VALIDATION REPORT

Final

"Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd"
in
China

Report N°2011-DG-201-MD

Revision N°1.3

RINA

VALIDATION REPORT

Project Title:	Country:	Estimated CERs (tCO2e):
Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd	China	246,651 annual average
Client:	**Client contact:**	
Lakewood Carbon Corp.	Mr. Robert W. Anderson, Jr.	
Report No.:	**Revision:**	**Date of this report:**
2011-DG-201-MD	1.3	07/08/2012
Approved by: Roberto Cavanna		**Date of approval:** 14/08/2012

Methodology

Number:	Version:	Title:	Scale	SS(s):
ACM0012	04.0.0 of 15/04/2011	Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects	Large	01 04

RINA Services S.p.A. (RINA), commissioned by Lakewood Carbon Corp., has performed the validation of the project activity "Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd" in China, with regard to the relevant requirements for CDM activities.

In conclusion, it is RINA's opinion that the project activity "Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd", in "China", as described in the PDD version 03 of 07/08/2012, meets all relevant requirements for CDM activities and all relevant host Party criteria and correctly applies the baseline and monitoring methodology "ACM0012", "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects", 04.0.0 of 15/04/2011.

Hence RINA requests the registration of the proposed project as a CDM project activity.

Work carried out by:

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Xuebin ZHANG - Technical Expert
Jie LI – Financial Expert

Work verified by:

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Keywords:

Climate Change, Kyoto Protocol, Clean Development Mechanism, Validation

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Abbreviations

BE	Baseline Emissions
CAR	Corrective Action Request
CCPP	Combined-cycle Power Plant
CDM	Clean Development Mechanism
CDM M&P	Modalities and Procedures CDM
CER(s)	Certified Emission Reduction(s)
CH4	Methane
CL	Clarification Request
CO2	Carbon dioxide
CO2e	Carbon dioxide equivalent
COG	Coke Oven Gas
CRT	Coordination and Technical Control Staff
DCI	Certification Division of RINA Services Spa
DECC	Department of Energy and Climate Change
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
EIA	Environmental Impact assessment
EPB	Environmental Protection Bureau
ER	Emission Reductions
ERCS	Emission Reductions Calculation Spreadsheet
ERPA	Emission Reductions Purchase Agreement
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG(s)	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of Approval
MoV	Means of Verification
MP	Monitoring Plan
MR	Monitoring Report
NCPG	North China Power Grid
NDRC	National Development and Reform Commission
NGO	Non-governmental Organization
ODA	Official Development Assistance
PDD	Project Design Document
PE	Project Emission
PP(s)	Project Participant(s)
Ref.	Document Reference
RINA	RINA Services Spa
SS(s)	Sectoral Scope(s)
UNFCCC	United Nations Framework Convention on Climate Change

VVM	Validation and Verification Manual
WECM	Waste Energy Carrying Medium
WHRB	Heat Recovery Steam Boiler

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1 INTRODUCTION

Lakewood Carbon Corp. has commissioned RINA to carry out the validation of the “Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd” project in China.

This report summarizes the findings of the validation of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting.

1.1 Objective

The objective of the Validation is to have an independent evaluation of a project activity by a designated operational entity against the requirements of the CDM as set out in decision 3/CMP.1, its annex and relevant decisions of the COP/MOP, on the basis of the project design document. In particular, the project's baseline, monitoring plan, and the project’s compliance with relevant UNFCCC requirements 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).

1.2 Scope

The validation scope is to review the PDD against the UNFCCC criteria for CDM.

UNFCCC criteria for CDM refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

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

2 METHODOLOGY

Validation was conducted using RINA procedures in line with the requirements specified in the CDM M&P, the latest version of the CDM Validation and Verification Manual, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques.

The validation consisted of the following three phases:

- Document review;
- Follow-up actions;
- The resolution of outstanding issues and the issuance of the final validation report.

The following sections outline each step in more detail.

2.1 Document Review

The PDD, version 01 of 01/12/2011, version 02 of 20/04/2012 and version 03 of 07/08/2012 /01/, in particular the applicability of the methodology, the baseline determination, the additionality of the project activity, the starting date of the project, the monitoring plan, the emission reduction calculations provided in the form of a spreadsheet, “ER Jikuang” version 01 of 01/12/2011 and version 02 of 23/03/2012 /96/ were assessed as part of the validation.

The following table lists the documentation that was reviewed during the validation.

/01/	Uniufa Energy Technology Co., Ltd.: CDM-PDD for project activity “Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun

	Thermal Power Co., Ltd" in China, version 01 of 01/12/2011, version 02 of 20/04/2012 and version 03 of 07/08/2012 The linkage of PDD published for global stakeholders' consultation: http://cdm.unfccc.int/Projects/Validation/DB/VUEC297IIHTJWVLSVWNHDF7QJ5QUSP/view.html, English language and retrieved on 18/04/2012
/02/	CDM Executive Board: Validation and Verification Manual (VVM), version 01.2 of 30/07/2010
/03/	CDM Executive Board: Guidelines for completing the project design document (CDM-PDD) and the proposed new baseline and monitoring methodologies (CDM-NM), version 07 of 02/08/2008
/04/	CDM Executive Board: Baseline and monitoring methodology "ACM0012", "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects", version 04.0.0 of 15/04/2011
/05/	CDM Executive Board: Methodological tool "Tool for the demonstration and assessment of additionality", version 06.0.0 of 25/11/2011
/06/	CDM Executive Board: "Tool to calculate the emission factor for an electricity system", version 02.2.1 of 29/09/2011
/07/	CDM Executive Board: "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", version 02 of 02/08/2008
/08/	CDM Executive Board: "Tool to determine the baseline efficiency of thermal or electric energy generation systems", version 01 of 17/07/2009
/09/	CDM Executive Board, "Tool to Determine the Remaining Lifetime of Equipment", version 01, dated on 16/10/2009
/10/	CDM Executive Board: Glossary of CDM terms, version 05 of 19/08/2009
/11/	CDM Executive Board: "Guidance on the Assessment of Investment Analysis", version 05 of 15/07/2011
/12/	CDM Executive Board: Guidelines on the demonstration and assessment of prior consideration of the CDM, version 04 of 15/07/2011
/13/	UNFCCC website Parties & Observer Status for China, http://maindb.unfccc.int/public/country.pl?country=CN, English language, retrieved on 15/01/2012
/14/	UNFCCC website Parties & Observer Status for China, http://maindb.unfccc.int/public/country.pl?country=GB, English language, retrieved on 15/01/2012
/15/	National Development and Reform Commission & Ministry of Construction: Economic Evaluation Methods and Parameters for Construction Projects (3rd Edition), dated on 08/2006
/16/	China's State Council, Provisional Regulation of China on Value Added Tax, dated on 10/11/2008
/17/	China's State Council, Provisional Regulation of China on Urban Maintenance and Construction Tax, dated 08/02/1985
/18/	China's State Council, Decision to modify the provisional regulation on Additional education tax, dated 20/08/2005
/19/	State Council of the People's Republic of China [No. 512], The Income Tax Law of the People's Republic of China for Enterprises, dated 06/12/2007
/20/	State Council of China, Regulations for the Implementation of the Enterprise Income Tax Law of China, dated on 06/12/2007
/21/	China Electric Power Yearbook Compiling Commission: China Electric Power Yearbook, 2008 – 2010
/22/	National Bureau of Statistics of China & National Bureau of Energy of China, China Energy

	Statistical Yearbook 2008-2010
/23/	IPCC: Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories Reference Manual, date 2006
/24/	CDM Executive Board: Response to request for deviation with title “Application of AM0005 and AMS-I.D in China” (M-DEV0004), dated 01/12/2005
/25/	China Government, Law of the People's Republic of China on Environmental Impact Assessment(EIA), dated 28/10/2002
/26/	Department of Climate Change, National Development and Reform Commission: Notification letter of commencement of CDM project activity, dated 29/12/2009
/27/	UNFCCC website Prior Consideration of the CDM, http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html, English language, retrieved on 26/10/2010
/28/	Jinan City Construction Consultancy Institute and Shandong Province Light Industry Design Institute: Feasibility Study Report (FSR), dated in 01/2010
/29/	Shandong Provincial Development and Reform Commission (DRC): Project Approval, dated on 30/09/2010
/30/	DNA of Host Country National Development and Reform Commission of the People’s Republic of China (NDRC): Letter of Approval (LoA), dated 19/04/2011 Website information, Chinese language and retrieved on 18/01/2012: http://cdm.ccchina.gov.cn/website/CDM/pdf/Item_new/Item_new6282.pdf
/31/	Office of National Coordination Committee on Climate Change, National Development and Reform Commission (NDRC) of China (DNA of China), 2011 Baseline Emission Factor for Regional Grids in China, dated on 20/10/2011.
/32/	Shandong Provincial Environmental Protection Science Research & Design Institute, Environmental Impact Assessment (EIA) Report, dated in 02/2010
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/34/	Shandong Jikuang Morningsun Thermal Power Co., Ltd and Uniufa, Advisory Agreement on CDM, dated on 02/12/2009
/35/	Shandong Jikuang Morningsun Thermal Power Co., Ltd, Stakeholder Survey Records and Summary on the project construction, dated on 25/01/2010
/36/	Shandong Jikuang Morningsun Thermal Power Co., Ltd, Board of Directors Resolutions (Decision Made on project implementation), dated on 16/02/2010
/37/	Shandong Jikuang Morningsun Thermal Power Co., Ltd and Solar Turbines International Company, Purchase Agreement for TITAN 130 Turbine Generator Sets (Gas Turbine Generator), dated on 12/04/2010
/38/	Shandong Jikuang Morningsun Thermal Power Co., Ltd and Wuxi Huaguang Boiler Co., Ltd, Purchase Agreement for Circulating Fluidized Bed Boiler, dated on 18/04/2010
/39/	Shandong Jikuang Morningsun Thermal Power Co., Ltd and Shenyang Yuanda Compressor Manufacturing, Purchase Agreement for COG Compressor, dated on 18/04/2010
/40/	Shandong Jikuang Morningsun Thermal Power Co., Ltd and Qingdao Jieneng Group, Purchase Agreement for Steam Turbine and Generator, dated on 18/04/2010
/41/	Shandong Jikuang Morningsun Thermal Power Co., Ltd and Nanjiing Nanguo Power, Purchase Agreement for Complementary combustion heat recovery steam boilers (WHRB), dated on 18/04/2010
/42/	Shandong Jikuang Morningsun Thermal Power Co., Ltd and Zhongjian Qiju Installation Engineering Company, Construction and Installation Contract, dated on 05/05/2010
/43/	Shandong Jikuang Morningsun Thermal Power Co., Ltd, Construction Order, dated on 04/05/2010
/44/	Shandong Jikuang Morningsun Thermal Power Co., Ltd, Prior Consideration of the CDM

	Form to EB, submission date 16/08/2010 and receive date 18/08/2010
/45/	Shandong Jikuang Morningsun Thermal Power Co., Ltd, Prior Consideration of the CDM Form to China DNA, submission date 27/08/2010 and confirmation dated 13/09/2010
/46/	Website Information, TITAN 130 Turbine Generator Sets Performance Specification, https://mysolar.cat.com/cda/layout?m=36056&x=7, English language and retrieved on 15/01/2012
/47/	Qingdao Jieneng Group, Steam Turbine and Generator Specifications (C12-3.43/1.27), dated in 07/2010
/48/	Wuxi Huaguang Boiler Co., Ltd, Circulating Fluidized Bed Boiler Specifications (UG-75/3.82-M41), dated in 02/2010
/49/	Nanjing Nanguo Power Equipment Co., Ltd., Complementary combustion heat recovery steam boilers (WHRB) Specifications (BQ136.2/500-45(4.1)-3.82(0.3)/450(144)), File No: 07-WII00-002
/50/	Shandong Jikuang Morningsun Thermal Power Co., Ltd and Lakewood Carbon Corp., Certified Emission Reductions Purchase Agreement (ERPA), dated on 15/07/2010
/51/	National Environmental Protection Bureau: Emission standard of air pollutants for coke oven, GB 16171-1996, dated on 07/03/1996
/52/	Department of Resource Saving and Environmental Protection of NDRC, Survey of Coke Industry Association, http://hzs.ndrc.gov.cn/newhjyzyjb/t20060907_83477.htm Chinese language, retrieved on 11/08/2011, dated on 07/09/2006
/53/	Shandong Morningsun Thermal Power Co., Ltd and Shandong Morningsun Coal Chemical Co., Ltd, COG Purchase Agreement, dated on 09/12/2011
/54/	State Council Office: Notice on the forbidden of illegal construction of fossil fuel fired power plants with an installed capacity less than 135MW, Guobanfamingdian [2002] No. 6, dated 15/04/2002
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/70/	Shanxi Energy and Conservation (Li YANG, Dong YUE), The Present and Future of China Coking Oven Gas Industry, dated in 03/2006
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/73/	Website information, Overview of the Technology and Application of Heat Pumps, http://www.maigoo.com/maigoocms/2011/0309/71213.html, Chinese language and retrieved on 12/03/2012
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/75/	Capacity Development for The Clean Development Mechanism (CD4CDM), Overview of the CDM pipeline, updated 01/07/2012. Website information: http://cd4cdm.org/CDMJIpipeline.htm
/76/	China State Council, Notification regarding the Regulation of Equity Portion in Investment Project, dated on 25/05/2009
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/80/	Website information, Labor Cost, Chinese language and retrieved on 26/03/2012, http://www.btophr.com/viewcontent/insurance.asp?city=%E6%B5%8E%E5%8D%97
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/86/	UNFCCC website information, Similar projects for the proposed project, UNFCCC Reference No. 812, 1608, 1609, 1689, 2520, 3400, English language and retrieved on 27/03/2012
/87/	Shandong Jikuang Morningsun Thermal Power Co., Ltd and Shandong Electric Power Corporation Jining Power Supply Company, Power Purchase Agreement, dated on 17/11/2011
/88/	Shandong Province Light Industry Design Institute, statistics regarding the CCPP projects in Shandong province, dated in 02/2012
/89/	UNFCCC website information, Project No. 0816, http://cdm.unfccc.int/Projects/DB/TUEV-SUED1166194116.62/view
/90/	UNFCCC website information, Project No. 3400, http://cdm.unfccc.int/Projects/DB/TUEV-SUED1265810080.32/view
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/93/	Shandong Jikuang Morningsun Thermal Power Co., Ltd, the coking production historical data records, data for year 2011
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/95/	Uniufa Energy Technology Co., Ltd., Enthalpy Calculation spreadsheet, dated on 23/03/2012
/96/	Uniufa Energy Technology Co., Ltd.: ER calculation spreadsheet “ER Jikuang” (ERCS), version 01 of 01/12/2011 and version 02 of 23/03/2012
/97/	UNFCCC Website information, CDM Project Activity Information for Project Reference No. 3166, 812, English language and retrieved on 17/04/2012
/98/	China National Technical Committee for Electric Energy Metering Standardization: DL/T 448-2000 Electric energy metering equipment technology management instruction, dated 01/01/2001
/99/	DNA of United Kingdom Department of Energy & Climate Change: Letter of approval dated 12/04/2012
/100/	The Government of the People’s Republic of China, Energy Conservation Law of the People’s Republic of China, http://www.gov.cn/flfg/2007-10/28/content_788493.htm, Chinese language and retrieved on 18/04/2012
/101/	CDM Executive Board: Information Note: Previous Rulings Related to The Appropriateness of Benchmarks for Project Activities Utilizing Waste Heat/Waste Gas for Power Generation, EB51 Annex 59, dated on 04/12/2009
/102/	Website information, Solar Energy Project Investment and Cost, Chinese language and retrieved on 19/04/2012, http://wenku.baidu.com/view/c9512c1bff00bed5b9f31d8e.html
/103/	Shandong Jikuang Morningsun Thermal Power Co., Ltd, Business License, registered date 28/09/2009
/104/	Shandong Jikuang Morningsun Coal Chemical Co., Ltd, Business License, registered date 26/12/2008
/105/	UNFCCC Website Information, Similar registered CDM Project Activities involved COG purchasing, English language and retrieved on 03/08/2012 http://cdm.unfccc.int/Projects/DB/TUEV-SUED1264601203.83/view http://cdm.unfccc.int/Projects/DB/TUEV-SUED1259337692.05/view http://cdm.unfccc.int/Projects/DB/TUEV-SUED1265810080.32/view

