and construction costs. The breakdown is provided in the FSR, which has been prepared Shanxi Renhe Electric Power Engineering Institute in line with the governing regulations and the according procedural manuals. Shanxi Renhe Electric Power Engineering Institute is an accredited agency for feasibility studies. The estimation is made based on the following reference:</p> <ul style="list-style-type: none"> <li>• <i>National Machinery and Electric Devices Price Index (2001);</i></li> <li>• <i>Non-Standardised Equipment Production Costing Guidance and Shanxi Engineering Development Standard Pricing Index;</i> and</li> <li>• <i>Shanxi Construction and Installation Costing Index (2003).</i></li> </ul>	<p>OK. DNV compared parameters used in the investment analysis with parameters that have been used for other similar project activities. This comparative analysis was based on investment cost per MW of electricity generated, ratio between the O&amp;M cost and the investment cost, electricity price per kWh, and the load factor. The results were found within a reasonable range of the previously accessed values for other similar projects.</p> <p><b>OK. This CL is closed.</b></p>

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>O&amp;M cost-</p> <p>The O&amp;M cost is estimated by the accredited design institute, which prepared the FSR in line with the governing regulations and procedural manuals. Estimates are made in accordance with the requirements of the <i>Electric Power Project Development Financial Analysis Detailed Rules and Regulations</i> and the <i>Economic Assessment Method and Parameters for Project Construction</i> (2006).</p> <p>Tax-</p> <p>Source: the <i>Economic Assessment Method and Parameters for Project Construction</i> (2006) and the State's Corporate Income Tax Regulation (<a href="http://www.tax.sx.cn/zstax/main/News.asp?News_ID=349&amp;ClassParent=9">http://www.tax.sx.cn/zstax/main/News.asp?News_ID=349&amp;ClassParent=9</a>)</p> <p>VAT: 17%</p> <p>For this specific project, the project revenue is estimated based on net tariff price, exclusive of VAT. Therefore it is not included as a part of the taxation in</p>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>the outflow.</p> <p>Urban maintenance: 5% Education added: 3% These taxes are both based on the expected VAT. For simplification, these two tax items are presented as one taxation item in the outflow.</p> <p>Income tax: 33% Income tax is deducted from the net revenue, i.e. the revenue less the costs including depreciation and other taxes.</p> <p>Timeframe- The main WHR equipments' average operational life is expected to be 20 to 25 years.</p> <p>However the lifetime of the coke ovens (i.e. the source of the waste heat) is more difficult to estimate. The ovens are necessary to produce the waste heat but must be kept operating throughout their life as the cooling of them causes significant contraction and damage. Therefore 20 years is used to take into</p>	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		<p>account the risk associated with the coking plant while also reflecting the lifetime of the WHR equipment.</p> <p>Electricity price- Reference: Notice on Adjustment on Electricity Price in Shanxi issued by Shanxi Provincial Pricing Bureau 2004.</p>	
<p><b>CL 21</b> Sensitive analysis. The PDD includes a sensitive analysis for a variation of +/-10% of the total investment, O&amp;M costs and income from electricity place. The project developer is requested to analyze the variation needed in those variables for the IRR to reach the benchmark and how unlikely is that level to be reached. The electricity output needs to be included as a variable in the analysis.</p>		<p>The variation in the total investment, O&amp;M costs and electricity sales revenue for the IRR to reach the benchmark is added in the PDD.</p> <p>The electricity output is discussed as one of the factors affecting the electricity sales revenue.</p>	<p>OK. The revised PDD includes variations in the parameters and assessments of the likelihood whether the IRR will reach the benchmark. <b>OK. This CL is closed.</b></p>

## **APPENDIX B**

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### **CERTIFICATES OF COMPETENCE**





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## CERTIFICATE OF COMPETENCE

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***Miguel Rescalvo***

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<b>GHG Auditor:</b>	Yes		
<b>CDM Validator:</b>	Yes	<b>JI Validator:</b>	--
<b>CDM Verifier:</b>	--	<b>JI Verifier:</b>	--
<b>Industry Sector Expert for Sectoral Scope(s):</b>	--		
<b>Technical Reviewer for (group of) methodologies:</b>			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes		
ACM0002, AMS-IA-D, AM0019, AM0026, AM0029, AM0045	Yes		
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes		

Høvik, 3 July 2007

**Einar Telnes**  
*Director, International Climate Change Services*

**Michael Lehmann**  
*Technical Director*



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## CERTIFICATE OF COMPETENCE

