VALIDATION REPORT

ZHANGPING HONGSHI CEMENT WASTE HEAT RECOVERY PROJECT IN CHINA

REPORT NO. 2009-9143

REVISION NO. 02

DET NORSKE VERITAS

VALIDATION REPORT

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Client: Natsource Asset Management Corp.		Client ref.: Lin Keming

Project Name: Zhangping Hongshi Cement Waste Heat Recovery Project
Country: China
Methodology: AM0024
Version: 2.1
GHG reducing Measure/Technology: Waste Heat Recovery
ER estimate: 87 545 tCO_2e /year
Size
☒ Large Scale
☐ Small Scale
Validation Phases:
☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues
Validation Status
☐ Corrective Actions Requested
☐ Clarifications Requested
☒ Full Approval and submission for registration
☐ Rejected

In summary, it is DNV's opinion that the "Zhangping Hongshi Cement Waste Heat Recovery Project" in China, as described in the PDD of version 03 dated 08 November 2010, 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. DNV thus requests the registration of the project as a CDM project activity.

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Zhangping Hongshi Cement Waste Heat Recovery Project in China

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Abbreviations

AQC	Air quenching chamber
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
ECPG	East China Power Grid
EIA	Environmental Impact Assessment
EPB	Environmental Protection Bureau
FAR	Feasibility Application Report
GHG	Greenhouse gas(es)
GSP	Global Stakeholder Process
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
LoA	Letter of Approval
LOI	Letter of Intention
MP	Monitoring Plan
NCV	Net Calorific Value
NDRC	National Development and Reform Commission
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
SCE	Standard Coal Equivalent
SP	Suspension pre-heater
UNFCCC	United Nations Framework Convention on Climate Change
WHR	Waste heat recovery

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1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the "Zhangping Hongshi Cement Waste Heat Recovery Project" in China. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host country 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 United Kingdom of Great Britain and Northern Ireland. Both parties fulfil the participation criteria and have approved the project and authorized the project participants. The DNA of China has also confirmed that the project assists in achieving sustainable development.

The project correctly applies AM0024 Version 2.1:"Baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants".

By utilizing waste heat for electricity generation, the project will displace fossil fuel based grid electricity and will result 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 87 545 tCO_2e per year over the fixed crediting period of ten years. 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 methodology AM0024 has been correctly applied and the monitoring plan sufficiently provides for collection of data to determine the project's emission reductions. Adequate training and monitoring procedures have been implemented.

In summary, it is DNV's opinion that the "Zhangping Hongshi Cement Waste Heat Recovery Project" in China, as described in the PDD version 03 dated 08 November 2010 meets all relevant UNFCCC requirements for the CDM and all relevant host country criteria and correctly applies the baseline and monitoring methodology AM0024 version 2.1. DNV thus requests the registration of the project as a CDM project activity".

2 INTRODUCTION

Natsource Asset Management Corp. has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the project Zhangping Hongshi 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. The validation team has based the validation on the recommendations in the Validation and Verification Manual /8/ for project implementation and the generation of CERs.

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

3 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk Review of the Project Design Documentation

The following table outlines the documentation reviewed during the validation:

/1/ Shanghai Chuanji Investment Management Co., Ltd.: Project Design Document for the "Zhangping Hongshi Cement Waste Heat Recovery Project", version 02 of 16 December 2009 and version 03 dated 08 November 2010.

/2/ Letter of Approval issued by DNA of China in October 2008.

/3/ Letter of Approval issued by DNA of the United Kingdom of Great Britain and Northern Ireland on 11 September 2009.

/4/ China National Materials Group Corporation: Feasability Application Report (FAR) of Zhangping Hongshi Cement Waste Heat Recovery Project in July 2007 and the approval letter by Fujian Provincial Development and Reform Committee on 13 September 2007.

/5/ Fujian Provincial Chemical Engineering and Technology Research Institute: EIA on 20 August 2007 and the approval letter by Fujian Provincial Environmental Protection Bureau on 30 August 2007.

/6/ Shanghai Chuanji Investment Management Co., Ltd.: Project IRR calculation spreadsheet

/7/ Shanghai Chuanji Investment Management Co., Ltd.: ER spread sheet (including OM, BM and CM)

/8/ CDM EB: Validation and Verification Manual Version 01.2.

/9/ CDM EB: AM0024 "Baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants" (Version 2.1) dated 24 November 2008.

/10/ CDM Executive Board, Tool for the demonstration and assessment of additionality, Version 5.2

/11/ CDM Executive Board, Tool to calculate the emission factor for an electricity system, version 02

/12/ The announcement about strictly forbid the construction of the thermal power station with the installed capacity lower than 135WM published by the state council office, The General Office of the State Council [2002] No.6

/13/ China Electric Power Yearbook 2004-2008

/14/ China Energy Statistical Yearbooks 2006-2008

/15/ Chinese DNA's guidance for the determination of grid boundaries and emission factors dated 2 July 2009

/16/ CDM EB, Answer to DNV's request for deviation of Chinese project activities from AM0005, received on 1 December 2005. To be found on

http://cdm.unfccc.int/Projects/Deviations

/17/ IPCC: Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories Reference Manual.

/18/ China Planning Publisher, "Project Economical Assessment Methods and Parameters for Construction Project" version 3 (2006), p. 74

/19/ Zhangping Hongshi Cement Co., Ltd.: Board meeting minutes for serious consideration of CDM revenues to proceed with the project activity on 19 August 2007.

/20/ CDM Development Agreement on project activity between Zhangping Hongshi Cement Co., Ltd. and Shanghai Chuanji Investment Management Co., Ltd. on 25 August 2007.

/21/ LOI from Fujian Branch of Construction Bank of China for bank loan of Zhangping Hongshi Cement Waste Heat Recovery Project on 18 November 2007.

/22/ Loan contract between Zhangping Hongshi Cement Co., Ltd. and Fujian Branch of Construction Bank of China for Zhangping Hongshi Cement Waste Heat Recovery Project on 18 April 2008.

/23/ Equipment (including turbines, generators and boilers) purchase contract between Zhangping Hongshi Cement Co., Ltd. and Lanxi Huixin Trade Co. Ltd. on 30 November 2007.

/24/ Constructions start application between Zhangping Hongshi Cement Co., Ltd. and Zhejiang Baosheng Construction Co. Ltd. on 28 December 2007.

/25/ CDM Emission Reduction Purchase Agreement (ERPA) between Zhangping Hongshi Cement Co., Ltd. and Natsource Asset Management Corp. of United Kingdom of Great Britain and Northern Ireland was signed on 6 June 2008.

/26/ Fujian Longyan Power Bureau: Acceptance authorization for grid connection for Zhangping Hongshi Cement Waste Heat Recovery Project in 3 April 2009.

/27/ Zhangping Hongshi Cement Co., Ltd.: Electricity consumption in 2009 from production log.

/28/ Zhangping Hongshi Cement Co., Ltd.: Net calorific value (energy content) per mass of the coal for the year of 2008.

/29/ Zhangping Hongshi Cement Co., Ltd.: Coal analysis procedures including the water loss, residue, vaporising material, total sulphur and low calorific value in 2008.

/30/ Zhangping Hongshi Cement Co., Ltd.: Quantity of fuel consumed by clinker production lines for the year of 2008.

/31/ Zhangping Hongshi Cement Co., Ltd.: Average annual output, expressed in tonnes, of clinker for the year of 2008.

/32/ The personnel training plan for Zhangping Hongshi Cement Waste Heat Recovery Project in 2008.

/33/ The Management and Operation Manual for Zhangping Hongshi Cement Waste Heat Recovery Project in 2008.

/34/ Zhangping Hongshi Cement Co., Ltd.: 56 answered questionnaires for the stakeholder comments from 20 August to 24 August 2007.

/35/ Interim Provisions for the Administration of Power Selling Prices, China NDRC, March 28, 2005.

/36/ National Bureau of Statistics of China:
Economic and social statistics dated 28 February 2006
http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20060227_402307796.htm
Economic and social statistics dated 28 February 2007
http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20070228_402387821.htm
Social guarantee statistics dated 19 May 2005
http://www.stats.gov.cn/tjgb/qttjgb/qgqttjgb/t20050519_402250763.htm
Social guarantee statistics dated 12 June 2006
http://www.stats.gov.cn/tjgb/qttjgb/qgqttjgb/t20060609_402329458.htm
Social guarantee statistics dated 18 May 2007
http://www.stats.gov.cn/tjgb/qttjgb/qgqttjgb/t20070518_402405314.htm

/37/ National Bureau of Statistics of China:
http://www.dcement.com/Article/200701/40878.html
http://jgs.ndrc.gov.cn/jgqk/t20071023_166354.htm

/38/ Chinese Concrete Society: The advanced PC lines statistics in each province
http://www.cnrmc.com/news/list.asp?id=38768

/39/ NDRC: Policies on the Development of Cement Industry dated 2006

/40/ DEED 7.5 MW Waste Heat Recovery Power Generation Project at Long Yan
http://www.dnv.com/focus/climate_change/Upload/DEED%207.5%20MW%20Waste%20Heat%20Recovery%20Power%20Generation%20Project%20at%20Long%20Yan.pdf
Fujian Cement Inc. Fujian Cement 4# and 5# kilns Waste Heat Recovery for Power Generation Project
http://www.netinform.net/KE/files/pdf/080804_%20Fujian%20Cement_V02_GSP.pdf

/41/ China National Materials Group Corporation: Design chart for the waste heat utilization as drying energy in grinding materials from tail waste heat in April 2008.

/42/ Hangzhou Generator Co. Ltd.: Operation specifications for the WHR turbines and generators: Discount from nominal 18 MW capacity to average output of 16 MW capacity during normal operation

/43/ National Construction and Material Bureau: Project Economical Assessment details for Construction Project in construction and material industry" 1994
http://www.law-lib.com/law/law_view.asp?id=10521

/44/ The Statute of People's Republic of China on value added tax, 1 January 2009:
http://www.chinaacc.com/new/63_67_/2008_11_17_wa8088515201711180021980.shtml.

/45/ State Council, The Law of the People's Republic of China on Enterprise Income Tax, 1 January 2008.

/46/ State Council, Provisional Regulations of the People's Republic of China on City Maintenance and Construction Tax, 1985.

/47/ State Council, City construction tax and Additional education fee Policy, 1 January 1999.

/48/ State Administration of Taxation: Decree No. 70 of Guoshuifa [2003] issued on 18 June 2003

/49/ Zhangping Grid: The tariff of on-grid tariff for the purchase of electricity on 26 July 2007.

/50/ NDRC Zhangping Branch: Clarification of cement production companies installed low temperature WHR power plant up to December 2008 in Fujian Province on 24 December 2008.

/51/ Shanghai Chuanji Investment Management Co., Ltd. and Natsource Asset Management Corp.: Email communication for project activity progress dated 23 January 2008.

/52/ Shanghai Chuanji Investment Management Co., Ltd. and Natsource Asset Management Corp.: Email communication for project activity progress dated 10 October 2008.

/53/ Shanghai Chuanji Investment Management Co., Ltd. and Natsource Asset Management Corp.: Email communication for project activity progress dated 14 May 2009.

/54/ Hongshigroup, Description of new production lines 5 000tonnes/day, commissioned on 28 May 2007; and 4 500tones/day, commissioned in May 2009 respectively
http://www.hongshigroup.com/xsqy-gang.asp

/55/ Tianjin Cement Design and Research Institute Co. Ltd, The energy supply for preheating the raw material and fuel after the SP boiler, the The test analysis report for 1# and 2# clinker production lines, of 15 December 2009

/56/ Tianjin Cement Design and Research Institute Co. Ltd, The test analysis report for 1# clinker production line. Conducted by Tianjin Cement Design and Research Institute Co. Ltd, 17 September 2007

/57/ Tianjin Cement Design and Research Institute Co. Ltd, The test analysis report for 2# clinker production line. Conducted by Tianjin Cement Design and Research Institute Co. Ltd, 17 September, 2009.

/58/ Sun Guangqi, Sun Jiaxin, The design of the conditioning tower, 1 June 2007
http://www.chinacements.com/tech/showtech.asp?id=1402

/59/ EU-China Energy and Environment Programme, Energy Efficiency Component, 2009

/60/ Hangzhou Generator Co. Ltd.: Specifications for turbines and generators of the proposed project, of 11 May 2007

/61/ Zhejiang Mingda Certified Public Accounts Corporation, financial audit report, of 4 March 2010

/62/ Zhangping Hongshi Cement Co., Ltd.: The production statistics of the two lines (1#

and 2#) during the period of June 2007 and August 2010

/63/ NDRC: Development Policy of Cement Industry dated 17 October 2006
http://www.gov.cn/gongbao/content/2007/content_751770.htm

/64/ Beijing Energy Conservative Center and Austria Environment International Consultancy Center, Energy Specific Consumption for Cement sector, August 2009

/65/ Integrated Pollution Prevention and Control (IPPC) Reference Document on Best Available Techniques in the Cement and Lime
Manufacturing Industries, December 2001, http://eippcb.jrc.ec.europa.eu/pages/FActivities.htm; http://eippcb.jrc.ec.europa.eu/

/66/ IPPC Reference Document on Best available Techniques in the Cement and Lime Manufacturing Industries, Draft September 2007.
http://www.jrc.es/pub/english.cgi/d1306713/03%20Reference%20Document%20on%20Best%20Available%20Technique%20for%20the%20Cement%20and%20Lime%20Manufacturing%20Industry%20%28revised%20Draft%20one%29

/67/ Zhangping Hongshi Cement Co., Ltd. and Lanxi Huixin Trade Co. Ltd., Lump sum contract for the project, of 10 October 2007.

/68/ Fujian Development and Reformation Committee, the requires for the waste heat utilization before the WHR installation to China Cement Association, 24 February 2008

/69/ China Cement Association, China Cement yearbook (2001~2005), 2007

/70/ Chinese Building Materials Institute, Comparison of domestic and foreign cement waste heat recovery technology, June 2005

/71/ Assembly of waste heat power generation technology for cement kiln, March 2009, Page 4

/72/ Zhuang Chunlai, the waste heat recovery status and trend for cement industry in China 26 April 2007
http://hvdc.chinapower.com.cn/membercenter/eprotectioncenter/viewarticle.asp?articleid=10020328

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

- *The procedures for maintenance and calibration intervals and day-to-day records handling have been updated to reflect the requirement of the methodology.*
- *OM and BM updating to the most recent available data when PDD was webhosted on 10 June 2009.*
- *Changes made to address the issues raised in the Secretariats completeness check*

3.2 Follow-up Interviews with Project Stakeholders

On 13-15 July 2009, Johnsen from DNV performed site visit for Zhangping Hongshi Cement Waste Heat Recovery Project with project stakeholders to confirm selected information and to resolve issues identified in the document review.