	http://cdm.unfccc.int/Projects/DB/TUEV-SUED1204557954.62/view http://cdm.unfccc.int/Projects/DB/TUEV-SUED1202299119.13/view http://cdm.unfccc.int/Projects/DB/TUEV-SUED1202302578.09/view
/106/	Shandong Province Light Industry Design Institute: Feasibility Study Report (FSR) for 45t/h Circulating Fluidized Bed Boiler, dated in 10/2009
/107/	UNFCCC website information, similar boiler facility involved in the project activities applied CDM and published on UNFCCC website, English language and retrieved on 06/08/2012, http://cdm.unfccc.int/Projects/DB/ERM-CVS1273590577.21/view http://cdm.unfccc.int/Projects/Validation/DB/FNRBQ3TRFM5FIQ0MBRXFH560MPJARP/view.html http://cdm.unfccc.int/Projects/Validation/DB/C79WEKHCZBA9AGA5OCEYYGD0C773ZW/view.html
/108/	Chen Weixing from East China Electric Power Design Institute, "Discussion of fuel apportionment for Combined cycle cogeneration units", dated on 27/04/2009 Chinese language and retrieved on 06/08/2012 http://wenku.baidu.com/view/540cced676a20029bd642d94.html http://www.doc88.com/p-515799596659.html
/109/	CDM Executive Board: Tool to calculate baseline, project and/or leakage emissions from electricity consumption, version 01 of 16/05/2008

2.2 Follow-up actions

On 10/01/2012, RINA visited project site in the centre of Jining Chemical Industry Economic & Technological Development Zone in Jinxiang Country, Jining City, Shandong Province, China, to resolve questions and issues identified during the document review and to perform interviews with relevant stakeholders in the host country.

The key personnel interviewed and the main topics of the interviews are summarized in the table below.

	Date	Name and Role	Organization	Topic
/a/	10/01/2012	Jin ShengSheng CDM Consultant	Uniufa Energy Technology Co., Ltd.	Writing of the PDD and validation procedure, ER calculation
/b/	10/01/2012	Guan Ren CDM Consultant	Uniufa Energy Technology Co., Ltd.	Writing of the PDD and validation procedure, ER calculation
/d/	10/01/2012	Li Jiapeng Vice President	Shandong Jikuang Morningsun Thermal Power Co., Ltd	Feasibility study of the project activity and project implementation, baseline scenario, additionality, CDM consideration, Monitoring plan
/e/	10/01/2012	Yang Yuming Engineer	Shandong Jikuang Morningsun Thermal Power Co., Ltd	Feasibility study of the project activity and project implementation, baseline scenario, additionality, CDM consideration, Monitoring plan
/f/	10/01/2012	Liu Bo Supervisor	Shandong Jikuang Morningsun Thermal Power Co., Ltd	Feasibility study of the project activity and project implementation, baseline scenario, additionality, CDM consideration, Monitoring plan
/g/	10/01/2012	Liu Xiayuan Engineer	Shandong Jikuang Morningsun Thermal Power Co., Ltd	Feasibility study of the project activity and project implementation, baseline scenario, additionality,

				CDM consideration, Monitoring plan
/h/	10/01/2012	Zhang Lulu Villager	Dongfeng Village, Jinxiang Town, Jining City	Economic and environmental impact raised by the project activity; stakeholders' comments
/i/	10/01/2012	Liu Chaohui Office Support	Huji Village, Jinxiang Town, Jining City	Economic and environmental impact raised by the project activity; stakeholders' comments
/j/	10/01/2012	Lu Lijun Villager	Huji Village, Jinxiang Town, Jining City	Economic and environmental impact raised by the project activity; stakeholders' comments
/k/	10/01/2012	Qin Meixiang Villager	Dongfeng Village, Jinxiang Town, Jining City	Economic and environmental impact raised by the project activity; stakeholders' comments
/l/	10/01/2012	Wang Junli Deputy Chief	Jinxiang EPB	Economic and environmental impact raised by the project activity; stakeholders' comments
/m/	11/01/2012	Sun Zuoyi Section Chief	Jining DRC	Project approval, project implementation, government policy, tariff policy

2.3 Resolution of outstanding issues

The objective of this phase of the validation is to resolve any outstanding issues which need to be clarified for RINA's positive conclusion on the project design.

To guarantee transparency a validation protocol has been customized for the project. The protocol shows in a transparent manner the requirements, means of validation and the results from validating the identified criteria. The validation protocol consists of four tables; the different columns in these tables are described in the figure below (see Figure 1). The completed validation protocol is enclosed in Appendix A to this report.

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

- The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions.
- The CDM requirements have not been met.
- There is a risk that the emission reductions cannot be monitored or calculate.

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

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration. CARs, CLs and FARs identified are included in the validation protocol in Appendix A of this report.

Figure 1 Validation protocol tables

Validation Protocol, Table 1 - Mandatory requirement		
Requirement	**Reference**	**Conclusion**
The requirements the project must meet.	Makes reference to the documents where the answer to the requirement is found.	This is either acceptable based on evidence provided (OK), or a Corrective Action Request (CAR) if a requirement is not met. A request for clarification (CL) is used when the validation team has identified a need for further clarification.

Validation Protocol, Table 2 - Requirement checklist					
Checklist Question	**Ref.**	**MoV**	**Comments**	**Draft Conclusion**	**Final Conclusion**
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organized in seven different sections.	Makes reference to documents where the answer to the checklist question or item is found.	Explain how conformance with the checklist question is investigated. Examples are document review (DR), interview or any other follow-up actions (I), cross checking (CC) with available information relating to projects, (N/A) means not applicable.	The discussion on how the conclusion is arrived at and the conclusion on the compliance with checklist question so far.	OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. For CAR, CL and FAR see the definitions above.	OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements.

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

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

2.4 Internal quality control

All the revisions of the validation report before being submitted to the client were subjected to an independent internal technical review to confirm that all validation activities had been completed according to the pertinent RINA instructions.

The technical review was performed by a technical reviewer(s) qualified in accordance with RINA's qualification scheme for CDM validation and verification.

2.5 Validation team and the technical reviewer(s)

The validation team and the technical reviewers consist of the following personnel:

Role/Qualification	Last Name	First Name	Country
Team Leader CDM	TONG	Yan	China
CDM Validator	ZHENG	Xia	China
Technical Expert CDM	RAN	Fanlin	China
Technical Expert	ZHANG	Xuebin	China
Financial Expert	LI	Jie	China
Technical Reviewer	VALOROSO	Rita	Italy
Technical Reviewer	TERAMO	Paolo	Italy
Technical Reviewer	KRISHNAN	Parveen Kumar	India
Technical Reviewer in Training- Technical Expert	TONG	Wing Yu	Italy

3 VALIDATION FINDINGS

The findings of the validation related to the project, as described in the PDD version 01 of 01/12/2011, version 02 of 20/04/2012 and version 03 of 07/08/2012 /01/, are stated in the following sections.

The validation requirements, the means of validation and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

3.1 Approval and Participation

The project's host Party is People's Republic of China and the Annex I Party is United Kingdom of Great Britain and Northern Ireland.

People's Republic of China and United Kingdom of Great Britain and Northern Ireland fulfil the requirements to participate in the CDM. Both have ratified the Kyoto protocol and established a DNA as the participating requirements for CDM under the Kyoto Protocol. People's Republic of China ratified the Kyoto Protocol on 30/08/2002 and established as DNA "National Development and Reform Commission (NDRC)" as per the UNFCCC website/13/; United Kingdom of Great Britain and Northern Ireland ratified the Kyoto Protocol on 31/05/2002 and established as DNA "Department of Energy and Climate Change (DECC)" as per the UNFCCC website/14/.

The project participant(s) are Shandong Jikuang Morningsun Thermal Power Co., Ltd from People's Republic of China and Lakewood Carbon Corp. from United Kingdom of Great Britain and Northern Ireland. Both project participants are private entities. The project participants are correctly listed in table A.3 of the PDD and the information is consistent with the contact details provided in Annex 1 of the PDD /01/.

The DNA of China issued a Letter of Approval on 19/04/2011, authorizing Shandong Jikuang Morningsun Thermal Power Co., Ltd as project participant and confirming that the project assists in achieving sustainable development /30/. The letter of Approval from United Kingdom of Great Britain and Northern Ireland was issued on 12/04/2012, authorizing Lakewood Carbon Corp. as project

participant /99/. Both the letters of approval were received directly by the PP and refer to the precise project activity in the PDD /01/.

The authenticity of the letter of approval from DNA of People's Republic of China has been validated by verifying the CDM project information listed on the website of Chinese DNA/30/ and the authenticity of the letter of approval from DNA of United Kingdom of Great Britain and Northern Ireland has been validated by verifying the original letter of approval provided directly by PP /99/. RINA has not found reason to doubt the authenticity of the letter of approval from both parties.

By checking the above documents /30//99/ RINA considers both the LoAs in accordance with paragraphs 45-48 of the VVM /02/.

The proposed project does not involve any public funding from an Annex I Party, and the validation did not reveal any information that indicated that the project could be seen as a diversion of official development assistance (ODA) funding towards the host country. It can be confirmed through the project FSR and the approval /28//29/ that the investment of the proposed project is sourced from the project developer by equity capital and bank loan, also confirmed by interview with local government official. No other investment sources were indicated.

Project participants	Shandong Jikuang Morningsun Thermal Power Co., Ltd	Lakewood Carbon Corp.
Parties involved	People's Republic of China	United Kingdom of Great Britain and Northern Ireland
APPROVAL		
LoA received	Yes /30/	Yes /99/
Date of LoA	19/04/2011	12/04/2012
LoA received from	Directly received from PP	Directly received from PP
Validation of authenticity	Verifying the CDM project information listed on the website of China DNA /30/	Verifying original document /99/
Validity of LoA	Yes	Yes
PARTICIPATION		
Party is party to Kyoto Protocol	Yes	Yes
Voluntary participation	Yes	Yes
Project contribution to SD	Yes	NA

3.2 Project design document

The PDD for the project activity "Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd", in "China", version 01 of 01/12/2011, version 02 of 20/04/2012 and version 03 of 07/08/2012 submitted by the Lakewood Carbon Corp. have been the basis for the validation process.

RINA confirms that the above PDD is based on the currently valid PDD template and is completed in accordance with the applicable guidance document Guidelines for completing the project design document (CDM-PDD) and the proposed new baseline and monitoring methodologies (CDM-NM) /03/.

The main changes between the PDD version 01 published for global stakeholder consultation and the PDD version 03 submitted for registration are listed as following:

- The description of the pre-project scenario has been refined in the PDD version 03, to clearly demonstrate there was no existing boiler prior to the project for steam supplying in the zone

and is in line with the actual situation seen by physical site visit; the technical information of the proposed project activity has been corrected in PDD version 03 to be in line with the actual employed equipment.

