VALIDATION REPORT

SDIC XINDENG ZHENGZHOU CEMENT WASTE HEAT RECOVERY PROJECT IN CHINA

REPORT NO. 2009-9266

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VALIDATION REPORT

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Client: ORBEO		Client ref.: Dorothy Denis

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Summary:

Project Name: SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Project
Country: China
Methodology: AM0024
Version: 2.1
GHG reducing Measure/Technology: utilization of waste heat for power generation.
ER estimate: 51 299 tCO_2e per annum (average)
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 project activity "SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Project" in China as described in the PDD, version 06 of 22 March 2011 meets all relevant UNFCCC CDM requirements, host Party criteria and correctly applies the baseline and monitoring methodology AM0024, version 2.1. Hence DNV requests the registration of the project as a CDM project activity

Report No.: 2009-9266	Subject Group: Environment
Report title: SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Project in China	
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Abbreviations

AQC	Air Quenching Chamber
BM	Build Margin
CAR	Corrective Action Request
CCPG	Central China Power Grid
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CH_4	Methane
CL	Clarification request
CM	Combined Margin
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DCS	Distribution Control System
DNV	Det Norske Veritas
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Baseline Emissions
ER	Emission Reductions
ERPA	Emission Reduction Purchase Agreement
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
LoA	Letter of approval
MP	Monitoring Plan
MW	Mega Watt
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
NCPG	Northwest China Power Grid
NCV	Net Calorific Value
NDRC	National Development and Reform Committee
NGO	Non-governmental Organization
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
PPA	Power Purchase Agreement
PE	Project Emissions
SP	Suspension Preheater
tCO_2e	Tonnes of CO_2 equivalents
UNFCCC	United Nations Framework Convention on Climate Change
WHR	Waste Heat Recovery

1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Changes Services AS (DNV) has performed a validation of the project activity "SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Project" in 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 France. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants SDIC Xindeng Zhengzhou Cement Co., Ltd. and ORBEO. The DNA from China confirmed that the project assists in achieving sustainable development. The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards China.

The project correctly applies the baseline and monitoring methodology AM0024, version 2.1 baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants.

The purpose of the proposed project activity is to produce electricity from the waste heat generated by a 4 500 tons/day new dry process cement clinker production line at the SDIC Xindeng Zhenghou Cement Co. Ltd of China, thereby resulting in reductions of CO_2 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 51 299 tCO_2e per year over the selected 10 year fixed 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.

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV's opinion that the project participants will be able to implement the monitoring plan.

In summary, it is DNV's opinion that the project activity "SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Project" in China, as described in the PDD, version 06 dated 22 March 2011, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AM0024, version 2.1. Hence, DNV requests the registration of the project as a CDM project activity.

Oslo, 11 April 2011

K.V.Raman
CDM Validator
DNV, India

Oslo, 26 April 2011

Trine Kopperud
Head of Approval Centre & Nordic
DNV Climate Change Services AS

2 INTRODUCTION

ORBEO has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the "SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Project" in 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 AM0024. The validation was based on the recommendations in the Validation and Verification Manual /48/

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.

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 tables list the documentation that was reviewed during the validation.

3.1.1 Documentation provided by the project participants

/1/ Shanghai Chuanji Investement Management Co. Ltd: *CDM-PDD for project activity "SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Project" in China*, Version 01 dated 23 September 2009 and latest version 06 dated 22 March 2011.

/2/ Tianjin cement industry design & research institute Co. Ltd: *Cement Plant Feasibility Study Report*, of November 2005.

/3/ Henan DRC: *Cement Plant - Feasibility Study Report approval letter*, of 24 January 2006.

/4/ SDIC Xindeng Zhengzhou Cement Co. Ltd: *WHR equipment management system manual*, of September 2009.

/5/ China Electricity Power Press: *Electricity power safe working regulations for State grid company (electricity transforming part)*, Version 2 of September 1982; *Electric utility safe working regulations (thermal and mechanism part)*, of July 2009

/6/ China Investment and Consulting Co. Ltd: WHR *Feasibility Study Report* of October 2008

/7/ Defeng City DRC (Development and Reform Committee): WHR *Feasibility Study Report approval letter*, of 27 November 2008.

/8/ Zhongxin Heavy Machinery Co. Ltd: *Analysis of the utilization of pure low-temperature heat energy produced by large dry-process cement production lines*, of 30 May 2005.

/9/ Luoyang Zhongzhong Whole set Engineering Institute Co. Ltd: *Lay out figure of cement production line and WHR system*, of December 2006.

/10/ SDIC Xindeng Zhengzhou Cement Co. Ltd: *IRR calculation spreadsheet "IRR-xindeng2009-10-09.xls"*, of 9 October 2009.

/11/ Luoyang Zhongzhong Whole set Engineering Institute Co. Ltd: *WHR system flow chart*, of August 2008.

/12/ China Cement Industry Association: *Statistic data of China Cement Industry Association*, of 26 February 2008.

/13/ SDIC Xindeng Zhenghou Cement Co. Ltd , *Daily reports of electricity consumption in cement plant (June 2008 – May 2010)*

/14/ General Office of the State Council: *Decree No. 2002-6 Notice on strictly prohibiting the installation of fuel-fired generators with the capacity of 135 MW or below.*

/15/ Henan agriculture University scenery and garden planning institute: *Environmental Impact Assessment Report*, of March 2008.

/16/ Zhengzhou Environment Protection Bureau: *Environmental Impact Assessment approval letter*, of 18 April 2008.

/17/ Zhongxin Heavy Industry Machinery Co. Ltd and SDIC Xindeng Zhengzhou Cement Co. Ltd: *Turnkey contract (including construction, equipment and technology service),* of 22 December 2008.

/18/ National Development Reform Committee: *NDRC notification for the CDM project development*, of 12 May 2009.

/19/ SDIC Xindeng Zhengzhou Cement Co. Ltd: *EB notification for the CDM project development*, of the 11 September 2009

/20/ NDRC Ministry of Construction: *Project Economic Evaluation Method*, August 2006.

/21/ Dengfeng City Electricity (Group) Co. Ltd: *Cement plant invoices electricity purchase,* September – November 2008-2009.

/22/ Zhengzhou Xindeng Enterprise Group Co. Ltd and SDIC Xindeng Zhengzhou Cement Co. Ltd: *Short-term loan agreement*, of 10 December 2008.

/23/ SDIC Xindeng Zhengzhou Cement Co. Ltd: *Emission reduction calculation spreadsheet* of 22 March 2011.

/24/ China NDRC: *Interim Provisions for the Administration of Power Selling Prices*, of 28 March 2005.

/25/ China Ministry labour and social security: *The official statistic on working staff salary,* from 2005 to 2007.

/26/ Common practice analysis: China Cement Association, Domestic cement production Statistics , 26 February 2008, *http://www.cnrmc.com/news/list.asp?id=38768*

/27/ SDIC Xindeng Zhengzhou Cement Co. Ltd: *Cement plant monthly production data* for 2008 and 2009.

/28/ National Energy Administration, Investment and Technological barriers in biomass plants, 23 November 2007

website: http://www.sdpc.gov.cn/zjgx/t20071123_174054.htm

/29/ Luoyang Mine Mechanical Engineering Institute Co. Ltd. *Construction permission start date*, of 11 March 2009.

/30/ 55 questionnaires from the stakeholders, from September 2007 to November 2007.

/31/ Changjiang HuaSheng Tianya Cement Co., Ltd: Specialist Consulting Summary with the expert from Changjiang HuaSheng Tianya Cement Co., Ltd, of 14 March 2007.

/32/ Building Material Industrial Association of Henan Province: *Consulting Building Material Industrial Association of Henan Province for how to overcome the barriers in the construction of WHR power station by CDM*, of May 2007.

/33/ Building Material Industrial Association of Henan Province: *The seminar held by Building Material Industrial Association of Henan Province for the information of CDM*, of 26-28 June 2007.

/34/ Board Committee of Zhengzhou Xindeng Enterprise Group Co., Ltd.: *Board decision report*, of 8 September 2007.

/35/ Zhengzhou Xindeng Enterprise Group Co., Ltd, Shanghai Chuanji Investment Management Co., Ltd: *CDM Development Agreement signed between Zhengzhou Xindeng Enterprise Group Co., Ltd, Shanghai Chuanji Investment Management Co., Ltd*, of 18 September 2007.

/36/ Zhengzhou Xindeng Enterprise Group Co., Ltd.: *Stakeholders consultancy-Questionnaire of the local stakeholders and related summary*, from September 2007 to November 2007.

/37/ SDIC Xindeng Zhengzhou Cement Co., Ltd, Orbeo: *The term sheet for the forward sale and purchase of certified emission reductions between SDIC Xindeng Zhengzhou Cement Co., Ltd and Orbeo*, of 1 July 2009.

/38/ SDIC Xindeng Zhengzhou Cement Co., Ltd: *Application letter for CDM project to NDRC*, of 3 July 2009.

/39/ SDIC Xindeng Zhengzhou Cement Co., Ltd, Orbeo: *ERPA signed between SDIC Xindeng Zhengzhou Cement Co., Ltd and Orbeo*, of 16 September 2009.

/40/ Center for wind and solar energy resources assessment of China, Wind Resource Distribution in China, without date
http://cwera.cma.gov.cn/cn/

/41/ China New Energy and Renewable Energy Network, Geothermal resource distribution, development and application in China, 10 April 2008
http://www.crein.org.cn/view/viewnews.aspx?id=20080410133557851

/42/ Business License of the Project Activity issued by the Administrative Bureau for Industry and Commerce of Dengfeng City on the 27 March 2008

/43/ High Voltage Power Purchase Agreement signed between Electric Power of Henan and SDIC Xindeng Cement Company on the 3 September 2009

/44/ Grid Connection Contract signed between Electric Power of Henan and SDIC Xindeng Cement Company 1st of June 2010

/45/ Zhongxin Heavy Industry Machinery Co. Ltd and SDIC Xindeng Zhengzhou Cement Co. Ltd: *Turnkey proposal for the construction, equipment and technology service)*, of the 8 October 2008.

3.1.2 Letters of approval

/46/ National Development Reform Comission (DNA of China): *Letter of approval* dated 22 September 2009

/47/ France DNA Letter of Approval for SDIC Xindeng Zhengshou Cement Waste Heat Recovery Project dated 30 April 2010

3.1.3 Methodologies, tools and other guidance by the CDM Executive Board

/48/ CDM Executive Board: *CDM Validation and Verification Manual*. Version 1.2

/49/ CDM Executive Board: *Approved baseline and monitoring methodology AM0024 "Baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants AM0024*. Version 2.1.

/50/ CDM Executive Board: *Tool for demonstration and assessment of additionality*. Version 5.2.

/51/ CDM Executive Board: *Tool to calculate the emission factor for an electricity system*. Version 2

3.1.4 Documentation used by DNV to validate / cross-check the information provided by the project participants

/52/ National Development and Reform Commission and Ministry of Construction P. R. China *"Methods and Parameters for the Economic Assessment of Construction Projects" issued in 2006*

/53/ China Electric Power Yearbook 2005, 2007, 2008.

/54/ China Energy Statistical Yearbook 2005, 2007, 2008.

/55/ 17% VAT (Value added tax) – State Administration of Taxation on the 1 January 1994

/56/ 25% income tax – No 63 Decree of PRC Chairman of the 16 March 2007

/57/ 3% educational surtax of VAT- The State Council order [2005] No. 448

/58/ 2% city maintenance and construction tax of VAT – P. R. China city construction and maintenance regulation Guofa [1985] 19.

/59/ National Development Reform Committee: 2009 Baseline Emission Factors for Regional Power Grids in China, 2 July 2009.

/60/ National Bureau of Statistics of China
Yearly price index of capital goods
http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20080228_402464933.htm
http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20090226_402540710.htm
Yearly cost of labour trends
http://www.stats.gov.cn/tjsj/jdsj/t20090430_402556246.htm
http://www.stats.gov.cn/tjsj/jdsj/t20091113_402606680.htm

/61/ China Cement Net, Waste Heat Recovery in Cement Kilns for Power Generation, 11 November 2005, http://www.ccement.com/news/2005/11-11/C1764869363.htm

/62/ State Council, Price Stability Plan decided during the Executive Board Meeting of the 09 January 2008, http://news.qq.com/a/20080109/004393.htm

/63/ State Council: Notice on Strictly Prohibiting the Installation of Fuel fired Generators with the Capacity of 135MW or below - Decree No. 2002-6.

3.2 Follow-up interviews with project stakeholders

On 9-10 November 2009 DNV visited the SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Plant in Henan Province, Xuanhua Town, Dengfeng City and performed interviews with project stakeholders.

	Date	Name	Organization	Topic
/64/	2009-11-9/10	Lin Keming (Project Manager)	Shanghai Chuanji Investment Management Co., Ltd	➢ Applicability of selected methodology. ➢ Baseline determination. ➢ Emission reductions calculation. ➢ Emission reduction monitoring plan
/65/	2009-11-9/10	Xue Hanshen (Project Manager)	Shanghai Chuanji Investment Management Co., Ltd	
/66/	2009-11-9/10	Chen Yan (Project Manager)	Shanghai Chuanji Investment Management Co., Ltd	
/67/	2009-11-9/10	Joseph See (CO_2 operation)	ORBEO	➢ Letter of Approval
/68/	2009-11-9/10	Nie Yanpeng (CO_2 operation)	ORBEO	
/69/	2009-11-9/10	Shen Songjie (WHR manager)	SDIC Xindeng Zhengzhou Cement Co., Ltd.	➢ Project background information. ➢ Project technology, operation, maintenance and monitoring capability. ➢ Project additionality. ➢ Project monitoring and management plan. ➢ Project approval status (incl. EIA approval, CDM project approval status) ➢ Stakeholder consultation process
/70/	2009-11-9/10	Wang Yanyan (WHR staff)	SDIC Xindeng Zhengzhou Cement Co., Ltd.	
/71/	2009-11-9/10	Zhou Yonglan (General Manager Assistant)	SDIC Xindeng Zhengzhou Cement Co., Ltd.	
/72/	2009-11-9/10	Ling Jinhui (Quality manager)	SDIC Xindeng Zhengzhou Cement Co., Ltd.	
/73/	2009-11-/9/10	Lei Fengshou (General Engineer)	SDIC Xindeng Zhengzhou Cement Co., Ltd.	
/74/	2009-11-9/10	Zhou Bingyao (Zhou Binyao)	SDIC Xindeng Zhengzhou Cement Co., Ltd.	

The changes between version 1 of 23 September 2009 published for the 30 days stakeholder commenting period and the final version 06 dated 22 March 2011 submitted for registration are due to DNV corrective action and clarification requests as reported in Table 3 of this report.