Date	Name	Organization	Topic

/73/	13-15 July 2009	Lin Keming Dou Yonghua	Shanghai Chuanji Investment Management Co., Ltd.	➢ Baseline determination of the project ➢ Applicability of selected methodology AM 0024 ➢ Issues related to the additionality ➢ Common practice analysis ➢ Emission reductions calculation ➢ Emission reduction monitoring plan and project management
/74/	13-15 July 2009	Zhu Xiaoyin Xu Jing	Zhangping Hongshi Cement Co., Ltd.	➢ Information of project construction ➢ The development of WHR project in province the project located ➢ The approval status (incl. EIA approval, the feasibility study report approval, CDM project approval) ➢ Project management ➢ Emission reduction monitoring plan ➢ Consulting process for stakeholder's comments ➢ Investment risks and barriers

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 is customised for the project. The protocol shows in transparent manner 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 "Project Name" in Country 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.

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

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**), a **Corrective Action Request (CAR)** of risk or non-compliance with stated requirements or a request for **Clarification (CL)** where further clarifications are needed.*

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

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

Figure 1 Validation protocol tables

3.4 Internal Quality Control

The validation report underwent a technical review before requesting registration of the project activity. The technical review was 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/Qualification	*Last Name*	*First Name*	*Country*	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	Expert input
CDM validator/ technical team leader	Deng	Cuiping	China	√		√	√		
GHG auditor	Zhang	Xiaojun, Johnsen	China	√	√	√			√
Technical Reviewer	Flagstad	Ole A	Norway					√	

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 revised and resubmitted PDD, version 03 dated 08 November 2010.

4.1 Participation Requirements

The project participants are Zhangping Hongshi Cement Co., Ltd. of China and Natsource Asset Management Corp. of United Kingdom of Great Britain and Northern Ireland. The host party China and Annex I Party United Kingdom of Great Britain and Northern Ireland meet the requirements to participate in the CDM. Both have ratified the Kyoto Protocol and established a DNA as per the participating requirements for CDM under the Kyoto Protocol.

The letter of approval (LoA) /2/ from the DNA of China dated October 2008, authorizing Zhangping Hongshi Cement Co., Ltd. as the project participant and confirming that the project assists Chinese sustainable development.

The letter of approval (LoA) /3/ from the DNA of United Kingdom of Great Britain and Northern Ireland, authorizing Natsource Asset Management Corp. dated 11 September 2009.

DNV has received from the project participants the Letters of Approval. During the course of the validation, DNV has not found elements to question the authenticity of the letters provided by the PP and considers that the letters comply with the paragraphs 45-48 of the Validation and Verification Manual /8/.

The project does not involve public funding, and the validation did not reveal any information /21/ /22/ that indicates the project can be seen as a diversion of official development assistance (ODA) funding towards China.

4.2 Project Design

The Zhangping Hongshi Cement Waste Heat Recovery Project is located in Xiyuan village, Suilin County, Zhangping City, Fujian Province, China. The geographical coordinate is sourced from PDD /1/ and confirmed through interview with PP /74/ to be longitude 117°22´27.78″ and north latitude 25°21´6.08″.

The project activity involves generation of electricity by utilizing the waste heat from two clinker production lines with capacities of 5 000 tonnes/day, commissioned on 28 May 2007, and 4 500 tonnes/day, commissioned in May 2009 respectively /54/, owned by Zhangping Hongshi Cement Co., Ltd..

The project will generate electricity by utilizing the waste heat from SP and AQC in the clinker production lines, which in the baseline large portion of waste heat were vented to the atmosphere /4/ with a portion of the waste heat from the SP used to dry the input raw materials and fuels /41/; nevertheless, this drying practice continues by using the exhaust gas from the SP boilers, thus will not impact on the vented portion of waste heat.

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The heat contained in the exhaust gas after the SP boilers can still meet the heat demand. This was checked by reviewing the energy required by drying the raw material and fuel and the available energy coming after the SP boilers, where this energy measurement and calculation /55/ was done by Tianjin Cement Design and Research Institute Co. Ltd (TCDRI), based on circumstance of the particular kilns under normal operation condition and in compliance with the national standard 'The methods for the measuring of heat balance of cement rotary kiln (No. JC/T 733-1987 (96)' and 'Methods for the calculation of heat balance heat efficiency and comprehensive energy consumption of cement rotary kiln (No. JC/T 730-1984 (96)'. The reviewed result is shown in the following table.

The actual energy demand and energy available for preheating

NO.	Energy demand for preheating of raw material and fuel in the projects scenario	Energy demand for preheating of raw material and fuel in the baseline scenario	Energy available for preheating
1#	43.19×10^6kJ (332292 Nm^3/h,86□) /55/	47.99×10^6kJ /56/	102.86×10^6kJ (332292 Nm^3/h,205□)
2#	46.60×10^6kJ (332811 Nm^3/h,93□) /55/	49.20×10^6kJ /57/	100.51×10^6kJ (332811 Nm^3/h,200□)

The energy demand in the baseline scenario for the 1# and 2# were also performed by Tianjin Cement Design and Research Institute Co. Ltd (TCDRI), in 17 September 2007 and 17 September 2009 respectively and the results are shown in the table above.

The result shows that the energy demand for preheating the raw material in the baseline is a little bit higher than that of project scenario; which was caused by the water content changes, as stated in the test report /55/ before and after implementation of project activity, the water content of the raw materials and coal before implementation of project activity is higher than the value after the implementation. Whereas, the energy available for preheating the raw material and fuel surpass the energy demand for both the baseline and project scenarios. In the baseline scenario, the the waste heat from SP was initially cooled down to 180~200□ by the conditioning tower /58/, before it can be used to preheat raw material and fuel.

The generated power will displace part of the consumed electricity by the cement works which would be otherwise imported from ECPG /4/, which is the same as the identified baseline scenario. Historical electricity demand and consumption are validated by the validation team and substantiated from the 2007 and 2008 production register log /27/.

Domestic waste heat recovery (WHR) system /23/ will be used by the project. The WHR system (having an average 15 years operational life time) includes 4 WHR boilers of which 2 for SP (suspension pre-heater, providing the steam with 26t/h-1.25Mpa-305℃) and 2 for AQC (air quenching chamber, providing the steam with 23/h-1.25Mpa-350℃), two steam turbines and two generators. Each clinker production line is geared up with power generating facilities (one steam turbine and one generator) as the unit capacity of per designed for 9MW and actual operation average output as 8 MW

/42/, providing a total nominal capacity of 18MW, while the effective capacity of 16 MW /42/.

The physical boundary of the project includes the waste heat sources; two sets of SP and AQC boilers, two steam turbine generators, one DCS system, water cycling system and one dust-removal system.

The project activity start date was gas turbines and generator purchase contract date on 30 November 2007 and the length of crediting period is fixed 10 years, starting on 1 June 2010. The designed operation life of the project is 15 years.

After full operation in the fixed 10 years crediting period, DNV confirmed by reviewing FAR /4/ that the estimated emission reduction from power generation is 87 545 tCO_2e per year due to expected average annual net electricity delivery to clinker production lines as 111 872 MWh per year.

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 Baseline Determination

4.3.1 Applicability

The methodology AM0024 (version 2.1) "Baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants" was applied for the baseline determination. The grid emission factor is determined in accordance with Version 02 of *"Tool for calculation of emission factor for electricity systems"* /11/.

DNV was able to verify that the project meets all applicability criteria of the baseline methodologies and the applicability of this methodology is justified since:

AM0024 Application Conditions	Proposed Project Activity
The electricity produced is used within the cement works where the proposed project activity is located and excess electricity 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).	Without the proposed project, all the electricity consumed by cement plants are imported from ECPG as designed and verified from the electricity consumption from monthly production log /27/. The electricity generated by the project activity will be used inside the cement works /26/, no surplus electricity for export to the grid.
Electricity generated under the project activity displaces either grid electricity or from an identified specific generation source. Identified specific generation source could be either an existing captive power generation source or new generation source.	Electricity generated by the proposed project will displace part of the baseline power imported from ECPG /4/ and this was verified from the acceptance authorization for grid connection to the cement plants for importing grid power that will be displaced /26/.
The grid or identified specific generation source option is clearly identifiable.	The power grid boundaries clearly identified as ECPG /15/ including Zhejiang, Shanghai, Anhui, Fujian and Jiangsu Power Grid.

Waste heat is only to be used in the project activity.	The recovered waste heat is only used to generate electricity for two 9MW steam turbines and generators to supply electricity for cement production /4/ and the waste gas from SP boilers can still meet the preheat requirements /41/.
In the baseline scenario, the recycling of waste heat is possible only within the boundary of the clinker making process.	Most of waste heat in the clinker production lines is vented and a portion of the waste heat was used to heat up the incoming raw materials /41/ and fuel qualifying as the Type 1 Waste Heat Utilization, and there are no other demands for additional waste heat. The waste heat will only be used within the boundary of the clinker manufacturing process according to FSR /4/ and also confirmed from the energy balance of the two kilns /56/ /57/ and this situation was verified by validation team by onsite visit /74/.
Non-applicability Criteria	**The Project Activity**
This methodology is NOT applicable to project activities where the current use of waste heat or the identified alternative business as usual use of waste heat is located outside of the clinker making process.	The current use of waste heat or the identified alternative business as usual use is located in the clinker making process /4/ and this situation was verified by validation team by onsite visit /74/.
This methodology is NOT applicable to project activities that affect process emissions from cement plants.	The entire volume of waste heat is a by-product of the process and the project activity will not affect process emissions and no additional fuel is needed for clinker production due to proposed project /4/.

For the validation of the waste heat used in the baseline scenario within the energy balance boundary of the clinker making process, to be in line with AM0024 Version 2.1, DNV checked the specific fuel consumption of the 1# clinker line per unit output of clinker in both the baseline and the project activity (the data for period of June 2007 to August 2010 available, real start up date of the proposed project on 20 April 2009), and the result was given in the following table /62/.

Energy consumption for the first clinker production line

Production line 1 /capacity (tonnes)	$O_{Clinker,B}$ **(Tonnes)**	$Q_{fuel,B}$ **(Tonnes)**	$NCV_{fuel,B}$ **(GJ/t)**	F_B **TJ**	EI_B **specific fuel consumption per unit output of clinker** (GJ/t)
	A	**B**	**C**	**D=B×C**	**E=D/A**
Before the proposed project (June 2007 to April 2009)	1467676	240299	22.53	5414	3.69
	$O_{Clinker,y}$	$Q_{fuel,y}$	$NCV_{fuel,y}$	$F_{P,y}$	$EI_{P,y}$
	A	**B**	**C**	**D=B×C**	**E=D/A**

After the proposed project (after 20 April 2009)	1594243	243604	22.98*	5597	3.51

Energy consumption for the second clinker production line

Production line 2 /capacity (tonnes)	$O_{Clinker,B}$ **(Tonnes)**	$Q_{fuel,B}$ **(Tonnes)**	$NCV_{fuel,B}$ **(GJ/t)**	F_B **TJ**	EI_B **specific fuel consumption per unit output of clinker (GJ/t)**
	A	**B**	**C**	**D=B×C**	**E=D/A**
Before the proposed project	1467676	240299	22.53	5414	3.69
	$O_{Clinker,y}$	$Q_{fuel,y}$	$NCV_{fuel,y}$	$F_{P,y}$	$EI_{P,y}$
	A	**B**	**C**	**D=B×C**	**E=D/A**
After the proposed project	939 543	145 866	22.95*	3 347	3.56

* the difference for NCV of the two lines originate from the statistics span, the line 1 is April 2009 to March 2010, while line 2 is from June 2009 to March 2010

And the energy balance prior to the implementation of the proposed project for the 1# and 2# lines /56/ /57/ are presented in the following table.

Energy share (balance) for two kiln process,
by Tianjin Cement Design and Research Institute Co. Ltd (TCDRI)

Production Line	**Energy balance out (%) of that energy received**			
	For preheating (%)	**Vented** (%)	**Clinker formation** (%)	**Other losses** (%)
1#	6.83	32.29	49.43	11.45
2#	6.99	31.20	49.78	12.03

It can be clearly shown from the above tables above that the specific fuel consumption per unit output has decreased 4.87% and 3.52% for line 1 and line 2 respectively after the implementation of the project activity. It is because the line 1 has taken technology reform in the middle of 2009. Thus it was confirmed that the waste heat is used in the baseline scenario within the boundary of the clinker making process, and the project is so called Type 1 Waste Heat Utilization.

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.

4.3.2 Project boundary

The project boundary is defined as the waste heat source (rotating kilns, generating the waste heat of the project), heat recovery boilers (SP boilers and AQC boilers), turbines and generators and its auxiliary facilities. The system boundary for the grid electricity system considered for determining a grid emission factor is all power plants which join up with ECPG including Zhejiang, Shanghai, Anhui, Fujian and Jiangsu Power Grid.

The selected sources and gases are justified for the project activity. The emissions sources included in the project boundary are as described in the following table:

	GHGs involved	*Description*
Baseline emissions	*CO_2*	*All power plants connected to ECPG*
Project emissions	*CO_2*	*Additional increase in the energy consumption per unit in clinker production compared with the baseline scenario without the proposed project.*
Leakage		*Negligible*

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).

4.3.3 Baseline determination

In accordance with AM0024 the baseline is determined through the following steps:

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

Sub-step 1.A: Identify and list, within the local context, the current business, as usual utilization of, and options technically feasible for, waste heat utilization. Include an assessment of potential use of waste heat in the cement work.

Identification of the alternatives that normally use for waste heat in the cement production process in the local context, which would be replaced by the project activity
Most of the waste heat from SP and AQC in the clinker production process in China, as per China Cement Association /68/, is vented to atmosphere except a portion from SP end was re-circulated to pre-heat raw materials and fuels; with only a few cement processes utilised waste heat to produce power.

As to the local context, as per Fujian Development and Reformation Committee /68/, the situation is just like the practice in whole China. Only two companies, as already depicted in the common practice section in submitted PDD /1/ /50/, where “DEED 7.5 MW Waste Heat Recovery Power Generation Project at Long Yan” and “Fujian Cement 4# and 5# kilns Waste Heat Recovery for Power Generation Project”. Yet both of them have sought for the support of CDM.

Electricity demand of the cement works (E_{CEMENT}) for at least two years prior to the start date of the project activity
The proposed project has not other E_{LOAD} as stated in the FAR /4/ and this was witnessed during the on-site visit by the validator.

As stated in the Energy consumption- electricity international benchmarks in 2009, the E_{CEMENT} for cement works is in the range 71-130 kWh/t /59/ for cement Dry process, multi-stage cyclone pre-heater and pre-calciner kilns.

The cement works of the proposed project uses less E_{CEMENT} , the estimate is 92 kWh/t cement as projected in the FAR /4/.

The proposed project was webhosted on 10 June 2009, just one year after the start up and operation of the 1# cement line on 28 May 2007. So the project proponent applied the estimated electricity demand data in FAR /4/ for E_{CEMENT}.

According to the FAR /4/, the comprehensive electricity consumption of cement is based on the average level of 2005 /69/ and this projected E_{CEMENT} is 92 kWh/t cement, and the actual E_{CEMENT} is also 94.60 kWh/t cement as indicated in the following table.