- The demonstration that the waste COG utilized in the project activity was flared into the atmosphere in the absence of the project activity at the existing coking oven production plant, has been enhanced in PDD version 03, including the justification of the project implementation status, to be in accordance with the requirement of Annex 2 of the applied methodology;
- The elimination of alternatives in the identification of the baseline scenario has been updated in PDD version 03, including transparently reporting of the lack of renewable energy in local area and elaborating the justification of the eliminations;
- The date of submission of the notification of prior consideration of the CDM FORM to EB secretariat has been corrected in PDD version 03, to be consistent with the date of the receiving the form confirmed by UNFCCC on the website;
- The value of insurance cost and the urban maintenance and construction tax rate applied in the investment analysis has been corrected in PDD version 03, to be consistent with the value indicated in the approved FSR;
- The sensitivity analysis has been updated in PDD version 03, to enhance the justification for the likelihood of variation of each key parameter to reach the benchmark;
- the common practice analysis has been updated in the PDD version 03, using the latest available "Tool for the demonstration and assessment of additionality" version 06.0.0, instead of the "Guideline of common practice" version 01;
- the calculation of the baseline emissions from thermal energy has been updated in the PDD version 03, to include the determination of the parameter $EF_{heat,j,y}$ and $HG_{n,process,j,y}$, in accordance with the applied methodology.
- the parameters that are available at validation have been updated in PDD version 03, to include the parameter $h_{feedwater}$ (expressed as unit enthalpy of the feed water for the WHRB) and the h_{steam} (expressed as unit enthalpy of the steam from the steam turbine), to calculate the baseline emissions from thermal energy; the value applied for these parameter has been corrected in PDD version 03, to be consistent with the value from standard steam book; the IPCC default value and the conservative method have been applied for the parameter of net calorific value and the emission factor of fossil fuels in PDD version 03;
- the amount of emission reductions has been corrected in PDD version 03, in response to the correction of the unit enthalpy value and the NCV and/or emission factor value of fossil fuels, from 242,242tCO2e in PDD version 01 to 246,651tCO2e. The increase of the emission reductions was caused mainly by the correction of the value of the unit enthalpy of the feed water, from 634.6482KJ/kg in PDD version 01 to 440.1776KJ/kg in PDD version 03. This correction is reasonable, since the thermal situation of the feed water was wrongly applied in PDD version 01 as the temperature of the feed water was 150 ^{o}C while it was actually 104 ^{o}C as per the approved FSR and the specification of the employed WHRB;
- the accuracy of the measurement equipment has been included in PDD version 03.
- For response to the incomplete, the justification of the "reference energy generation facility" using investment analysis has been included to identify the baseline scenario of the proposed project activity in the updated PDD version 03; the monitoring parameters regarding the project emissions have been included in the monitoring plan; the monitoring for both generated and delivered electricity and heat have been included in the updated PDD version 03.

3.3 Project Design

The purpose of the proposed project activity is to generate electricity and steam by utilizing waste gas resources recovered from an existing coking plant with an annual coke production of 800,000t. The total installed capacity of the project activity is 42MW (including two sets of 15MW gas turbine generators and one set of 12MW steam turbine generator) as per the approved FSR /28/ and the signed equipment purchase agreements /37//40//41/, utilizing the waste COG of about 158,604,000Nm^3 per year from the coking plant for power and heat generation as per the project

design in FSR /28/. It is expected to generate totally net electricity 229,219MWh and 240,000 tons of steam annually as per the approved FSR /28/. The generated electricity will be delivered to the power grid NCPG and the generated steam will be delivered to steam consumers at the local zone of the project. It is located in the centre of Jining Chemical Industry Economic & Technological Development Zone in Jinxiang County, Jining City, Shandong Province, China. The geographical coordinates of the project activity are East longitude 116°23'31" and North latitude 35°10'29" as per the approved FSR/28/ and confirmed by GPS measure on the site.

In the absence of the project activity, the waste COG generated by the existing coke oven line would not utilized and would continue to be flared to the atmosphere; the electricity demand would be supplied by the grid NCPG /31/; the steam consumption would be supplied by newly built coal-fired boilers.

In the project scenario, the waste COG generated from the existing coking plant will be utilized by the proposed project activity to generate electricity and steam. The generated power will be supplied to the NCPG to replace equivalent electricity which is dominated by fossil fuel-fired power generation and the steam will be supplied to the consumer in the project located zone to replace equivalent steam which would be supplied by coal-fired boilers. Therefore the utilization of waste COG will reduce the emissions of anthropogenic GHGs.

As per the project design in FSR /28/ and by physical site visit, the existing coke oven line produces an annual coke production of 800,000 ton. As per the instruction of the technical lifetime by the manufacturer /66/, the existing coke oven line was designed and manufactured by Angang Group Design Institute and was commenced operation in 12/2010; the technical lifetime of the coke oven is 25 years. Furthermore, according to the operation explanation of the coke oven line from the existing production line's owner Shandong Morningsun Coal Chemical Co., Ltd. in 01/2012 /67/, the coke oven line started operation in 12/2010 and has been put into operation for almost 1 year. RINA thus determined that the remaining lifetime of the existing coke oven line is about 24 years according to the latest version of Tool to Determine the Remaining Lifetime of Equipment /09/ which is much longer than the expected crediting period of fixed 10 years.

As per the project design in approved FSR /28/, the project activity consists mainly of two gas turbine generators, two complementary combustion heat recovery steam boilers (WHRB) and one set of steam turbine generator, as well as one 75ton/h coal-fired steam boiler as a standby steam generator in case of project maintenance or other accidents. According to the approved design /28/, the waste COG is 158,604,000Nm^3 per year, of which the waste COG of totally amount 105,564,000Nm^3/yr will be used by the gas turbine generators for electricity genearation and the rest waste COG (totally 53,040,000Nm^3/yr) will be used in the complementary combustion heat recovery steam boilers (WHRB) to generate heat that sent to the steam turbine generator. The total installed capacity of the gas turbine generator sets is 30MW including two Titan^{TM} 130 type generator sets, each with a capacity of 15MW manufactured by Solar Turbines Incorporated as per the signed equipment purchase agreement /37/ and by the nameplates of the equipment seen at the site; the total installed capacity of the WHRB is 90ton/h including two sets of WHRB, each with a capacity of 45ton/h (model: BQ136.2/500-45(4.1)-3.82(0.3)/450(144)) manufactured by Nanjing Nangou Power Equipment Co., Ltd. as per the signed equipment purchase agreement /49/ and by the nameplates of the equipment seen at the site; the installed capacity of the steam turbine is 12MW (Turbine model: C12-3.43/1.27) manufactured by Qingdao Jieneng Steam Turbine Group Co., Ltd. and the installed capacity of the steam turbine generator is 12MW (Generator Model: QF-12-2) manufactured by Shandong Jinan Generator Equipment Plant as per the signed equipment purchase agreement /47/ and by the nameplates of the equipment seen at the site; the rated steam capacity of the standby steam boiler is 75ton/h (Model: UG-75/3.82-M41) manufactured by Wuxi Huaguang Boiler Co., Ltd.. The technical details of the equipment included in the PDD have been reviewed and found the same as the description in the approved FSR /28/. At the time of the physical site visit on 10/01/2012, the above equipment was under construction and debugging at the project site; the technical specifications indicated in the nameplates of these equipment are consistent with the project design in FSR /28/. The expected operational lifetime of these equipment is 30 years for the two gas turbine generators as per the public information /46//68/ and 15 years for others as per the manufacturer's specification /47//48//49/. It is therefore confirmed that the operational lifetime of these main equipment are at least 15 years. The equipment were almost domestically manufacturer as per the signed purchase agreement /38//39//40//41/ and manufacturer's specification /47//48//49/; the two sets of gas turbine generators

were imported from Solar Turbines International Company from U.S.A as per the signed purchase agreement /37/ and no transfer of technology from Annex I Party was involved as per the agreement /37/.

The construction of the proposed project started on 04/05/2010 in accordance with the project construction order /43/. At the time of the physical site visit on 10/01/2012, the project was still under construction, which the main equipment were under installation and debugging; the pipeline to deliver the waste COG from the existing coke oven production line to the proposed project site was still under construction; the flaring system was existed at the coke oven line plant for the disposal of the waste COG and the flame was glaring upon the flare in the sky. RINA thereby confirmed that at the time of physical site visit, the proposed CDM project activity was not completely implemented and the equipment for waste COG recovery and utilisation were still under installation or construction. Therefore, RINA ensured that the waste COG utilized in the proposed project activity was not used and was flared into the atmosphere in the absence of the project activity at the existing facility, in accordance with the requirement of Annex 2 of the applied methodology /04/.

The starting date of the proposed project activity is determined as 12/04/2010 when the purchase contract on main equipment (TITAN 130 Gas Turbine Generator Sets) was signed /37/. The project selected a fixed 10 years crediting period started from 01/09/2012 and ended on 31/08/2022. The emission reductions are expected to be 246,651tCO_2e annually and will be 2,466,510tCO_2e over the chosen fixed 10 years crediting period.

RINA was able to verify all the documented evidence listed above during the validation process and can confirm that data and considerations are complete and accurate. RINA also confirms that the description of the proposed CDM project activity, as contained in the PDD sufficiently covers all relevant elements, is accurate and complete and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity.

3.4 Application of selected baseline and monitoring methodology

The project correctly applies the approved methodology “ACM0012”, “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects”, 04.0.0 of 15/04/2011 /04/, which was valid from 15/04/2011 onwards.

The project activity also applies the tools “Tool for the demonstration and assessment of additionality” version 06.0.0 of 25/11/2011 /05/, “Tool to calculate the emission factor for an electricity system” Version 02.2.1 of 29/09/2011 /06/, “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”, version 02 of 02/08/2008 /07/, “Tool to determine the baseline efficiency of thermal or electric energy generation systems”, version 01 of 17/07/2009 /08/ and “Tool to Determine the Remaining Lifetime of Equipment”, version 01 of 16/10/2009 /09/. These tools are included in the applied methodology and the versions of these tools are the latest version available at the time of preparing this report.

The proposed project activity meets the criteria defined in the baseline methodology and tools as it ensures that:

The applied consolidated methodology ACM0012 version 04.0.0 is applicable to project activities implemented in an existing or Greenfield facility converting waste energy carried in identified WECM stream(s) into useful energy. The proposed project activity is implemented in an existing coking plant and utilizes the waste energy i.e. COG to generate electricity and steam. The WECM is the waste coking oven gas (COG) which is used for cogeneration. It has been confirmed by the physical site visit and from the FSR /28/, in the absence of the project activity, the waste COG was generated by the existing coke oven line facility was flared into atmosphere. During the site visit, the proposed project was under construction, the waste COG has been not utilized and flared in the flaring system, the flame was visible upon the flaring system.

VALIDATION REPORT

By physical site visit, document review /28//29/, interview with local government officials, it has been validated that the applicability conditions, as required by the methodology and tools, are satisfied by the proposed project activity. The detailed assessment and conclusion are listed in table below.

Applicability conditions	PDD Justification	Assessment by RINA	Conclusion
For project activities which recover waste pressure, the methodology is applicable where waste pressure is used to generate electricity only and the electricity generated from waste pressure is measurable;	The project is not to recover waste pressure,	The project is based on the use of waste COG as confirmed by physical site visit, interview with PP and reviewing the project application report	Not applicable
Regulations do not require the project facility to recover and/or utilize the waste energy prior to the implementation of the project activity	There are no regulations which require the project facility to recover and/or utilize the waste gas prior to the implementation of the project activity	According to the local and sectoral expertise and interview with the local government representatives, there is no regulation required the recovery of the waste energy.	Satisfied
The methodology is applicable to both Greenfield and existing waste energy generation facilities. If the production capacity of the project facility is expanded as a result of the project activity, the added production capacity must be treated as a Greenfield facility;	The Project is the cogeneration plant based on the COG from the existing coking oven. The production capacity of the project facility will not be expanded as a result of the project activity.	By physical site visit, an existing coke oven line is in operation. As confirmed by the project developer and reviewed the approved FSR /28/, there is no capacity expansion plan for the production and no production expanded due to the project activity.	Satisfied
Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the project facility shall not be included in the emission reduction calculations.	Under abnormal operation, the waste COG will be flared to the atmosphere just as the baseline scenario. And the time span will be recorded. These emissions will not be accounted for.	As per the design, under abnormal operation, the waste COG will be flared and vented to the atmosphere and the emissions in the abnormal period will not be accounted for as claimed by PP	Satisfied
If multiple waste gas streams are available in the project facility and can be used interchangeably for various applications as part of the energy sources in the facility, the recovery of any waste gas stream, which would be totally or partially recovered in the absence of the project activity, shall not be reduced due to the implementation of CDM project activity. For such situations, the guidance	Recovered waste COG is the only gas stream for the project and there is no waste gas is used in the absence of the project activity.	It is validated by physical site visit and confirmed by the approved FSR /28/ that the proposed project involves recovery of only one waste gas COG from the coking plant and no other waste gas is recovered by the project.	Satisfied

provided in Annex 3 shall be followed.			
The methodology is not applicable to the cases where a WECM stream is partially recovered in the absence of the CDM project activity to supply the heat of reaction, and the recovery of this WECM stream is increased under the project activity to replace fossil fuels used for the purpose of supplying heat of reaction.	Waste COG is not recovered absolutely in the absence of the project activity.	As per the design /28/ and physical site visit, the waste COG was not recovered in the absence of the CDM project activity.	Satisfied
This methodology is also not applicable to project activities where the waste gas/heat recovery project is implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) to generate power. However, the projects recovering waste energy from single cycle and/or combined cycle power plants for the purpose of generation of heat only can apply this methodology	The project is a co-generation combined–cycle power plant (CCPP) but not a single cycle power plant.	As per the design /28/ and physical site visit with the expertise of the installed equipment, the project activity involves a co-generation combined-cycle power plant (CCPP) generating electricity and steam. The waste gas recovery is not implemented in a single-cycle power plant.	Satisfied
The emission reduction credits can be claimed up to the end of the lifetime of the waste energy generation equipment. The remaining lifetime of the equipment should be determined using the latest version of the "Tool to determine the remaining lifetime of equipment"	The remaining lifetime of the waste energy generation equipment (coke oven) is estimated by "Tool to determine the remaining lifetime of equipment". The technical lifetime of coke oven production line is 25 years, and it has operated barely one year, so the remaining lifetime of the coke oven production is over 10 years. Therefore, The credits period can be claimed for 10 years.	It has been assessed in section 3.3 of this report that the remaining lifetime of the existing coke oven line is about 24 years according to the latest version of Tool to Determine the Remaining Lifetime of Equipment /09/ which is much longer than the expected crediting period of fixed 10 years. Please refer to the assessment in section 3.3. of this report.	Satisfied