3.3 Resolution of outstanding issues

The objective of this phase of the validation is to resolve any outstanding issues which need 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 four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "SDIC Xindeng Zhengzhou Cement Waste Heat Recovery Project" in China is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

(a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;

(b) The CDM requirements have not been met;

(c) There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities		
Requirement	***Reference***	***Conclusion***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**) or a **corrective action request (CAR)** if a requirement is not met.*

Validation Protocol Table 2: Requirement Checklist				
Checklist question	***Reference***	***Means of verification (MoV)***	***Assessment by DNV***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the CDM-PDD	*Gives reference to documents where the answer to the checklist question or item is found.*	*Means of verification (MoV) are **document review (DR)**, **interview (I)** or any other follow-up actions (e.g., on site visit and telephone or email interviews) and **cross-checking (CC)** with available information relating to projects or technologies similar to the proposed CDM project activity under validation.*	*The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.*	*OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A c**orrective action request (CAR)** is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A **clarification request (CL)** is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A **forward action request (FAR)** during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Corrective action and/ or clarification requests	***Ref. to checklist question in table 2***	***Response by project participants***	***Validation conclusion***
*The **CARs** and/ or **CLs** raised in Table 2 are repeated here.*	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants to address the CARs and/or CLs.*	*The validation team's assessment and final conclusions of the CARs and/or CLs.*

Validation Protocol Table 4: Forward Action Requests		
Forward action request	***Ref. to checklist question in table 2***	***Response by project participants***
The FARs raised in Table 2 are repeated here.	*Reference to the checklist question number in Table 2 where the FAR is explained.*	*Response by project participants on how forward action request will be addressed prior to first verification.*

Figure 1 Validation protocol tables

3.4 Internal quality control

The validation report underwent a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

				Type of involvement						
Role	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 4.1 - TA 1.1 competence	Financial expertise
Project manager & Auditor	Zamarron	Francisco	Italy	✓		✓				✓
Project manager (Resigned)	Valoroso	Rita	Italy			✓				
Technical team leader (CDM validator) & Sectoral Competent (TA1.1)	Kakaraparthi	Venkata Raman	India	✓		✓	✓		✓	
GHG auditor, Sectoral competent (TA4.1)	Wang	Ning Neil	China	✓	✓				✓	
Technical reviewer (DVR)	Kang	Guo	China					✓		
Technical reviewer (FVR)	Flagstad	Ole	Norway					✓		
Person with sectoral competence assisting technical reviewer (TA4.1)	Faggin	Matteo	Italy						✓	
Person with sectoral competence assisting technical reviewer (TA1.1)	Bao Jun	Hou	China						✓	

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

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 PDD, version 06 dated 22 March 2011 /1/.

4.1 Participation requirements

The project participants are SDIC Xindeng Zhenghou Cement Co. Ltd of China and ORBEO of France. The host Party (China) and the Annex I Party (France) meet all relevant participation requirements. Both have ratified the Kyoto Protocol and established a DNA as the participating requirements for CDM under the Kyoto Protocol.

A letter of approval (LoA) was issued by DNA of China on 22 September 2009, authorizing SDIC Xindeng Zhenghou Cement Co. Ltd as project participant and confirming that the project assists in achieving sustainable development /46/. The letter of Approval of the Annex I Country was issued by the DNA of France on 30 April 2010 /47/.

DNV has received from the Project Participants the Letters of Approval issued by the two DNAs.

The letters of approval were received from the project participants. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /48/.

The proposed project does not involve any public funding from an Annex I Party, and the validation did not reveal any information that indicated that the project can be seen as a diversion of official development assistance (ODA) funding towards China.

4.2 Project design

The project activity is located in the cement plant of SDIC Xindeng Zhengzhou Cement Co. Ltd., which is situated in Qingshigou Village, Xuanhua Town, Dengfeng City, Henan Province, China. The geographical coordinates of the project site are north latitude 34º23′36″ and east longitude 113º14′16″.

The purpose of the project activity is to generate electricity from the waste heat from the 4 500 tons/day new dry process cement clinker production line and use it for the clinker production. The clinker line is situated in the SDIC Xindeng Zhengzhou Cement Co. Ltd which is in operation since March 2008. It is the only clinker line present in the cement plant. In the cement plant there are not captive power generation plants and all the Cement Plant electricity demand is sourced from the Central China Power Grid (hereafter as “CCPG”).. Currently a small part of the waste heat is used for pre-heating the incoming raw material and the rest (major portion) of the waste heat from the kiln is vented to atmosphere.

The project activity consists of one AQC boiler, one SP boiler and one 9 MW stream turbine generator., with an overall efficiency of power generation at 21.56% as confirmed by the analysis of pure low-temperature heat energy produced by large dry-process cement

production lines /8/. The construction of the project activity started on 11 March 2009 and trials started in December 2009 and formal operations started on the 1st of June 2010 when the grid connection contract was signed /44/. The project activity can supply only 1/3 of the cement plant requirements and the remaining 2/3 needs to be supplied by the Power Company which has requested to connect the WHR power station with the power grid in order to phase/synchronise both current streams. According to the approved FSR /7/, the project activity is expected to operate 7 600 hours per year generating a gross electricity of 65 360 [1]MWh at a plant load factor of 86.76%, representing a net electricity of 60 150 MWh per year that will be completely consumed internally for cement production.

Prior to the implementation of the project activity, according to the electricity invoices of 2008 and 2009 /21/ the yearly electricity consumption of the cement plant was 125 188 MWh from June 2008 to May 2009 and 144 742 MWh from June 2009 to May 2010 /21/, that is to say higher than the 60 150 MWh that will be generated by the project activity, and was supplied by CCPG.

The expected operational lifetime of the proposed project activity is 15 years as per the FSR. DNV has verified that this is in line with industry standards in which boiler life is estimated in 10-15 years due to dust erosion /61/. A fixed crediting period of 10 years has been chosen for the project, starting on 1 June 2011. The emission reductions are calculated to be on average 51 299 tCO_2e per year over the ten-year crediting period.

DNV considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant forms and guidance for completing the PDD.

4.3 Application of selected baseline and monitoring methodology

The project correctly applies the approved consolidated baseline and monitoring methodology AM0024 "*Baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants AM0024*. Version 2.1. /49/. The proposed project activity falls under the Type 1 class contemplated in the methodology as the waste heat in the baseline scenarios used within the energy balance boundary of the clinker production process. During the site visit DNV has verified the correspondence of the cement production line lay-out and the WHR System Flow Chart of the project design /9/ confirming that there is not waste heat supplied to applications outside the boundary of the clinker making process.

The proposed project activity meets the applicability criteria in the baseline methodology. During the site visit and validation process it has been verified by DNV that:

1. All electricity supplied by the proposed project activity will be used within the cement plant. Prior to the implementation of the project activity, no captive power plant was installed in the project and there was no electricity exported to CCPG as per cement production line lay-out /9/ verified during the site.

[1] The gross electricity is calculated by 8.6 MW and 7600h which is 65 360 MWh. The difference between the gross production of 65 360MWh and the net supply to the plant of 60 150MWh is due to the self-consumption of auxiliary equipments such as cycling water pumps of the project activity (see CL 1 in Appendix A).

2. The electricity supplied by the proposed project activity will displace equivalent amount electricity imported from CCPG as per cement plant electricity consumption in 2008 / 2009 according to the electricity invoices /21/
3. Central China Power grid is an independent power grid and is one of the six regional power grids of China. The CCPG geographical boundary comprises Henan Province, Hunan Province, Hubei Province, Jiangxi Province, Sichuan Province and Chongqing City, the boundary of which is clearly identifiable. Information of CCPG is reported annually in the *China Electric Power Yearbook* /53/.
4. The waste heat recovered from the clinker production line will be used only to generate electricity in the project activity as per verified WHR System Flow Chart /9/; and past electricity consumption of the cement plant /21/.
5. During the site visit it has been checked that in the pre-project activity a part of the waste heat from the back-end of the kiln was used for drying raw materials after cooled down by the conditioning tower. In the project activity, the clinker line will still provide waste heat for drying purposes, being the heat in excess to the drying demand the one feeding the combined boilers. So the recycling of waste heat is within the boundary of the clinker making process.

It has also been verified that:

1. According to the cement production line lay-out /9/, the waste heat is only used within the clinker making process and there is no other alternative use of the waste heat.
2. According to the WHR System Flow Chart /9/ and the WHR Feasibility Study Report /6/, the project activity only utilizes the waste heat generated by the clinker production line and will not change the mixture ratio of the raw materials. So the project activity will not affect process emissions from cement plants.

Possible CO_2 emissions for increasing the energy consumption per unit in clinker produced due to project activity have been considered in the project activity so no other emissions sources not foreseen by the methodology are involved.

The assessment of the project's compliance with the applicability criteria of AM0024 (version 2.1) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

4.4 Project Boundary

The project boundary includes the facilities constructed on account of the project activity, the rotating kiln, waste heat recovery boilers (AQC and SP boilers), waste heat generator and its auxiliary facilities. The system boundary for the grid electricity system considered for determining the grid emission are all power plants connected with CCPG. The electricity system is defined according to the methodological tool "Tool to calculate the emission factor for an electricity system" /51/. The delineation and the characteristics of CCPG are available and have been published in the 2009 Baseline Emission Factors for Regional Power Grids in China /59/. The CCPG is composed by Henan Province, Hunan Province, Hubei Province, Jiangxi Province, Sichuan Province and Chongqing City.

The defined project boundary is in line with the approved baseline methodology AM0024 /49/ where the spatial extent of the project boundary includes the project power plant and all power plants connected physically to CCPG including Henan Provincial grid to which the project is connected. There are not auxiliary sources in the project activity fed with fossil fuel.

The emissions sources included in the project boundary are:

	Source	Gas	Included?	Justification/Explanation
Baseline	Grid electricity generation	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project activity	On-site fossil fuel consumption due to the project activity	CO_2	Included	Included in case of project activity does increase the energy consumption per unit in clinker production. Otherwise, the emission source excluded.
		CH_4	Excluded	Excluded for simplification. This emission source is very small.
		N_2O	Excluded	Excluded for simplification. This emission source is very small.

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by AM0024 (version 2.1).

4.5 Baseline determination

The baseline scenario has been determined, as per the applicable methodology AM0024 /49/, applying the following steps:

Step 1: Determination of technically feasible alternatives to the project activity:

Sub-step 1.a: Alternatives to waste heat utilization

DNV has verified during the site visit that prior to the project activity the waste heat was partially used for drying of raw materials and fuel. The remaining waste gas was released to the atmosphere. According to the statistic conducted by the China Cement Industry Association /12/ this was the common use of waste heat in the local context.

There are not other alternative demand for the waste gas. During the site visit it has been confirmed that the project activity is located in a rural area, with no residential or industrial areas around. It is not applicable to utilize the waste heat as resident or industry heat source.

According to the verified cement production line lay-out and the WHR System Flow Chart of the project design /9/, the fuel demand in the project activity remains the same than the baseline. The clinker line will still provide waste heat for drying purposes, being the heat in excess to the drying demand the one feeding the combined boilers. The so far vented waste heat will be utilized in electricity generation replacing a part of the electricity consumption of the clinker plant verified by DNV /21/ . Therefore the recovery of waste heat is within the energy balance boundary of the clinker making process and there are not other waste heat utilization alternatives to the project activity.

Sub-step 1.b: Alternatives to source of electricity supply

The cement unit (project proponent) could cover the electricity needs by the following ways:

Alternative 1) Continue import of electricity from CCPG to meet all the electricity demands;

Importing electricity from the CCPG is the current practice for the project owner. This alternative also does not face any technical barriers.

Alternative 2) Construct a WHR power plant without CDM support, the electricity supplied by which will be used for the clinker production and the electricity shortage will be met through importing electricity from CCPG;

There are no technically barriers for the implementation of the project activity.

Alternative 3) Construct a captive fossil fuels fired power plant, the electricity supplied by which will be used for the clinker production and the electricity shortage will be met through importing electricity from CCPG.

The majority of the units in the CCPG are thermal power plants A thermal power plant with same capacity as the project activity can be considered to meet the power demand of the project entity. It is a technically feasible alternative.

Alternative 4): Construct a captive plant using renewable resources. It has been verified from the evidences /40/ /41/ that wind and other renewable resources plants are not feasible alternatives to the project activity because there are not such resources around the cement plant for building a 9 MW power plant. Setting up a biomass based power generation is also not a feasible option because of the high investment cost required to build a biomass plant. This has been verified from the Investment/Technological barriers – National Development and Reform Commission website /28/.

To summarize, based on the above alternative identification, the technically feasible scenarios to the project activity are listed below:

Scenario 1: Proposed project activity not undertaken as a CDM project activity

The project entity may adopt the 9MW waste heat recovery and utilization system for power generation without the support of the revenues from CERs. The electricity produced by the project will be used in the clinker production line and the electricity shortage will be met

through importing electricity from CCPG;

Scenario 2: Import equivalent electricity from CCPG and vent the waste heat to atmosphere as continuation of the current situation

The project entity can continue the current practice which is to purchase all the demanded electricity from CCPG.

Scenario 3: Implementation of a new 9 MW fossil fuels fired power plant

The project entity can also generate equivalent amount of power by a fossil fuels fired power plant. There are no onsite power stations for the cement production line as all power comes from the Grid. The project entity would install a 9 MW thermal power station to meet the demand.

Step 2: Compliance with regulatory requirements:

Scenario 1 and 2 are in compliance with all applicable legal and regulatory requirements.

Scenario 3: According to State Council (2006) /63/, which is applicable to the any type of power plant, the installation of new thermal power plants of less than 135 MW is prohibited. As the installed capacity of the project activity is only 9 MW which is less than 135 MW, the construction and operation of thermal power plant does not comply with the legal and regulatory requirements. Therefore this scenario should be excluded from the baseline scenario.

Since scenario 3 is eliminated, the project entity will continue to purchase power from CCPG or undertake the project activity without the support of CDM.

Step 3 Undertake economic analyses of all options that meets the regulatory requirements.

The investment returns of scenario 1 have been calculated on the basis of savings from substituting power from CCPG. According to the Feasibility Study Report of the Waster Heat Recovery Power Station, the IRR of equity investment is 7.98% and lower than the benchmark of 12%. Hence the project is not feasible.

Therefore the baseline scenario for the project activity would be scenario 2 in which the project entity will continue purchasing power from the CCPG and the waste heat will be released to atmosphere as in the baseline scenario. No extra investment will be required for this scenario, and no any barriers exist in smooth operation of clinker production lines.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario are correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

4.6 Additionality

The project additionality has been demonstrated applying the latest version of the methodological tool "Tool for demonstration and assessment additionality" version 05.2 /50/.

4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status.

DNV has verified that the 22 December 2008, i.e. the date on which the project owner signed the turnkey contract with the Zhonxin Heavy Industry Machinery Co. Ltd /17/, represents the earliest financial commitment for the project (project starting date).

Prior to that, the project owner had:

a) on the 21 of March 2007, according to the minutes of the meeting, a consultation with Mr. Wang Nengbao /31/, supervisor of the WHR power station of Huasheng Tianya Cement Co., Ltd. which was developing a CDM project, took place on the 14 of March 2007 about the economic benefits of WHR projects.

b) on the 22 of May 2007, consulted the Building Material Industrial Association of Henan Province /32/ regarding the options to gain financial support for cement WHR projects. The Association encouraged cement companies to seek the benefits of CDM.

c) on the 26 of June 2007, participated in a seminar held by the Building Material Industrial Association of Henan Province /33/ relative to energy saving and emission reduction in cement industry. During the seminar, the speakers analyzed cement WHR projects financials and explained how cement WHR projects not financially attractive in Henan Province became attractive with CDM support.

d) in October 2008 the Feasibility Study Report of the project activity was completed by the Tianjin cement industry design & research institute considering CDM financial support.

It is DNV opinion that all these events which happened before the signature of the turnkey contract are showing that PP seriously was considering CDM before taking the investment decision.