E_{CEMENT} : annually estimated and actually consumed.

Year	The estimated (kWh/t, cement)	The actual (kWh/t, cement)	The actual output(10^4tonnes)	Actual Annual Demand (10^6KWh) Ecement
2007.5.28~2008.5.27(abnomal production due to initial start up)	92	94.66	103	97.5
2008.5.28~2009.4.20 (full production)		94.60	189	178.8

Thus electricity demand of the cement works two years prior to the start date of the project activity, in the form of the specific electricity consumption per unit output of the cement, which is projected as E_{CEMENT} of 92 kWh/t cement in FAR /4/, can be substantiated by the ex-post actual performance indicated in the above table. It is thus in the opinion of DNV that the projected E_{CEMENT} of 92 kWh/t cement is realistic and credible.

As it is stated from FAR /4/, design chart for the waste heat utilization in tail gas /41/ prior to the implementation of the proposed project and through the site visit /74/, DNV confirms that most of the waste heat from SP and AQC in the clinker production lines for all cement production lines was being vented to the atmosphere in the baseline scenario. Only a portion of the waste heat is re-circulated in the clinker section to heat the raw material. Hence the project activity falls into the category of Type 1 Waste Heat Utilization as per the methodology. The waste heat is also within the energy balance boundary of the clinker making process which is reflected in the specific fuel consumption of the clinker line per unit output of clinker after DNV's investigating production statistics /27/ /30/; and this was confirmed through the energy balance performed by Tianjin Cement Design and Research Institute Co. Ltd (TCDRI) /56/ /57/.

The waste heat can only be transmitted through long distance pipelines in order to reach demand side which would incur unattractive investment to project owner as the project site is located in the rural area with scattered residents and no other industrial user, the circumstance was verified through site survey by validation team /74/; hence, ruled out

the possibility of other demands for additional waste heat use that should be considered as part of the baseline.

The baseline and project scenario for waste heat recycling differs only in that the project utilises the venting part of energy released in the baseline. The drying of raw materials utilises the same portion of SP exhaust gas /41/ and is not changed from baseline to proposed project activity.

Measurements of the specific fuel consumption per unit clinker output of the clinker lines connected to the project activity before and after the project implementation would capture any change in emission resulting from this change in Type 1 waste heat flows.

Sub-step 1.B Identify and list the source of electric energy supply for cement plants, in the local context. The current and future situation of electricity demand and supply to the cement plant, where the project activity is located, should be included in the CDM-PDD in order to determine what electricity supply is likely to be displaced by the project activity.
DNV checked year 2009 production data from production records /27/, it clearly showed that all electricity consumption is sourced from the ECPG. Furthermore, in line with the methodology, the variables E_{load} and EG_{cement} indicate that the units did not have a captive power generation units in the baseline, with no other local loads. The data provided in the PDD has been verified against records /27/.

The credible and realistic alternatives are formulated which is deemed by DNV as sufficient and realistic.
Scenario 1: The project activity undertaken without being registered as a CDM project activity;
Scenario 2: Continuation of equivalent import of electricity from ECPG and venting of waste heat to atmosphere as continuation of the current situation;
Scenario 3: Implementation of a similar scale fossil fuels fired power station.
DNV considers the list of realistic and credible alternatives to be complete.

Step 2: Compliance with regulatory requirements
DNV was able to verify that the thermal power plants with installed capacity less than 135 MW are strictly prohibited /12/ in the areas that are covered under the large grids like provincial grids. It has also been verified that the non-compliance of the above mentioned law is not a common practice in China. Hence, this alternative 3 has been eliminated from further discussions.
Based on the above discussion, it has been concluded that alternatives 1 and 2 were therefore further considered.

Step 3: Undertake economic analysis of all options that meets the regulatory requirements
From the B.4.4.6, after financial analysis of the equity investment of the proposed project, the equity IRR of proposed project is 7.34% which is below the benchmark inherent to the specific sector, showing the BAU of **scenario 2,** *Continuation of equivalent import of electricity from ECPG and venting of waste heat to atmosphere as*

continuation of the current situation, is more economically attractive than the proposed project, so baseline scenario is **scenario 2.**

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 and 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.

4.4 Additionality

The project applies the "Tool for demonstration and assessment of additionality" version 5.2 /10/ 2 approved by the CDM-EB.

4.4.1 CDM consideration and continued action to secure CDM status

Starting date of the project activity

The project activity start date has been verified by DNV corresponding to turbine and generator purchasing contract dated on 30 November 2007 /23/ which the project participant has committed to expenditures related to purchase and it is the earliest date at which either the implementation or construction or real action of a programme activity begins, in compliance with the definitions of starting date shown in Paragraph 67 EB 41. And the other activities such as construction start application (signed on 28 December 2007) are later than the date of equipment purchase contract.

Awareness of the CDM prior to project's start date and the key role of CDM benefits in the investment decision was evidenced through the following chronological events:

Time Sequence	Key Word	Refer	Performing Entities
July 2007	FAR	/4/	China National Materials Group Corporation
19 August 2007	Board minutes	/19/	Zhangping Hongshi Cement Co., Ltd.
25 August 2007	CDM Agreement	/20/	Zhangping Hongshi Cement Co., Ltd. and Shanghai Chuanji Investment Management Co., Ltd.
30 November 2007	Project activity Start Date	/23/	Zhangping Hongshi Cement Co., Ltd. and Lanxi Huixin Trade Co. Ltd.

It is DNV's opinion that these events described above demonstrate that project developer was aware of CDM prior to project's start date and CDM benefits were a decisive factor in the decision to proceed with the investment.

Continuing and real actions to secure CDM status in parallel with project's implementation was evidenced through the following chronological events:

Time Sequence	Key Word	Refer	Performing Entities
23 January 2008	Communication with CER buyer	/51/	Shanghai Chuanji Investment Management Co., Ltd. and Natsource Asset Management

			Corp.
6 June 2008	ERPA	/25/	Zhangping Hongshi Cement Co., Ltd. and Natsource Asset Management Corp.
10 October 2008	Communication with CER buyer	/52/	Shanghai Chuanji Investment Management Co., Ltd. and Natsource Asset Management Corp.
14 May 2009	Communication with CER buyer	/53/	Shanghai Chuanji Investment Management Co., Ltd. and Natsource Asset Management Corp.
1 December 2008	commissioning		Zhangping Hongshi Cement Co., Ltd.
21 April 2009	Fully operation		Grid Connection Agreement
10 June 2009	GSP	/	UNFCCC
7-9 July 2009	on-site visit	/74/	DNV

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.

4.4.2 Identification of alternatives to the project activity consistent with current laws and regulations

As discussed in § 4.3 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 project IRR is 7.34% which is lower than the equity IRR return of 12% (after tax) stipulated by "*Project Economic Evaluation Methods and Parameters"*/18/. For further details please refer to the below investment analysis section of this report.

ii) Continuation of the current practice: **scenario 2,** *Continuation of equivalent import of electricity from ECPG and venting of waste heat to atmosphere as continuation of the current situation.* This alternative is in compliance with all mandatory laws and regulations in the host Country and does not involve any additional investment.

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

4.4.3 Investment analysis: Choice of approach

As the project generates economic benefits through displacement of electricity from ECPG other than CDM related income, and the alternative (Scenario 1) does not involve any investments, the choice of benchmark analysis is in line with the EB guidance and is justified.

4.4.4 Investment analysis: Benchmark selection

The waste heat used for the project is from the cement production process and the project activity is intrinsic to the production of cement. There is only one investor for the project as the project activity is affiliated to cement production lines and the electricity can not meet all the demand of current cement plant, so the financial indicator is chosen as the equity IRR (after tax). DNV was able to verify that in China, for projects involving investment in cement industry, minimum equity IRR return of 12%

(after tax) stipulated by *"Project Economic Evaluation Methods and Parameters"*/18/ issued by China Planning Publisher in 2006, latest version available at the time of the project feasibility study stage, and this benchmark is deemed reasonable and widely recommended by the industry experts and is widely used at present in China.

4.4.5 Investment analysis: Input parameters

Step 1: Assess the sources of the input parameters

DNV has verified all the input values used for the IRR calculations /6/. It has been confirmed that the input values have been sourced from the feasibility application report (FAR) /4/ which has been prepared in July 2007 by China National Materials Group Corporation, an independent design entity authorized by NDRC. The FAR is approved by Fujian Provincial Development and Reform Committee on 13 September 2007 /4/.

Step 2: Confirm that the values used in the PDD are fully consistent with the FSR (or PDR, or FAR)

It is verified that there is no inconsistency for the input parameters in the PDD (IRR spreadsheet) with the assumptions in the FAR (similar function as the FSR) /4/.

A FAR in China is required to be developed by a third party who is accredited for this task directly by the government. An approval letter of the FAR is issued by the government only after it passes the public assessment of the sector experts designated by the government. Hence, a FAR can, in our opinion, be regarded as an accurate and trustworthy report coming from a recognized entity. In context of the proposed project activity, the FAR was prepared by China National Materials Group Corporation in July 2007 who was accredited by NDRC and FAR approved by Fujian Provincial Development and Reform Committee on 13 September 2007.

Step 3: Assess the period of time between the finalization of the FSR (or PDR, or FAR) and the investment decision

The FAR of the proposed project was finalized by China National Materials Group Corporation in July 2007 /4/ which is four months prior to decision to proceed with the project activity (i.e. turbine and generator purchase contract between Zhangping Hongshi Cement Co., Ltd. and Nanjing Turbine and Motor Co. Ltd.) which was on 30 November 2007 /24/. Given this relative short period of time between finalization of the FAR 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 and that it is thus reasonable to assume that the approved FAR have been the basis of the decision to proceed with the investment in the project.

Step 4: Cross-check the parameters used in the financial analysis with the parameters used by other similar projects

According to the VVM version 01.2 paragraph 95, DNV performed the cross-check analysis from authentic documentation for other similar projects in China, shown in the table below to assess the appropriateness of the assumption in the PDR for the proposed project.

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The input parameters used in the financial analysis were compared with the data reported for other similar WHR CDM projects in China as shown in table 1, comparing the PLF, investment costs RMB per kW, percentage of O&M costs relative to total investment costs. DNV was able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.

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Table 1 Cement WHR projects (with the available data) comparison in China

No.	project	Ref No.	Installed capacity [MW]	PLF	El.gen/year [GWh]	Benchmark [%]	Tot. Investment /kW [RMB/kW]	RMB/kWh	O&M year [10^4RMB]	O&M/Inv. [%]
1	Power Generation by Waste Heat Recovery Project of Xinjiang Tianshan Cement Co. Ltd. in Urumqi City, Xinjiang Autonomous Region, P. R. China.	1696	6	0.70	36.6	08	8 982	1.47	769	14
2	Yulong Tongli WHR Project	1623	9	0.71	56.0	12	6 651	1.07	1030	17
3	Pingyuan Tongli WHR Project	1624	9	0.71	56.0	12	6 793	1.09	997	16
4	BBMG Cement WHR for 10.5 MW power generation project in Beijing	1402	10.5	0.78	72.2	12	8 844	1.29	1 940	21
5	Jiangsu Qingshi Cement Plant's Low Temperature Waste Heat Power Generation Project	1309	13.5	0.76	90.1	12	7 380	1.11	1 842	18
6	Huanghe Tongli WHR Project	1622	9	0.71	55.9	12	6 970	1.12	970	15
7	Yuhe Tongli WHR Project	1619	18	0.71	111.9	12	6 962	1.12	1 990	16
8	***Zhangping Hongshi Cement Waste Heat Recovery Project***	***/***	***18***	***0.71***	***111.9***	***12***	***8 665***	***1.39***	***2 138***	***14***
9	Inner Mongolia Wulanchabu Volan Cement Waste Heat Recovery Project	1730	17	0.69	103.1	15	8 644	1.42	452	03
10	8MW pure low temperature waste heat recovery (WHR) for power generation in SDIC Hainan Cement Co., Ltd.	1450	8	0.69	48.5	16	7 345	1.21	851	14
11	Tangshan Jidong Cement Guye District 12MW Cement Waste Heat Recovery Project	2701	12	0.64	67.7	16	7 057	1.25	1 158	14
12	Waste Heat Recovery and Utilisation for Power Generation Project of Digang Conch Cement Company Limited	1672	18.5	0.81	132.1	18	7 214	1.01	1 872	14
13	Waste Heat Recovery and Utilisation for Power Generation Project of Huaining Conch Cement Company Limited	1673	18	0.81	128.3	18	7 166	1.01	1 807	14
14	Waste Heat Recovery and Utilisation for Power Generation Project of Jiande Conch Cement Company Limited	1674	8.3	0.81	59.2	18	9 835	1.38	630	08
15	Waste Heat Recovery and Utilisation for Power Generation Project of Tongling Conch Cement Company Limited	1675	46.8	0.81	333.9	18	7 774	1.09	4 289	12
16	Waste Heat Recovery and Utilisation for Power Generation Project of Zongyang Conch Cement Company Limited	1676	33.5	0.81	239.0	18	8 047	1.13	2 847	11

By comparing the proposed project with the other similar projects, the appropriateness of the assumptions for the proposed project has been evaluated and the main input parameters are assessed by DNV as the following:

1. Total static investment

The total static investment as per FAR /4/ includes the construction, equipment purchase, installing and other relative expenses; according to the 'Investment Assessment Interim Provisions for Construction Projects in construction and materials industry' which was issued by State Bureau of Building Materials Industry in 1994 /43/.

DNV verified that total static investment is 150.29 million RMB comprising of 61.76 million RMB as equity, 41.1% of the total in FAR and PDD and IRR spreadsheet applied the same. DNV read through the FAR and confirmed that the construction cost is estimated based on the guidelines /43/ for similar size WHR projects and the installation cost is estimated based on the guidelines for installation charges of similar size projects; and the investment estimation is in compliance with "Project Economical Assessment Methods and Parameters for Construction Project" /18/ /43/.

The total investment cost per kW installed capacity is 8 665 RMB. This figure is in line with other similar WHR projects (6 651-9 835 RMB/kW) in China. And also the investment per kWh is 1.39 RMB/kWh for the proposed project, is in the range of the similar WHR projects whose RMB/kWh range is 1.07-1.47 RMB/kWh.

Moreover, the investment costs were further cross-checked against real costs. As per general contract of 10 October 2007 /67/, the actual total investment is 151 million which is higher than the estimated value 150.29 million in the FAR /5/.

Base on the above analysis, DNV can confirm that the total static investment used in the PDD is reasonable and applicable at the time of investment decision.

2. Working capital

In the FAR, the working capital is assumed as 2.615 million RMB, which is a part of equity. And this amount was fully recovered at the end of financial analysis.

3. on grid tariff

The applied tariff in PDD version 03 dated 08 November 2010 is same from FAR as 0.365 RMB/KWh (Excl. VAT), it is verified by DNV to be supported by the electricity purchase invoice 26 July 2007 /49/. This applied purchase tariff from FAR is valid and applicable at the time of the investment decision.