The methodology requires that the extent of use of waste energy from the waste energy generation facilities in the absence of the CDM project activity will be determined in accordance with the procedures provided in Annex 1 (for Greenfield project facilities) and in Annex 2 (for existing project facilities) of this methodology. The proposed CDM project activity is implemented in an existing project facilities as per the approved FSR /28/, and is applicable to the requirement of Annex 2 of the applied methodology ACM0012 version 04.0.0 /04/ which was updated and recommends DOE to supplement the analysis of extent of use of WECM in the existing facility through the on-site checks prior to project implementation to confirm that no equipment for waste energy recovery and utilization had been installed on the specific WECM steam prior to the implementation of the CDM project activity. However

such requirement of “on-site checks” is not mandated as that “should” is applied in the requirement, i.e. “The DOE **should** supplement the analysis prescribed by following methods through the on-site checks prior to project implementation to confirm that no equipment for waste energy recovery and utilisation had been installed on the specific WECM stream (that is recovered under the project activity) prior to the implementation of the CDM project activity” as per the methodology ACM0012 version 04.0.0 /04/, which means there are other methods to assess the situation.

RINA studied the project implementation, and found that the project developer decided to invest the project as CDM on 16/02/2010 /36/ and started on 12/04/2010 as main equipment purchase agreement was signed /37/, and started project construction on 04/05/2010 /43/. The main equipment was manufactured in the end of year 2010 as per the nameplates of equipment seen at the site. RINA is of opinion that when the latest version 04.0.0 of ACM0012 was available in 04/2011 /04/, the project has started construction for almost one year. Considering the requirement of “on-site checks prior to project implementation to confirm that no equipment for waste energy recovery and utilization had been installed on the specific WECM stream prior to the implementation of the CDM project activity” is valid in ACM0012 version 04.0.0 since 04/2011, which was after the starting of the project implementation, RINA is of opinion that it is reasonable for the PP not to invite DOE to conduct on-site checks prior to the start of the implementation of the project.

In view of the above understanding, RINA assessed the situation based on the physical site visit for CDM validation, i.e. at the time of the physical site visit on 10/01/2012, RINA observed that the proposed CDM project activity was not completely implemented as that 1) the equipment for waste COG recovery and utilization were still under installation or construction; 2) the flaring system was existed at the coke oven line plant for the disposal of the waste COG and the flame was glaring upon the flare in the sky. RINA also interviewed the local governmental officials and the stakeholders nearby, they confirmed the same situation as observed.

Therefore, RINA ensured that the waste COG utilized in the proposed project activity was not used and was flared into the atmosphere in the absence of the project activity at the existing facility, which demonstrated the same as the requirement of Annex 2 of the applied methodology. /04/.

The PP demonstrates the use of waste energy in absence of proposed project in PDD by providing **energy balance** of the coking oven line, which was made by an independent third party Angang Group Design Institute /69/. It demonstrated clearly the process parameters that the sum of the energy input was 1,080,000 ton of clean coal annually and the sum of the energy output was 328,800,000 m^3 of COG and 800,000 ton of Coke annually. Totally 151,248,000 m^3 of COG is sent back to the existing coke oven line for production, which accounts for 46% of energy content of total generated COG. As a balance result, the remaining COG of 177,552,000 m^3 annually is not used in the production line and flared to the atmosphere.

The energy content of the COG is normally in the range 16,726~17,981 kJ/Nm^3, which is sourced from China Energy Statistics Yearbook /22/. As estimated in the approved FSR /28/, the energy content of waste COG from the existing production line is 17,020kJ/Nm^3, which is within the range, thus is reasonable. Otherwise the **energy balance** of the coke oven line shows that about 177,552,000m^3 COG is excessed that would be otherwise wasted in absent of the project activity /69/. The COG excess rate of this coke plant is 54%, which is close to the average COG excess rate in China for independent coke plant (52%) /71/. Furthermore, the estimated waste COG utilized by the proposed project activity, as designed in the approved FSR /28/, is 158,604,000Nm^3 which is lower than that in the energy balance, considering an un-avoided flaring during the start-up of the project and equipment repairing, which account about 10.67% of the total waste COG. By crosschecking against similar registered CDM project activities in Shandong province (Ref. No. 3166, 812 /97/), RINA found that the COG utilization of similar projects is in the range of 83%-96%, into which the proposed project falls. It is thus confirmed that the estimation of the amount of waste energy released was reasonable and the amount of the waste COG utilized by the project as sourced from FSR /28/ and applied in PDD is conservative comparing with the result of energy balance /69/.

Therefore, RINA was able to confirm that the provided energy balance /69/ can demonstrate the waste energy was not used and the estimations of the energy content and amount of waste energy released were conservative.

The methodology also requires the applicability conditions included in the tools referred to above apply. The methodology requires additionality demonstration using “Tool for the demonstration and assessment of additionality”, therefore the additionality tool is reasonably applied; the proposed CDM

project activity generates electricity and delivers to the grid NCPG, which is located in host country China, therefore “Tool to calculate the emission factor for an electricity system” is applicable to the project; the CDM project is implemented at an existing facility and the methodology requires demonstration of the remaining lifetime of the existing facility, therefore “Tool to determine the remaining lifetime of equipment” is applicable to the project; the project activity involves the combustion of fossil fuels, e.g. diesel, coal, the methodology requires using “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” to calculate the project emissions, therefore the tool is applicable to the project.

It is confirmed by validating the applied methodology ACM0002 /04/ referred to in the PDD, by cross-checking the PDD against the approved FSR /28//29/, and through the on-site visit and interviewing with the PP and government officials.

Emission sources which are not addressed by the applied methodology /04/ and which are expected to contribute more than 1% of the overall expected average annual emissions reduction have not been identified.

RINA hereby confirms that the selected approved methodology and tools, have been previously approved by the CDM Executive Board, and is applicable to the Project, which complies with all the applicability conditions therein.

3.5 Project boundary and baseline identification

3.5.1 Project boundary

According to the approved methodology “ACM0012”, “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects”, version 04.0.0 /04/ and Tool to calculate the emission factor for an electricity system version 02.2.1 /06/, the project boundary of the project activity includes the following:

1) The “project facility”, i.e. waste energy generation facility. For the proposed project activity, the project facility includes the industrial facility where waste energy is generated, i.e. the existing coking oven production line as per the signed agreement between the owner of existing coking plants and the project developer /53/; the waste energy recovery and useful energy generation equipment, i.e. the newly built project electricity and heat generation plant, as confirmed by physical site visit and reviewing the approved FSR /28/;

2) The “recipient facility(ies)”, i.e. the facilities receive project energy and energy distribution system. For the proposed project activity, the recipient facilities include the facilities where the project electricity power is exported, i.e. the physically connected power grid NCPG as per the signed grid connection agreement /74/; the facilities where the project steam is exported, i.e. the project located development zone Jining Chemical Industry Economic & Technological Development Zone; the energy distribution systems, i.e. the steam distribution pipelines and the electricity transmission lines, as confirmed by physical site visit and reviewing the approved FSR /28/;

3) The spatial extent of the grid, i.e. all power plants connected physically to the NCPG (a regional power grid including Beijing, Tianjin, Hebei, Shanxi, Shandong and Inner-Mongolia autonomous region) where the proposed project activity will be connected, as confirmed by the approved FSR /28/ and reviewing the latest data available at the time of PDD submitted to DOE for validation of “2011 Baseline Emission Factor for Regional Grids in China” announced by Office of National Coordination Committee on Climate Change, National Development and Reform Commission (NDRC) of China (DNA of China) on 20/10/2011 /31/.

RINA checked the emissions sources included in the project boundary and confirmed that:

	GHGs involved	Description
Baseline emissions	CO_2	The main emission source for the baseline is considered to be a) CO_2 generated by the NCPG, to which the proposed project activity is connected, as equivalent power electricity will be replaced by the project activity from the

		grid which is dominated by fuel-fired power generation; b) CO_2 generated by the boilers which would be existed in the absence of the proposed project activity and therefore CO_2 emissions are included as main emission sources.
Project emissions	CO_2	The main emission source for the project activity is considered to be a) CO_2 generated by supplemental electricity consumption which is imported from the grid NCPG; b) CO_2 generated by the energy required by cleaning of gas; c) CO_2 generated by the operation of the standby boiler which would be used and consume fossil fuels when the proposed CCPP plant is unavailable; d) CO_2 generated by supplemental fossil fuel consumption at the proposed project plant i.e. the diesel consumption for the CCPP start-up.
Leakage	N/A	No leakage is to be considered as per the applied methodology ACM0012 /04/

The baseline involves no cogeneration plant, no generation of steam used in the flaring process and the project activity involves no captive electricity replacement.

By physical site visit and reviewing the approved FSR /28/, RINA can confirm that the project boundary and emission sources described in the PDD are correct and meet the requirements of the methodology, and also that the selected sources and gases are reasonably justified for the proposed project activity.

3.5.2 Baseline identification

According to the approved methodology “ACM0012”, “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects”, version 04.0.0 /04/ the baseline was determined as follows:

Step 1: Define the most plausible baseline scenario for the generation of electricity using the baseline options provided in the methodology

For the proposed project activity, 6 alternative scenarios for the use of waste COG, 12 alternative scenarios for power generation and 14 alternative scenarios for the steam generation were identified in the PDD which follows the guidelines of the methodology /04/. No mechanical energy generation is involved in the project activity and the proposed project activity is based on an existing facility without improvement of the production capacity as confirmed by physical site visit and review of approved FSR /28/. The identified baseline options were assessed as below:

Use of waste COG:

W1: WECM is directly vented to atmosphere without incineration

It is properly excluded as the national code for COG (GB16171-1996 /51/) stipulates that the excess COG must be flared to the atmosphere and prohibited to be released into atmosphere directly.

W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste pressure energy is not utilized;

It is a plausible scenario as the release of waste COG to the atmosphere is the situation prior to the implementation of the proposed project as per the physical site visit and the utilization of waste COG is not widely presented in coking industry in China and the release of the COG after incineration to atmosphere is common in China /52/.

W3: Waste energy is sold as an energy source

It is considered as a possible baseline scenario as for the proposed project the waste COG was sold by the generator to the proposed project developer for power and steam generation /53/ as the scenario of the proposed project activity without applying CDM. Furthermore, selling the waste COG as an energy source to residential users is not possible as the location of rural residential is far away from the energy source as per physical site visit and interview with the stakeholders; the construction of the distribution system and the safety issues are technically difficult than sold to industry users based on RINA’s technical expertise. Further the

physical site visit confirmed that no other industry users were available nearby, other than the proposed project developer, to use the waste COG. RINA confirmed that no mandatory regulation constrains the trade of waste energy.

W4: Waste energy is used for meeting energy demand at the recipient facility

It is considered as a possible baseline scenario as the waste COG is used for power and steam generation to meet the energy demand of local area and the zone as designed in the approved FSR /28/.

W5: A portion of the quantity or energy of WECM is recovered for generation of heat and/or electricity and/or mechanical energy, while the rest of the waste energy produced at the project facility is flared/released to atmosphere/unutilized.

It is properly excluded as the proposed project purpose is to utilize all of the waste COG to generate power and heat stream, while the alternative W5 uses a portion of the waste gas and also only a portion of waste COG recovery would be a waste of the rest COG. It is validated that all of the waste COG will be utilized as per the FSR /28/ and the energy balance sheet /69/.

W6: All the waste energy produced at the facility is captured and used for export electricity generation or steam.

It is considered as a possible baseline scenario as the proposed project is to capture and utilize all the waste COG for export electricity and steam generation as per the approved FSR /28/.

Power Generation:

P1: Proposed Project activity not undertaken as a CDM Project activity

It is considered as a possible scenario, which is technically feasible. RINA based on local expertise confirmed that no mandatory regulation constrains the implementation of the proposed project activity.

P2: On-site or off-site existing fossil fuel fired cogeneration plant

It is properly excluded as no on-site or off-site existing fossil fuel fired cogeneration plant by physical site visit and as confirmed by local government official during site interview.

P3: On-site or off-site Greenfield fossil fuel fired cogeneration plant

It is properly excluded as the relevant Chinese regulation /54/ prohibits building coal-fired power plant with the capacity of 135MW and below, or restrains to build single turbine with an installed capacity under 100MW of thermal power plant. Furthermore, for other kind of fossil fuel based plant, e.g. the natural gas, the project located Jining City, which is based on coal-fired power and lack of natural gas sources /71/, as clarified by the local government officials /84/, thus greenfield natural gas fired cogeneration plant is not practical in the project location.