Since the project starting date is after 2 August 2008, in accordance with the guidance provided in Annex 46 (EB41) the project activity is to be considered a new project activity. In addition, the starting date is prior to the date of the PDD publication for stakeholder comments on the 6 October 2009. The notification for CDM consideration was sent to the DNA of China on the 12 May 2009 /18/, this is within 6 months of the project start date and fulfils the requirement of Annex 46 of EB41. This approach was confirmed in the Validation and Verification Manual (VVM) version 1.0 issued in the EB 44 meeting on the 28 November 2008. The six months notification to both the DNA and the UNFCCC was introduced in the VVM version 1.1 issued in the EB51 meeting of the 4 December 2009. /48/ The PP sent the CDM consideration notification to UNFCCC on the 11 September 2009 /19/. So DNV determined that the CDM was seriously considered in the decision to implement the project

activity and it is in line with this guideline although the notification to UNFCCC was over the six months of the starting date of the project.

The project has been commissioned in December of 2009 and formal operations started on the 1st of June 2010 when the grid connection contract was signed /44/. DNV was able to check the above referred documents and consider satisfactory actions were undertaken to secure CDM status in parallel with the physical implementation of the project activity according to the EB49, annex 22.

It is DNV's opinion that the proposed CDM project activity complies with the requirements of the latest version of the guidance on prior consideration of CDM.

4.6.2 Identification of alternatives to the project activity

As discussed in chapter 4.4 of this validation report, an analysis on possible alternatives to the project activity has been conducted by the PP. The analysis result was that only two alternative scenarios to the project activity are considered to be feasible:

i) The proposed project activity not undertaken as CDM project: The alternative is not realistic as the equity IRR is 7.98% which is lower than the 12% benchmark used by the cement industry. For further details please refer to the below Investment Analysis section of this report.

ii) Continuation of the current practice: The waste heat produced by the clinker line being vented and the equivalent net annual electricity produced by the project supplied by the Central China Power Grid (CCPG). This alternative is in compliance with all mandatory laws and regulations in the host Country and does not involve any additional investment to the project proponent.

Therefore the last alternative has resulted to be the baseline scenario for the project activity.

4.6.3 Investment analysis

Choice of approach

The "Tool for demonstration and assessment of additionality" version 5.2 /50/ contemplates three investment analysis options. The proposed project activity generates economic benefits other than CDM related income, due to the savings in electricity purchasing for the amount directly produced by the project activity. Option I can not be applied. The alternative to the project activity is the supply of electricity from a grid which is not considered an investment. Hence, the investment comparison analysis (Option II) is not suitable. Thus according to the tool /50/ a benchmark approach is considered appropriate and the benchmark analysis (Option III) has been applied.

The option to use the benchmark analysis for the project activity is in line with the investment analysis guidelines paragraph 15, which states that "If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate".

Benchmark selection

The project participant has compared the Equity internal rate of return against the benchmark of 12% as per *Methods and Parameters for the Economic Assessment of Construction Projects* /52/. The referred document was issued in 2006 and it was the source used by the cement industry to define the expected minimum returns at the moment that the investment decision was made in December 2008.

DNV is able to confirm that the selected benchmark is suitable and reasonable for the following reasons:

(i) according to the approved FSR /7/ the project is considered as an extension of a cement project and the business licence /44/ states that the project owner is the same as the owner of the cement plant /42/. The project activity only partially displaces (about 35%) of the requirement of electricity of the Cement unit sourced from the grid.

(ii) the benchmark was determined by the National Development and Reform Commission and Ministry of Construction P. R. China and is the current reference used by the cement industry in China /52/.

(iii) the 12% benchmark is referred to internal rate of return of the equity after income tax which correspond to the Equity IRR contemplated in the investment analysis section of the FSR /6//7/.

Input parameters

DNV has validated the input parameters used according to the *Guidance of EB38 paragraph 54 (c)*. The following steps have been followed to assess the investment analysis.

Step 1: Assessment of the sources used for input parameters

All input parameters used in the financial analysis are sourced from the FSR developed in October 2008 by an independent officially accredited entity, the China Investment and Consulting Co. Ltd. /6/.

The FSR input parameters were verified and approved by the Defeng City DRC on the 27 November 2008 /7/ and the information can thus be considered as provided by independent and recognized source.

Step 2: Confirmation that the values used in the PDD and investment analysis are fully consistent with the FSR.

DNV compared the input parameters for the financial analysis included in the PDD /1/ with the parameters stated in the approved FSR /7/and was able to confirm that the values applied are consistent with the values stated in the document mentioned before.

Step 3: Assessment of the period between of time the finalization of the FSR and the investment decision.

The investment decision to proceed with the project activity was taken on the 22 December 2008 /17/ (starting date of the project activity) which was one month after the FSR was approved the 27 November 2008 /7/. Given this relative short period of time between approval of the FSR and the decision to proceed with the project activity it is unlikely in the context of the project that the input values would have materially changed. Thus it is reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project activity.

Step 4: Cross check of the main input parameters used in the financial analysis with parameters used by other similar projects.

The input parameters used in the financial analysis were compared with the parameters reported for other cement sector WHR projects registered under CDM methodology ACM0004 in Henan Province with similar power capacity (from 4,5 MW to 14 MW) . The data that has been cross checked was relative to the investment costs per installed capacity and per net KWh produced, the annual O&M costs as percentage of the investment costs and the electricity tariff.

Table 1 – Data Comparison of parameters used in the Financial Analysis

Project name / UNFCCC Ref. Number	*Load Factor (Annual Operating hours at 100% / 8 760 hours) (%)*	*Installed Capacity (MW)*	*Total Investment/ Installed Capacity Million RMB/MW*	*O&M (% of initial investment)*	*Grid Tariff VAT excluded (RMB/KWh)*
Luoyang Huanghe Tongli Cement Co., Ltd / 1 622	*70.95*	*9*	*6.97*	*15.46*	*0.326*
Zhumadian Yulong Tongli Cement Co., Ltd / 1 623	*70.95*	*9*	*6.65*	*17.21%*	*0.326*
Xinxiang Pingyuan Tongli Cement Co., Ltd / 1 624	*70.95*	*9*	*6.79*	*16.31%*	*0.326*
Henan Baofeng County Cement Co., Ltd. / 1714	*68.11*	*7,5*	*NA*	*NA*	*NA*
Henan Xichuan Cement Co., Ltd / 1723	*68.67*	*9*	*NA*	*NA*	*NA*
Tianrui Group Cement Co., Ltd / NA	*53.88*	*4.5*	*6.82*	*NA*	*0,31*
Ruzhou Tianuri Cement Co., Ltd / NA	*54.88*	*14*	*7.04*	*NA*	*0.315*
Henan Jinrong Cement Co., Ltd / NA	*62.53*	*9*	*7.88*	*9,6%*	*0.334*
Project Activity / NA	***86.76***	***9***	***8.48***	***13.51%***	***0.343***

- **Grid tariff:** In China, the tariff is strictly regulated by the Chinese Government. The value used in the financial analysis is 0.343 Yuan RMB/kWh VAT excluded. DNV has checked that this tariff has been sourced from the tariff invoices of the Dengfeng

City Electricity to the Cement plant /21/ and checked it with similar projects (see table 1) in the Henan Province resulting to be the highest of the tariffs. Therefore it is deemed to be, in DNV opinion, an acceptable value .

- **Investment cost:** The estimated total fixed assets is 76.31 million RMB, it has been taken from the FSR prepared in October 2008 /6/ and approved in November 2008 /7/.. This total investment represents a unit cost for MW installed of 8.48 million of RMB. This value is 7.6 % higher than the upper value of the range (6.65 and 7.88 RMB/MWh) of the projects under consideration. Therefore the investment cost has been further cross-checked against actual implementation costs. The investment decision was taken with the signature of the turnkey contract with Zhongxin Heavy Industry Machinery Co. Ltd on the 22 December 2008 /17/. However, when the FSR was under preparation, the contract proposal was already available /45/. In the proposal, the total project costs sum up to 76.32 million RMB which indicates that the FSR investment cost estimate was reasonable at the time of the investment decision.
- **Annual O&M costs:** These have been calculated according to the data from the approved FSR /6/. The O&M annual costs for the project activity represent 13.14 % of the total investment. This percentage is in the 9.6% - 17.21% range of the other projects analysed, and therefore it is considered by DNV as reasonable.
- **Tax rates:** These were taken from the approved FSR /6/ /7/ and they are in line with the current Chinese regulations. Tax rates account to 17% for VAT /55/ 25% for income tax /56/, 3% educational supplementary tax /57/and 7% for urban maintenance and construction tax /58/. The financial analysis also considers the tax benefits enjoyed by the project from loan interest as 60% of the project total investment is financed by a loan with a linear repayment at 7.83% interest rate and during a period of 8 years.
- **Electricity generation:** the project will generate 60 150 MWh annually. This represent a Load Factor of the equipment of 86.76%. The Load Factor range of the projects considered in the comparison was found to be 53.88% to 70.95 %. Therefore the project Load Factor is deemed to be conservative.

Calculation and conclusion

IRR calculation /10/ and the underlying assumptions have been provided by the PP in a spreadsheet verified and found to be correct by DNV. The equity IRR without CDM revenues is 7.98% which confirms that the proposed project activity in absence of CDM benefits and compared to the benchmark IRR of 12% is not financially attractive, while the equity IRR with CDM revenues is 13.38%.

Sensitivity analysis

A sensitivity analysis has been carried out for those parameters with higher contribution to the revenues and costs in order to demonstrate the robustness of the financial analysis. The parameters selected are a) construction investment b) power generation c) electricity tariff and d) annual operational cost. It has been demonstrated that the equity IRR of the project touches the benchmark of 12% if a) the construction investment decreases by 18.5% b) power generation increases by 11.08% c) electricity tariff increase by 11.08% and d) annual

operational costs decrease by 21.64%. As stated below, it is DNV opinion that these variations are unlikely.

Construction investment: The equity IRR reaches the benchmark of 12% if the FSR construction cost decreases 18.5%. According to the national Bureau of Statistics of China /60/ the price index of capital goods has been increasing during the last years in China. In addition, the turnkey contract signed between Zhongxin Heavy Industry Machinery Co. Ltd and SDIC Xindeng Zhengzhou Cement Co. Ltd /17/ contemplates a total project investment of 76,32 Million RMDs against the 76.31 Million RMD planned in the FSR.

Therefore, it is DNV opinion that a reduction of the Investment Costs to reach the 12% benchmark is deemed to be unlikely.

Net electricity output: The project IRR reaches the benchmark of 12% if the power generation increases by 11.08%. This means an increase of the number of annual operating hours from the 7 600 hours contemplated in the FSR /7/ to 8 442 hours which is deemed unlikely taken into consideration that the clinker line worked 7 180 hours in 2009 (for the whole year) /27/. The production hours for the year 2008 are not considered representative, as the clinker plant was commissioned in March 2008. Since the actual operating hours in 2009 is less than that envisaged in the FSR, it is not likely that the operative hours can increase to 8 442 hours annually.

Electricity tariff: The grid tariff needs also to be increased by 11.08% so the IRR can reach the 12 % benchmark. The grid price used in the financial analysis amount to 0.343 Yuan/kWh and it is strictly regulated by the government /41/. The 0.343 Yuan/kWh is the fixed tariff contemplated also in the PPA /43/ for 3 years from 2009 until 2012. After 2012 it is unlikely that the tariff will increase as the electricity price is regulated by the government and the State Council announced on 09/01/2008 that the electricity tariff should be kept at a stable level in the coming futures to ensure stability of society /62/ .

In addition, future escalations of the tariff alone are unlikely but they should be with escalation of the O&M costs. In fact, according to National Bureau of Statistics of China /60/ , the growth rate in Electricity Tariff and Price Purchase Index (PPI) and Average Earning of Employed Persons in Urban Units in the last 10 years is listed in the following table:

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	1999~2008	Average annual growth rate
Electricity Tariff	100.9	102.4	102.3	100.8	100.9	102.4	104.2	102.8	102.2	101.8	122.7	2.1%
PPI	96.7	105.1	99.8	97.7	104.8	111.4	108.3	106.0	104.4	110.5	153.2	4.5%
Average Earning of Employed Persons in Urban Units	111.7	112.2	116.1	114.2	112.9	114.0	114.3	114.6	118.5	116.9	388.1	14.5%

The growth rate in Electricity Tariff is smaller than the PPI and Average Earning of Employed Persons in Urban Units growth rates. If we assume that the electricity tariff, PPI and Average Earning of Employed Persons in Urban Units will continue to grow annually and the growth rate is the average annual growth rate based on last 10 year statistics listed in the above form, the IRR will be 7.04%. This is still below the benchmark.

Thus it can be concluded that the growth rate in other costs will definitely escalate faster than electricity tariff.

Operation & Maintenance cost: Annual operation and maintenance cost needs to decrease by 21.64%. The only way to decrease O&M costs is through a decrease in the price of the labour force or the replacement equipment. According to the National Bureau of Statistics in China/60/, the salary trend increased by 19.7% in 2008 and by 12.4% until September 2009 and the price index of capital goods has increased on yearly basis by 3.1% in 2007 and by 7.7% in 2008. Therefore this variation in DNV opinion is not likely.

4.6.4 Barrier analysis

Barrier analysis has not been adopted by the PP to demonstrate additionality.

4.6.5 Common practice analysis

The selected region for common practice is the Henan Province in which all cement plants have similar geographical environment and the same environment with respect to regulatory framework, investment climate, access to technology and financing. The price of cement product and of the raw materials, the salary of working staff and taxes of the project are all similar for all the projects in Henan province.

According to the market information published by China Cement Industry Association /26/, there are 50 new dry process cement clinker production lines in Henan Province and 10 of them are implementing or have implemented WHR power plant by the end of 2007.

The projects with installed capacity in the 4.5 MW to 18 MW range and that share the same, waste heat recovery technology as the project activity, are following:

Zhumadian Yulong Tongli Cement Co., Ltd.
Xinxiang Pingyuan Tongli Cement Co., Ltd
Luoyang Huanghe Tongli Cement Co., Ltd.
Henan Yuhe Tongli Cement Co., Ltd.
Henan Xichuan Cement Co., Ltd.
Henan Baofeng County Cement Co., Ltd.
Tianrui Group Cement Co., Ltd.
Tianrui Group Ruzhou Cement Co., Ltd.
Weihui City Tianrui Cement Co., Ltd.
Henan Jinrong Cement Co., Ltd.

From this 10 projects the first 6 have been registered as CDM Projects and the other 4 face the same barriers that the project activity so they are also seeking CDM registration.

Hence, DNV was able to confirm that the proposed project activity is not common practice without CDM funding in the Henan Province.

In conclusion, the argumentations presented above are assessed by DNV sufficient to demonstrate that the project is not a likely baseline scenario, and that emission reductions resulting from the project activity are additional.

4.7 Monitoring

The Approved monitoring methodology AM0024 "Monitoring methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants" Version 2.1. /49/ has been applied.

The project monitoring plan is in compliance with the monitoring methodology AM0024 (version 2.1).

It is DNV's opinion, that the project participants are able to implement the monitoring plan.