4. Annual Power Generation

The estimated PLF is determined in the FAR and following this the PLF is determined according to the requirements set by annex 11 of EB 48.

The designed power generation of the proposed project is 111 872 MWh, corresponding to 6 215 hours each year, corresponding to a PLF of 0.71, which can be deemed reasonable when compared with the similar WHR projects with the PLF ranging from 0.64-0.81.

5. Auxiliary consumption

The auxiliary consumption is estimated based on the experience of FAR designer. The rate of auxiliary consumption is 8% assumed in FAR /4/ and the validation team is able to cross-check with the article titled "Comparison of domestic and foreign cement

waste heat recovery technology" /70/, and confirms that for domestic (China) cement waste heat recovery power plant the auxiliary electricity rate is indicated as "<9%". In viewing the applied auxiliary electricity rate of 8% in the proposed project, it is thus confirmed that the annual supplied electricity is realistic and reliable. The net electricity delivery is 111 872 MWh after deduction 8% for the annual electricity generated which is equal to 121 600MWh.

6. Life time and operation period

According to EB's guidance on investment (EB41 Annex 45), it is reasonable to set the 15 years life time for the proposed project, as generally those boilers have a working life of 15 year /4/ which most likely will be shortened by the severe working conditions due to dust erosion. Further more form the specifications from the manufacturer; the life time is usually 10 to 15 years for steam turbine and 15 years for the boilers /60/. So it is reasonable for the FAR designer applying 15 years as the life time.

7. O&M cost

The O&M costs are fully reflected in the FAR /4/ as O&M cost covering raw material consumption, fixed cost (salary, maintenance, management, etc.), and other cost. The yearly levelized O&M cost for the proposed project is 21.38 million RMB; which accounts for 14% of total investment, DNV compared the O&M for the total investment for the proposed project with similar WHR projects in China which was uploaded in the UNFCCC system (see table 1 in chapter 4.4.5), for which the O&M cost/total investment is in the range of 3-21%. The conclusion is that it is confirmed that this 14% is reasonable in comparison with the range of 3-21% for those similar WHR projects in China in respect of the O&M per total investment.

Further investigation was also carried to break down the cost, to reveal the components of the O&M cost for the proposed project. The O&M cost consist of the following parts:

O&M cost breaking down /4/

Sub Items	RMB
Material fee	8 100 000
Salary	2 000 000
Equipmemt repair cost	3 300 000
Other O&M fee	3 640 000
Other maufacturing expense	3 500 000
Total	20 540 000

Material Fee

The estimated materials and annual consumption /4/

No.	Raw materials	Unit price (RMB /t)	Annual consumption (t)	Annual cost (RMB)
1	Anti-corrosive. corrosive inhibiter for recycling water	15 000	86	1 290 000
2	98% $Na_3Po_4.12H_2O$	3 000	140	420 000
3	NaCl	2 000	127	254 000
5	lube	82 052	22	1 805 144
6	Water	2.5	1 736 000	4 340 000

7	Sum			810 0000

Salary

35 staffs (page 28 of FAR /4/) with average annual wage and welfare of 5.71×10^4 RMB / person gives the total salary of two WHR station as $5.71*10^4*35=200*10^4$ RMB /yr.

Equipment repair cost

Repair change=fixed asset*repairing rate

Where 2% is adopted for repairing rate for two WHR Power Generator sets, fixed asset is 150.29 million RMB (page 4, FAR). Thus, the repair cost is $15029*10^4*2\%=330*10^4$ RMB.

Other O&M costs

The Other O&M costs here mean the other management fee. The other O&M management fee includes grid connection charge, labor union fee, staff training fee, labor insurance, waste emission charge, travel expense etc. According to 'the Economical Assessment and Parameters for Construction Projects' /18/ (page 97), the usual estimation method for the other management fee takes the multiple of the salary, while 1.82 is adopted as the multiple in the project with other management costs. The other management fee=salary $*1.82=200*10^4*1.82=364*10^4$ RMB.

Other manufacturing expense

Refer to page 97 of 'Economical Assessment and Parameters for Construction Projects' /18/, the other manufacturing expense is the repairing parts of the manufacture expense with deduction of the salary of the management staff, depreciation fee as well as the repair fee. Other manufacturing expense includes repair fee for buildings and houses which used for management, the office allowance, article of consumption, labor protection fees, loss on work stoppages. The usual estimation method for the other manufacturing expense takes the percentage of the original value of fixed asset (with deduction of the interest during the construction period), while 2.38% is adopted as the percentage in the project with other manufacture expense. The other manufacturing expense=(fixed asset-interest during the construction period)= $(15029-316.93)*10^4*2.38\%=350*10^4$ RMB.

The actual O&M costs in 2009 audited /61/ by Zhejiang Mingda Certified Public Account Corporation showed that the yearly annual O&M in 2009 is $2063.56*10^4$ RMB , which is higher that that ($2054*10^4$ RMB) of assumed in the FAR. Hence, the estimation of the annual O&M costs of the project is plausible, comparing with the marked prices.

8. Other cost in O&M cost

Other O&M fee includes Grid connection charge, travel expense, staff training fee, labor insurance, labor union fee and waste emission charge. Other manufacturing expense includes labor protection fee, office allowance and office supplies expense, Low-value consumption goods cost, article of consumption cost, transpotation fee,

equipment maintenance cost, and consulting expense. This can be clearly seen in the table 2.

Table 2 Break down of the other O&M fee and other manufacturing expenses

Other O&M fee	364.00
grid connection charge	335.62
labor union fee	4.00
staff training fee	5.00
labor insurance	5.88
waste emission charge	8.50
travel expense	5.00

Other manufacturing expense	350.00
Equipment maintenance Cost	180.00
labor protection cost	15.00
low-value consumption goods cost	12.00
article of consumption cost	38.00
office allowance and office supply expense	40.00
consulting expense	50.00
transportation cost	15.00

As to the rate other cost takes in the O&M cost, by comparing proposed project to that of the newly registered WHR projects of China, DNV is of opinion that, the rate assumed for the proposed project is 33.40% within the reasonable range spanning from 21.49% to 40.67% illustrated in the following table.

Table 3 Comparison of the rate that other cost takes in O&M cost with the newly registered cement plant WHR projects in China

ID No.	Project Title	O&M Cost	Other cost in O&M	The Rate other cost takes in O&M cost
	The proposed activity	***2138***	***714***	***33.40%***
1309	Jiangsu Qingshi Cement Plant's Low Temperature Waste Heat Power Generation Project	710	270	38.03%
1675	Waste Heat Recovery and Utilisation for Power Generation Project of Tongling Conch Cement Company Limited	3276	704	21.49%
1673	Waste Heat Recovery and Utilisation for Power Generation Project of Huaining Conch Cement Company Limited	1807	499	27.61%
1672	Waste Heat Recovery and Utilisation for Power Generation Project of Digang Conch Cement Company Limited	1872	612	32.69%

1674	Waste Heat Recovery and Utilisation for Power Generation Project of Jiande Conch Cement Company Limited	631	172	27.26%
1676	Waste Heat Recovery and Utilisation for Power Generation Project of Zongyang Conch Cement Company Limited	2847	1158	40.67%
1450	8MW pure low temperature waste heat recovery (WHR) for power generation in SDIC Hainan Cement Co., Ltd.	852	216	25.35%

9. Taxes

According to the current law in China, The Statute of People's Republic of China on value added tax, the VAT is defined as 17% for cement industry /44/.

The income tax of Zhangping Hongshi Cement Waste Heat Recovery Project is chosen 25% that is in line with the Law of the People's Republic of China on Enterprise Income Tax /45/.

The city construction tax is 6% for Zhangping Hongshi Cement Waste Heat Recovery Project which is derived from Provisional Regulations of the People's Republic of China on City Maintenance and Construction Tax /46/.

The education tax for Zhangping Hongshi Cement Waste Heat Recovery Project is 4% /47/.

It was checked that tax benefits from interest payments have been covered in the assessment of the income tax in line with EB guidance.

10. Residual value

The residual value of the assets is 4%, which is in line with the government document of Decree No. 70 of Guoshuifa [2003] issued by the State Administration of Taxation on 18 June 2003 /48/; and this residual value of 6.139 million RMB was refunded at the end of the financial analysis.

4.4.6 Investment analysis: Calculation and conclusion

In the calculation of Equity-IRR of the proposed project, the tariff and O&M cost are assumed unchanged through the whole analysis period, it is in compliance with *"Project Economical Assessment Methods and Parameters for Construction Project"* version 3 /18/ as both parameters are hard to predict due to unpredicted change of inflation and taking into account the same economic climate in which annual O&M cost and the tariff are changing synchronously along with the economy fluctuation, the overall impact will still remain without significant fluctuation as a result of the mutual offset of the two parameters.
Furthermore, both parameters represent the data when the project owner makes the investment decision prior to the project activity start and it is reasonable to assume the fixed O&M costs and electricity tariff in the evaluation of project viability.

The IRR calculations were provided in a spreadsheet /6/. The calculations were verified and found to be correct by DNV. The assumptions used in the calculations were deemed to be correct by DNV. The project-IRR without CDM revenues is 7.34%, which confirms that the project in the absence of CDM benefits and compared to the benchmark of 12% is not financially attractive. With CER revenues the equity IRR increases to 12.70%, this is above the benchmark.

4.4.7 Investment analysis: Sensitivity analysis

A sensitivity analysis has been carried out for parameters contributing more than 20% to revenues or costs to check the robustness of the financial analysis. Reasonable variations of the fixed investment, annual O&M cost, net annual generation and tariff were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation.

DNV was able to verify that the project IRR will touch the benchmark only if the above mentioned parameters change by values as mentioned below:

Key Indicators	***Variation of the parameter indicator needed to reach benchmark***
Fixed cost	-21.63%
Annual O&M cost	-23.46%
Tariff	12.68%
Net annual generation	12.68%

DNV was able to confirm that 21.63% decrease in investment costs is unlikely to happen, as the cost of construction, purchase of facilities and related accessories which forms the main budget of the investment. And also the upward trend of 3.5% of price indices of investment in 2006 and the anticipated increase of 2-3% in 2007 in fixed assets /37/ made this 21.63% decrease in investment cost further impossible.

Similarly, it is not realistic that the annual O&M cost decreases by 23.46% due to raw material, fuel and energy prices upward increase as 8.3%, 6.0% and 4.4% in 2005, 2006 and 2007 /36/, and also the workers' salaries up to 12.8%, 13.6 % and 12.7 % (excluding inflation) in 2005, 2006 and 2007 /36/. And this trend will not change much in the future. Therefore, it is impossible to decrease the O&M to the threshold value.

The increase of annual generation of 12.68% means that the proposed project will operate at the 8564 hours with an efficiency of 97.5% which is considered to be unrealistic when compared with the hours of a calendar year and the practical efficiency of the turbines and the generators.

Validation team from local DNV can confirm that the electricity tariff is strictly controlled by the central government, which is one of main options for the central government to counterbalance the inflation /35/. If the tariff increase 12.68%, the O&M costs will also increase in the other direction as a result of the tariff increase; thus DNV is in the opinion that 12.68% increase of the tariff will not be practical to exert the influence on the robust of the financial analysis of the proposed project.

The analysis above shows that only under very unrealistic circumstances, the IRR would reach the benchmark. Therefore, the sensitivity analysis confirms the robustness of the investment analysis and that project is not financially attractive.

In conclusion, the investment analysis and sensitivity assessment have shown that the project activity is not financially attractive.

4.4.8 Barrier analysis

Investment analysis has argued that the project is the economically less attractive without the revenue from the sale of CERs. Barrier analysis has not been considered for analysis.

4.4.9 Common practice analysis

The major difference /64/ between the non slurry (rotating kiln with pre-heaters) and other cement production processes (such as dry hollow kilns and wet kilns etc.) is the raw batch preparation and the pyrolysis process (with or without multi-stage cyclone preheaters and precalciner).

Technology advancements and energy conservation initiatives/regulations (consciousness) are the major drivers for the WHR system, to be exclusively applied to the non slurry (rotating kiln with pre-heaters) cement process; whereas the other cement production processes (such as dry hollow kilns and wet kilns etc.) has been phased out during the cement process updating over the years, and thus this is the reason to focus the common practice analysis to project activities based on non-slurry clinker production process.

- The industrial policy clearly encourages the cement production process within the non slurry clinker production process. According to the objective of the Development Policy of Cement Industry issued by NDRC (Decree 50, NDRC) in year 2006 /63/, all types of the less advanced cement processing lines in China, including dry hollow kiln and wet kiln etc., should be phased out by the end of 2008.
- WHR for electricity generation is a recently developed process; using waste heat generated from the rotating kiln process with pre-heaters. The Integrated Pollution Prevention and Control (IPPC) publish reference documents for large industrial sectors on the Best Available Techniques for those sectors. In December 2001 the first such document was published for the cement and lime manufacturing industries /65/ and there is absolutely no mention of waste heat recovery projects in that document. This demonstrates that this technology was not being implemented at all at that time in Europe. In September 2007, the IPPC published a draft revision to this reference document /66/ that mentions only one test project at the Slite cement plant in Sweden.

In respect of the waste heat recover technology, there are three kinds of power generation system in the cement industry, high temperature power generation system, low temperature generation system and power generation with Supplementary Firing system /71/. The high temperature power generation system requires the temperature of waste heat should be above 800℃ /71/ and this system is mainly used in dry hollow kilns before 1980. The power generation with supplementary firing system has been prohibited /72/. The temperature of waste heat from AQC and SP is mostly below 400□ in the advanced CP lines, so only low temperature power generation system could be used.

Thus, the common practice analysis has been conducted in the low temperature power generation system.

Common practice analysis is made on province level since projects developed within the same province are faced by similar regulatory framework and investment climate (industry strategy, electricity tariff, approval policy, commercial loan policy and taxes policy) that make them comparable.

The project is a low temperature power generation project for two new (5 000 tonnes/day, commissioned on 28 May 2007, and 4 500 tonnes/day, commissioned in May 2009 respectively /54/) dry process clinker production lines, according to policies on the development of cement industry /39/ regulated that construction of clinker production lines with a production capacity below 2000 tonnes/day is prohibited in areas which are not constrained by the market or transportation capacity. It is reasonable to select the 20 advanced PC lines /38/ operated in the Fujian province to represent as similar sample base for comparing.

The document for clarification of cement production companies which have installed low temperature WHR power plant up to December 2008 in Fujian Province by NDRC Zhangping Branch had provided the validation team information for the common practice in Fujian province and concluded that only two ('DEED 7.5 MW Waste Heat Recovery Power Generation Project at Long Yan' and 'Fujian Cement 4# and 5# kilns Waste Heat Recovery for Power Generation Project') /50/ of these 20 production lines constructed in Fujian province, had installed low temperature power generation systems; nevertheless, those two projects are both applying for CDM revenues /40/.
Therefore, the validation team confirms that the proposed CDM project activity is not common practice. In summary, it is sufficiently demonstrated that the project is not a likely a baseline scenario and that emission reductions occurring from this will hence be additional.