P4: On-site or off-site existing renewable energy based cogeneration plant

It is properly excluded as there is no existing renewable energy based cogeneration plant at the project located area as confirmed by physical site visit and interview with local government officials.

P5: On-site or off-site Greenfield renewable energy based cogeneration plant

It is properly excluded as the renewable energy resources are lack at the project location. By survey of public information through internet /71/ and based on RINA's local knowledge and expertise, RINA confirmed that Jining City, where the project located, is an inland city and lack of water resource, wind resource; also there is not enough biomass near the project site for power generation as confirmed through interview with local government officials Jining DRC that a planning renewable energy based cogeneration plant nearby the project location but supplies electricity and steam to another industrial zone; the Jining DRC also clarified that the area of 100km of the planned cogeneration plant has no new biomass based plant due to the consumption by the planned plant and the lack of biomass in this area /84/; for the solar energy, RINA studied the solar technology and referred to public information available on the website /102/, and found that solar energy projects are innovative and high technology with high investment cost and there is no practice on the solar energy based cogeneration in China; the on-site interview with local government officials also confirmed that the solar energy

resource is not rich in Jining city. RINA thus confirmed that greenfield renewable energy based cogeneration plant is not a plausible scenario.

P6: On-site or off-site existing fossil fuel based existing identified captive power plant

It is properly excluded as there is no on-site or off-site existing fossil fuel based existing identified captive power plant, as confirmed by physical site visit and by local government official during site interview.

P7: On-site or off-site existing renewable energy or other waste energy based captive power plant

It is properly excluded as there is no on-site or off-site existing renewable energy or other waste energy based captive power plant, as confirmed by physical site visit and by local government official during site interview.

P8: On-site or off-site Greenfield fossil fuel based captive plant

It is properly excluded as the same reason as alternative P3, for which the Chinese regulation /54/ prohibits constructing such plant.

P9: On-site or off-site Greenfield renewable energy or other waste energy based captive plant

It is properly excluded as the same reason as alternative P5, there are lack of renewable energy resources at the project location, and RINA confirmed through physical site visit and interview with local government official, there is no other waste energy to be recovered for captive plant at the project located zone.

P10: Sourced from grid-connected power plants

It is a plausible scenario that in absence of the project activity, the power would be sourced by the coal fired dominated power grid NCPG, as confirmed by physical site visit.

P11: Existing captive electricity generation using waste energy (if the project activity is captive generation using waste energy, this scenario represents captive generation with lower efficiency or lower recovery than the project activity)

It is properly excluded as there is no existing captive electricity generation using waste energy as confirmed by physical site visit and also the proposed project activity is grid-connected power generation plant using waste energy as per the design in approved FSR /28/.

P12: Existing Cogeneration using waste energy, but at a lower efficiency or lower recovery.

It is properly excluded as no existing cogeneration using waste energy as per the physical site visit and confirmed by local government official during site interview.

Steam generation:

H1: The proposed project activity is not undertaken as a CDM project activity;

It is a plausible baseline scenario as the proposed project activity will utilize waste COG for cogeneration and no regulations or laws constrain the implementation of this scenario.

H2: On-site or off-site existing fossil fuel based cogeneration plant;

It is properly excluded as physical site visit confirmed that no on-site or off-site existing fossil fuel based cogeneration plant.

H3: On-site or off-site Greenfield fossil fuel based cogeneration plant;

It is properly excluded as the same reason as alternative P3.

H4: On-site or off-site existing renewable energy based cogeneration plant;

It is properly excluded as the same reason as alternative P4.

H5: On-site or off-site Greenfield renewable energy based cogeneration plant;

It is properly excluded as the same reason as alternative P5.

H6: An existing fossil fuel based element process;

It is properly excluded as physical site visit confirmed that no existing fossil fuel based element process at the project location.

H7: A new fossil fuel based element process;

A new fossil fuel based element process may provide the same heat as the project activity and the fossil fuel based element process is a common in project location area to provide heat

production as per project design in FSR /28/, local expertise and confirmed through interview with the government officials. Therefore it is a realistic and credible baseline alternative.

H8: An existing renewable energy or other waste energy based element process to supply heat;

It is properly excluded as physical site visit confirmed that no existing renewable energy or other waste energy based element process at the project location.

H9: A new renewable energy or other waste energy based element process to supply heat;

It is properly excluded as there is lack of renewable energy resources at the project location as confirmed through the clarification made by the Jining DRC /84/. By survey of public information through internet /71/ and based on RINA's local knowledge and expertise, RINA confirmed that Jining City, where the project located, is an inland city and lack of water resource, wind resource and solar resource. It is validated that a planning renewable energy based cogeneration plant nearby the project location but supplies electricity and steam to another industrial zone as confirmed by Jining DRC /84/; the Jining DRC also clarified that the area of 100km of the planned cogeneration plant has no new biomass based plant due to the consumption by the planned plant and the lack of biomass in this area /84/. RINA confirmed through physical site visit and interview with local government official, there is no other waste energy to be recovered in element process that can supply equivalent heat at the project located zone. RINA thus confirmed that waste energy based existing captive plant is not a necessary and plausible scenario.

H10: Any other source such as district heat;

It is properly excluded as physical site visit and interview with local government officials confirmed that no other source of heat in the project located zone.

H11: Other heat generation technologies (e.g. heat pumps or solar energy);

It is properly excluded as demonstrating that using solar energy to generate heat is not feasible as the solar technology is novel and the use of heat pumps technology could not meet the requirement of the project activity. This was confirmed through public information /72//73/ demonstrating that the use of solar or heat pump technology for heat generation is technically unfeasible or practically rare for the kinds of the proposed project in host country.

H12: Steam/process heat generation from waste energy, but with lower efficiency or lower recovery;

It is properly excluded as that the government of China supports the development of energy saving and emission reduction projects as per the "Energy Conservation Law of the People's Republic of China" /100/, and the energy recovery projects with lower efficiency or lower recovery would not be a preference supported by the government and there is a risk to forbid the development of the lower efficiency or lower recovery energy generation projects by the government in China in future /100/. Therefore it is not a plausible situation for the project developer to develop lower efficiency or lower recovery energy generation project, instead of the proposed project.

H13: Cogeneration with waste energy, but at a lower efficiency or lower recovery;

It is properly excluded as the same reason as assessed in H12..

H14: On-site fossil fuel consumption to supply heat.

It is considered as a plausible baseline scenario as that on-site fossil fuel consumption may supply the same heat as the proposed project.

In summary of above assessment, the baseline options W2, W3, W4, W6, P1, P10, H1, H7, H14 are possible baseline scenario and other baseline options were properly excluded.

The combinations of realistic and plausible scenarios are identified as:

Scenario ONE: W2 & P10 & H7/H14, i.e. the waste COG is flared to the atmosphere after incineration; the equivalent electricity is sourced from grid-connected power plants; and new coal based boiler in the centralized steam plant supply steam;

Scenario TWO: W3/W4/W6 & P1 & H1, i.e. the project activity undertaken without CDM.

Step 2: Step 2 and/or step 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality" shall be used to identify the most plausible baseline scenarios by eliminating nonfeasible options

The step 2 of Section B.5 of the PDD presents the evaluation using the investment analysis, which excluded Scenario TWO: W3/W4/W6 & P1 & H1, i.e. the project activity undertaken without CDM as being financially infeasible. (The assessment of investment analysis regarding the additionality has been conducted in Section 3.6 of this validation report).

As specified by the applied methodology /04/, three situations are required to be identified for the baseline scenario using economic analysis. It has been validated by physical site visit and document review /28/ that 1) the proposed project activity is implemented in an existing factility; 2) the waste COG was released to the atmosphere after flaring; 3) in absence of the project acticity, the electricity consumption was imported from the existing grid NCPG and there is no heat supplier on operation that supplied heat to the recipients, i.e. heat consumers (Shandong Jikuang Morningsun Coal Chemical Co., Ltd. and Yangguang Yanliao Co., Ltd) in the Zone, prior to the implementation of the proposed project activity (Greenfield recipient). Therefore the project activity fully followed the situation 3 and the likely baseline scenario is based on a "reference energy generation facility", i.e. a reference heat (steam) generation facility. For this reference facility, the technology may be varied based on different energy sources, e.g. the coal, natural gas, biomass. However, it has been assessed in this section above for alternative P3, P5 that the project location area is lack of natural gas, biomass /71/, and as clarified by the Jinin City Government, there was no natural gas distrubition system in the county where the project located and the biomass was limited /84//102/. Therefore the only plausible fuel would be used for steam generation in the reference facility is coal and the coal-fired based technology factility is taken into consideration for the reference facility, i.e. the coal-fired boiler, the coal-fired cogeneration. Review of relevant Chinese regulation /54/, building coal-fired power plant with the capacity of 135MW and below, or single turbine with an installed capacity under 100MW of thermal power plant, were prohibited and there is no forbidden for the building of coal-fired boiler with capacity of the proposed project. Therefore, only coal-fired boiler was considered as the reference energy generation facility and an investment analysis related to the "reference energy generation facility" was conducted and included in the updated PDD version 03 /01/ and IRR calculation spreadsheet "IRR Jikuang" version 03 of 03/08/2012 /55/.

The investment comparison analysis, i.e. levelized cost of steam production in RMB/ton has been applied for both the reference coal-fired boiler facility and the proposed CCPP plant in accordance with "Tool for the demonstration and assessment of additionality", version 06.0.0 of 25/11/2011.

For the reference coal-fired boiler facility, the investment analysis input parameters were sourced from a feasibility study report for 45t/h Circulating Fluidized Bed Boiler completed by the same project designer Shandong Province Light Industry Design Institute as the proposed project in 10/2009 /106/, which generates the same output (steam production) amount 240,000ton. According to this report, the total fixed asset investment is 30,070,000RMB and the annual O&M cost is 28,517,737RMB. These input parameters were included in the IRR spreadsheet and crosschecked with similar coal-fired boilers facilities applied CDM and published on UNFCCC website /107/, the investment cost and the O&M were comparatively higher than that of the similar facilities, which would be conservative and were also included in the IRR spreadsheet /55/. Besides, the depreciation rates, the residual value rate, the taxes were the same as the values applied in the proposed project. RINA is of opinion that the input values applied for the analysis of the reference boiler are reasonable.

The assessment of investment analysis of the proposed CCPP plant has been included in section 3.6 of this report and it was validated that the input parameters were sourced from approved FSR and were the basis at the time of investment decision. RINA noted that the proposed CCPP plant generates not only steam production but also the electricity which is different than the reference boiler that generates only steam production. For fairly comparison of the two, the apportion for the steam production cost for the proposed CCPP plant was made in the analysis. The apportion method were referred to the research article "Discussion of fuel apportionment for Combined cycle cogeneration units" issued by Chen Weixing from East China Electric Power Design Institute on 27/04/2009 /108/,

which deemed appropriate. RINA checked the calculation of the apportion in the spreadsheet /55/ and confirmed it was correct and in line with the method /108/.

The levelized cost calculation has been correctly applied in the IRR calculation spreadsheet /55/. In conclusion, the levelized cost of steam production in RMB/t for the reference steam boiler was calculated as 102RMB/ton which is much lower than the levelized cost of the proposed CCPP plant 158RMB/ton considering the apportion of steam generation cost. Therfore RINA concluded that the reference coal-fired boiler facility is economically attractive than the CCPP technology and the coal-fired boiler as the reference energy generation facility is most plausible baseline scenarios for heat generation.

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

Since only one plausible alternative was remained according to the steps taken in above assessment, step 4 is not applied and in line with the applied methodology.

Conclusion:

The only baseline scenario remaining is Scenario ONE: W2 & P10 & H7/H14, i.e. the waste COG is flared to the atmosphere after incineration; the equivalent electricity is sourced from grid-connected power plants; and new coal based boiler in the centralized steam plant supply steam.

RINA was able to verify the baseline identification contained in the PDD and documented evidences listed during the validation process and can confirms that the procedure contained in the methodology ACM0012 and the required tool “Tool for the demonstration and assessment of additionality” to identify the most reasonable baseline scenario has been correctly applied and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity. The assumptions and data used by the project participants are listed in the PDD, including their references and sources. The documentation used is 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.

3.6 Additionality

According to the approved baseline and monitoring methodology“ACM0012”, “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects”, version 04.0.0 /04/, the additionality of the project has been established applying the methodological tool “Tool for the demonstration and assessment of additionality”, version 06.0.0 /05/.

The above opinion of RINA to the additionality of the proposed project is further explicitly explained in the following steps.

3.6.1 Prior consideration of the clean development mechanism

It has been demonstrated that CDM was seriously considered in the decision to implement the project activity by the following assessment in accordance with the “Guidance on the demonstration and assessment of prior consideration of the CDM” version 04 /12/.

Determination of the starting date of the proposed project activity

The starting date of the proposed project activity is identified as 12/04/2010 when the purchase contract for the main equipment TITAN 130 Turbine Generator Sets (Gas Turbine Generator) was signed /37/ as it is the earliest date on which either the implementation or the construction or real action of a project activity begins, in accordance with the Glossary of CDM terms version 05 /10/. RINA collected the information regarding the implementation, the construction and the real action of the project which has committed to expenses and listed the key documents as below. These documents has been reviewed and considered to be valid and realistic, since it was signed with a third party.