4.7.1 Parameters determined ex-ante

For emission reduction estimation purposes, the baseline emission factor is determined *ex ante* according to the methodological tool "Tool to calculate emission factor for an electricity system" /51/ as the weighted average of OM and BM. During the project activity the emission factor will be calculated ex post according to approved methodology AM0024 Ver. 2.1. /49/. The weight of OM and BM are selected for the first crediting period as 0.5 as requested for hydropower project by the methodological tool. Data published by the NDRC /59/ in July 2009 have been used as it was the latest data available at the time of webhosting the PDD for global stakeholder consultation on 6 October 2009. DNV can confirm the data used were conservative, as the combined grid emission factor of the Central China Power Grid is calculated as 0.85285 tCO_2e/MWh based on the available data in October 2009, while the combined grid emission factor is 0.8712 tCO_2e/MWh based on the data published on December 2008 /53//54/.

The following parameters were established ex-ante.

- Electricity consumption of Xindeng cement works from June 2008 to May 2009 (125 188 MWh) and from June 2009 to May 2010 (144 742 MWh)
- Installed capacity of CCPG in 2005-2007 (see tables 3-13, 3-14 and 3-15 in Annex 3 of the PDD).
- Power generation from CCPG in 2005-2007 and Power Generation from NCPG in 2006 and 2007. (see table 3-8 in Annex 3 of the PDD)
- Thermal power plant self-use rate of CCPG in 2005-2007. (see table 3-8 in Annex 3 of the PDD)
- Power plant self-use rate of NCPG in 2006 and 2007 (see table 3-9 in Annex 3 of the PDD).
- Amount of fuels consumed by the power sources delivering electricity to CCPG (2005-2007) and NCPG (2006 and 2007) (see tables 3-3, 3-4, 3-5, 3-6 and 3-7 in Annex 3 of the PDD).

- Net Calorific Value per mass or volume unit of the fuel consumed by the power sources delivering electricity to CCPG and NCPG (see tables 3-3, 3-4, 3-5, 3-6 and 3-7 in Annex 3 of the PDD).
- CO_2 emission factor of the fuel consumed by the power sources delivering electricity to CCPG and NCPG (see tables 3-3, 3-4, 3-5, 3-6 and 3-7 in Annex 3 of the PDD).
- The commercial optimized efficiency of China thermal power generation. (see table 3-12 in Annex 3 of the PDD)
- The Operating Margin Emission Factor (1.1255 tCO_2e/MWh)
- The Built Margin Emission Factor (0.5802 tCO_2e/MWh)
- The Combined Margin Emission Factor (0.85285 tCO_2e/MWh)
- Average annual energy (fuel) consumption of clinker making process prior to project implementation of 5 439,04 TJ according to monitoring records (5 306,34 TJ from June 2008 to May 2009 and 5 571,75 TJ from June 2009 to May 2010 /23/ /27/ verified by DNV.
- Average annual production of clinker in the baseline scenario, resulting to be 1.54 million tons according to the monthly monitoring records (1.50 millions from June 2008 to May 2009 and 1.57 million tons from June 2009 to May 2010) /23/ /27/ verified by DNV.
- The energy consumption per unit output of the clinker production line in the baseline scenario resulting to be 3.54 GJ/ton of clinker according to monitoring records (3.54 GJ/ton from June 2008 to May 2009 and 3.54 GJ/ton from June 2009 to May 2010) /23/ /27/ verified by DNV.

4.7.2 Parameters monitored ex-post

The following parameters will be monitored:

- Grid Emission Factor on an annual basis
- Net Calorific Value of coal used in the 4 500 t/d clinker production line in the year *y*.
- Annual energy (fuel) consumption of the clinker making process in the project year y.
- Emission factor of fuel used in clinker production by monitoring the carbon content (C%) of the fuel, and calculating the CO_2 emission factor of the fuel by the equation $EF_{CO2,fuel,y} = C\% * 44/12$ assumption that all carbon content in the fuel are fully burned.
- Average annual production of clinker after project implementation.
- Quantity of net electricity supplied by the 9 MW power plant in the year y to the cement plant.

4.7.3 Management system and quality assurance

A monitoring system will be implemented in order to ensure that the real, measurable and long-term GHG emission reductions for the proposed project activity are monitored and

reported. Relevant functions of the organization structure have been identified and will be trained to conduct the monitoring plan and to make the monitored data accurate. The General Manager of the installation will be responsible to write the monitoring plan in a yearly basis.

The monitoring plan also defines the measurement equipments that will be made available, their accuracy and the maintenance and calibration procedures that will be operative during the project life.

The data and document management is other critical element of the monitoring plan and procedures for collect and archive the relevant data have been defined. All monitoring data will be archived at least until two years after the whole crediting period.

4.8 Estimation of GHG emissions

The emission reduction ER_y by the proposed project activity during the crediting period is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y) as follows:

> **baseline emissions (BE_y):** are the product of the baseline emission factor ($EF_{grid,CM,y}$ in tCO_2/MWh) times the electricity supplied by the proposed project activity to the grid (EG_y in MWh).

The baseline emission factor is determined *ex ante* according to the methodological tool "Tool to calculate emission factor for an electricity system" /51/ as the weighted average of OM and BM. The weight of OM and BM are selected as 0.5 as requested for hydropower project by the methodological tool.

Calculation of EF_{OM}. The simple OM emission factor calculation method is selected due to low-cost/must run projects are lower than 50% (respectively 34.43% in 2004, 38.37% in 2005, 38.60% in 2006, 35.12% in 2007 and 35.46 in 2008 of the total grid generation). The *ex-ante* vintage data is employed for the OM calculation of the project. The PDD was web-hosted on 6 October 2009 and the latest available data vintage was from 2004 to 2007. China Electric Power Yearbook 2005-2008 editions /53/ and China Energy Statistical Yearbook 2005-2008 editions /54/ have been used for operating margin calculation. The EF_{OM} for 2005, 2006 and 2007 are calculated as the most recent three years full generation weighted average of the emission factors. Also, according to Tool to calculate the emission factor for an electricity system /51/ power dispatching between regional power grids should be considered in the calculation of the operating margin emission factor. The electricity imported from NCPG and emissions CO_2 generated during this power generation are fully considered in the calculation of the operating margin emission factor. Consequently the Operating Margin Emission Factor is determined to be 1.1255 tCO_2e/MWh. The EF_{OM} is calculated ex-ante and will be fixed in the first crediting period of the project activity.

Calculation of the EF_{BM}. Considering that the plant specific consumption and electricity generation data is not publicly available in China, steps 5 and 6 of the Tool to calculate the emission factor for an electricity system /51/ have been applied as follows:

i) use of capacity additions for hydro power from the years 2005 to 2007 is chosen and reaches 29.30% of the total installed capacity /53/ ;

ii) Use of weights estimated using installed capacity in place of annual electricity generation. Thermal power plant accounts for 70.64% of the total installed

capacity additions in this period /53/. Since specific data for each technology is not available, the fraction of fuels (coal 99.13%, natural gas 0.74% and oil 0.13% /53/) was estimated from the CO_2 intensity for the fuels used in the CCPG.

iii) Use of 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. This is 38.10% for coal power plants and 49.99% for oil power plants and gas power plants /53/. The efficiency values were only available 2 July 2009, i.e. after the global stakeholder consultation (23 May 2009). However, the values are more conservative than the latest values available at that time (37.28% and 48.81%, respectively). The use of these higher efficiencies that lower the build margin emission factor and the CERs of the project was therefore accepted by DNV.

The calculated EF_{BM} is 0.5802 tCO_2e/MWh. The resulting combined margin emission factor is 0.85285 tCO_2e/MWh, and the annual electricity delivered to the CCPG is expected to be 60 150 MWh /10/. Hence, the total emission reductions from the project are estimated to be on the average 51 299 tCO_2e per year over the selected 10 year fixed crediting period.

The baseline emission estimate can be replicated using the data and parameter values provided in the PDD and supporting files /23/ submitted for registration. The data sources mentioned have been verified by DNV.

project emissions (PE_y): are the difference in CO_2 emissions from use of fossil fuel in the clinker manufacturing unit before and after the implementation of the project activities.

$$PE_y = (EI_{P,y} - EI_B) * O_{clin\,ker,y} * COEF_{fuel,y}$$

Where:

PE_y	is project emissions generated by project activity;
$EI_{P,y}$	is the ex-post energy consumption per unit output of clinker for given year, y, in TJ/ton of clinker produced;
EI_B	is the pre-project energy consumption per unit output of clinker in TJ/ton of clinker produced (i.e. measured before the Project activity goes into operation);
$O_{clin\,ker,y}$	is the clinker output of the cement works in a given year y;
$COEF_{fuel,y}$	is the carbon coefficient (tCO_2e / TJ of input fuel) of the fuel used in the cement works in year y to raise the necessary heat for clinker production;

$$EI_B = \frac{F_B}{O_{clin\,ker,B}}$$

Where:

F_B	is average annual energy consumption, expressed in TJ, of clinker making process prior to the start of operation of the project activity. At least one full

year of data should be used.

If a year's worth of pre-project activity data is not available, then the project developer should outline the plan for ensuring conservativeness based on a combination of the ex-ante design estimate of energy consumption plus available measured data.

$O_{clin\,ker,B}$ is average annual output, expressed in tonnes, of clinker prior to the start of operation of the project activity. At least one full year of data should be used. The data will be monitored, recorded and saved by project entity Cement Works;

$$EI_{P,y} = \frac{F_{P,y}}{O_{clin\,ker,y}}$$

Where:

$F_{P,y}$ is monitored annual energy consumption in a year y, expressed in TJ, of clinker making process;

$O_{clin\,ker,y}$ is monitored annual output, expressed in a year y, in tones of clinker;

According to the operation practice of the project owner monitors the quantity of the fuel consumed in the calcinations process (FC_{fuel}) and the net calorific value of the fuel (NCV_{fuel}), and uses the equal $F = FC_{fuel} * NCV_{fuel}$ to calculate the energy consumption in the calcinations process.

The project owner monitors the carbon content (C%), and calculating the CO_2 emission factor of the fuel follow the equation $EF_{CO2,fuel,y} = C\% * 44/12$. It is assumed that all carbon content in the fuel are fully transferred to CO_2 after burning.

$$COEF_{fuel,y} = EF_{CO2,fuel,y} / NCV_{fuel,y}$$

Where:

$NCV_{fuel,y}$ is the net calorific value (energy content) per mass or volume unit of a fuel used in clinker making process in year y;

$EF_{CO2,fuel,y}$ is the CO_2 emission factor per unit of energy of the fuel used in year y, expressed as tCO_2e per unit mass or volume unit;

The monthly monitoring records (from June 2008 to May 2010) /27/ of the clinker output, fuel consumption, net calorific value (NCV) and carbon content of the fuel have been checked by DNV and used for calculating the energy consumption per unit output of clinker in the baseline scenario (EI_B) resulting to be 3.54 GJ/t of clinker.

The project activity has been designed to have no influence to the previous clinker production, and no extra emissions will be occurred with the implementation of the project activity. Therefore the PDD has adopted $EI_{P,y} = EI_B$ for the calculation of the project emissions. This assumption is, in DNV opinion, deemed to be reasonable. The actual ex-post energy consumption per unit output of clinker and project emissions will be updated according to the

actual practice and the actual project emissions will be monitored.

leakage (L_y): no leakage has to be considered for the proposed project activity.

The emission reduction of the project activity in the proposed year *y* is the difference between the baseline emission (EB_y) and the project emission (PE_y). The Project Participant has provided the emission reduction calculations in a separate excel file /10//28/ that has been checked by DNV. The resulting annual value of the emission reductions is:

$ER_y = EB_y - PE_y$ =51 299-0 = 51 299 tCO_2e

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 51 299 tCO2e per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

4.9 Environmental impacts

An Environmental Impact Assessment has been conducted according to Chinese laws and regulations; the EIA was approved by the Yunnan Province Environmental Protection Bureau on 18 April 2008 /15//16/ and no significant environmental impacts are expected from the project activity.

4.10 Comments by local stakeholders

A survey of the local residents in the area closest to the SDIC plant using questionnaires was implemented from September 2007 to November 2007. The area considered for the survey was Qingshiguo village which is near to the project activity. In that village there are 1 873 residents and 60 questionnaires were distributed. Only the 55 taken back have been checked. A summary of the stakeholders comments have been included in the PDD and verified by DNV during the site visit.

DNV considers that the local stakeholder consultation has been carried out adequately by the PP.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 01 dated 23 September 2009, was made publicly available on the CDM website and Parties, stakeholders and NGOs were through the CDM website invited to

provide comments during a 30 days period from 6 October 2009 to 4 November 2009. (http://cdm.unfccc.int/Projects/Validation/DB/YNJB6L6DGN06JK8CFQOY9I3CM1H86S/view.html). No comments were received during that period.

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APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory requirements for Clean Development Mechanism (CDM) project activities