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***Mathsy Kutty***

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJi-i1

<b><i>GHG Auditor:</i></b>	Yes		
<b><i>CDM Validator:</i></b>	Yes	<b><i>JI Validator:</i></b>	--
<b><i>CDM Verifier:</i></b>	--	<b><i>JI Verifier:</i></b>	--
<b><i>Industry Sector Expert for Sectoral Scope(s):</i></b>	--		

Høvik, 26 September 2007

Einar Telnes  
*Director, International Climate Change Services*

Michael Lehmann  
*Technical Director*



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## CERTIFICATE OF COMPETENCE

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***Hendrik Brinks***

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1)

<b>GHG Auditor:</b>	Yes		
<b>CDM Validator:</b>	Yes	<b>JI Validator:</b>	--
<b>CDM Verifier:</b>	--	<b>JI Verifier:</b>	--
<b>Industry Sector Expert for Sectoral Scope(s):</b>	Sectoral scope 1, 2, 3 & 12		
<b>Technical Reviewer for (group of) methodologies:</b>			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0013, AM0022, AM0025, AM00379, AMS-III.H, AMS- III.I	Yes
ACM002, AMS-I.A-D, AM0019, AM0026, AM0029, AM0045	Yes	ACM0006, AM0007, AM0015, AM0036, AM0042	Yes
ACM0004, ACM0012	Yes		

Høvik, 30 October 2007

*Michael Lehmann*

Michael Lehmann

Technical Director, International Climate Change Services



# CERTIFICATE OF COMPETENCE

***Michael Lehmann***

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJi-i1)

<b>GHG Auditor:</b>	Yes		
<b>CDM Validator:</b>	Yes	<b>JI Validator:</b>	Yes
<b>CDM Verifier:</b>	Yes	<b>JI Verifier:</b>	Yes
<b>Industry Sector Expert for Sectoral Scope(s):</b>	Sectoral scope 1, 2, 3		
<b>Technical Reviewer for (group of) methodologies:</b>			
ACM0001, AM0002, AM0003, AM0010, AM0011, AM0012, AMS-III.G	Yes	AM0027	Yes
ACM002, AMS-IA-D, AM0019, AM0026, AM0029, AM0045	Yes	AM0030	Yes
ACM003, ACM0005, AM0033, AM0040	Yes	AM0031	Yes
ACM0004, ACM0012	Yes	AM0032	Yes
ACM0006, AM0007, AM0015, AM0036, AM0042	Yes	AM0035	Yes
ACM0007	Yes	AM0038	Yes
ACM0008	Yes	AM0041	Yes
ACM0009, AM0008, AMS-III.B	Yes	AM0034	Yes
AM0006, AM0016, AMS-III.D, ACM0010	Yes	AM0043	
AM0009, AM0037	Yes	AM0046	
AM0013, AM0022, AM0025, AM0039, AMS-III.H, AMS-III.I	Yes	AM0047	
AM0014	Yes	AMS-II.A-F, AM0044	Yes
AM0017	Yes	AMS-III.A	Yes
AM0018	Yes	AMS-III.E, AMS-III.F	Yes
AM0020	Yes		
AM0021, AM0028, AM0034, AM0051	Yes		
AM0023	Yes		
AM0024	Yes		

Høvik, 5 February 2007

**Einar Telnes**  
*Director, International Climate Change Services*

**Michael Lehmann**  
*Technical Director*



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## CERTIFICATE OF COMPETENCE

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***Peter Molin***

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<b><i>GHG Auditor:</i></b>	Yes		
<b><i>CDM Validator:</i></b>	--	<b><i>JI Validator:</i></b>	--
<b><i>CDM Verifier:</i></b>	--	<b><i>JI Verifier:</i></b>	--
<b><i>Industry Sector Expert for Sectoral Scope(s):</i></b>	--		

Høvik, 30 October 2007

*Michael Lehmann*

Michael Lehmann

*Technical Director, International Climate Change Services*



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## CERTIFICATE OF COMPETENCE

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***Mindy (Ming) Yue***

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-CDMJ1-i1

<b><i>GHG Auditor:</i></b>	Yes		
<b><i>CDM Validator:</i></b>	Yes	<b><i>JI Validator:</i></b>	--
<b><i>CDM Verifier:</i></b>	--	<b><i>JI Verifier:</i></b>	--
<b><i>Industry Sector Expert for Sectoral Scope(s):</i></b>	--		

Høvik, 5 January 2007

**Einar Telnes**  
*Director, International Climate Change Services*

**Michael Lehmann**  
*Technical Director*