4.5 Monitoring

The monitoring methodology AM0024 version 2.1 is correctly applied. The project monitoring plan is in compliance with the monitoring methodology ACM0012 (version 3.2). It is DNV's opinion, that the project participant is able to implement the monitoring plan.

Monitoring of sustainable development indicators is not required by the Chinese DNA. The environmental impacts are considered minor /5/ and will be monitored by the local environmental authority during the project lifetime.

4.5.1 Parameters determined ex-ante

The following parameters are determined ex-ante and verified /28/ /30/ /31/ by DNV.

Parameters	Unit	Value applied	Source of data used
NCV_B	GJ/tonne	22.11	Net calorific value (energy content) per mass unit of the fuel consumed by the clinker production lines prior to the start of operation of the project activity /28/.

F_B	TJ	5504.19	Average annual energy (fuel) consumption for 1# clinker line prior to the start of operation of the project activity /30/.
$O_{clinker,B}$	tonnes	1 523 307.80	It is the average annual output for 1# clinker line, expressed in tonnes, of clinker prior to the start of operation of the project activity /31/.
EI_B	GJ/t	3.69	Energy consumption per unit clinker production prior to project implementation. Calculated as the following formula: $EI_B = \frac{F_B}{O_{clinker,B}}$
$OXID_{fuel}$		100%	Default value of IPCC
OM ECPG	tCO_2e/MWh	0.8825	Chinese NDRC /13/ /14/
BM ECPG	tCO_2e/MWh	0.6826	Chinese NDRC /13/ /14/
CM ECPG	tCO_2e/MWh	0.78255	Chinese NDRC /13/ /14/

4.5.2 Parameters monitored ex-post

According to AM0024 and "Tool to calculate the emission factor for an electricity system" (Version 2.1), the following data and parameters should be monitored:

Parameter	unit	Recording frequency	Data variable
$EG_{CP,Y}$	MWh	Continuously	Electricity supplied to cement plant.
$NCV_{fuel,y}$	GJ/tonne	Monitored according to *Proximate analysis of coal (D21 GB / T 212 –2001)*	Net calorific value (energy content) per mass unit of coal used in clinker making process in year *y*.
$EF_{CO2,fuel,y}$	$tCO_2/ t. m^3$	Calculation	Emission factor of coal used in Clinker production.
$Q_{fuel,y}$	tonnes	Each cargo/Weigh bridge	Consumption of coal in the clinker production lines, y.
$F_{p.y}$	TJ	Calculation	The Consumption ($Q_{fuel,y}$) and Calorific Value of coal ($NCV_{fuel,y}$) will be measured and used to calculate F_{Py}. $F_{Py} = Q_{fuel,y} \times NCV_{fuel,y}$
$O_{clinker,y}$	Tonnes	Calculation	Average annual output, expressed in tonnes, of clinker in year *y*.

PE_y and $CO_{EFfuel,y}$ are required to be calculated not measured using the formulae described in Equation 4 according to the AM 0024 (version 2.1), so the parameters are not included in the monitoring plan. However, the $CO_{EFfuel,y}$ has been described in section B 6.2, and PEy is available in section B 6.3 of the PDD.

$EI_{P,y}$, is required to be calculated not measured using formulae described in Equation 6 according to the AM 0024 (version 2.1), so it is not included in the monitoring plan.

4.5.3 Management system and quality assurance

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

The personnel training plan /32/ and management and operation manual /33/, including responsibilities and authorities for project management, procedures for monitoring and reporting, QA/QC procedures, procedures for calibration of metering equipment and training, were verified.

The project developer will establish a CDM team, the outline of which is shown in the PDD, and a project management and operation manual as described below:

The responsibility of the monitoring is clearly stated in the monitoring plan in the PDD, the workshop structure comprises of workshop manager, supervisor and branch operators to ensure the sufficient monitoring, collection, recording, archiving and trouble shooting. The role of the CDM group is to ensure that the data monitored are accurately recorded, properly archived, QA/QC procedure is timely carried out and the entire monitoring process is strictly in line with the CDM requirements. The relevant documents will be kept for at least two years after the end of the crediting period.

The electricity meters with accuracy of 0.5s will be installed in the central room to monitor the power supplied to the cement production lines. The meters will be calibrated once a year by an independent entity and within the year and under normal condition, the project owner will check the appropriateness of the meters to make sure the meters are in the reasonable accuracy range.

For the monitoring of $NCV_{fuel,y}$ and $Q_{fuel,y}$, it relies on the clinker process and the project owner will be in charge of monitoring and calibration (calibrations will be executed by independent third parties) of the meters.

4.6 Algorithms and/or formulae used to determine emission reductions

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 87 545 tCO_2 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, and 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.

4.7 Estimate of GHG Emissions

The emission reduction ER_y by the project activity during the crediting period is the difference between baseline emissions (EB_y) and the project emissions (PE_y). As there are no project emissions in the project activity (it is verified that the proposed project will not incur additional coal and other fuel /4/ for the originally operated clinker production lines as it is just usage of waste heat of the main process of clinker lines) and the leakage is zero as allowed by AM0024 version 2.1, the emission reductions are equivalent to the baseline emissions, so for the proposed project, the ER_y is expressed in the following formula.

$$ER_y = BE_y - PE_y$$

Where:

ER_y the emission reduction by the project activity in year y, expressed in tCO_2;

BE_y the baseline emissions in year *y*, expressed in tCO_2;

PE_y the project emissions due to possible fuel consumption changes in the cement kilns, of the cement works where the proposed project is located, as a result of the project activity in year *y*, expressed in tCO_2.

1) Baseline emissions:

The power generated by the project activity supplies to clinker production lines with no extra power delivery to the grid, so the baseline emissions will be calculated as:

$$EB_y = EG_{CP,y} \times EF_{Grid,y}$$

Where:

$EG_{CP,y}$ electricity supplied from the project activity to the cement plant (MWh)

EF_{Grid} emission factor of the baseline electricity ECPG (tCO_2e/MWh)

The baseline emission factor for the project is determined *ex-ante* as a combined margin, consisting of combination of the operating margin (OM) and build margin (BM) according to "tool to calculate the emission factor for an electricity system" of version 02 /11/.

The PDD was published on 10 June 2009 with the data for calculation of the grid emission factor at the time of requesting registration of the project to the latest data available, Yearbooks from 2008, showing 2007 data vintage /13/ /14/. The calculation is furthermore in accordance with the calculation of the combined margin emission factor published by the DNA of China /15/.

Aggregated generation and fuel consumption data are used due to the fact that more specific data for the power plants are not available in the ECPG (option C). Country specific data for net calorific value of each type of fossil fuel, country specific data for

emission factors for the fuel /14/, IPCC 2006 /17/ default values for the oxidation factor of each type of fossil fuel and the total electricity delivered to the ECPG /13/ were selected and deemed reasonable.

The grid emission factor of the ECPG is determined *ex-ante* for the fixed 10 years crediting period based on the most recent information available. It has been calculated as the weighted average (w_{OM} = 0.50 : w_{BM} = 0.50) of the operating margin and the build margin emission factors.

According to the data from China Electric Power Yearbook 2004-2008 /13/, the low-cost/must-run resources in the latest five years including year 2002 to 2006 constitute less than 50% of the total grid generation. Therefore, it is justified that the OM is calculated using the "simple OM" method. OM is calculated to be 0.8825 tCO_2e/MWh as a generation weighted average for the years 2005, 2006 and 2007 /13/.

Because plant specific fuel consumption and electricity generation data is not public available in China, the build margin is calculated in accordance with the EB's guidance /16/:

- Use of capacity additions from the years 2005 to 2007 is chosen and reaches 24.99% of the total installed capacity /13/;
- Use of weights estimated using installed capacity in place of annual electricity generation. Thermal power plant accounts for 95.25% of the total installed capacity additions in this period /13/. Since specific data for each technology is not available, the fraction of fuels (coal 96.98%, natural gas 2.31% and oil 0.72% /13/) was estimated from the CO_2 intensity for the fuels used in the ECPG;
- 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 /14/.

The BM is calculated to be 0.6826 tCO_2e/MWh. The resulting combined margin emission factor of 0.78255 tCO_2e/MWh, is fixed *ex-ante* for the entire first crediting period. This value is also in line with the guidance from Chinese DNA.

2) Project emissions: The project emissions (PE_y) are the difference in CO_2 emissions from use of fossil fuel in the clinker making process before and after the project implementation. $PE_y = (EI_{p,y} - EI_B) \times O_{clin\,ker,y} \times COEF_{fuel,y}$

Where:

EI_B is the pre-project energy consumption per unit output of clinker in TJ/ton of clinker produced;

$EI_{p,y}$ is the ex-post energy consumption per unit output of clinker for given year, *y*, in TJ/ton of clinker produced;

$COEF_{fuel,y}$ is the carbon coefficient (tCO_2/TJ of input fuel) of the fuel used in the cement works in year *y* to raise the necessary heat for clinker production;

$O_{Clinker}y$ is the clinker output of the cement works in a given year *y*.

For the proposed project, there is no extra fuel needed for the clinker process in its designed FAR /4/ verified by DNV, assumption of $EI_{p,y} = EI_B$ in PDD for simplification is justified and the ex-post energy consumption per unit output of clinker was monitored

to update the project emission in case of occurrence of real difference for the energy consumption before and after the implementation of the proposed project.

As assessed the equation and parameters in the PDD, AM0024 Version 2.1 and *Tool to calculate the emission factor for an electricity system (version 02)*, the annual electricity delivered to the ECPG is expected to 111 872 GWh /4/. Hence, the total emission reductions from the project are estimated to be on the average 87 545 tCO_2e per year over the fixed 10 years crediting period. The baseline emission estimate can be replicated using the data and parameter values provided in the PDD and supporting files submitted for registration. The data sources mentioned have been verified by DNV.

In summary, the GHG calculations are complete and transparent, and the data accuracy has been verified.

4.8 Environmental Impacts

An environmental impact assessment (EIA) /5/ was conducted according to Chinese law & regulation. The potential environmental impacts have been sufficiently identified and are sufficiently documented in the PDD. The air impact, acoustical impact, waste water treatment method, solid waste and ecology system impact have been fully addressed in the PDD in consistence with the EIA assessment and no significant environmental impacts are envisaged in the project activity based on EIA. The Fujian Provincial Environmental Protection Bureau approved the EIA of the project on 30 August 2007 /5/.

4.9 Comments by Local Stakeholders

Zhangping Hongshi Cement Co., Ltd. carried out a survey of the potential stakeholders, mainly staffs and local residents of the most affected group. 56 questionnaires are distributed among the staffs and residents /34/ on 20 August 2007.

There were no adverse comments on the project activity, though some concerns are raised on noise pollution during the construction period and water pollution during operation phase. The project owner will adopt appropriate and necessary actions to assure the environmental issues raised in EIA and by stakeholders are properly addressed. DNV considers the local stakeholder consultation carried out adequately.

4.10 Comments by Parties, Stakeholders and NGOs

The PDD of Version: 01 dated 13 May 2009 was made publicly available on UNFCCC website (http://cdm.unfccc.int/Projects/Validation/DB/2D8WL2XC2E4D7PB1S9J7I843KOHLC2/view.html) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 10 June 2009 to 09 July 2009.

No comments were received.

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	~~CAR 1~~ 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

Requirement	Reference	Conclusion
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 that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK
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		OK
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	CDM Modalities and Procedures §45c,d	OK

Requirement	Reference	Conclusion
and taking into account relevant national and/or sectoral policies and circumstances.		
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK
19. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	~~CL 5~~ ~~CL 6~~ ~~CL 7~~ OK

Table 2 Requirements Checklist

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	/1/ /4/	DR I	The Zhangping Hongshi Cement Waste Heat Recovery Project is located in Xiyuan village, Suilin County, Zhangping City, Fujian Province, China. The geographical coordinate is sourced from PDD /1/ and confirmed through interview with PP /74/ to be longitude 117°22´27.78″ and north latitude 25°21´6.08″. The spatial extent of the project boundary comprises the waste heat sources, heat recovery and power generating equipment, and the power plants connected physically to ECPG that the proposed project activity will affect.		OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/ /4/	DR I	The projects system boundaries are clearly defined through the description in the PDD, which include waste heat sources (SP and AQC), WHR boilers (SP boilers and AQC boilers), steam turbine generators, the auxiliaries and all power plants physically connected to East China Power Grid. East China Power Grid includes Zhejiang Power Grid, Shanghai Power Grid, Anhui Power Grid, Fujian Power Grid, and Jiangsu Power Grid.	~~CL 1~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Clarification is requested for gross electricity generation by the proposed project, and further justification for difference between gross electricity and net delivery to the clinker production lines. Clarification is requested for the commissioning date of two cements lines and actual implementation status of those two WHR power stations, for example, construction, and commissioning and electricity generation.		
A.2. Participation Requirements (VVM para 51-54, 125-127) *Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.*					
A.2.1. Which Parties and project participants are participating in the project?	/1/ /2/ /3/	DR	China and United Kingdom of Great Britain and Northern Ireland are the two Parties participating in the proposed project activity. China is hosting the project and United Kingdom of Great Britain and Northern Ireland is the Annex I Party. The project participants are Zhangping Hongshi Cement Co., Ltd., from the host country, China and Natsource Asset Management Corp. from United Kingdom of Great Britain and Northern Ireland.		OK
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all	/1/	DR	The letters of approval from the DNA of China has been obtained in October 2008;	~~CAR 1~~	OK

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private/public project participants been authorized by an involved Party?	/2/ /3/		LoA United Kingdom of Great Britain and Northern Ireland is 11 September 2009. The written approval of voluntary participation from the designated national authority of United Kingdom of Great Britain and Northern Ireland was not received.		
A.2.3. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	/1/ /2/ /3/	DR	China has ratified in Kyoto Protocol on 30 August 2002, and established a DNA; National Development and Reform Commission of the People's Republic of China. DNA of United Kingdom of Great Britain and Northern Ireland: The Department for Environment, Food and Rural Affairs on ratification of the Kyoto Protocol on 31 May 2002.		OK
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/ /4/	DR	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 the China.		OK
A.3. Technology to be employed (VVM para 58-64) *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					
A.3.1. Does the project design engineering reflect current good practices?	/4/	DR	The project design engineering reflects current good practices. The project will generate power by utilizing waste heat, which is produced in the clinker production process,		OK

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			and which will otherwise be emitted into air directly.		
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/ /4/	DR I	The project will use domestic WHR technology, with DCS controlling system imported.		OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/	DR I	The training is planned properly, as described in the PDD.		OK
A.4. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	/1/ /2/	DR	Yes, this was confirmed in the LoA issued by DNA of China.		OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/ /4/ /5/	DR	Yes. The project will, among others benefits, mitigate local environmental pollution caused by coal-fired power plants and create local employment opportunity.		OK
B. Project Baseline (VVM para 65-76 and VVM para 136 (b) for small-scale project activities, as applicable) *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Does the project apply an approved methodology and the correct version thereof? (VVM para 65-	/1/	DR	Yes, the project correctly applies the methodology AM0024 "Baseline		OK