Requirement	Reference	Conclusion
About Parties		
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	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	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
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
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
About additionality		
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	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		
About forecast emission reductions and environmental impacts		
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	OK
For large-scale projects only		
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
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
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
Other		
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 and 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. 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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity					
A.1 Title of the project activity (VVM para 55-57)					
A.1.1 Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ Date of the PDD is included.		OK
A.1.2 Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	☒ Yes		OK
A.2 Description of the project activity (VVM para 58-64)					
A.2.1 How was the design of the project assessed?	/1/	DR I	*What type is the project?* ☒ Project in existing facility or utilizing existing equipment(s) The proposed project is developed at the site of SDIC Xindeng Zhengzhou Cement Co. Ltd plant. ☒ Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO_2e per year. In this case, a site visit must be performed. ☐ Project is a bundled small scale project, with each project in the bundle with emission reductions not exceeding 15,000 tCO_2e per year. In such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				☐ individual small scale project activity with emission reductions not exceeding 15 000 tCO_2e per year. In this case, DOE may not conduct a physical site visit as appropriate. ☐ Greenfield project *How was the design of the project assessed?* ☒ Physical site inspection ☒ Reviewing available designs and feasibility studies		
A.2.2	If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR I	NA. The project is developed in existing facilities.		OK
A.2.3	If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year), justify the sampling through a statistical analysis:	/1/	DR I	NA. The project is a large scale project.		OK
A.2.4	Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/ /2/ /3/ /4/ /5/	DR I	Yes. The proposed project activity involves the installation of a 9 MW Waste Heat Recovery power generation system equipped for the 4,500 tons/d new dry process cement production line. The cement production line capacity of 4500 tons/day is also confirmed by the approved Cement FSR. Project equipments included in the WHR power generation system are a generator, a steam turbine, a suspension preheater (SP) boiler and an air quenching chamber (AQC) boiler. The designated lifetime of the project equipments is 15 years. The proposed project activity reduces CO_2 emissions using waste heat generated in		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			clinker making process to produce electricity. The "WHR equipment management system manual" and the "Electricity power safe working regulations for State grid company and electric utility safe working regulations" included information for meeting and maintenance needs for the WHR plant. *The PDD description of the Project Activity does not provide information about:* *1) the total number of clinker lines present in the cement plant,* *2) if the 171 000 MWh annual comsuption is referred only to the new line that started operations in March 2008 or to the whole plant.* *3) Why is not possible to export part of the electricity produced by the project activity to the grid but all have to be consumed inside the Cement Plant .*	~~CL 1~~	
A.2.5 Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR I	Yes. The proposed project activity involves alteration of existing installation with the implementation of a 9 MW waste heat recovery power generation system. Before the PA the heat produced in the Suspension Preheater (SP) was vented to atmosphere from the Air Quecching Chamber (AQC) after having been used for drying the clinker raw materials and fuel. The Project Activity involves the installation of 2 boilers (SP boiler and AQC boiler), a steam turbine and a generator to produce electricity from the waste heat.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.2.6	Does the project design engineering reflect current good practices?	/1/ /6/ /7/	DR I	The proposed project activity involves the installation of a 9 MW Waste Heat Recovery power generation system equipped for the 4,500 tons/d new dry process cement production line. Project equipments included in the WHR power generation system are a generator, a steam turbine, a suspension preheater (SP) boiler and an air quenching chamber (AQC) boiler. The designated lifetime of the project equipments is 15 years. In the approved FSR is confirmed that the project design engineering reflect current good practice, as well as thermal and energy capacity.		OK
A.2.7	Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/ /6/ /7/ /8/	DR I	The proposed project activity produce electricity through the use of the vented waste heat produced in the clinker calcination process. The electricity generated by the project activity is 65 360 MWh per year. Domestic technology and equipments are used in the project activity. Based on the "Analysis of the utilization of pure low-temperature heat energy produced by large dry-process cement production lines" (literature) the efficiency of power generation has been determined into 21.56%. As stated in the approved FSR the operation hours of the WHR power generation system are 7600 and 100% electricity produced by the project activity is used for cement production. The approved FSR confirms that the ACQ technology, using dual pressure system which is the leading technology, can be considered in better performance than any		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			commonly used technology. The other commonly technologies are single-pressure system and flash roaster system; in the approved FSR are listed the comparison data of these three systems.		
A.3 Participation requirements (VVM para 51-54, 125-127)					
A.3.1 Do all participating Parties fulfil the participation requirements as follows:	/1/	DR	The involved parties are People's Republic of China as the host Party and France as the Annex I Party. The project participants are the SDIC Xindeng Zhengzhou Cement Co. Ltd (state-owned entity) and Orbeo. The project participants are listed in Section A.3. of the PDD and the information is consistent with the contact details provided in Annex I of the PDD.		OK
	China (host)		France (Annex I)		
a) Party has ratified the Kyoto Protocol	☒ Yes ☐ No		☒ Yes ☐ No ☐ Yes ☐ No		
b) Party has designated a Designated National Authority	☒ Yes ☐ No		☒ Yes ☐ No ☐ Yes ☐ No		
c) The assigned amount has been determined	☒ Yes ☐ No		☐ Yes ☐ No ☐ Yes ☐ No		
A.3.2 Do the letters of approval meet the following requirements?	/1/ /43/	DR	A letter of approval was issued by DNA of China on 22 September 2009 authorizing SDIC Xindeng Zhenghou Cement Co. Ltd as project participant and confirming that the project assists in achieving sustainable development. *The LoA from DNA of France is not yet available.*	~~CAR 1~~	OK
	China (host)		France (Annex I) Country Y		OK
a) LoA confirms that Party has ratified the Kyoto Protocol	☒ Yes ☐ No		☐ Yes ☐ No ☐ Yes ☐ No		
b) LoA confirms that participation is voluntary	☒ Yes ☐ No		☐ Yes ☐ No ☐ Yes ☐ No		
c) The LoA confirms that the project contributes to the	☒ Yes ☐ No		NA NA		