Date	Activity	Evidence
02/12/2009	Advisory agreement of CDM project was signed by the project developer with Uniufa Energy Technology Co., Ltd.	/34/
30/09/2010	The project FSR was approved by Shandong DRC	/28/
12/04/2010	Purchase Agreement for TITAN 130 Turbine Generator Sets (Gas Turbine Generator) was signed by project developer with Solar Turbines International Company	/37/
18/04/2010	Purchase Agreements for Circulating Fluidized Bed Boiler, COG Compressor, Steam Turbine and Generator, Complementary combustion heat recovery steam boilers (WHRB) were signed by the project developer with the equipment suppliers	/38/ /39/ /40/ /41/
04/05/2010	Construction Order was issued by the project developer.	/43/
05/05/2010	Construction and Installation Contract was signed by the project developer with Zhongjian Qiju Installation Engineering Company	/42/
15/07/2010	Emission Reduction Purchase Agreement was signed by the project developer with Lakewood Carbon Corp.	/50/

RINA was able to confirm that the starting date of the proposed project is 12/04/2010 when the project developer signed purchase agreement for the TITAN 130 Turbine Generator Sets (Gas Turbine Generator) /37/, as it is the earliest date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project.

The starting date of the proposed project activity is after 02/08/2008, but prior to the date of PDD published for global stakeholder consultation (03/12/2011) /01/.

Prior consideration of the CDM

In accordance with the "Guidance on the demonstration and assessment of prior consideration of the CDM" version 04 /12/, in case of a new project activity with a starting date on or after 02/08/2008, the project participant must inform the Host Party DNA and the UNFCCC secretariat in writing if the commencement of the project activity and of their intention to seek CDM status. By reviewing the notifications listed below, RINA was able to confirm that such notifications have been made within six months of the project activity start date (12/04/2010) and contained the precise geographical location and a brief description of the project, also using the standardized form F-CDM-Prior Consideration. RINA confirmed that the UNFCCC secretariat has received the notification on the date 18/08/2010 by cross-checking the information on UNFCCC website /27//44/. RINA also confirmed the China DNA (NDRC) has issued the approval letter to the notification on 13/09/2010 by reviewing the approval notification form /45/.

Date	Activity	Evidence
18/08/2010	Prior Consideration of the CDM Form was received by the UNFCCC secretariat	UNFCCC website /27//44/
13/09/2010	Submitted Prior Consideration of the CDM Form to the China DNA (NDRC) and it was approved on 13/09/2010	Approved Prior Consideration of the CDM Form by China DNA /45/

RINA thus concluded that the CDM has been seriously considered in the decision to implement the project activity and the proposed project complies with the requirements of the latest version of the Guidance on prior consideration of CDM /12/.

3.6.2 Identification of alternatives

The PDD identifies alternatives to the project activity to determine the most realistic baseline scenario in accordance with the methodology's requirements, as described above in section 3.5.2 of this report.

The baseline scenario identified is the same as the pre-project situation, which is the waste COG is flared to the atmosphere, the NCPG provides the equivalent electricity and the newly built coal-fired boilers would provide the equivalent steam to the customers in the zone.

RINA assessed the list of alternatives given in the PDD and, through review of supporting documents as assessed in section 3.5.2 of this report (refer to section 3.5.2), has confirmed that: a) the list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity; b) the list contains all plausible alternatives that the DOE considers to be viable, credible and complete as a means of supplying the outputs or services that are to be supplied by the proposed CDM project activity; and c) the alternatives comply with applicable and enforced legislation.

3.6.3 Investment analysis

3.6.3.1 Choice of approach

The PP has selected the investment analysis "benchmark analysis" (Option III) to demonstrate additionality in the PDD, in accordance with the applied methodology ACM0012 and required tool "Tool for the demonstration and assessment of additionality", version 06.0.0 /05/.

"Tool for the demonstration and assessment of additionality" requires that "*if the CDM project activity and the alternatives identified generate no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III)*".

Simple cost analysis is not applicable for the project activity as the proposed project generates economic benefits apart from the CDM income, i.e. the sale of electricity; the investment comparison analysis is not applicable for the project activity as the proposed project delivers electricity to the grid NCPG which is not applicable for investment comparison. Therefore, RINA was able to confirm that the selection of Option III benchmark analysis is reasonable.

3.6.3.2 Benchmark selection

The financial indicator applied in the analysis is the Internal Rate of Return (IRR). This is correctly identified in the PDD version 03 /01/. The IRR is the financial indicator commonly used in the host country to assess the economic or financial feasibility of investment projects, and is also the key financial indicator referred by the government to determine investment thresholds or as benchmarks for projects.

The proposed project activity is power and heat generation project as per the approved FSR /28/ and confirmed by physical site visit, which is categorized as in the power industry as per the "Economic Evaluation Methods and Parameters for Construction Projects (3rd Edition)" /15/ and all the electricity generated by utilizing waste COG will be delivered to the NCPG as per the design /28/ and the project approval /29/. Referring to the "Information Note: Previous Rulings Related to The Appropriateness of Benchmarks for Project Activities Utilizing Waste Heat/Waste Gas for Power Generation" /101/, RINA is of opinion that all the power output (electricity) of the proposed project activity was meant for consumption by users other than the industrial facilities from the coking oven line and can be considered as predominantly exporting to the grid and be an investment in power production.

A benchmark Project IRR before tax of 8% was adopted in the PDD version 03 /01/ in accordance with the "Economic Evaluation Methods and Parameters for Construction Projects (3rd Edition)" /15/. This regulation was issued by the National Development and Reform Commission and the Ministry of Construction of the P.R.China (the government) and is the latest version available at the time of investment decision and also at the time of this report and it indicates the applicable benchmark for each category of business. According to this regulation, an applicable benchmark IRR for the thermal power industry (including grid-connected cogeneration as the proposed project activity) is 8% (Project IRR before tax). This benchmark was also applied in the approved project FSR /28/ which was reviewed and approved by the government /29/. Based on local financial expertise for above assessment, RINA was able to confirm that the 8% benchmark Project IRR before tax chosen for the proposed project is reasonable and in line with the Chinese regulation /15/.

3.6.3.3 Input parameters

RINA has verified all input parameters used for investment analysis presented in the PDD /01/ and IRR calculation spreadsheet /55/ as following:

Assessment of the sources used for input parameters. RINA confirmed that all the input parameters used in the financial analysis have been taken from the approved FSR which was completed by an independent officially accredited entity, Jinan City Construction Consultancy Institute and Shandong Province Light Industry Design Institute, in 01/2010 /28/ and verified and approved by Shandong Provincial Development and Reform Commission (DRC) on 30/09/2010 /29/. Therefore, it can be considered the information was provided by independent and recognized source.

Confirmation that the values used in the PDD and investment analysis are fully consistent with the project application report. RINA compared the input parameters for the financial analysis included in the PDD /01/ with the parameters stated in the approved FSR /28/ and was able to confirm that the values applied are consistent with the values stated in the document.

Assessment of the period of time the finalization of the project application report and the investment decision. The project application report was completed in 01/2010 for the project activity /28/, which was about few days prior to the investment decision to proceed with the project activity on 16/02/2010 (directorate decision on application for CDM /36/). Given the sufficiently short period of time between the finalization of the project application report and the investment decision it is unlikely in the context of the underlying project activity that the input parameters would have materially changed. Thus it is reasonable to assume that the project application report has been the basis of the decision to proceed with the investment in the project activity.

Cross-check of the main input parameters used in the financial analysis. The main input parameters used in the financial analysis /01//55/ were cross-checked with relevant regulations/laws/evidences and confirmed as follows:

1. Total static investment and Bank loans.

The total static investment is sourced from the approved FSR /28/ and was designated to be 352,891,700RMB, including fixed asset investment 339,025,700RMB and working capital value 13,866,000RMB. RINA checked already signed equipment and construction contracts and found that these signed contracts indicated that the total contracted value was 360,160,000RMB (including 4,680,000RMB for 75t/h circulating fluidized bed boiler /48/, 5,480,000RMB for the steam turbine generator set /40/, 6,400,000RMB for the COG compressors /39/, 10,000,000RMB for the waste heat recovery boilers (WHRB) /41/, 77,000,000RMB for the gas turbine generator sets (TITAN130) /37/, 228,000,000RMB for the construction and installation /42/, 28,600,000RMB for the grid connection system /74/)). Comparing the total investment amount with the signed value in the contracts, it is found that the total signed amount of the contracts was 2.06% higher than the estimated value in the approved FSR. Thus RINA considered the use of estimated total static investment amount 352,891,700RMB in the analysis is conservative.

RINA also studied the international database from UNEP for Capacity Development for The Clean Development Mechanism (CD4CDM) for similar registered CDM projects using COG for power and/or steam generation in China /75/. Comparing with the data of these similar projects, RINA found that the investment per capacity of the project is 8,402RMB/kW, which is in the normal range of these projects (4,457.5RMB/kW~12,726.7RMB/kW). RINA thus ensured that the value applied for investment is reasonable.

The total investment of the proposed project amounts to 361,806,850RMB, including the total fixed asset investment 339,025,700RMB, the bank loan interest 8,915,150RMB and working capital value 13,866,000RMB, as per the approved FSR /28/. As estimated in the approved FSR, among the total investment, 211,720,150RMB is equity and 150,086,700RMB is from bank loans. The loans from the bank were approved by local government /29/ in accordance with the equity portion regulation /76/. Hence the bank loans and equity value indicated in IRR spreadsheet /55/ is reasonable. It is noted that the benchmark analysis is based on the Project IRR (pre-tax), in which the loans and interests have no impact on the project IRR in accordance with the Guidance on the Assessment of Investment Analysis version 05 /11/ and this has been correctly applied in the investment analysis in the IRR spreadsheet ERCS /55/.

2. Electricity Tariff and Steam Price

The applied electricity tariff (0.4105RMB/kWh including VAT) in the analysis is sourced from the approved FSR /28/ based on the Notification regarding the tariff of power electricity in local area that issued by the government /77/ in year 2008, which is the latest policy available at the time of the investment decision and where regulated the tariff of the cogeneration projects as 0.4105RMB/kWh including VAT. RINA is therefore able to confirm that the electricity tariff (0.4105RMB/kWh including VAT) applied in the analysis is reasonable. During the validation, the tariff for the power generation of the proposed project has been approved by local government Jining City Price Bureau on 16/09/2011 /57/ as 0.435RMB/kWh including VAT. Using this approved tariff in calculation, the pre-tax Project IRR is increased to 5.68%, which is still much lower than the selected IRR benchmark 8%.

The steam price is sourced from the approved FSR /28/ as 150RMB/ton including VAT. The steam price has been approved by local government Jining City Price Bureau on 20/04/2011 for the proposed project activity /58/, the same as in the approved FSR /28/, and was contracted by the project developer with the steam consumers /92/. RINA is therefore able to confirm that the steam price (150RMB/ton including VAT) applied in the analysis is reasonable.

3. Taxes.

The tax rates were taken from the approved Project Application Report and account to 17% of VAT for electricity and 13% of VAT for steam, 7% for additional urban construction surtax, 3% for educational surtax and 25% for income tax. These can be cross checked against relevant Chinese regulations issued by Chinese government.

A 17% rate of VAT for electricity and 13% rate of VAT for steam are in compliance with “Provisional Regulation of China on Value Added Tax” issued by China’s State Council /16/. Two types of surtax, additional urban construction surtax and educational surtax are imposed and are calculated on the basis of VAT paid. The rate of 7% for additional urban construction surtax applied in the analysis complied with Article 4 of “Provisional Regulation of China on Urban Maintenance and Construction Tax” issued by China’s State Council /17/. The rate of 3% for educational surtax applied in the analysis complied with “Decision to modify the provisional regulation on Additional education tax” issued by China’s State Council /18/. A 25% rate of enterprise income tax is applied in the analysis, which is in line with Article 4 of “Enterprise Income Tax Law of China” issued by National People’s Congress of China/19/.

RINA reviewed the above mentioned policies/regulations/laws, and confirmed that these provisions were valid at the time of project design and investment decision. RINA verified the IRR calculation spreadsheet /55/ and confirmed that the income tax was not deducted from the net cash flow for the calculation of Cash flow before tax, which is in line with the applied benchmark Project IRR before tax.

4. Operating costs.

The O&M cost employed in the calculation accounts to 82,014,014RMB per year and has been sourced from the approved FSR /28//29/. As per the approved FSR, the O&M costs include a) labour cost and welfare (6,511,680RMB), b) Management cost (3,222,586RMB), c) Material Cost (2,996,000RMB), d) Water cost (2,070,000RMB), e) Maintenance cost (8,475,643RMB), f) Insurance cost (3,226,705RMB) and g) COG cost (55,511,400RMB). RINA has assessed the breakdowns as below:

a) Labor cost and welfare. According to the “Average salary of industry” published by Shandong Statistical Information Net /59/, the average salary in power generation and cogeneration industry is 41,910RMB, which is slightly lower and closed to the value adopted for the project activity (42,000RMB). The welfare is 14% of the labor cost, which is in line with the “Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects” /60/. The number of staffs is 136 which is less than the standard of the position arrangement for thermal power plants issued by State Grid Company in year 1998 (total 168 staffs are needed as per the standard for the proposed project) /78/. Therefore RINA is of opinion that the estimation of Labor cost and welfare is reasonable and conservative.

b) Management cost. The management cost is sourced from the approved FSR /28/ and includes the employee educational expenses, the social security and housing fund, and the business entertainment fee. RINA validated that the employee educational expenses and the business

entertainment fee are required by the Chinese regulations on the enterprises, i.e. “Regulations for the Implementation of the Enterprise Income Tax Law of China” /20/, in which the employee educational expenses are regulated to be no more than 2.5% of the labor cost and welfare and the business entertainment fee is required to be no more than the 0.5% of the revenues. RINA thus considered the use of expenses rate 1.50% for employee educational expenses and 0.5% for business entertainment fee are reasonable. The social security and housing fund are required by the Chinese Labor Law /79/ and the normal expenses are in the range of 38.3%-39.4% of the labor cost in Jinan City in Shandong Province /80/. RINA confirmed that the Jinning city is similar to Jinnan city and the use of 38% rate for social security and housing fund is reasonable and conservative.

c) Material Cost. The cost is occurred for N_2 gas consumption for the sealing of COG compressor, the protection of gas engines and WHRB, and the diesel consumption for ignition of the gas engines. The annual quantity of N_2 gas and diesel consumed by the project activity was estimated based on the operation condition of the plant by a qualified independent party Jinan City Construction Consultancy Institute and Shandong Province Light Industry Design Institute, who was contracted by the project developer /28/ and was reviewed and approved by the government /29/. Therefore RINA considered the estimation is reasonable. For crosscheck, the value was compared with the registered CDM project activities (Ref. No. 812, 3400), it was found that the unit diesel consumption per capacity of the proposed project is 480t/kW which is in the range of the referred project (250-3,680t/kW), while the unit N2 consumption per capacity of the proposed project is 57,100 m3/kW, which is higher than the value (39,300 m3/kW) applied for the referred project No 3400 (there is no such information in project No 812). However considering that the occupation of this part of cost is very small, only consits 3.5% of the total O&M cost, it has only slight impact on the IRR that even if it is decreased to ZERO, the IRR without CDM of the project is 5.0%, still far below the benchmark 8%.