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76)	/9/		methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants", Version 2.1.		
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled? (VVM para 78-80)	/1/ /9/	DR	All the applicability criteria were discussed in the PDD. ● Without the proposed project, all the electricity consumed by clinker production lines is imported from ECPG. The electricity generated by the project activity will be used inside the cement works /26/, no surplus electricity for export to the grid. Justification is requested for historical and projected supply and demand in table B-4-1 in PDD at least 2 years prior to the starting date of the project activity as of 18 November 2007, meaning that 2005 and 2006 data should be provided. And also after this project is operated, the projected power from grid will be decreased. ● Electricity generated by the proposed project will displace part of the baseline power imported from ECPG /4/ /26/. ● The power grid boundaries clearly identified as ECPG including Zhejiang, Shanghai, Anhui, Fujian and Jiangsu Power Grid. ● The recovered waste heat is only used to generate electricity for two 9MW steam turbine generators to supply electricity for cement production /4/ and the waste gas from SP boilers can still meet the preheat requirements /41/.	~~CAR 2~~	OK

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			● Most of waste heat in the clinker production lines is vented and a portion of the waste heat was used to heat up the incoming raw materials and fuel-so called Type 1 Waste Heat Utilization, and there are no other demands for additional waste heat. The waste heat will only be used within the boundary of the clinker making process /4/ /74/. ● The current use of waste heat or the identified alternative business as usual use is located in the clinker making process /4/ /74/. ● The entire volume of waste heat is a by-product of the process and the project activity will not affect process emissions.		
B.2. Baseline Scenario Determination (VVM para 81-88, 105-107) *The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.*					
B.2.1. What is the baseline scenario?	/1/ /9/	DR	The baseline scenario is determined as "Continuation of equivalent import of electricity from ECPG".		OK
B.7.1. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/ /9/	DR	Except for the baseline scenario as defined in the following Scenario 1, two other scenarios have been considered: Scenario 1: The project activity undertaken without being registered as a CDM project activity; Scenario 2: Continuation of equivalent import of electricity from ECPG; Scenario 3: New fossil fuel (coal/diesel/gas)		OK

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			based captive power plant. The selected scenario was chosen as the most likely one as the following reasons: a. Scenario 1 are not realistic as the scenario is not economically feasible, referring to the details in the additionality analysis. Scenario 3 does not comply with the Chinese power regulations, "fuel-fired power plants with an installed capacity less than 135MW are prohibited in the areas covered by large grids.		
B.2.2. Has the baseline scenario been determined according to the methodology?	/1/ /9/	DR	The baseline scenario was determined according to the requirements in AM0024 by following steps. **Step 1: Determination of technically feasible alternatives to the project activity** **Sub-step 1.A: Identify and list, within the local context, the current business, as usual utilization of, and options technically feasible for, waste heat utilization. Include an assessment of potential use of waste heat in the cement work.** As it is stated from FAR /4/ and through the site visit, DNV confirmed that the most of the waste heat from SP and AQC in the clinker production lines is vented to the atmosphere and a portion is re-circulated to heat up the raw material which falls into the so called Type 1 Waste Heat Utilization; The waste heat is within the energy balance boundary of the clinker making process which is reflected	~~CAR 2~~	OK

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			in the specific fuel consumption of the clinker line per unit output of clinker after DNV's investigating production statistics /27/ /30/. No civil and industrial demand for the waste heat as in the vicinity of the project site, there are no residents and industrial facilities around the project location which was verified through site survey by validation team /74/, this ruled out the possibility of other demands for additional waste heat use that should be considered as part of the baseline; **Sub-step 1.B Identify and list the source of electric energy supply for cement plants, in the local context. The current and future situation of electricity demand and supply to the cement plant, where the project activity is located, should be included in the CDM-PDD in order to determine what electricity supply is likely to be displaced by the project activity.** From the two years (2007-2008) data /27/, it is demonstrated that electricity consumption all came from local grids to substantiate that no other local loads and existing captive power plant in cement plants. Justification is requested for historical and projected supply and demand in table B-4-1 in PDD at least 2 years prior to the starting		

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			date of the project activity as of 18 November 2007, meaning that 2005 and 2006 data should be provided. And also after this project is operated, the projected power from grid will be decreased. the baseline options for electricity are listed below: - Supply from grid; - Supply from existing capacity or in case of increase of energy demand expansion of captive power generation source, if one exists: and - Construction of a captive plant with different fuel options if electricity demand is increasing. The credible and realistic alternatives are formulated which is deemed by DNV as sufficient and realistic. **Scenario 1:** The project activity undertaken without being registered as a CDM project activity; **Scenario 2:** Continuation of equivalent import of electricity from ECPG and venting of waste heat to atmosphere as continuation of the current situation; **Scenario 3:** Implementation of a similar scale fossil fuels fired power station. **Step 2: Compliance with regulatory requirements** DNV was able to verify that the thermal power plants with installed capacity less than 135 MW are strictly prohibited /12/ in the		

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			areas that are covered under the large grids like provincial grids. It has also been verified that the non-compliance of the above mentioned law is not a common practice in China. Hence, this alternative 3 has been eliminated from further discussions.		
B.2.3. Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	The baseline scenario was determined using conservative assumptions where possible.		OK
B.2.4. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /4/	DR	Yes. The sectoral policy and development trends in cement sectors have been taken into account.		OK
B.2.5. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	The baseline scenario determination compatible with the available data and are all literature and sources clearly referenced.		OK
B.2.6. Have the major risks to the baseline been identified?	/1/	DR	There are no significant risks.		OK
B.3. Additionality Determination (VVM para 94-121 and VVM para 137 for small-scale project activities, as applicable) *The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.*					
B.3.1. Is the project additionality assessed according to the methodology? **(VVM para 98-103) (VVM para 108-114) (VVM para 115-118) (VVM para 119-121)**	/1/ /4/ /6/ /18/	DR I	The project additionality is demonstrated by applying the "Tool for the demonstration and assessment of additionality" version 5.2. /10/ The Tool to calculate the emission factor for	~~CL 2~~ ~~CL 3~~ ~~CAR 3~~	OK

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			an electricity system (Version 02) should be adopted as appropriate. Step1. Identification of alternatives to the project activity consistent with current laws and regulations *Sub-step1a. Define alternatives to the project activity:* See B.2.2. For the baseline determination. *Step 2: Investment analysis.* As the project generates economic benefits through the sales of electricity other than CDM related income and the alternative does not involve any investments, benchmark analysis (Option III) is justified to conduct the investment analysis. The waste heat used for the project is from the cement production process and the project activity is intrinsic to the production of cement. There is only one investor for the project as the project activity is affiliated to cement production lines and the electricity the proposed project generated can not meet all the demand of current cement plant, so the financial indicator is chosen as the equity IRR (after tax). DNV was able to verify that in China, for projects involving investment in cement industry, minimum return of 12% (after tax) stipulated by "*Project Economic Evaluation Methods and Parameters"*/18/ issued by China Planning Publisher in 2006		

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			can be expected and this benchmark is deemed reasonable and widely recommended by the industry experts and is widely used at present in China. Concerning financial analysis, clarification is required as following: Urban construction maintenance taxes is 6% and surtax for education expenses is 4% in FAR while they are 4% and 6% respectively in PDD; Line 39 in IRR without CDM, is this item "Original value of fixed assets" or sth. else? Line 80 "Retrieved circulating funds? Why put this item at the end of the financial analysis? Give the breakdown of Other O&M fee and other manufacturing expense Clarification is requested for the invoice of the tariff before 18 November 2007 to cross check the tariff assumed in PAR. ● According to EB 51, Annex 51, **GUIDELINES ON THE ASSESSMENT OF INVESTMENT ANALYSIS, version 3,** concerning in cases where a post-tax benchmark is applied the DOE shall ensure that actual interest payable is taken into account in the calculation of income tax. ● The tax refund if those refund existed.		

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			Sensitivity analysis A sensitivity analysis has been carried out for parameters contributing more than 20% to revenues or costs to check the robustness of the financial analysis. Reasonable variations of the fixed investment, annual O&M cost, net annual generation and tariff were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation. DNV was able to confirm that 21.63% decrease in investment costs is unlikely to happen, as the cost of construction, purchase of facilities and related accessories which forms the main budget of the investment. And also the upward trend of 3.5% of price indices of investment in 2006 and the anticipated increase of 2-3% in 2007 in fixed assets /37/ made this 21.63% decrease in investment cost further impossible. Similarly, it is not realistic that the annual O&M cost decreases by 23.46% due to raw material, fuel and energy prices upward increase as 8.3%, 6.0% and 4.4% in 2005, 2006 and 2007 /36/, and also the workers'		

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			salaries up to 12.8%, 13.6 % and 12.7 % (excluding inflation) in 2005, 2006 and 2007 /36/. And this trend will not change much in the future. Therefore, it is impossible to decrease the O&M to the threshold value. The increase of annual generation of 12.68% means that the proposed project will operate at the 8564 hours with an efficiency of 97.5% which is almost unrealistic when compared with the physical hours of a calendar year and the practical efficiency of the turbines and the generators. Validation team from local DNV can confirm that the electricity tariff is strictly controlled by the central government, which is one of main options for the central government to counterbalance the inflation /35/. If the tariff increase 12.68%, the O&M costs will also increase in the other direction as a result of the tariff increase; thus DNV is in the opinion that 12.68% increase of the tariff will not be practical to exert the influence on the robust of the financial analysis of the proposed project. *Step 3: Barrier analysis.* Barrier analysis has not been selected to demonstrate additionality. *Step 4: Common practice analysis.* Common practice analysis is made on province level since projects developed		

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			within the same province are faced by similar regulatory framework and investment climate (industry strategy, electricity tariff, approval policy, commercial loan policy and taxes policy) that make them comparable. By the end of 2007, 20 new dry process clinker production lines constructed in Fujian province, only two /40/ of these 20 production lines had installed low temperature power generation systems and all of two project activities had started CDM development process in an attempt to gain incentives from CERs revenues. According to Tool for the Demonstration and Assessment of Additionality (ver. 5.2), other CDM project activities are not to be included in common analysis, therefore, none is identified as similar activities to the Project. Therefore, validation team confirms that the proposed CDM project activity is not common practice. Justification is requested for selection of region for common practice. And further evidence is requested for only two /40/ of these 20 production lines constructed in Fujian province, had installed low temperature power generation systems.		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	/1/ /6/ /9/	DR	This can only be assessed after the response to **CL 2**.	~~CL 2~~	OK

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<tr><td>B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?</td><td>/1/</td><td>DR</td><td>Refer to B.3.1</td><td>~~CL 2~~</td><td>OK</td></tr>
<tr><td>B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?</td><td>/1/
/4/</td><td>DR
I</td><td>The project activity start date has been verified by DNV corresponding to turbine and generator purchasing contract dated on 30 November 2007 /23/ which the project participant has committed to expenditures related to purchase and it is the earliest date at which either the implementation or construction or real action of a programme activity begins, in compliance with the definitions of starting date shown in Paragraph 67 EB 41. And the other activities such as construction start application (signed on 28 December 2007) are later than the date of equipment purchase contract.
Correction is requested for the project activity start date defined by PP, as the date of intent of loan release is not what the meaning of EB’s commitment to expenditures.
DNV has assessed and verified the evidence and timeline for serious CDM consideration as a decisive factor in the decision to proceed with project activity as follows:
<table><tr><th>Time Sequence</th><th>Key Word</th></tr><tr><td>July 2007</td><td>FAR</td></tr><tr><td>19 August 2007</td><td>Board minutes</td></tr><tr><td>25 August 2007</td><td>CDM Agreement</td></tr><tr><td>30 November 2007</td><td>Project activity</td></tr></table></td><td>~~CAR 4~~</td><td>OK</td></tr>
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<tr><td></td><td>Start Date</td></tr>
</table>
Project owner took consolidated measures to continuing and real actions to secure CDM status for the proposed project in the parallel with its implementation demonstrated as:
<table>
<tr><th>Time Sequence</th><th>Key Word</th></tr>
<tr><td>6 June 2008</td><td>ERPA</td></tr>
<tr><td>10 June 2009</td><td>GSP</td></tr>
<tr><td>7-9 July 2009</td><td>on-site visit</td></tr>
</table>
Clarification is sought to justify why the PP started the proposed project (30 November 2007 /23/) one and half years earlier prior to GSP dated 10 June 2009 when the PP claimed its serious consideration of CDM revenues to proceed with the project activity.</td><td>~~CL 4~~</td><td></td></tr>
<tr><td>B.4. Calculation of GHG Emission Reductions – Project emissions (VVM para 89-93)
It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?</td><td>/1/
/9/</td><td>DR</td><td>The project emission calculations are documented according to AM0024.
The project emissions (PE_y) are the difference in CO_2 emissions from use of fossil fuel in the clinker making process before and after the project implementation.
$PE_y = (EI_{p,y} - EI_B) \times O_{clinker,y} \times COEF_{fuel,y}$
Justification is sought for the one year for EI_B</td><td>~~CAR 5~~</td><td>OK</td></tr>
</table>

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			selected from December 2007 to November 2008 is not reasonable because the project was fully operated on 1 December 2008 and the equation (6) in Methodology should be used for calculation PE_y because there are two clinker production lines in this project. ER calculator for baseline and project is requested as spreadsheet format.		
B.4.2. Have conservative assumptions been used when calculating the project emissions?	/1/	DR	The conservative assumptions have been used when calculating the project emissions.		OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	/1/	DR	No uncertainty for project emission estimates.		OK
B.5. Calculation of GHG Emission Reductions – Baseline emissions (VVM para 89-93) *It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /9/	DR	Yes. The baseline emission calculations are documented according to AM0024 by following the steps defined in AM0024. The power generated by the project activity supplies to clinker production lines with no extra power delivery to the grid, so the baseline emissions will be calculated as: $EB_y = EG_{CP,y} \times EF_{Grid,y}$ Where:	~~CAR 6~~	OK

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			$EG_{CP,y}$ = electricity supplied from the project activity to the cement plant (MWh) $EF_{Grid,y}$ = emission factor of the baseline electricity ECPG (tCO_2e/MWh). As per tool to calculate emission factor for an electricity system, the date vintages should be based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. The PDD was webhosted on 10 June 2009, the China Energy Statistical Yearbooks 2008 and China Electric Power Yearbook 2008 has been published prior to that, the calculation of the grid emission factor should be updated to the latest data in ER spreadsheet and PDD Section B6.		
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/ /16/ /17/	DR	See CAR 6.	~~CAR 6~~	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	No significant uncertainties can be addressed for this project.		OK
B.6. Calculation of GHG Emission Reductions – Leakage (VVM para 89-93) *It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.6.1. Are the leakage calculations documented according to the approved methodology and in a	/1/	DR	According to AM0024, potential leakage		OK