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
sustainable development of the host country?				~~CAR 1~~	
d) The LoA refers to the precise project activity title in the PDD			☒ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No		
e) The LoA is unconditional with respect to (a) to (d) above			☒ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No		
f) The LoA is issued by the respective Party's DNA			☒ Yes ☐ No ☐ Yes ☐ No ☐ Yes ☐ No		
g) The LoA was received directly by the DNA or the PP			☐ DNA ☒ PP ☐ DNA ☐ PP ☐ DNA ☐ PP		
h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic					
A.3.3 Have all private/public project participants been authorized by an involved Party?	/1/ /43/	DR	The letter of approval issued by the DNA of China on 22 September confirms that SDIC Xindeng Zhengzhou Cement Co. Ltd is authorized as China's participant to voluntarily participate in and carry out the project activity. *A formal letter of confirmation regarding the voluntary participation by the DNA of France is not yet available.*	~~CAR 1~~	OK
A.4 Technical description of the project activity (VVM para 58-64)					
A.4.1 Is the project's location clearly defined?	/1/ /9/	DR I	Yes. The proposed project is developed at the site of SDIC Xindeng Zhenghou Cement Co. which is located in Xuanhua Town, Denfeng City, Henan Province. The geographical coordinate is North latitude 34°23'36" and East longitude 113°14'16" and it can be confirmed by lay out figure of cement production line and WHR system.		OK
A.5 Public funding of the project activity					
A.5.1 In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of	/1/	DR	According to the Financial Analysis reported in the FSR the project will be financed by loan		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	official development assistance and is separate from and is not counted towards the financial obligations of these Parties?			(61%) and the remaining 39% with Equity.		
B Application of a baseline and monitoring methodology						
B.1	**Methodology applied (VVM para 65-76)**					
B.1.1	Does the project apply an approved methodology and the correct version thereof?	/1/ /49/	DR	Yes. The proposed project applies the approved consolidate baseline and monitoring methodology AM0024 "Baseline methodology for greenhouse gas reduction through waste heat recovery and utilization for power generation at cement plant", Version 02.1		OK
B.1.2	If applicable, has any specific guidance provided by the CDM EB in respect to the applied methodology been considered?	/1/ /50/ /51/	DR	No specific guidance has been considered.		OK
B.2	**Applicability of methodology (and tools) (VVM para 65-76)**					
B.2.1	How was it validated that project complies with the following applicability criteria 1: The electricity produced is used within the cement works where the proposed project activity is located and excess is supplied to the grid; it is assumed that there is no electricity export to the grid in the baseline scenario (in case of existing captive power plant)?	/1/ /9/ /6/ /7/ /46/	DR I	During the site visit it was checked that there was no captive power plant in the cement plant. In the approved Project FSR (page 8) and in project lay out it is indicated the 100% electricity produced by the proposed project activity will be used in the cement production plant. The expected annual electricity gross production project (65 360 MWh) represents less than 40% of the annual demand of the cement plant.		OK
B.2.2	How was it validated that project complies with the following applicability criteria 2: Electricity generated under the project activity displaces either grid electricity or from an	/1/ /6/	DR I	At page 8 of the approved FSR it is confirmed that the electricity generated under the project activity will directly displace equivalent amount		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	identified specific generation source. Identified specific generation source could be either an existing power generation source or new generation source?	/7/ /46/		of electricity imported form the CCPG.		
B.2.3	How was it validated that project complies with the following applicability criteria 3: The grid or identified specific generation source option is clearly identifiable?	/1/ /6/ /7/ /10/ /46/	DR I	The approved FSR (page 8) confirms that the delineation and the characteristics of CCPG are available. The 2009 Baseline Emission Factors for Regional Power Grids in China published on July 2009 evidenced the CCPG which is composed by Henan Province, Hunan Province, Hubei Province, Jiangxi Province, Sichuan Province and Chongqing City.		OK
B.2.4	How was it validated that project complies with the following applicability criteria 4: Waste heat is only to be used in the project activity?	/1/ /6/ /7/ /9/ /11/ /46/	DR I	The approved FSR, the Lay out figure of cement production line and WHR system, and the WHR system low chart confirm that the heat recovered from the clinker production line will be used only to generate electricity in the project activity. The amount of heat that will be recovered will cover the need to generate the electricity expected by the proposed project activity. Through the approved FSR (page 12) it is possible confirm that the amount of heat recovered will be $14360*10^4$ kJ/h and the electricity generated will be 65 360 MWh (page13-14). This represent less than 40% of the annual consumption of the cement plant.		OK
B.2.5	How was it validated that project complies with the following applicability criteria 5: In the baseline scenario, the recycling of waste heat is possible only within the boundary of the clinker making process?	/1/ /11/ /46/	DR I	According to the FSR of the cement plant the waste heat is partially recycled for drying the clinker raw materials and fuel. No other uses have been considered.		OK
B.2.6	Is the selected baseline on of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/ /46/	DR I	Yes.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.3	**Project boundary (VVM para 78-80)**					
B.3.1	What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?	/1/ /10/ /46/	DR I	Yes. The project boundary includes the facilities constructed on account of the project activity, the rotating kiln, waste heat recovery boilers (AQC and SP boilers), waste heat generator and its auxiliary facilities. The system boundary for the grid electricity system considered for determining the grid emission are all power plants connected with CCPG. The electricity system is defined according to the methodological tool "Tool to calculate the emission factor for an electricity system". The delineation and the characteristics of CCPG are available and have been published in the 2009 Baseline Emission Factors for Regional Power Grids in China. The CCPG is composed by Henan Province, Hunan Province, Hubei Province, Jiangxi Province, Sichuan Province and Chongqing City		OK
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/ /46/	DR I	Baseline: CO_2 emissions for electricity consumption by the cement plant from the CCPG. Project activity: On-site fossil fuel consumption due to the project activity. *There is not indication if there are auxiliary sources in the project activity fed with fossil fuel*	~~CL 2~~	OK
B.3.3	Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/1/ /9/ /46/	DR I	Possible CO_2 emissions for increasing the energy consumption per unit in clinker produced due to project activity have been considered in the Project Actiivity So no other emissions sources not foreseen by the methodology are involved.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4 Baseline scenario determination (VVM para 81-88, 105-107) *Ensure that the evaluation of all alternatives provided in the PDD and required by the methodology and also possible alternatives/offshoots of alternatives are discussed. Check that all alternatives required to be considered by the methodology are included in the final PDD. If baseline alternatives required to be considered by the methodology are considered not applicable, please assess the justification for this.*					
B.4.1 Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/ /46/	DR	The following baseline scenarios have been identified, and can be considered complete. (1) proposed project activity not undertaken as CDM project activity; (2) import electricity form the CCPG and venting the waste heat into the atmosphere. (3) implementation of a new 9 MW fossil fuels power plant. *A non thermal captive plant has not been considered as an alternative and the historical data presented in table B4.1 of the PDD is not reffered to two years prior the start date of the project activity (starting date is defined as 22/12/2008). as requested by the applicable methodology. In addition the units (10^4kWh) reported in table B4.1 are not correct*	~~**CAR 3**~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4.2 How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/ /46/ /12/ /13/ /14/	DR I	The baseline scenarios have been eliminated through the following steps: Step 1 – Determination of technically feasible alternatives to the project activity. 1.A. As confirmed by the China Cement Industry Association, the current use of the waste heat from kilns is vented and some is used for drying the raw materials. This is the normal use in the cement production process in the local context. Through the site visit it is possible to confirm that the project activity is located in rural area where no residential or industrial areas there are around and no other potential demands for waste heat there are. The waste heat is within the energy balance boundary of the clinker making process. The total energy entered the kilns is equal to the sum of energy adsorbed by the clinker. 1.B. The current electricity supply and demand baseline has been identified through the electricity demand of the cement works considering the other loads and the baseline electricity generation of the existing captive power plant as zero. Ex ante projection of demands is presented over the 10 years crediting period and data of 2008 have been sourced from meter records and checked through the daily electricity demand report. *The PP should describe in the PDD the verifable elements / data on which are based the following statements:* *1) the current situation in the local context*	~~CL 3~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				is that waste heat from kilns is vented to the atmosphere. *2) The recovery of the waste heat is within the energy balance boundary of the clinker making process* Step 2 – Compliance with regulatory requirements. Only Scenario (3) is not in compliance with all applicable legal and regulatory requirements. Based on the Notice on Strictly Prohibiting the Installation of fuel fired generators, the installation of generators with the capacity of 135 MW or below is prohibited. Scenarios (1) and (2) are in compliance with all applicable legal and regulatory requirements. Step 3 – Undertake economic analysis of all options that meets the regulatory requirements.		
B.4.3	What is the baseline scenario?	/1/ /46/	DR I	The baseline is determined as import of electricity from the CCPG and waste heat is vented except for a small amount used for drying raw material and fuel .		OK
B.4.4	Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/ /46/	DR	See point B.4.2	~~CL 3~~	OK
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?	/1/ /46/	DR	See point B.4.2	~~CL 3~~	OK
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic	/1/	DR	Yes.		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	trends and political aspirations?					
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Yes.		OK
B.4.8	Is the baseline determination adequately documented in the PDD? • All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity	/1/ /12/ /13/ /14/	DR I	See point B.4.2		OK
B.5	**Additionality determination. (VVM para 94-121)**					
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/ /46/ /47/	DR	In line with the approved methodology AM0024, the project additionality has been demonstrated applying the "Tool for demonstration and assessment additionality" version 05.2.		OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/ /46/ /47/ /16/	DR I	The proposed project activity had received letter of approval of EIA which demonstrates the regulatory requirements have been correctly taken into account to evaluate the project activity and the alternatives.		OK
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	Yes.		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/ /47/	DR	Project participants for demonstrating the additionality of the proposed project activity select the Investment analysis.		OK
	Prior consideration of CDM (VVM para 98-103)					
B.5.5	What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/ /17/	DR I	The project starting date for the proposed project activity is defined according to paragraph 47 of EB41 meeting report, which is on 22 December 2008 based on the turnkey contract signed by the project owner with the Zhonxin Heavy Industry Machinery Co. Ltd, as this the date "on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity".		OK
B.5.6	If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/ /18/ /19/	DR I	According to EB49 Annex 22, the project participant informed the Chinese DNA on 12 May 2009 and the UNFCCC 11 September 2009, of the commencement of the project activity. *The text in the second column of Table B5-1 in the PDD shall identify the relevant actions undertaken by the project owner in order to secure CDM status. (In fact the column title "CDM Consideration" would be more appropriate). The table should also indicate which of the reported dates is the project starting date explaining why.*	~~CL 13~~	OK
	Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)					
B.5.7	What initiatives where taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the	/1/	DR	NA. The proposed project starting date was on 22 December 2008.		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	project activity?					
B.5.8	When did the construction of the project activity start?	/1/	DR	NA.		OK
B.5.9	When was the project commissioned?	/1/	DR	NA		OK
B.5.10	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	NA		OK
	Investment analysis (VVM para 108-114)					
B.5.11	Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/	DR	The proposed project activity generated economic benefits other than CDM related income, due to the savings in electricity purchasing for the amount directly produced by the project activity.		OK
B.5.12	Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	The feasible alternative does not involve investment and this has been indicated in the PDD		OK
B.5.13	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	Option III of the methodological tool "Tool for demonstration and assessment of additionality" has been used.		OK
B.5.14	Is the benchmark/discount rate the latest available at the time of decision?	/1/ /20/	DR I	The used benchmark is the 12% for Chinese Cement Industry as based on the latest edition of Project Economic Evaluation Methods (2006) and this is the latest benchmark available at the time of the investment decision (December 2008).		OK
B.5.15	What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/ /20/ /6/	DR	The financial indicator used id the equity investment IRR (after tax) of 12% for Chinese Cement Industry. The resulting equity IRR in the		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
		/7/		investment analysis is 7.98% which lower than the selected benchmark of 12%. The benchmark selected has been determined by the national administration of the industry in China and in the approved FSR the financial projections of the project activity have also been compared against the same benchmark of 12%. *The PP has used in the financial analysis equity IRR without justifying that the project owner is the same that the owner of the cement plant.*	~~CL 4~~	
B.5.16	Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/	DR	Yes.		OK
B.5.17	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/ /6/ /7/	DR I	Yes. The income tax has been calculated taking into account the depreciation. As per the approved FSR (page 51) the depreciation year is 15 years and this is in accordance with normal accounting practice in China.		OK
B.5.18	Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/ /6/ /7/	DR I	The project lifetime is established to be 15 years and the investment analysis has bee done for the same period. Yes a 5% on the original value of fixed assets minor the original value of amortization has been taken into account a salvage value. The salvage value is 3.84 million RMB and the returned last year working capital of 1.23 Million RMB have been taken from the approved FSR (page 51) which also confirms the 15 years of project lifetime (page 51).		OK
B.5.19	When a feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between	/1/ /6/ /7/	DR I	The Feasibility Study Report was completed on October 2008 and approved on 27 November 2008. Given the short period of time between approval of the FSR and the decision to proceed		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	finalization of the FSR and the investment decision adequate?	/8/		with the project activity (starting date on 22 December 2008) it is reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project. All the input parameters used in the financial analysis have been sourced from the approved FSR and the values used in the PDD are fully consistent with the FSR.		
B.5.20	How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM version 1 paragraph 95.	/1/ /6/ /7/	DR I	☒ The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval ☐ The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) ☐ Other approach. As per the approved FSR the plant load factor is 86.76% and the operation hours are 7600. The electricity that will be generated by the proposed project activity will be 65 360 MWh and the net electricity supplied to grid will be 60 150 MWh. The difference between the gross and the net electricity is due to the rate of 7.97% of the power used to self consumption and this is included in the approved FSR.		OK
B.5.21	How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM version 1 paragraph 95.	/1/ /6/ /7/ /21/	DR I	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				The electricity tariff, sourced from the approved FSR, used in the financial analysis is 0,343 Yuan/RMB/kWh. This is based on the cement plant purchase tariff established the grid company.		
B.5.22	How were the investment costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM version 1 paragraph 95.	/1/ /6/ /7/ /22/	DR I	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements, contracts and annual financial reports related to the project and the project participants The investment accounts to 78 470 000 Yuan/RMB of which 30 670 000 Yuan RMB as equity investment and 47 800 000 Yuan RMB as short-term loan. The loan agreement was signed on December 2008 for a loan period of 5 years and loan interest of 7.83%. The total investment in the approved FSR account to 78.47 million RMB and the turnkey contract is for 76.3 million RMB; the difference is represented by the interest and the cash flow. Since the short period from the FSR approval (27 November 2008) and the investment decision (22 December 2008) it is possible assume that the data used in the financial analysis were available and valid at the time of the investment decision.		OK
B.5.23	How were the O&M costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been	/1/ /6/	DR I	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	used for cross-checking in accordance with VVM version 1 paragraph 95.	/7/		announcements and annual financial reports related to the project and the project participants *Provide details on how the O&M costs were validated:* The O&M costs are estimated to be 10 310 000 Yuan RMB/year and they includes material fees, salary, repairing fee and other fees and they have been compared with other similar projects.		
B.5.24	Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM version 1 paragraph 95.	/1/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how other input parameters were validated:*		OK
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/ /23/	DR I	Yes. The calculation in the spreadsheet has been verified and found to be correct.		OK
B.5.26	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/	DR I	A sensitivity analysis has been carried out for parameters to contributing more than 20% to revenues or costs, that is electricity supplied by the project activity, annual O&M costs, construction investment cost and electricity tariff.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/ /6/ /7/	DR I	Reasonable variations of the construction investment costs, net electricity output, electricity tariff and annual O&M costs were evidenced by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that happen. The sensitivity analysis is also included in the approved FSR.		OK
B.5.28	Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/ /60/ /26/ /27/ /28/	DR I	Construction investments. The equity project IRR reaches the benchmark of 12% if the investment costs decrease by 18.50%. Based on official statistics from the prices office of NDRC, the price index of capital goods has increased of 3.5% on year basis in 2006 and estimated to rise around to 2-3% in 2007, so it is unlikely that the costs could decrease by 18.50%. Net electricity output. The equity IRR reaches the benchmark of 12% if the annual net electricity supplied to the grid increased of 11.08%. O&M costs. The annual O&M costs should decrease by 21.64% to reach the 12% of the IRR benchmark. Based on official statistics from Ministry labour and social security the salary to the working staff increased of 12.8% and 12.7% in 2005 and in 2007 respectively. Electricity tariff. The electricity tariff should increases by 11.08% to reach the 12% of the IRR benchmark. Since the electricity tariff in China is under the strictly control of the Government and adjustment may need to be approved by the CPC Central Committee, so it is unlikely that the electricity tariff could increases by 11.08%. *The motivations given by the PP in the sensitivity*		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			analysis for demonstrating the unlikelihood of parameters variations such as to reach the benchmark, are based on data referred to the time before the investment decision date (December 2008) instead of taking into consideration real data available from the investment decision to the in September 2009 (variations in the grid tariff, variantions in price indexes, variations in cost of labour, actual loan given by the bank , etc).	~~CL 5~~	
Barrier analysis (VVM para 115-118)					
B.5.29 Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.	/1/	DR	The barrier analysis has not been adopted by the project participants.		OK
B.5.30 How were the investment barriers assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	NA		OK
B.5.31 How does CDM alleviate the investment barriers?	/1/	DR	NA		OK
B.5.32 Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	NA		OK
B.5.33 How were the technological barriers assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR	NA		OK
B.5.34 How does CDM alleviate the technological barriers?	/1/	DR	NA		OK
B.5.35 Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	NA		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.36	How were the barriers due to prevailing practise assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR	NA		OK
B.5.37	How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	NA		OK
B.5.38	Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	NA		OK
B.5.39	How were the other barriers assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	NA		OK
B.5.40	How does CDM alleviate the other barriers?	/1/	DR	NA		OK
B.5.41	Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	NA		OK
Common practice analysis (VVM para 119-121)						
B.5.42	What is the geographical scope of the common practice analysis? Is this justified?	/1/ /47/	DR I	The geographical scope chosen by the project participants for common practice analysis is the Henan Province. *No justification is available for the geographical area selected for the common practice analysis.*	~~CL 6~~	OK
B.5.43	What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/ /47/	DR I	*No justification is available for the scope of technology and size for common practice analysis*	~~CL 6~~	OK
B.5.44	What is the data source(s) used for the common practice analysis?	/1/ /12/ /29/	DR I	The data sources used for the common practice analysis are: i) Statistic data of China Cement Industry Association published in 2008 (ii) China		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
		/47/		Cement Association, published in 2007.		
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/ /12/ /29/ /47/	DR I	Based on the statistic data from the China Cement Industry Association there are 50 sets of new dry process cement clinker production in Henan Province and only 10 plants are equipping or have equipped WHR power plant by the end of 2007 and 6 among them have been registered as CDM projects. The common practice analysis has been carried out among 4 WHR projects. *From the 10 projects identified in the common practice analysis, The PP is requested to indicate better which ones have asked CDM financing (by indicating UNFCCC registration reference or the link to the UNFCCC web site) and which ones have not, showing in this last case what are the barriers that such projects are facing.*	~~CL 7~~	OK
B.5.46	How were possible essential distinctions between the project activity and similar activities assessed?	/1/ /47/	DR I	*Please refer to CL6 and CL7 raised in section B.5.42, B.5.43, B.5.45.*	~~CL 6~~ ~~CL 7~~	OK
B.5.47	What is the conclusion of the common practice analysis?	/1/ /47/	DR I	*Please refer to CL6 and CL7 raised in section B.5.42, B.5.43, B.5.45.*	~~CL 6~~ ~~CL 7~~	OK
Conclusion						
B.5.48	What is the conclusion with regard to the additionality of the project activity?	/1/	DR	Please refer to CLs raised in section B.5.	~~CL4~~ ~~CL 5~~ ~~CL 6~~ ~~CL 7~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.6	**Calculations of GHG emission reductions**					
	Data and parameters that are available at validation and that are not monitored (VVM para 199-203)					
B.6.1	How was the electricity consumption of cement works prior to project (E_{cement}) available at validation verified?	/1/ /46/	DR	Through invoices		OK
B.6.2	How was the electricity consumption of other load in the cements work complex prior to project (E_{load}) available at validation verified?	/1/ /46/	DR	*Eload is equal to zero*		OK
B.6.3	How was the grid emission factor (EF_{grid}) available at validation verified?	/1/ /46/ /48/	DR	Checking the calculation of the Grid Emission Factor excel sheet provided by the PP *In the PDD (§ 4.6.1) it is indicated that the baseline emission factor is determined ex-ante. However this is in contrast with the approved methodology AM0024 rev 2.1 which requires ex-post annual determinations of the grid emission factor.*	~~CAR 3~~	OK
B.6.4	How was the insert parameter available at validation verified?	/1/ /46/ /48/	DR	*The PP is requested to provide evidence relative to:* *1) the project commissioning data (December 2009)* *2) the actual total cost of the project activity* *3) the actual loan provided for project financing* *4) the number of annual operating hours of the cement plant in 2009.* *5) the average calculation reported in §B.6.2 of the PDD relative to: annual energy fuel consumption of clinker making; annual production of clinker and the energy consumption per unit output of clinker production. The average shall cover the period July 2009- December 2009 (project*	~~CL 12~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				implementation)		
	Baseline emissions (VVM para 89-93)					
B.6.5	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /46/ /48/	DR	According to approved methodology AM0024 baseline emissions have been calculated by multiplying the electricity supplied by the project activity to the CCPG and the combined margin CO_2 emission factor of the grid. As per the methodological tool "Tool to calculate the emission factor for an electricity system" the grid emission factor has been calculated as the weighted average of OM and BM. The weight of OM and BM are selected for the fixed crediting period as 0.5. *Please refer to section B.6.3*	~~CAR 3~~	OK
B.6.6	Have conservative assumptions been used when calculating the baseline emissions?	/1/ /46/ /48/	DR	Yes. For CM calculation, the CO2 emission factors of the coal, oil and gas fuel fired best technology for power generation in China is used as the CO2 emissions factors of the coal and gas fuel-fired power plant for BM calculation. *Please refer to section B.6.1*	~~CAR 3~~	OK
B.6.7	Are uncertainties in the baseline emission estimates properly addressed?	/1/ /46/ /48/	DR	No significant uncertainties in the baseline emissions can be addressed		OK
	Project emissions (VVM para 89-93)					
B.6.8	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /46/	DR	According to the approved methodology AM0024 the project emissions have been estimated as the difference in CO_2 emissions from use of fossil fuel in the clinker making process in cement manufacturing unit before and after the project implementation.		OK
B.6.9	Have conservative assumptions been used when calculating	/1/	DR	EI_B = pre-project energy consumption per unit of		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	the project emissions?	/30/ /46/		output of clinker in TJ/ton of clinker produced. EI_P,y = Energy Consumption of Per Ton Clinker ex post. $COEF_{fuel}$ = carbon coefficient of the coal used in the cement works tCO_2/TJ. $O_{clinker}$= clinker output of the cement works. The line monthly static data confirm monthly output of the clinker for the period June 2008/June 2009 and June 2009/Ocotber 2009, as well the monthly generated from the coal in the period of the output of clinker *The EIB was only available for one year and was calculated for the same period than the crediting period on.* *There is inconsistency between the figures provided in the PDD and that in the excel sheet of the ER calculation.*	~~CL 8~~	
B.6.10	Are uncertainties in the project emission estimates properly addressed?	/1/ /46/	DR	*Please refer to section B.6.9.*	~~CL 8~~	OK
	Leakage (VVM para 89-93)					
B.6.11	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /46/	DR	As per the approved methodology the project activity could lead leakages for construction and fuel handling. Corresponding emissions are negligible and can therefore be ignored.		OK
B.6.12	Have conservative assumptions been used when calculating the leakage emissions?	/1/ /46/	DR	Yes. No particular relevant assumption has been made		OK
B.6.13	Are uncertainties in the leakage emission estimates properly addressed?	/1/ /46/	DR	Yes. No particular uncertainties in the leakages emissions		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Emission Reductions (VVM para 89-93)					
B.6.14 Algorithms and/or formulae used to determine emission reductions: • All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.	/1/ /31/ /46/ /48/	DR	The project is expected to reduce CO_2 emissions to the extent of 512 990 tCO_2 (51 299 tCO_2/year on average) during the fixed 10-years crediting period.		OK
B.7 Monitoring plan (VVM para 122-124)					
Data and parameters monitored					
B.7.1 Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR I	The proposed project activity applied the approved monitoring methodology AM0024 version "Monitoring methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants", has been used.		OK
B.7.2 Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/ /46/	DR I	*The monitoring plan does not explicitly mention the parameters: PE_Y project emissions, EI_B energy intensity and fuel consumption.*	~~**CL 9**~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/ /46/	DR I	NCV_{coal} measured by calorimeter EF_{CO2} coal, calculated based on the monitoring records. The carbon content (C%) will be calculated. F_P is calculated based on the monitoring records. $O_{clinker}$ monitored by solid flux meter. EG energy supplied to grid monitored by electricity meter		OK
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/ /46/	DR	*The PP is requested to provide the measurement accuracy of calorimeter, solid flux meter and electricity meter.*	~~CL 10~~	OK
B.7.5	In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/ /46/	DR	Maintenance and calibration of measurement equipment is expected to be periodically. *The PP is requested to provide the frequency of maintenance and calibration of calorimeter, solid flux meter and electricity meter.*	~~CL 10~~	OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/ /46/	DR	*The monitoring frequency is not mentioned.*	~~CL 10~~	OK
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/ /46/	DR	*The recording frequency is not mentioned.*	~~CL 10~~	OK
	Ability of project participants to implement monitoring plan					
B.7.8	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR I	During the on site visit DNV checked company's infrastructure and interviewed the responsible monitoring people. DNV considers the monitoring plan feasible.		OK
B.7.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and	/1/	DR I	Yes. Procedure for data management has been established.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	how to process performance documentation)?					
B.7.10	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR I	*Procedure for quality assurance and quality control procedures are not described in the PDD (i.e. procedure for training of monitoring personnel, procedure for emergency preparedness for cases where emergencies can cause unintended emissions, procedure for identify corrective actions in order to provide for more accurate future monitoring and reporting).*	~~CL11~~	OK
B.7.11	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 I	Yes. All monitoring parameters will be kept for the whole crediting period and for two years after.		OK
	Monitoring of sustainable development indicators/ environmental impacts					
B.7.12	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/ /16/	DR I	According to the approved methodology AM0024 do not need to monitor the sustainable development indicators. Otherwise the monitoring of sustainable development indicators is not required by the DNA of China. The environmental impacts are identified in the EIA that was approved on 18 April 2008.		OK
B.7.13	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	DNA of China does not require collection and archiving of relevant data related to environmental, social and economic impacts. Environmental impacts will be monitored by local environmental authority.		OK
B.7.14	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	Yes.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
C Duration of the project activity / crediting period						
C.1.1	**Start date of project activity (VVM para 99-100, 104)**					
C.1.2	How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/ /17/ /32/	DR I	The project starting date for the proposed project activity is defined according to paragraph 47 of EB41 meeting report, which is on 22 December 2008 based on the turnkey contract signed by the project owner with the Zhonxin Heavy Industry Machinery Co. Ltd, as this the date "on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity". The construction activity started on 11 March 2009 when the project developer received the construction permission.		OK
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/ /6/ /7/	DR I	The operational lifetime of the proposed project activity is 15 years as also confirmed by the approved FSR.		OK
C.1.4	Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	*The crediting period starting date in the PDD needs to be corrected* Yes. A fixed crediting period of 10 years has been chosen starting from 1 June 2010.	~~CL 14~~	OK
D Environmental Impacts (VVM para 131-133)						
D.1.1	Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?	/1/ /15/ /16/	DR I	The Environment Protection Bureau approved the EIA on 18 April 2008.		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
D.1.2	Does the project comply with environmental legislation in the host country?	/1/ /15/ /16/	DR	Yes.		OK
D.1.3	Will the project create any adverse environmental effects?	/1/ /15/ /16/	DR	As per the results of EIA and the related approval, the proposed project activity will not cause negative impacts on the environment.		OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/ /15/ /16/	DR	Yes. The information stated in the PDD is consistent with the approved EIA. The environmental impact analysis covers the impact on air, water, noise, wastes and ecosystem.		OK
D.1.5	Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /15/ /16/	DR	Yes.		OK
D.1.6	Are transboundary environmental impacts considered in the analysis?	/1/ /15/ /16/	DR	The proposed project activity will not have any transboundary effects.		OK
E Stakeholder Comments (VVM para 128-130)						
E.1.1	Have relevant stakeholders been consulted?	/1/ /33/	DR I	Yes. From September 2007 to November 2007 the project owner asked the opinion and comments of the local stakeholders.		OK
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/ /33/	DR I	A survey of the local residents in the area closest to the SDIC plant using questionnaires was implemented. The area considered for the survey		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				was Qingshiguo village which is near to the project activity and the staff family members who lived around the project. In that village there are 1873 residents and 60 questionnaires were distributed. Only the 55 taken back have been checked. The local residents are informed by website and site visit.		
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 in accordance with such regulations/laws?	/1/	DR I	The stakeholder consultation process is not required by regulation or laws in China.		OK
E.1.4	Is a summary of the stakeholder comments received provided?	/1/ /33/	DR I	Yes. A short summary of the stakeholder comments received is described in the PDD.		OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/ /33/	DR I	No negative comments have been received on the project, therefore no necessary due account has been taken. All the questionnaires available have been checked.		OK