   Furthermore. RINA studied the market price for the N_2 gas and diesel and found that at the time of investment decision, the price of N_2 gas was in the range of 1.2-1.3RMB/Nm^3 /81/ and the price of diesel was about 5,925RMB/ton /63/. Therefore, RINA is of opinion that the use of unit price 1.2RMB/Nm^3 for N_2 gas and 5,800RMB/ton for diesel is close to the market price and is reasonable and conservative.

d) Water cost. The annual water quantity needed is 900,000 tons, a detailed calculation process of water quantity has been provided in approved FSR /28/ based on the operational conditions of the boilers and generators, which is recognized as determined by a qualified independent party and thus is reasonable. For crosscheck, the value was compared with the registered CDM project activities (Ref. No. 812, 3400), it was found that the unit water consumption per capacity of the proposed project is 2,140t/kW which is much lower than the value (8,210t/kW) applied for the referred project No 3400. The water price is 2.30RMB per ton, which is reasonable and conservative being crosschecked by the standard available at the time of invest for industry water in the project located Jining City (2.33RMB/ton) /82/.

e) Maintenance cost. The maintenance cost is for the daily maintenance and accounts for 2.5% of the fixed asset value as per the FSR /28/, and is within the range regulated by “Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects” /60/. For crosscheck, the same value was applied for the registered CDM project activity “Gas-Steam Combined Cycle Power Plant (CCPP) Project of Laiwu Iron & Steel Group Corp.” (Ref. No. 3400) /105/. Therefore it is confirmed reasonable.

f) Insurance cost. The Insurance cost is designed to consist of the property insurance and employer’s liability insurance, which is in line with related insurance laws and regulations in China. For property insurance, according to the “Property Insurance”/61/ which complies with the China insurance industry regulation as included in the appendix of the book, the project activity shall be classified as type V industry, and the corresponding property insurance rate is 0.5% of the fixed assets, which is the same as adopted in investment analysis. The additional property insurance rate 0.2% of the fixed assets is also in line with the “Property Insurance”/61/. The employer’s liability insurance was calculated as 775,975.20 RMB per year, which is in full compliance with the regulations described in the “Employer’s Liability Insurance”/62/. The total amount of public liability insurance was calculated as 74,160 RMB per year in the investment

analysis, which is fully compliance with the regulation of Public Liability Insurance, supervised by China Insurance Regulatory Commission /83/ and thus is reasonable.

g) COG cost. The proposed project activity is developed by Shandong Jikuang Morningsun Thermal Power Co., Ltd, other than the COG generator Shandong Jikuang Morningsun Coal Chemical Co., Ltd, and it is economically reasonable that the developer purchases COG from the generator for energy generation. RINA has validated that Shandong Jikuang Morningsun Thermal Power Co., Ltd and Shandong Jikuang Morningsun Coal Chemical Co., Ltd are two independent legal entities through the provided copies of business licenses of the two /103//104/ and their business scopes are totally different, as the proposed project developer Shandong Jikuang Morningsun Thermal Power Co., Ltd is of scope "electricity and heat generation" /103/, while the COG generator Shandong Jikuang Morningsun Coal Chemical Co., Ltd is of scope "coke produciton", and the former was established on 28/09/2009 and the latter was established on 26/12/2008.

According to the approved FSR /28/, the waste COG price is estimated 0.35RMB/m^3. It is validated that the waste COG is purchased as of price 0.40RMB/m3 by the project developer Shandong Jikuang Morningsun Thermal Power Co., Ltd, from the energy generator Shandong Morningsun Coal Chemical Co., Ltd by crosschecking the purchase contract signed between the two entities on 09/12/2011 /53/ and also confirmed by on-site interview. Furthermore, RINA studied the similar registered CDM project activity that ultilizing COG purchased from the generator, and found that the COG price of totally 6 similar registered CDM project activities (Reference Number: 3328, 3166, 3400, 1658, 1608, 1609) /105/ was in the range of 0.38-0.48RMB/m3. PDD applies 0.35RMB/m^3 in accordance with the approved FSR which is lower than the normal range and also lower than the actual price and deemed to be conservative.

In conclusion, RINA ensured that the values employed in the calculation of O&M cost in the PDD and IRR spreadsheet version 03 /55/ can be validated and are reasonable based on the references cited above.

5. Annual electricity supplied to the grid and annual steam output

The annual electricity delivered to the grid is estimated to be 229,219MWh in approved FSR /28/ and relies on the energy content of waste COG from coking production and the capacity and efficiency of the employed generators. The energy content of waste COG from the existing production line is tested as 17,020kJ/Nm^3 as per the approved FSR /28/, which is within the normal range 16,726~17,981 kJ/Nm^3 that sourced from China Energy Statistics Yearbook /22/, thus is reasonable. As per the specification of the employed gas turbine generators (TITAN 130) /46/, the gas consumption of unit set is 8,797Nm^3/h and thus the total COG consumption by the installed two gas turbine generators would be 17,594Nm^3/h or 105,564,000Nm^3/yr (6,000h operation hours); the thermal efficiency of the TITAN 130 is about 35.145%. RINA therefore estimated that the theoretical annual electricity generation by the two TITAN 130 generators is about 175,417MWh. Furthermore, the project also employed two complementary combustion heat recovery steam boilers (WHRB) with each capacity of 45ton/h to generate heat and one set of 12MW steam turbine generator to recover the heat and generate electricity. According to the approved design /28/, the rest waste COG 53,040,000Nm^3/yr (=158,604,000-105,564,000) or 8,840Nm^3/h will be used in the complementary combustion heat recovery steam boilers (WHRB) to generate heat that sent to the steam turbine generator. This steam turbine generator would generate totally 72,000MWh electricity theoretically based on 6,000h normal operation status annually. Therefore RINA estimated the total electricity generation of the proposed project as 247,417MWh, close to but a little less than the estimation in the approved FSR (252,000MWh = (30MW+12MW)*6,000h) /28/. RINA is thus of opinion that the estimation of 252,000MWh in approved FSR /28/ is conservative. By considering the internal electricity using rate 9.04% as stated in approved FSR /28/, the annual electricity supplied to the grid can be estimated as 229,219MWh (=252,000MWh*90.96%). Crosschecking the registered similar projects in UNFCCC website, the internal electricity using rate 9.04% is close to the lowest of the range of 6%~25% of similar projects /86/. Therefore, RINA ensured that the estimation of the electricity supplied to the grid is reasonable.

The expected annual operating hour is 6,000h. RINA studied the international database updated on 01/07/2012, from UNEP for Capacity Development for The Clean Development Mechanism (CD4CDM) for similar registered CDM projects using COG for power and/or steam generation in China (totally 16 registered similar project activities) and found that the annual operating hour was in

the range of 5,100h-8,136h /75/ and averaged as 5,730h. The expected 6,000h was in the normal range and a little higher than the average value, which would be conservative in the investment analysis. The plant load factor (PLF) was determined as 68.5% (=6,000h/8,760h) and is also in the normal range of similar registered CDM projects (58.2%-92.9%) /75/. Hence the estimation of the annual operating hour and the plant load factor is reasonable.

The annual steam output is estimated to be 240,000ton/yr in approved FSR /28/ and relies on the steam demand by the consumers and the capacity of the steam generator of the project. Based on the balance of demand and supply of the steam, the total demand of steam is 40t/h which was applied in the FSR and consistent with the contracted amount with the customers /92/; the rated steam extraction capacity of turbine extraction is 50t/h as per the specification of the steam turbine and generator /47/, which is a little higher than the demand in order to secure the stable steam supplying in case the gas turbine and WHRB are not in rated operation. Therefore RINA is of opinion that the use of 40t/h steam in the analysis is reasonable. Furthermore, even if the value of 50t/h was applied for financial analysis, the project IRR would be 6.9%, which is still under the benchmark of 8%.

6. Operating Period, investment analysis period and remaining lifetime of the baseline equipment

The expected lifetime of the project activity is 15 years which can be confirmed by the approved FSR /28/. It is widely used by the relevant authorities in China for evaluating the financial viability of proposed projects. RINA checked the specifications of the main equipment, i.e. the boilers, turbines and generators /37//38//39//40//41/ and found consistency of the lifetime of 15 years. Therefore, RINA ensured that the use of 15 years' operating period is reasonable. The investment analysis period is 15 years as per the approved FSR /28/, which is consistent with the operating period and is in accordance with the requirements of Para.3 of "Guidance on the Assessment of Investment Analysis" version 05 /11/, i.e. "a minimum period of 10 years and a maximum of 20 years will be appropriate".

The waste COG generated by the coking oven production line is flared to the atmosphere in the baseline scenario, the remaining lifetime of the energy generation sources, i.e. the coking oven production line shall be determined in accordance with "Tool to determine the remaining lifetime of equipment" version 01 /09/. By physical site visit and reviewing the instruction of the technical lifetime of the coke oven line by the manufacturer /66/, RINA was able to confirm that the coke oven line has been operated 2 years and the technical lifetime for the existing coke oven line is expected to be 25 years. This was also confirmed by the owner of the existing coke oven line /67/. Given the PP demonstrated the normal operation and maintenance of the line and the technology employed in the line is mature technology and common practice in China, RINA thus considered that the remaining lifetime can be determined as a difference between the technical lifetime and the operational time, i.e. 23 years.

7. Others

The Residual Value Rate of 5% was applied in the benchmark analysis. It is in line with Article 59 of "Regulations for the Implementation of the Enterprise Income Tax Law of China" issued by China's State Council /20/, which authorizes enterprises to determine an appropriate rate of residual value by themselves according to the property and usage of the their fixed assets. RINA confirmed the use of 5% residual value rate is reasonable. RINA has checked the IRR calculation spreadsheet /55/ and confirmed that depreciation has been deducted in estimating gross profits on which tax is calculated, and has been added back to net profits for the purposes of calculating IRR; the residual value (fair value) of the project assets at the end of the assessment period has been included as a cash inflow in the final year.

In summary, based on the above reliable data sources, RINA was able to confirm that the input values are valid and applicable at the time of investment decision. Therefore, RINA ensured that the investment analysis is in accordance with "Guidelines on the assessment of investment analysis" version 05 /11/.

3.6.3.4 Calculation and conclusion

The Project IRR calculations were provided in a spreadsheet, IRR Jikuang version 03 /55/. Based on the above assessment in section 3.6.3.3, RINA verified the calculations in the spreadsheet and

was able to confirm that the assumptions and the financial calculations used in the project IRR before tax calculation are correct.

The Project IRR before tax without CDM revenue is 3.8%, much lower than the benchmark 8%, which shows that the proposed project activity is not financially attractive in absence of CDM benefits.

3.6.3.5 Sensitivity analysis

A sensitivity analysis was carried out for parameters contributing to more than 20% to revenues or costs in order to check the robustness of the financial analysis. Reasonable variations of operating costs, investment costs, electricity revenue and steam revenue were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen. The result of the sensitivity analysis is as follows:

Operating costs. The IRR reaches the benchmark 8% if the operating costs decrease by 13%. According to the Statistical Yearbook of Shandong (2007-2011) /85/, the average annual growth rate of raw material purchase price index is 5.4% over the past five years; and the labor cost were also increased in the past five years /85/. RINA is of opinion that it is unlikely that the operating costs will decrease by 13%.

Investment costs. The IRR reaches the benchmark 10% if the investment costs decrease by 21%. The signed contracts were provided by PP. By crosschecking these contracts /37//38//39//40//41//42//74/, it was found that the total contracted cost amount was 360,160,000RMB, including the cost of main equipment and construction and installation service, and also the grid connection system. This value was a little higher than the estimation in approved FSR (352,891,700MRB). RINA is therefore of opinion that it is unlikely for the investment costs to decrease 21% to reach the benchmark.