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complete and transparent manner?	/9/		effects can be ignored.		
B.6.2. Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	Not Applicable.		OK
B.6.3. Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	Not Applicable.		OK
B.7. Emission Reductions *The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.*					
B.7.2. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	/1/ /9/	DR	This should be fully addressed after CAR 6 closed.	~~CAR 6~~	OK
B.8. Monitoring Methodology (VVM para 122-124) *It is assessed whether the project applies an appropriate monitoring methodology.*					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/ /9/	DR	The monitoring plan is documented according to the approved methodology and in a complete and transparent manner		OK
B.8.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/ /9/	DR	Yes. All monitored data required for verification and issuance are required to be kept for two years after the end of the crediting period in the PDD.		OK
B.9. Monitoring of Project Emissions *It is established whether the monitoring plan provides for*					

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reliable and complete project emission data over time.					
B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/ /9/	DR	The monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period.		OK
B.9.2. Are the choices of project GHG indicators reasonable and conservative?	/1/ /9/	DR	The choice of project GHG indicators as listed in the B.9.1 follow the requirements in AM0024.		OK
B.9.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	/1/ /9/	DR	For monitoring parameters of $NCV_{fuel,y}$ and $Q_{fuel,y}$, their meters' accuracy, monitoring frequency, data recording and data aggregation for efficiency verification are also needed.	~~CL 5~~	OK
B.9.4. Is the measurement equipment described and deemed appropriate?	/1/ /9/	DR	Refer to **CL 5**.	~~CL 5~~	OK
B.9.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/ /9/	DR	For monitoring parameters of $NCV_{fuel,y}$ and $Q_{fuel,y}$, their meters' accuracy, monitoring frequency, data recording and data aggregation for efficiency verification are also needed.	~~CL 5~~	OK
B.9.6. Is the measurement *interval* identified and deemed appropriate?	/1/	DR	The measurement *interval* was identified and deemed appropriate. Clarification is requested for the monitoring frequency of $NCV_{fuel,y}$ and $O_{clinker,y}$ and also for other parameters such as weibridge and electricity balance.	~~CAR 7~~	OK

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B.9.7. Is the *registration, monitoring, measurement* and *reporting* procedure defined?	/1/	DR	Yes. These procedures for *registration, monitoring, measurement* and *reporting* are defined in the PDD properly.		OK
B.9.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR	Procedures are identified for *maintenance* of monitoring equipment and installations in the PDD. Calibration intervals were correctly defined. For electricity meter, the calibration frequency is at least once a year to ensure the reliability of the system and the accuracy of the readings.		OK
B.9.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	These procedures are defined properly in the PDD.		OK
B.10. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.*					
B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/	DR	Yes, all the relevant parameters for the baseline emission estimations are included in the monitoring plan and will be collected and archived during the crediting period. This includes $EG_{CP,y.}$ Clarification is requested for the project owner to make it clear as whether there is a backup system for electricity meters if those meters are out of function or out of accuracy range, and how to double check the electricity supplying to the clinker production	~~CL 6~~	OK

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			lines as there are no receipt as business as usual way when the electricity is sold to the grid.		
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/ /9/	DR	The choice of baseline GHG indicators is in line with AM0024. That is $EG_{CP,y}$.		OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/	DR	• Electricity demand of cement works and other local loads within the complex of cement works prior to start of the project; • Waste heat use within the cement works and normal uses of waste heat in cement production commonly practiced in the region or Host country; • Regulations and/or policy that could influence the use of waste heat and generation of power in the region.		OK
B.10.4. Is the measurement *equipment* described and deemed appropriate?	/1/	DR	See CL 6.	~~CL 6~~	OK
B.10.5. Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR	The Electric meter with the class of 0.5 was installed in the central control room to monitor the power supplied to the cement production lines. Procedures are in place on how to deal with erroneous measurements.		OK
B.10.6. Is the measurement *interval* for baseline data identified and deemed appropriate?	/1/	DR	The measurement interval for baseline data identified and deemed appropriate "The electricity supplied by power station will be	~~CAR 7~~	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			daily collected and monthly archived, and then submitted to the project entity." Clarification is requested for the monitoring frequency of $NCV_{fuel,y}$ and $O_{clinker,y}$ and also for other parameters such as weibridge and electricity balance.		
B.10.7. Is the registration, *monitoring, measurement* and *reporting* procedure defined?	/1/	DR	The procedure of registration, monitoring, measurement and reporting has been described.		OK
B.10.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	/1/	DR	Yes. The calibration frequencies and maintenance of monitoring equipment and installations have been addressed according to the industry standards. For electricity meter, the calibration frequency is at least once a year to ensure the reliability of the system and the accuracy of the readings.		OK
B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	Yes.		OK
B.11. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					
B.11.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	/1/	DR	Project participants do not need to consider leakage in applying this methodology.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.11.2. Are the choices of project leakage indicators reasonable and conservative?	/1/	DR	Not Applicable.		OK
B.11.3. Is the measurement method clearly stated for each leakage value to be monitored and deemed appropriate?	/1/	DR	Not Applicable.		OK
B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	DNA of China does not require collection and archiving of data related to social and economic impacts. The environmental impacts will be monitored by local environmental authority annually.		OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Monitoring of sustainable development indicators is not required by the Chinese DNA. The environmental impacts are considered minor /5/ and will be monitored by the local environmental authority during the project lifetime.		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	Yes. This will be on local authority decision.		OK
B.13. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are*					

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
addressed.					
B.13.1. Is the authority and responsibility of overall project management clearly described?	/1/	DR	Yes. The authority and responsibility of overall project management is clearly described.		OK
B.13.2. Are procedures identified for training of monitoring personnel?	/1/	DR	These procedures are defined in the PPD properly.		OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	No emergency situation which can cause unintended emissions is expected from the project.		OK
B.13.4. Are procedures identified for review of reported results/data?	/1/	DR	These procedures are defined in the PPD properly.		OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/ /8/	DR	Clarification is requested as for procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting.	~~CL 7~~	OK
C. Duration of the Project/ Crediting Period (VVM para 99-100, 104) *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	/1/ /4/	DR I	The project activity start date has been verified by DNV corresponding to turbine and generator purchasing contract dated on 30 November 2007 /23/ which the project participant has committed to expenditures related to purchase and it is the earliest date at which either the implementation or construction or real action of a programme		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			activity begins, in compliance with the definitions of starting date shown in Paragraph 67 EB 41. And the other activities such as construction start application (signed on 28 December 2007) are later than the date of equipment purchase contract. The project life time is clearly defined as 15 years and consistent with FAR.		
C.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR	Yes. The start of the crediting period is 1June 2010.		OK
D. Environmental Impacts (VVM para 131-133 and VVM para 136 (d) for small-scale project activities, as applicable)) *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /5/	DR	Yes. The environmental impacts during construction and operation period are elaborated in the PDD, mainly about impacts of waste water, dust, noise and solid waste on environment.		OK
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/ /5/	DR	Yes. The EIA has been approved by the local EPB on 30 August 2007 and it depicted the proposed project had little negative effects on environment.		OK
D.1.3. Will the project create any adverse environmental effects?	/1/ /5/	DR	As per the results of EIA and from the approval of the local Environmental Protection Bureau, the impacts on the environment are not significant.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
D.1.4. Are transboundary environmental impacts considered in the analysis?	/1/ /5/	DR	There are no transboundary environmental impacts foreseen for the project.		OK
D.1.5. Have identified environmental impacts been addressed in the project design?	/1/ /5/		Yes. The impacts related to noise are properly addressed in the PDD.		OK
D.1.6. Does the project comply with environmental legislation in the host country?	/1/ /5/	DR	Yes.		OK
E. Stakeholder Comments (VVM para 128-130) *The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.*					
E.1.1. Have relevant stakeholders been consulted?	/1/	DR	Zhangping Hongshi Cement Co., Ltd. carried out a survey of the potential stakeholders, mainly staffs and local residents of the most affected group as the project site is far away form the populated area. 56 questionnaires are distributed among the staffs and residents /34/ on 20 August 2007.		OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	Yes.		OK
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/ /5/	DR	The stakeholder consultation process has been carried out in accordance with such regulations/laws.		
E.1.4. Is a summary of the stakeholder comments received provided?	/1/ /34/	DR	There were no adverse comments on the project activity, though some concerns are		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			raised on noise pollution during the construction period and water pollution during operation phase.		
E.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	The project owner will adopt appropriate and necessary approach to assure the environmental issues raised in EIA and stakeholders be properly addressed through technological and economic way.		OK

Table 2b: Additional requirements checklist for VVM version 1 (EB 44)

A.5. Letter of approval					
A.5.1 Is the LoA received directly from the DNA or through the project participant.	/2/ /3/	DR	The written approval of voluntary participation from the designated national authority of Annex I Party was not received.	~~CAR 1~~	OK
A.6. Project design					
A.6.1 Does the PDD describe the CDM project activity with all relevant elements in a transparent and accurate way?	/1/ /4/	DR	It is by a transparent and accurate way to discribe the project activity such as project site, the capacity, the turbines and parameters and those are consistent with related information reflected in FAR. Clarification is requested for gross electricity generation by the proposed project, and further justification for difference between gross electricity and net delivery to the clinker production lines.	~~CL 1~~	OK
A.6.2 Has the CDM project activity at the start of the validation been constructed or does the CDM project activity use existing facilities or equipment?	/1/ /4/ /74/	DR	The project activity is a newly built WHR project constructed before the start of the validation on 10 June 2009 (date of first web host publication of the PDD for stakeholder).		OK
A.6.3 Is the project a large scale project, a small scale project with average annual emission reductions above 15 000 tonnes or a bundled small scale project? Has on-site visit been carried out?	/1/ /4/	DR	The project activity is a large scale project fully addressed in FAR and PDD; On 13-15 July 2009, Zhang Xiaojun Johnsen of DNV performed site visit for Zhangping Hongshi Cement Waste Heat Recovery Project with project stakeholders to confirm selected information and to resolve issues identified in the document review.		OK
A.6.4 Does the project activity involved alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/ /4/	DR	No, project activity does not involve alteration of existing installations.		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

A.7. Project emissions not addressed by the methodology					
A.7.1 Does the methodology describe all project emission source for the project activity that contributes all 1% of the emission reductions? Sources that the methodology considers not to take into account are not relevant (e.g. cement and iron consumption for building hydropower plants).	/1/ /9/	DR	Project emissions: The project emissions (PE_y) are the difference in CO_2 emissions from use of fossil fuel in the clinker making process in cement manufacturing unit, where the project is being implemented, before and after the project implementation. PE_y, is determined as following $PE_y = (EI_{p,y} - EI_B) \times O_{clinker,y} \times COEF_{fuel,y}$ Pre-project and ex-post energy consumption per unit output of clinker was assumed same in FAR /4/ for simplifying the calculation. Therefore the ex-ante estimate of PE_y is zero but actually those will be monitored in whole fixed crediting period. DNV has been able to confirm the calculation process and the data source. Justification is sought for the one year for EI_B selected from December 2007 to November 2008 is not reasonable because the project was fully operated on 1 December 2008 and the equation (6) in Methodology should be used for calculation PE_y because there are two clinker production lines in this project. ER calculator for baseline and project is requested as spreadsheet format.	~~CAR 5~~	OK
A.8. Documentation of baseline emissions					
A.8.1 Documentation of the baseline determination: a. All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The	/1/ /9/	DR	a. As per tool to calculate emission factor for an electricity system, the date vintages should be based on the most recent data available at the time of	~~CAR 6~~	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

data are properly referenced. b. All documentation is relevant as well as correctly quoted and interpreted. c. Assumptions and data can be deemed reasonable d. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. e. The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity			submission of the CDM-PDD to the DOE for validation. The PDD was webhosted on 10 June 2009, the China Energy Statistical Yearbooks 2008 and China Electric Power Yearbook 2008 has been published prior to that, the calculation of the grid emission factor should be updated to the latest data in ER spreadsheet and PDD Section B6.; b. Yes; c. Assumptions and data can be deemed reasonable d. Yes; e. Yes. The methodology has been correctly applied to identify what would occur in the absence of the proposed CDM project activity.		
A.9. Documentation of the calculations					
A.9.1 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/ /9/	DR	• From reference /28/ /30/ /31/, all assumptions and data used by the project participants are listed in the PDD and deemed proper. • All documentation is correctly quoted and interpreted. • CL 2 • CAR 5	~~CL 2~~ ~~CAR 5~~	OK
A.10. Implementation of the monitoring plan					