Table 3 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
CAR 1 *The LoA from DNA of France is not yet available.* *A formal letter of confirmation regarding the voluntary participation by the DNA of France is not yet available.*	A.3.2. A.3.3.	The application of France LoA can only be initiated with full copy of DVR delivered.	OK - France DNA Letter of Approval for SDIC Xindeng Zhengshou Cement Waste Heat Recovery Project dated 30 April 2010 **CAR 1 is closed**
CAR 2 *(1) Captive plants different from thermal plants have not been considered as an alternative in the baseline determination and (2) the historical data presented in table B.4.1 of the PDD is not referred to two years prior the start date of the project activity (starting date is defined as 22/12/2008) as requested by the applicable methodology. (3) In addition the 10^4kWh units reported in table B4.1 are not correct*	B.4.2.	1) Captive plants different from thermal plants include captive plants using renewable resources, such as wind power, hydropower, biomass resource, solar power, even geothermal power. For two reasons these options should not be considered as an alternative in the baseline determination: Firstly there are limited/no renewable resources around the cement plant. No hydraulic, geothermal and biomass resources are available, and not enough wind and solar power for building a 9MW power plant. The project activity is located in a mountainous area which can be proved by the on-site auditor, no hydraulic resource is around. And on the basis of chart ”Wind Resource Distribution of China”, the annual wind power intensity in area where the project activity is located is lower than 50 watt/m2 which clearly state that there are not enough wind resource to build a 9MW power plant. Also according to the thesis “Geothermal resource distribution, development and application in China” (http://www.crein.org.cn/view/viewnews.asp	1) OK - The consideration of the alternative and the motivations why is not feasible have now been reported in the PDD. Evidences supporting the motivations (scarcity of renewable resources in the area and large investment required) have also to be provided and verified by DNV. 2) OK – Data relative to the last years (2008 and 2009) is now reported in the PDD. 3) OK – It has been verified that the correct units have been now reported. **CAR 2 is closed**

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		x?id=20080410133557851) , (http://www.cqvip.com/onlineread/onlineread.asp?ID=29637340&SUID=EGBNBFDHDNCBCOPIBOLGEMCBCDOIPNFP) published on Electric Power Survey & Design, there are three type of geothermal resource: high temperature, medium temperature and low temperature of which only high temperature geothermal resource is used to generated power. In China, high temperature geothermal resource distributes in Tibet, Tengchong and Taiwan. Besides, it is estimated that the potential capacity of the geothermal power in Tibet area is 5 817.65MW of which only less than 30 MW are used right now which indicate that geothermal power generation is not a common practice in China. Thus geothermal resource and wind power resource and hydraulic resource are not available or not enough to build a 9 MW power plant. These options can be ruled out. Secondly, constructing a new power plant using renewable resource usually requires a lot of investment which beyond the ability of the project owner. For the Biomass Power plant option, in addition to the barrier for biomass materials collection, the investment cost is much higher According to the registered CDM project "Shandong Wudi Biomass Generation Project" (http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1185428818.84/view), the total investment is 236.74 million CNY and the installed capacity is 24MW, which the	

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		investment per unit capacity is 9.864 million CNY/MW. For another registered CDM biomass power Project "Heilongjiang Tangyuan Biomass Cogeneration Project" (http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1187227326.51/view), the total investment is 269.42 million CNY, and the installed capacity is 24MW which the investment per unit capacity is 11.226 million CNY/MW. For the project activity itself, the total investment is 78.47 million CNY, and the installed capacity is 9MW which the investment per unit capacity is 8.718 million CNY/MW. Compared to the two biomass power project above, the investment per unit capacity of the project activity is the lowest among the three projects. This has indicated that building a 9MW biomass power plant is beyond the ability of the project owner. Besides, according to the methodology AM0024 (version 02.1), "the option with the highest IRR is the baseline scenario for waste heat recovery and electricity supply to the cement works". Certainly the IRR of "Continue venting the waste heat and importing same amount electricity as the project supplied from CCPG"is the highest. Thus the option of constructing a renewable resource power plant could be ruled out. For the reasons above, captive plants different from thermal plants are not considered as an alternative in the baseline determination. The related part in PDD has been revised, please refers to sub-step 1.a B4.	

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		All references related have been provided. 2) According to page 26 of FSR, the cement plant started the construction in July 2006. It started to be operated in March 2008. Thus, only the historical data for electricity demand of the clinker production line from March 2008 to the start date of the project activity 22/12/2008 was available. This means that there is no historical data exists for year 2007. So the data presented in table B.4.1 of the PDD is not able to include up to two years prior to the start date of the project activity. Rather, the data in table B4.1 start from 2008, the same year the cement plant start to operate. 3) The 104 kWh units reported in table B4.1 has been revised in PDD.	
CAR 3- In the PDD (§ 4.6.1) it is indicated that the baseline emission factor is determined ex-ante. However this is in contrast with the approved methodology AM0024 rev 2.1 which requires ex-post annual determinations of the grid emission factor.	B.6.3 B.6.5 B.6.6	The PDD has been revised accordingly.	It is now contemplated in the PDD and the Monitoring Plan ex-post grid emission factor monitoring **CAR 3 is closed**
CL 1 *The PDD description of the Project Activity does not provide information about:* *1) the total number of clinker lines present in the cement plant,* *2) if the 171 000 MWh annual consumption is referred only to the new line that started operations in March 2008 or to*	A.2.4	1) The total number of clicker lines present in the cement plant is only one line. 2) The total 171,000MWh annual consumption is referred to the whole cement plant, with only one clinker production line installed. Please refer to paragraph 2, part A.2 in PDD. According to the FSR page 4: Installed capacity: 9MW	1) OK - The information has been included in the PDD addressing correctly the CL request 2) OK - It has been clarify that the 171 000 MWh is referred to the whole cement plant and that the difference in the gross electricity is due to the 8,6 MW installed capacity contemplated in the FSR and the 9

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
the whole plant and why the gross electricity indicated in section A.2 of the PDD is 65 360 MWh when the resulting gross electricity is 68 400 MWh (installed capacity 9 MW and the annual operating hours 7 600 h) . Please confirm that the difference between the gross production of 65 360 MWh and the net supply to the plant of 60 150 MWh is due to the consumption of the auxiliary equipment. 3) *Why all the electricity produced by the project activity have to be consumed inside the Cement Plant and why is not possible to export electricity to the grid.*		Capacity designed for project activity: 8.6 MW Annual operating hours: 7 600 h The gross electricity is calculated by 8.6 MW and 7600h which is 65 360 MWh. The difference between the gross production of 65 360MWh and the net supply to the plant of 60 150MWh is due to the self-consumption of auxiliary equipments such as cycling water pumps of the project activity. The gross electricity is equal to the self consumption of the project activity plus the net supply electricity. 3) According to page 26 of FSR, the expected annual electricity generated by project activity is 60 150MWh and the annual demand of the cement plant is 171 000MWh all of which were purchased from the grid in the absence of the project activity. The expected annual electricity generated by project activity is only about one-third of the demand of the whole cement plant. There are obviously no extra electricity could be export to the grid. What's more, transporting electricity to the grid will usually cause additional fees on installation of new equipments. Thus consuming all the electricity generated within the cement plant is the most practical and economical way for the project owner. The related part in PDD A.2 has been revised.	MW installed capacity with generators available in the market. The actual losses of the auxiliary equipment have been verified through the daily operation log. 3) OK- The information has been included in the PDD addressing correctly the CL request **CL1 is closed**
CL 2 *There is not indication if there are auxiliary sources in the project activity fed with fossil fuel*	B.3.2.	The project activity recovers the waste heat generated from the clinker production process through boilers to generate over-heated steam.	OK – Verified that the clarification relative to the non existence of fuel fed auxiliary sources have included in the PDD

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		The over-heated steam is then led to the steam turbine for power generation by the generator. Among the whole process, no auxiliary sources fed with fossil fuel are needed, but only the electricity for the operation of auxiliary equipments such as cycling pumps which is provided by the project activity. The related revision has been made in PDD A4.3.	**CL2 is closed**
CL 3 *The PP should describe in the PDD on which elements / data are based the following statements:* *1) the current situation in the local context is that waste heat from kilns is vented to the atmosphere.* *2) The recovery of the waste heat is within the energy balance boundary of the clinker making process*	B.4.2. B.4.4 B.4.5	1) The project activity is located in rural area, where no residential or industrial areas around. Besides, it is not financially attractive to transmit waste heat to the urban district due to the long distance and large investment in pipe network. So it is not applicable to utilize the waste heat as resident or industry heat source and prior to the implementation of the project activity. Most of the waste heat is vented to atmosphere without any utilization and only a small portion of waste heat is used to dry the raw material. As there are no potential demands for waste heat，waste heat from kilns is vented to the atmosphere. Please refer to PDD paragraph 3, Sub-step 1.a, Step 1, part B4. Proof provided by qingshi gou village has been provided which shows the project activity is located in qingshi gou village. There are no people living around the project in 200 meters. This has also been validated during onsite validation. And there are no cement plants around the project activity area. But in Henan province which is the project activity located,	1) OK. The motivations have been described in the PDD and accepted by DNV. 2) OK. There is only one clinker line in the cement production plant **CL3 is closed**

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		there have been ten projects which all are seeking for the help of CDM. In their cases, before the implementation of the project activity, the waste heat was vented into the atmosphere. For details, please refer to CL7. 2) The clinker production process happens in the rotary kiln which is a chemical reaction. The input of the energy of the process is provided by the combustion of the coal, and the output of the energy is used for chemical reaction and also absorbed by the raw materials and the gas. Raw mix is fed in at the upper end and the rotation of the kiln causes it gradually to move downhill to the other end of the kiln. At the other end, coal is blown in through the "burner pipe", producing a large concentric flame in the lower part of the kiln tube. As material moves under the flame, it reaches its peak temperature, before dropping out of the kiln tube into the cooler. Then the waste heat generated from the clinker making process is led to the boilers which generate over-heat stream for the production of electricity or vented to the atmosphere in the absence of the project activity. From the description above, all the waste heat recovered was from the clinker production process. Thus the recovery of the waste heat is within the energy balance boundary of the clinker production process.	
CL 4 *The PP has used in the financial analysis Equity IRR without justifying that the project owner is*	B.5.15	According to the page 49 of the FSR, the total investment of the project activity is 78.47 million CNY, among them 30.67 million CNY	OK- Verified that the ownership of the cement plant and the Project activity is the same.

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
the same that the owner of the cement plant.		was raised by the project owner which is also the owner of the cement plant. Also, the business license of SDIC has been provided which clearly states that the project owner is the same that the owner of the cement plant. The business license has been provided.	**CL4 is closed**
CL 5 *The motivations given by the PP in the sensitivity analysis for demonstrating the unlikelihood of parameters variations such as to reach the benchmark are based on data referred to the time before the investment decision date (December 2008) instead of taking into consideration real data available from the investment decision to the data in which the PDD was produced in September 2009 (variations in the grid tariff, variations in price indexes, variations in cost of labour, actual loan given by the bank , etc).*	B.5.28	The sensitivity analysis is based on data from FSR designed by China Investment and Consulting Co., Ltd. Regarding the parameters variations in the sensitivity analysis due to time gap, because the grid tariff and the loan (including loan interest) are fixed, this can be proved by purchase invoices and loan contract; the possible variation will only be the variation in price indexes and cost of labour. After taking a look at the trend of the price index of capital goods and cost of labour in China these years, it will be easy to find out that the price index of capital goods and cost of labour in China increase yearly which will only decrease the IRR. The latest statistic data available for cost of labour is 2009. But The price index of capital goods in 2009 is not available right now. The statistic data of price index of capital goods and cost of labour have also been updated into the latest available in PDD Page 18. The detail information of the trend of price index of capital goods and cost of labour please refer to: http://www.stats.gov.cn/tjsj/ndsj/2008/indexch.htm	The sensitivity analysis has been reviewed in the PDD addressing in a satisfactory way the issues raised in the CL. **CL5 is closed**

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		And other documents of information have been provided. Also the Turnkey Contract which proves the total investment and the invoices for purchasing electricity which prove the electricity tariff will be provided. The total amount in the turnkey contract is 76.30 million. The total investment of the project is 78.47 million. This is calculated as the sum of amount in the turnkey contract, interest on loan in the construction period (1.8 million) and initial (start-up) working capital (0.35 million).	
CL 6 *No justification is available for the geographical area selected for the common practice analysis.* *No justification is available for the scope of technology and size for common practice analysis.*	B.5.42 B.5.43 B.5.46 B.5.47 B.5.48	1) Henan Province is selected for the geographical area for reason below: The selected region for common practice is Henan Province, China, in which all cement plants have similar geographical environment and the same environment with respect to regulatory framework, investment climate, access to technology and financing. And the production and sales of cement are usually limited by region. The price of cement product, the receptivity of the region, the price of raw material, the salary of working staff and taxes of the project are all similar for all the projects in Henan province. As the project activity is located in Henan Province, therefore the geographical area selected for common practice analysis is Henan province. 2）All the 10 projects identified in the common practice analysis share the same technology	1) OK- Justification for the geographical area selected for the common practice analysis has been included in the PDD and accepted by DNV. 2) OK - Justification for the geographical area selected for the common practice analysis has been included in the PDD and accepted by DNV. **CL6 is closed**

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		which is pure low temperature waste heat recovery, as the same as the project activity. And the sizes of all the 10 projects identified in the common practice analysis are varied from 4.5MW to 18MW due to the difference of the production capacity of clicker line varied from 3000t/d to 10000t/d. But the ratio between the capacity of clinker lines and the capacity of project is about 500 t*MW/d. The detailed comparison of the 10 projected can be found in document" Comparison of 10 projects identified in the common practice analysis". Thus all the projects identified in the common practice analysis can be considered as being similar to the project activity for the scope of technology and size. For more information of all the 10 projects identified in the common practice analysis, please refer to the response for CL 7. The related part in PDD Page 19 has been revised.	
CL 7 *From the 10 projects identified in the common practice analysis, The PP is requested to indicate better which ones have asked CDM financing (by indicating UNFCCC registration reference or the link to the UNFCCC web site) and which ones have not, showing in this last case what are the barriers that such projects are facing.*	B.5.45 B.5.46 B.5.47 B.5.48	All the 10 projects identified in the common practice analysis have asked for CDM financing. The detail information of the link to UNFCCC web site are under below: Zhumadian Yulong Tongli Cement Co., Ltd.: http://cdm.unfccc.int/Projects/DB/TUEV-SUED1203344226.45/view Xinxiang Pingyuan Tongli Cement Co., Ltd.: http://cdm.unfccc.int/Projects/DB/TUEV-SUED1203346530.12/view	OK- The integrations have been reported by the PP in the PDD and checked by DNV. **CL7 is closed**

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		Luoyang Huanghe Tongli Cement Co., Ltd.: http://cdm.unfccc.int/Projects/DB/TUEV-SUED1203342601.93/view Henan Yuhe Tongli Cement Co., Ltd.: http://cdm.unfccc.int/Projects/DB/TUEV-SUED1203325077.19/view Henan Xichuan Cement Co., Ltd.: http://cdm.unfccc.int/Projects/DB/DNV-CUK1204744113.55/view Henan Baofeng County Cement Co., Ltd.: http://cdm.unfccc.int/Projects/DB/DNV-CUK1204739530.8/view Tianrui Group Cement Co., Ltd.: http://cdm.unfccc.int/Projects/Validation/DB/8GT9VD7GHLUB17MW7O4ETNXD5AZL77/view.html Tianrui Group Ruzhou Cement Co., Ltd.: http://cdm.unfccc.int/Projects/Validation/DB/1J1UIJ1VY8ZTJT815W9KPYJ64U7GBL/view.html Weihui City Tianrui Cement Co., Ltd.: http://cdm.unfccc.int/Projects/Validation/DB/8G1ZB5U9D8X43O3C750557R6G650KZ/view.html Henan Jinrong Cement Co., Ltd.: http://cdm.unfccc.int/Projects/Validation/DB	

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		/1FPCMWTI7YTDLFOXK35O73L1KTS42J/view.html The related footnotes have been revised in PDD.	
CL 8 *There are inconsistencies between the figures provided in the PDD and the figures in the excel sheet of the ER calculation.*	B.6.9 B.6.10	The inconsistencies between the figures provided in the PDD and that in the excel sheet of the ER calculation has been revised in the excel sheet. The revised excel has be provided.	OK – The figures in the PDD match with the figures in the ER calculation sheet. **CL8 is closed**
CL 9 *The monitoring plan does not explicitly mention the parameters: PEY project emissions, EIB energy intensity and fuel consumption. The clinker production Monitoring (section 4.2 of the PDD) does not describe:* *1) the modalities to be used in clinker production the measurement (clinker used and eventual clinker storage)* *2) if the determination of the fuel (coal) is wet or dry* *3) the frequencies the Net Calorific Value and the Carbon content of the fuel is to be determined.* *4) meters M1…M6 in the chart in section B.3 of the PDD.*	B.7.2	According to the methodology AM0024 and PDD, PEy project emissions and EIB energy intensity are calculated by the following monitored parameters: Oclinker,y annual production of clinker after project implementation; Fp,y annual fuel consumption of clinker making process after project implementation; which will be monitored by weighbridge. NCVfuel,y Calorific Value of fuel used in Clinker Production lines; EFC,fuel,y The carbon content of fuel. As PEy project emissions and EIB energy intensity are not monitored directly and are calculated by the above parameters, thus monitoring the above parameters will achieve the calculation of PEy project emissions and EIB energy intensity. The monitoring records (July 2008 to Jun 2009) of the clinker output, fuel consumption, the net calorific value (NCV) and carbon content of the fuel are used for calculating the energy	OK- The additional information has been reported in the monitor plan section of the PDD and checked by DNV **CL9 is closed**

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		consumption per unit output of clinker (EI_B). The clinker production will be measured continuously by weighbridge and the exact amount of the clinker production is determined by the clinker amount of the clinker storage and the amount monitored by weighbridge. Production of clinker= clinker storage (last month) + clinker sold (monitored by weighbridge)—clinker storage (current month) The coal monitored by weighbridge is wet. The Net Calorific Value and the Carbon content of the fuel is continuously monitored and monthly recorded. A chart of the simplified electrical diagram consists of meters M1 to M6 has been provided in PDD B7.2.	
CL 10 *The PP is requested to provide the measurement accuracy of calorimeter, solid flux meter and electricity meter.* *The PP is requested to provide the frequency of maintenance and calibration of calorimeter, solid flux meter and electricity meter.* *The frequencies and registrations of:* *1) Clinker production* *2) Fuel Consumption* *3) Net Calorific Value and the Carbon content* *Are not defined in the Monitoring Plan yet.*	B.7.4 B.7.5 B.7.6 B.7.7	Annual fuel consumption and annual clinker production are measured by weighbridge instead of solid flux meter. The related part B7.2 in PDD has been revised. And all calibration certificates of electricity meter and weighbridge have been provided. The calorimeter will be calibrated by the project owner according to the national standard GB/T212-2001 of China. The clinker production and coal is continuously monitored by weighbridge. The Net Calorific Value and the Carbon content of the fuel are continuously monitored and	OK- The additional information has been reported in the monitor plan section of the PDD and checked by DNV **CL10 is closed**

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		monthly recorded. Please refer to CL9. All the monitor frequency fit the requirement of the methodology AM0024. All data monitored will be manually or electronically recorded. The PDD has been revised	
CL 11 *Procedures for quality assurance and quality control are not described in the PDD (i.e. procedure for training of monitoring personnel, procedure for emergency preparedness for cases where emergencies can cause unintended emissions, procedure for identify corrective actions in order to provide for more accurate future monitoring and reporting).*	B.7.10	The related part B7.2 in PDD has been revised.	OK- The additional information has been reported in the monitor plan section of the PDD and checked by DNV **CL11 is closed**
CL 12- Provide evidence relative to: 1) the project commissioning data (December 2009) 2) the actual total cost of the project activity 3) the actual loan provided for project financing 4) the number of annual operating hours of the cement plant in 2009. 5) the average calculation reported in §B.6.2 of the PDD relative to: annual energy fuel consumption of clinker making; annual production of clinker and the energy consumption per unit output of clinker production. The average shall cover the period July 2009- December 2009 (project implementation)	B.6.4	1) In the former PDD, the commissioning data of the project activity is estimated on Dec 2009. Indeed, the project started its trial operation on 01/12/2009. However, the official operation started on 01/06/2010 when the grid connection contract was signed between the project participant with the Electric Power of HeNan, which is the state grid company. The grid connection contract has been provided to demonstrate this official operation date. The PDD has been revised accordingly. 2) The turnkey contract has been provided to	1) The Grid Connection Agreement has been checked by DNV 2) The Turnkey contract has been provided and checked by DNV 3) The Short term loan contract has been provided and checked by DNV 4) Operation records have been provided and checked by DNV **CL12 is closed**

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		reflect on the actual total fixed assets cost of the project activity which is 76.30 million RMB. A comparison is made to the initial estimated fixed assets cost stated on FSR page 56 Table 2 No.1.1, as follows: ▪ According to the FSR, the fixed asset cost of the proposed project activity is 76.31 million RMB This amount can be obtained by adding up the construction costs, the equipment costs, the installation costs and the design fee, the debugging fee and the training fee ▪ Therefore, by comparing the actual cost of 76.30 million RMB to the initial estimated cost of 76.31 million RMB, the difference is only 10 thousands RMB. When the actual cost of 76.30 million RMB is used to calculate the IRR without CDM revenue, it is 7.96%, and still below the benchmark. It is thus concluded that such difference will not affect the additionality of the project activity. 3) The loan contract has been provided to reflect on the actual loan of the project activity. The amount and the interest of the loan are consistent with the value in PDD which are 47.80 million and 7.83% respectively.	

Corrective action and/ or clarification requests	Ref. to Table 2	Response by project participants	Validation conclusion
		4) The annual operation hours of the cement plant in 2009 is 7179.67 hours based on Monitor Record of cement production which has been provided. The value is lower than the estimated value which is 7600 thus can be considered conservative. As the official operation date of the project activity is 01/06/2010, thus the average calculation period shall cover the period from entire July 2009 to end of May 2010. The PDD and ER sheet have been revised accordingly. The evidence related has been provided.	
CL 13 The text in the second column of Table B5-1 in the PDD shall identify the relevant actions undertaken by the project owner in order to secure CDM status. (In fact the column title "CDM Consideration" would be more appropriate). The table should also indicate which of the reported dates is the project starting date explaining why.	B.5.6	The PDD has been revised.	The PDD has been now completed in the missing parts **CL13 is closed**
CL 14 – The crediting period starting date in the PDD needs to be corrected	C.1.4	The starting date has been corrected to 01/03/2011. The PDD has been revised accordingly.	The crediting period has been now corrected in the PDD **CL14 is closed**

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants

Forward action request	Reference to Table 2	Response by project participants
NO FAR have been issued		

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Kakaraparthi Venkata Raman holds a bachelor degree (B.Tech) in Chemical Engineering and a Diploma in Management. He has an overall experience of 18 years in the Chemical Process Industry - Fertilisers and Chemicals industry (FACT). His main areas of work include a) Technical Services (for Ammonia, Urea, Co-generation thermal power plants (captive), and complex fertilizers plants)- 10 years b) Erection, commissioning and hands-on operation of state of art HTAS Ammonia plant - 4 years c) Management and operation of Sulphuric acid plant as Plant Manager- 2 years and d) two years in management Information System operation and assisting of top management in planning of operations..

While in fact he has completed the ISO14001 EMS LA course and also involved in implementation of Environmental Management Systems and in conducting internal audits.

Experience prior to joining Fertiliser industry include six months experimental work on charcoal manufacture in Karnataka Regional Engineering college.

He has experience of around 5 years in validation and verification of numerous CDM projects. His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in areas of (a) 1.1 Thermal energy generation from fossil fuels and Biomass as well as thermal electricity from solar (b) 1.2 Energy Generation from renewable energy sources (c) 5.1/4.13/11.1/12.1 Chemical Processes Industries and (d) 13.1 Waste handling and disposal.

Francisco Zamarron holds a 6 year Diploma in Civil Engineering and a 2 year post-graduated Master in Business Administration. He has an overall working experience of around 25 years.

Before joining DNV in 1996 he has worked as a Project Manager in the construction sector, Business Developer Manager in process automation sector mainly for the oil and gas industry and Management Consultant for small and medium organizations. From 1996 until 2005 he has conducted, on behalf of DNV, third party Management System Audits against ISO 9001, ISO 14001, EMAS and ISO 14044 Standards in a large spectrum of industrial and service sectors.

Since 2005 he has continued his professional carrier in DNV in the climate change field, with particular focus on the Kyoto Protocol Mechanisms, as a CDM Validator and EU ETS Service Responsible. He has managed the validation of many CDM and has carried out verifications and technical review of numerous EU ETS reports. Through his work experience, he has acquired sectoral competence within energy generation from renewable energy sources and construction.

He has also experience in providing technical environmental advisory services and verifying corporate greenhouse gas emissions; emission reductions and product carbon footprints

Rita Valoroso holds a bachelor degree in Geology and a Master in Environmental Management. She ha san overall experience of more than 20 years.

Before joining DNV in 2004 she has worked and Technical Responsible and Freelance Consultant on waste and landfill management. From 2001 she has also conducted third party Management System Audits against ISO 9001, ISO 14001 and EMAS.

Since 2005 she has continued her professional carrier in DNV in the climate changed field until her resignation in January of 2010. She has managed the validation of many CDM and has carried out verifications and technical review of numerous EU ETS reports. Through her work experience, she has acquired sectoral competence within energy generation from renewable energy sources and landfill.

Guo Kang holds a Diploma in Biochemistry. Having an overall work experience of around 13 years. Prior to joining DNV he was an auditor of Management System Standards, including ISO9001, ISO140001 and OHSAS18001 in various industries. His auditing experience also covers auditing in the fields of environmental management, energy conversation and cleaner production in various manufacturing industries. He has experience of 3 years in validation and verification of numerous

CDM projects in DNV. Through his work experience, he has acquired sectoral competence in energy generation from renewable energy sources and waste heat recovery.

Wang Ning Neil holds a Master Degree in Energy and Environment Technology. Having an overall experience of around 5 years. Prior to joining DNV having 3 years experience in cement industry covering analysis of market and technical consultancy services. He has experience of around 2 years in validation and verification of CDM projects and other 3rd party validation/verification services.
His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in cement industry.

Matteo Faggin holds a Master Degree in Business Administration and a Master Degree in Mechanical Engineering. He has an overall experience of around 8 years. Prior to joining DNV having 7 years experience in the cement, construction and aluminum industries covering industrial operations and new project implementation for cement plants, quarries, energy and thermal distribution projects.

He has experience of around 1 year in validation and verification of numerous CDM projects.
His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in Cement Industry, Electricity Distribution, Heat Distribution, Mining and Mineral processes.

Expertise in Project Management for the execution of large projects aimed at reducing the greenhouse gasses emissions and increasing the energy efficiency of manufacturing plants.

Ole Andreas Flagstad holds a Master Degree in thermodynamics/energy efficiency and has an overall working experience of around 20 years. He has worked both in public and private sector, including 5 years with a research institute (IFE) where specific responsibilities included running an energy efficiency network in the food industry and direct intervention with the industry. Other work experience includes working in European research programmes, administering national research programmes and International Energy Agency annexes.

Ole Andreas Flagstad has 4 years experience in validation and verification of projects within CDM, JI and other carbon credit schemes. His qualifications and experience in carbon credit schemes (primarily CDM and JI), qualifies him for different roles in a broad group of technical areas.

Hou Bao Jun holds a Master Degree in Applied Chemistry. Having an overall experience of around 5 years. Prior to joining DNV, having around 4 years experience in thermal power plant and about 10 months experience in chemical cleaning field. He was responsible for the normal operation of water treatment equipment and was tasked to redesign the production process to raise its efficiency. He participated in the device process design and construction. He has accumulated rich experience in the construction of the power equipment. He is also familiar with other areas of a power plant, namely the boiler system, the turbine system and the electricity system. His experience covers the fields of chemistry and energy.
His qualification, industrial experience demonstrate his sufficient sectoral competence in "Thermal Energy Generation from Fossil Fuels and Biomass including Thermal Electricity from Solar" and "Waste Handling and Disposal".