* MoV = Means of Verification, DR= Document Review, I= Interview

A.10.1 How were the plans for implementation of the monitoring plan, data management, QA/QC procedures assessed? To what extent can the emission reductions achieved by the project by monitored ex-post and verified later by a DOE?	/1/ /33/	DR	For monitoring parameters of $NCV_{fuel,y}$ and $Q_{fuel,\ y}$, their meters' accuracy, monitoring frequency, data recording and data aggregation for efficiency verification are also needed. Clarification is requested for the project owner to make it clear as whether there is a backup system for electricity meters if those meters are out of function or out of accuracy range, and how to double check the electricity supplying to the clinker production lines as there are no receipt as business as usual way when the electricity is sold to the grid. Clarification is requested as for procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting.	~~CL 5~~ ~~CL 6~~ ~~CL 7~~	OK
A.11. CDM consideration prior to starting date					
A.11.1 The prior consideration of CDM for the project activity complies with EB41 annex 46	/1/	DR	Clarification is sought to justify why the PP started the proposed project (30 November 2007 /23/) one and half years earlier prior to GSP dated 10 June 2009 when the PP claimed its serious consideration of CDM revenues to proceed with the project activity.	~~CL 4~~	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR 1 The written approval of voluntary participation from the designated national authority of United Kingdom of Great Britain and Northern Ireland was not received.	A.2.2. A.5.1.	The LOA of UK DNA has been sent to auditor.	OK The written approval of voluntary participation from the designated national authority of United Kingdom of Great Britain and Northern Ireland has been on 11 September 2009. The CAR was closed.
CAR 2 Justification is requested for historical and projected supply and demand in table B-4-1 in PDD at least 2 years prior to the starting date of the project activity as of 18 November 2007, meaning that 2005 and 2006 data should be provided. And also after this project is operated, the projected power from grid will be decreased.	B.1.2. B.2.2.	The 1st cement production line started commissioning on 28/05/2007, and was fully operational in July 2007, less than 2 years prior to the start date of the project activity. The methodology does not provide any guidance on the data that should be used in the event of less than 2 years of data; therefore, the historical demand and supply has been based on data provided in the FAR of the cement production line. What's more, the electricity generation of the project activity is deducted from the projected power from grid after the project is operated. See the FAR of cement production line.	OK As the cement production line was set up 2 years earlier than the WHR project activity start date, the justification for utilization of historical demand and supply has been based on data provided in the FAR of the cement production line was a solution and the PP provided the production statistics log /27/ for validation team to check the assumption in the PDR, which was checked as reasonable. The CAR was closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR 3 The Tool to calculate the emission factor for an electricity system (Version 02) should be adopted as appropriate.	B.3.1.	Please see revised PDD in which version 2 of the tool is now used.	OK The correct version of tool has been applied. The CAR was closed.
CAR 4 Correction is requested for the project activity start date defined by PP, as the date of intent of loan release is not what the meaning of EB's commitment to expenditures.	B.3.4. A. 8.1.	The project activity start date has been revised to 30 November 2007, on which Equipment Purchase Contract was signed.	OK The perception of the project activity start date has been in compliance with the EB's guideline for this term. The CAR was closed.
CAR 5 Justification is sought for the one year for EI_B selected from December 2007 to November 2008 is not reasonable because the project was fully operated on 1 December 2008 and the equation (6) in Methodology should be used for calculation PE_y because there are two clinker production lines in this project. ER calculator for baseline and project is requested as spreadsheet format.	B. 4.1. A. 7.1. A. 9.1.	The project activity start commissioning on 1st December 2008, and the fully operation date is 21 April 2009 (See the signed Grid Connection Agreement. The WHR power station can only start fully operation after the PO signed the GCA with local grid company). So the selected one-year period from December 2007 to November 2008 for EI_B calculation is reasonable according to the equation (3) in Methodology AM0024 (2.1) since only the data prior to the start of operation of the project activity were used. The equation (6) in Methodology has been added in the PDD for use of PE_y calculation. ER, EI_B and EF of East China Power	OK The justification of the PP's adoption of one full year data December 2007 to November 2008 for EI_B calculation before the start of operation of the project activity, can be deemed reasonable as the definition of: FB = Is the 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. The CAR was closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		Grid calculator was provided to auditor as spreadsheet format.	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR 6 As per tool to calculate emission factor for an electricity system, the date vintages should be based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. The PDD was webhosted on 10 June 2009, the China Energy Statistical Yearbooks 2008 and China Electric Power Yearbook 2008 has been published prior to that, the calculation of the grid emission factor should be updated to the latest data in ER spreadsheet and PDD Section B6.	B. 5.1. B. 5.2. B. 7.2. A. 8.1.	The emission factor for East China Power Grid has been revised to the latest version published by NDRC on 2nd July 2009. And emission reductions are also revised as EF changes.	OK Most recent available data of emission factor of the ECPG has been used to calculate ER. The CAR was closed.
CAR 7 Clarification is requested for the monitoring frequency of $NCV_{fuel,y}$ and $O_{clinker,y}$ and also for other parameters such as weighbridge and electricity balance.	B. 9.6. B. 10.6.	$NCV_{fuel,y}$, $Q_{fuel,y}$ and $O_{Clinker,y}$ are monitored continuously, during which weighbridge, electric balance and heat measuring equipment are used. Please refer to B.7.1	OK The monitoring of the $NCV_{fuel,y}$, $Q_{fuel,y}$ and $O_{Clinker,y}$ is in a continuous way based on the primary equipments like weighbridge, electric balance and heat measuring equipment, whose calibration will be performed according to the mandatory standards or procedures. The CAR was closed.
CL 1 Clarification is requested for gross electricity generation by the proposed project, and further justification for difference between	A. 1.2. A. 6.1.	Gross electricity generation is the total electricity generated by generators. And the self-consumption (which is the electricity consumed by auxiliary	OK 1. The gross and net electricity generation is clearly illustrated. 2. Commissioning date of two

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
gross electricity and net delivery to the clinker production lines. Clarification is requested for the commissioning date of two cements lines and actual implementation status of those two WHR power stations, for example, construction, and commissioning and electricity generation.		equipments of the WHR power station, takes an assumed value of 8% of the gross electricity generation in the FAR) subtracted from gross electricity generation gives net electricity supply, which is equal to net electricity delivery to the clinker production lines as the WHR power plant is located next to the cement production lines and there's no line loss during delivery. 1st cement production line started commissioning on 28/05/2007, and line 2 started commissioning on 6th May 2009, and was fully operational since 10th July 2009. The WHR power plant started construction on 28/12/2007, the 1st phase WHR power station started commissioning on 12/11/2008 and its fully operation started on 21/04/2009(the date grid connection agreement signed); the 2nd phase project started commissioning on 28/09/2009. No issues were found during commissioning, so the second WHR line remained operational. Thus, the operational date is taken to be 1 October 2009.	cements lines and actual implementation status of those two WHR power stations, for example, construction, and commissioning and electricity generation have been provided to give a whole picture of time frame of the implementation of the project activity and its related cement lines. The CL was closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 2 Concerning financial analysis, clarification is required as following: ● Urban construction maintenance taxes is 6% and surtax for education expenses is 4% in FAR while they are 4% and 6% respectively in PDD; ● Line 39 in IRR without CDM, is this item "Original value of fixed assets" or sth else? ● Line 80 "Retrieved circulating funds? Why put this item at the end of the financial analysis? ● Give the breakdown of Other O&M fee and other manufacturing expense ● Clarification is requested for the invoice of the tariff before 18 November 2007 to cross check the tariff assumed in PAR. ● According to EB 51, Annex 51, **GUIDELINES ON THE ASSESSMENT OF INVESTMENT ANALYSIS, version 3,** concerning in cases where a post-tax benchmark is applied the DOE shall ensure that actual interest payable is taken into account in the calculation of income tax. ● The tax refund if those refund existed.	B. 3.1. B. 3.2. B. 3.3. A. 9.1.	1、Urban construction maintenance taxes and surtax for education expenses have been corrected in PDD; 2、The item in Line 39 in IRR without CDM is "Original value of deferred assets" (Prepaid recurring expense (such as insurance, interest, or rent) carried forward as an asset, until benefit is received.), which has been corrected in IRR spreadsheet. 3、There's a literal error in previous IRR spreadsheet. The item in Line 80 is supposed to be "Loan repayment of circulating funds", not "Retrieved circulating funds". It has been corrected in IRR spreadsheet. 4、**Other O&M fee** includes Grid connection charge, travel expense, staff training fee, labor insurance, labor union fee and waste emission charge. **Other manufacturing expense** includes labor protection fee, office allowance and office supplies expense, Low-value consumption goods cost, article of consumption cost, transpotation fee, equipment maintenance cost, and consulting expense. **Please see the**	OK 1. The urban construction maintenance taxes and surtax for education expenses have been correctly applied accoridng to Chinese State Council regulations /46/ /47/. 2. It was clear for the item of Line 39 for the "Original value of deferred assets". 3. It was clear for the item of Line 80 for the "Loan repayment of circulating finds". 4. The PP's further explanations can sufficiently address the clarifications.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		detailed costs in "breakdown of other O&M fee and other manufacturing expense" spreadsheet. 5. The invoice of tariff before 18 November 2007 was provided to auditor along with this response. 6. The actual interest payable has been taken into account in the calculation of income tax in the IRR calculation according to the Guidelines on the Assessment of Investment Analysis (version 03) as the following: **The income tax** = (revenue from electricity savings- Total O&M Fee - Depreciation fee - Amortization fee - **interest for long-term repayment - Circulating fund loan interest** -city build tax – extra charges of education funds) *rate of income tax 7. The electricity generated by the project activity is consumed by the cement plant. Project owner don't sell electricity to the power grid. So VAT refunds isn't applicable to this project.	5. The applied tariff in FAR can be supported by the realistic tariff receipt dated 26 July 2007 /49/. 6. The actual interest payable has been taken into account in the calculation of income tax in the IRR spreadsheet. 7. This is reasonable. The CL was closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 3 Justification is requested for selection of region for common practice. And further evidence is requested for only two /40/ of these 20 production lines constructed in Fujian province, had installed low temperature power generation systems.	B. 3.1.	The selected region for common practice in PDD is Fujian 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. The reply from NDRC Zhangping Branch (NDRC Zhangping Branch is the official governmental department which has the authority to approve all new construction projects in Zhangping district, and also part of the NDRC system of Fujian province. So NDRC Zhangping Branch has access to all relevant data in Fujian Province.) shows that there're only two cement production companies which have installed low temperature WHR power plant up to December 2008 in Fujian Province. The evidence was provided to auditor. The related part of common practice has been updated.	OK The region of Fujian province for the comparison of similar projects has been fully justified and accepted by validation team. The document for clarification of cement production companies which have installed low temperature WHR power plant up to December 2008 in Fujian Province by NDRC Zhangping Branch had provided the validation team information for the common practice in Fujian province /50/ and the PDD was updated in a proper way. The CL was closed.
CL 4 Clarification is sought to justify why the PP started the proposed project (30 November 2007 /23/) one and half years earlier prior to GSP dated 10 June 2009 when the PP claimed its serious consideration of CDM revenues to	B. 3.4. A. 11.1.	Project owner signed CDM Development Agreement with CDM consultant on 25/08/2007, and then project owner started to collect supporting documentation for PDD writing and additionality demonstration.	OK The follow up activities after proposed project (30 November 2007 /23/), as CER business iterations /51/ /52/ /53/ between Shanghai Chuanji Investment

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
proceed with the project activity.		In January 2008 (please refer to CERs buyer email1), CERs price negotiation started. After finishing Due Diligence investigation, CERs buyer signed ER Purchase Contract with project owner on 06/06/2008. CERs buyer started pre-validation of the project activity in October 2008 (please refer to CERs buyer email2) and finished it in May 2009 (please refer to CERs buyer email3). The timeline and evidence above show that CDM related activities have been carried out during the one and a half year, and this could demonstrate that project owner take a serious consideration of CDM revenue to proceed with the project activity.	Management Co., Ltd. and Natsource Asset Management Corp. have cleared the doubt of validation team for its serious consideration of CDM revenues to proceed with the project activity. The CL was closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 5 For monitoring parameters of $NCV_{fuel,y}$ and $Q_{fuel,\ y}$, their meters' accuracy, monitoring frequency, data recording and data aggregation for efficiency verification are also needed.	B. 9.3. B. 9.4. B. 9.5. B. 10.3. B. 10.4. A. 10.1.	Accuracy for weighbridge is ±0.075%, accuracy for electric balance is ± 0.0001g. $NCV_{fuel,y}$ and $Q_{fuel,\ y}$ will be continuously monitored, and the monitoring data will be recorded on daily basis. And a monthly monitoring report will be compiled on monthly basis. The B.7.2 has been updated.	OK The accuracy and monitoring frequency, data recording and data aggregation have been addressed in the section B.7.1. in PDD. The CL was closed.
CL 6 Clarification is requested for the project owner to make it clear as whether there is a backup system for electricity meters if those meters are out of function or out of accuracy range, and how to double check the electricity supplying to the clinker production lines as there are no receipt as business as usual way when the electricity is sold to the grid.	B. 10.1. B. 10.4. A. 10.1.	Project entity have installed 6 kilowatt meters (meter M1, M2 and M3 for 1st phase WHR power station, meter M4, M5 and M6 for 2nd phase WHR power station, all meters keep running all the time) to measure electricity generation and supply. The net electricity supply is monitored by kilowatt meters M3 and M6 installed at the tielines which connect the WHR power station to the General Transformer Station. The kilowatt meter M1 and M4 installed at the generator are used to measure gross electricity generation, and the kilowatt meter M2 and M5 installed at the transformer station of WHR power station are used to measure the self-consumed electricity. Meter M1, M2, M4, M5 are also used as backup system for the monitoring of net electricity	OK There is a backup system for electricity meters if other meters are out of function or out of accuracy range, to double check the electricity supplying from generators. The CL was closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
		supply. The net electricity supply can be calculated as self-consumed electricity subtracts from gross electricity generation if the meter M3 and M6 which measure net electricity supply are out of function or out of accuracy range (by checking readings of M3 and M5 against those of M1, M2, M4, and M5). And the calculated net electricity supply can be used to double check the electricity supplying to the clinker production lines. What's more, DCS can also record meter readings and be used to crosscheck the electricity generation and supply.	

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 7 Clarification is requested as for procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting.	B. 13.5. A. 10.1.	Spare meter (only put into operation during malfunctioning of main meters) for main kilowatt meters has been installed at the WHR power plant. Once the main meters are out of function, the monitor of Inspection team should inform Workshop Manager immediately. The malfunctioning meter will be replaced by spare meter and be sent for maintenance or calibration. The starting time and ending time (the time when malfunctioning main meters are put back into operation) of the event of meter malfunction will be precisely recorded. The data from backup system will be used to calculate the net electricity supply during the time meter M3 or M6 which measures the net electricity supply is out of function. There's also a backup system for weighbridge and electric balance. Spear weighbridge and electric balance will be used while main meters are malfunctioning. The malfunctioning meters will be sent for maintenance. Please refer to "Quality control system for monitoring data" of B.7.2.	OK After check the description in "Quality control system for monitoring data" of B.7.2., it is clearly illustrated that procedures have been in place for corrective actions in order to provide for more accurate future monitoring and reporting. The CL was closed.

APPENDIX B

CERTIFICATES OF COMPETENCE

CERTIFICATE OF COMPETENCE

Ole Andreas Flagstad

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:	Yes				
Technical Area	***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas					
Renewables — *Hydro power*					
Renewables — *Wind power*					
Renewables — *Other renewable*					
Biomass					
Grid connection of isolated system					
Cement					
Waste-heat / waste-gas recovery				Jan 2009	Jan 2009
Efficiency of thermal power plants					
Coal mine methane				Jan 2009	Jan 2009
Fuel switch					
Manure management					
Waste / wastewater treatment					
Energy efficiency			Jan 2009		Aug 2009
N_2O					
HFCs				Jan 2009	Jan 2009
Flare reduction					
PFCs					Aug 2009
Charcoal					
CO_2 recovery					
Transport					
Non-renewable biomass					
Biofuel					
Pipeline leakage reduction					Aug 2009
SF_6					

Høvik, 24 August 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

Xiaojun Johnsen Zhang

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas						
Renewables	*Hydro power*	Jan 2009				
	Wind power	Jan 2009				
	Other renewable					
Biomass						
Grid connection of isolated system						
Cement		Jan 2009				
Waste-heat / waste-gas recovery						
Efficiency of thermal power plants						
Coal mine methane		Aug 2009	Aug 2009			
Fuel switch						
Manure management						
Waste / wastewater treatment						
Energy efficiency						
N_2O						
HFCs						
Flare reduction						
PFCs						
Charcoal						
CO_2 recovery						
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 28 August 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

Cuiping Deng

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:	Yes

Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas						
Renewables	*Hydro power*	Jan 2009	Jan 2009		Jan 2009	Jan 2009
	Wind power	Jan 2009	Jan 2009			
	Other renewable					
Biomass						
Grid connection of isolated system						
Cement						
Waste-heat / waste-gas recovery		Mar 2009	Mar 2009			
Efficiency of thermal power plants						
Coal mine methane		Mar 2009				
Fuel switch						
Manure management						
Waste / wastewater treatment						
Energy efficiency						
N_2O			Jan 2009			
HFCs						
Flare reduction						
PFCs						
Charcoal						
CO_2 recovery						
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 24 March 2009

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