Electricity revenue. The IRR reaches the benchmark 10% if the electricity revenue increases by 14%. This variation would be affected by two parameters: 1) electricity output and 2) electricity tariff. For the case of 1) electricity output, RINA has estimated based on the energy of waste COG in Section 3.6.3.3 of this report that the theoretical annual electricity generation by the two TITAN 130 generators and one set of steam turbine generator is about 247,417MWh, close to but a little less than the estimation in the approved FSR (252,000MWh) /28/. RINA also confirmed in Section 3.6.3.3 that the internal electricity consumption rate is 9.04% as stated in approved FSR /28/, is close to the lowest of the range of 6%~25% of similar projects /86/. Furthermore as per the signed power purchase agreement between the project developer and the grid company /87/ the sold amount of electricity to the grid was expected to be 220,000MWh and would be controlled by the grid company, which is still less than the applied estimation in approved FSR /28/. Therefore RINA is of opinion that the electricity output is very unlikely to decrease by 14%. For the case of 2) electricity tariff, the approved tariff is 0.435RMB/kWh as per the tariff approval by the government and the signed power purchase agreement /87/, which is only 6% higher than the applied electricity tariff (0.4105RMB/KWh including VAT) sourced from the approved FSR /28/. Considering the tariff is controlled by the government and very stable in China, RINA is of opinion that the tariff is very unlikely to increase by 14%.

Steam revenue. The IRR reaches the benchmark 10% if the steam revenue increased by 35%. RINA has studied and confirmed in section 3.6.3.3 of this report that the estimation of the annual steam revenue is reasonable in line with the demand of steam by consumer and the capacity of installed steam turbine generator and crosschecked be consistent with the contracted steam amount by the consumer /92/. Furthermore, even if using the rated capacity of the installed steam turbine generator, the total steam supplied would be 50t/h which is 25% higher than the estimated 40t/h in approved FSR /28/. For the steam price, it has been approved as 150RMB/t by the local price bureau and regulated with only 10% fluctuation /58/. Therefore RINA is of opinion that the either the annual steam output or the steam price is very unlikely to increases 35%.

In conclusion, the result of the IRR investment and sensitivity analysis have shown that without the income from the CERs sale, the project activity is not the most financially attractive option.

3.6.4 Barrier analysis

Barrier analysis was not conducted in accordance with “Tool for the demonstration and assessment of additionality” version 6.0.0 /05/.

3.6.5 Common practice analysis

A common practice analysis has been carried out in order to complement the investment analysis presented in the PDD /01/. PDD applied “Tool for the demonstration and assessment of additionality” version 6.0.0 /05/ for the analysis.

Shandong Province has been selected as the applicable geographical area in the common practice analysis. RINA based on local expertise, considered the natural resources, the industrial structure, the economic development level and the investment and policy/strategy framework of Shandong province are different from other provinces and these differences affect the demand for products and technologies. Nevertheless projects developed within the same province are faced by similar regulatory framework and investment climate that make them comparable. RINA thus considered that technologies in Shandong province are different from other locations and the selection of the applicable geographical area was justified properly in PDD version 03 /01/ and is reasonable.

Stepwise approach analysis has been taken in the PDD version 03 /01/ in accordance with the tool /05/.

1) The capacity range was selected to be +/-50% of the design capacity of the proposed project, i.e. 21~63MW in Step 1, which is in line with the tool /05/.
2) Identification of all plants that deliver the same output or capacity has been included in Step 2 following the tool /05/. RINA studied a latest survey statistics regarding the CCPP projects in Shandong province issued by Shandong Province Light Industry Design Institute in 02/2012 /88/ and found that there were only 3 CCPP projects implemented in Shandong Province and this was also confirmed through interview with local government officials. These 3 CCPP projects were considered as the plants that deliver the same output or capacity, within the applicable output range calculated in Step 1 and as the proposed project activity. Through on-site interview and review of the statistics /88/, RINA was able to confirm that among these 3 projects, two projects were registered as CDM project activity with UNFCCC reference No. 0812 and 3400 /89//90/; only one project was not applied for CDM and started commercial operation in year 2009 before the start date of the proposed project /91/. Since registered CDM project activities and projects activities undergoing validation are required to be not included in this step, the all plants satisfied in this step are identified as $N_{all} = 1$.
3) The identified one project in Step 2 applied the similar technology with the proposed project as confirmed by study the technology information provided in website /91/. Therefore $N_{diff}=0$ is reasonable
4) $N_{all}- N_{diff}=1<3$ and F=1-0/1=1

Therefore it is concluded that the proposed project activity is not “common practice” within a sector in the applicable geographical area.

3.6.6 Conclusion

RINA can confirm that all data, rationales, assumptions, justifications and documentation provided by the project participants to support demonstration of additionality are credible and reliable.

By assessing the evidences presented and cross-checking the information contained in, RINA considers the reasoning for the proposed project additionality demonstration is credible and reasonable i.e. the proposed project has the ability to reduce anthropogenic emissions of greenhouse gases by sources below those that would have occurred in the absence of the registered CDM project activity.

3.7 Monitoring Plan

The approved baseline and monitoring methodology “ACM0012”, “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects”, version 04.0.0 /04/ has been applied.

The monitoring plan is in accordance with the monitoring methodology; the monitoring plan will give opportunity for real measurement of achieved emission reductions.

RINA has checked all the parameters presented in the monitoring plan against the requirements of the methodology; no deviations relevant to the project activity have been found in the plan.

RINA confirms that the monitoring arrangements described in the monitoring plan are feasible within the project design, and the means of implementation of the monitoring plan are sufficient to ensure the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified.

3.7.1 Parameters determined ex-ante

The baseline emissions are determined according to ACM0012 version 04.0.0 /04/. By reviewing the applied methodology and the revised PDD version 03 /01/, RINA confirmed that all the parameters available at validation have been included in the PDD, the data unit and value applied are correct and sourced from reliable evidences. The parameters are listed and assessed in the table below:

Data and parameters	Unit	Value applied	Source of data used	Assessment
Installed Capacity of the Project activity	MW	42	Approved FSR /28/	This value has been crosschecked through the information on the nameplates of the generators by physical site visit.
$\eta_{EP,i,j}$	-	100%	ACM0012 /04/	The maximum value 100% was applied in the calculation, which is in line with the methodology and conservative.
$Q_{BL,product}$	ton	800,000	approved FSR /28/ historical data records /93/	the PP applied the minimum value of 1) the average annual historical production data /93/ and 2) the most relevant manufacture’s data for normal operating conditions, i.e. the design document FSR completed by an independent party /28/. By review of the historical data and the project design, RINA confirmed that the historical coke production of the past year 2011 was 800,080t and the designed production for normal operation is 800,000t annually. Therefore RINA is of opinion that the use of value 800,000t is reasonable and conservative.

$q_{WCM,product}$	Nm^3/ton	222	Energy Balance /69/	The value was calculated based on the Energy balance sheet provided by an independent qualified party /69/, as 177,552,000m^3/800,000ton = 222m^3/ton. It was crosschecked with the public technical and practical information /70/ and confirmed that this value is in the normal practical range (*208m^3 to 244m^3*) and thus is reasonable.
f_{WCM}	-	1	The electricity generated by the project is purely from use of waste COG as per approved FSR /28/	The value is applied as 1 since the electricity generation is purely from the use of waste COG, which was designed in the approved FSR /28/
$h_{feedwater}$	KJ/kg	440.1776 (104 ^oC, 5.8MPa)	The standard steam book /94/	The parameter represents the unit enthalpy of the feed water to calculate the net enthalpy of the feed water to the WHRB. The value applied was calculated based on the data from standard data books /94/. RINA checked the calculation spreadsheet /95/ and confirmed the calculation is correct and can be reproduced.
h_{steam}	KJ/kg	3,114.42374 (332 ^oC, 1.27MPa)	The standard steam book /94/	The parameter represents the unit enthalpy of the output steam to calculate the net enthalpy of the extraction steam from the steam turbine. The value applied was calculated based on the data from standard data books /94/. RINA checked the calculation spreadsheet /95/ and confirmed the calculation is correct and can be reproduced.
$EF_{CO2,i,j}$	tCO2/TJ	94.6	IPCC 2006 /23/	This parameter is used to calculate $EF_{heat,j,y}$. It represents the CO_2

				emission factor per unit of energy of the baseline fuel, i.e. coal in case of the proposed project that in absence of the project the coal would be used for heat generation. The value 94.6 was sourced from the IPCC default value.
$EF_{CO2,coal}$	tCO2/TJ	99.7	IPCC 2006 /23/	This parameter is used to calculate project emissions caused by coal consumption. It represents the CO_2 emission factor per unit of coal. The value 99.7 was sourced from the IPCC default value at the upper limit of the uncertainty at a 95% confidence interval, which is conservative.
Operating margin of NWPG (OM)	tCO_2e/MWh	0.9803	Emission Factor published by China NDRC /31/	The emission factor of the electricity system was sourced from the latest information available at the time of validation. The information was published by China DNA /31/, thus is in line with the tool /06/.
Build margin of NWPG (BM)	tCO_2e/MWh	0.6426		
Emission factor of NWPG (CM)	tCO_2e/MWh	0.81145		

3.7.2 Parameters monitored ex-post

Complying with the applied ACM0012 version 04.0.0 /04/ and the methodological tool "Tool to calculate emission factor for an electricity system" version 02.2.1 /06/, the following are the list of parameters that are to be monitored during the crediting period.

1. Fraction of total heat that is used by the steam consumers in the project that in absence of the project activity would have been supplied by the district heating process ($ws_{i,j}$). This parameter is estimated from data on heat consumption by steam customers and will be monitored yearly, which is in line with the applied methodology.
2. Quantity of waste COG used for energy generation during year y ($Q_{WCM,y}$). For the proposed project activity, this parameter will be monitored by the flow meter installed before the inlet of the COG compressor, the unit is Nm^3. This parameter will be monitored continuously by the meter with accuracy level 2.0. The meter will be maintained under industry standards and calibrated by qualified institution annually.
3. Quantity of electricity supplied to the recipient by generator, which in the absence of the project activity would have sourced from the grid ($EG_{i,j,y}$, or EG_y as indicated in PDD version 03 /01/). For the proposed project activity, the electricity will be supplied to the grid NCPG. This parameter will be monitored at both the project site (project facility) and the connected substation (the connection point to the grid, i.e. recipient facility) for crosscheck the total energy supplied by the generator and the total electricity received by the grid, continuously by electricity

meters with accuracy 1.0. The meters will be maintained under industry standards and calibrated by qualified institution annually.

4. Electricity consumed by gas cleaning equipment or other supplementary electricity consumption by the Project activity during the year y ($EC_{PJ,y}$). For this project activity, the electricity is consumed from the grid NCPG. This parameter will be monitored continuously by electricity meter with accuracy level 1.0. The meter will be maintained under industry standards and calibrated by qualified institution annually.
5. Quantity of fossil fuel (diesel) combusted in the project activity during the year y ($FF_{diesel,y}$). This parameter will be monitored by flow meter installed at the inlet of WHRB, the unit is ton. This parameter will be measured monthly by the meter with accuracy level 0.5. The meter will be maintained under industry standards and calibrated by qualified institution annually.
6. Net calorific value of the fossil fuel (diesel) combusted as supplementary fuel at the start of the gas turbine (NCV_{diesel}). This parameter is used to calculate the project emissions of the diesel consumption. The value 0.0433 was sourced from the IPCC default value /23/ at the upper limit of the uncertainty at a 95% confidence interval, which is conservative. The monitoring of this parameter is in line with the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /05/.
7. The CO_2 emission factor per unit of diesel ($EF_{CO2,diesel}$). This parameter is used to calculate project emissions caused by diesel consumption. The value 74.8 was sourced from the IPCC default value at the upper limit of the uncertainty at a 95% confidence interval, which is conservative. The monitoring of this parameter is in line with the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /05/.
8. Quantity of fossil fuel (coal) combusted in the project activity during the year y ($FF_{coal,y}$). This parameter will be monitored by balance records, the unit is ton. This parameter will be monitored monthly and aggregated yearly. The metering instrument will undergo regular maintenance/calibration according to the industry standards.
9. Net calorific value of the fossil fuel (coal) combusted by the backup boiler in the project year y (NCV_{coal}). This parameter is used to calculate the project emissions of the coal. The value 0.0305 was sourced from the IPCC default value /23/ at the upper limit of the uncertainty at a 95% confidence interval, which is conservative. The monitoring of this parameter is in line with the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /05/.
10. The CO_2 emission factor per unit of coal ($EF_{CO2,coal}$). This parameter is used to calculate project emissions caused by coal consumption. The value 99.7 was sourced from the IPCC default value at the upper limit of the uncertainty at a 95% confidence interval, which is conservative. The monitoring of this parameter is in line with the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" /05/.
11. Feed water temperature of the WHRB ($T_{feedwater}$). This parameter is monitored by the thermometer installed at the inlet of WHRB, the unit is ^oC. The accuracy of the meter is 2.0. This parameter will be monitored daily and averaged yearly. The thermometer will undergo regular maintenance/calibration according to the industry standards.
12. Feed water pressure of the WHRB ($P_{feedwater}$). This parameter is monitored by the manometer installed at the inlet of WHRB, the unit is MPa. The accuracy of the meter is 2.0. This parameter will be monitored daily and averaged yearly. The manometer will undergo regular maintenance/calibration according to the industry standards.
13. Feed water volume of the inlet of the WHRB in year y ($Q_{feedwater,y}$). This parameter is monitored by flow meter installed at the inlet of WHRB, the unit is t/a. The accuracy of the meter is 2.5. This parameter will be monitored continuously and aggregated annually. The flow meter will undergo regular maintenance/calibration according to the industry standards.
14. Extraction steam temperature generated by the steam turbine (T_{steam}). This parameter is monitored by the thermometers installed at both the outlet of the steam and at the contracted receipting point at the receipting facility, the unit is ^oC. The accuracy of the meters is 2.0. This parameter will be monitored daily and averaged yearly. The thermometers will undergo regular maintenance/calibration according to the industry standards.

15. Extraction steam pressure provided by the steam turbine (P_{steam}). This parameter is monitored by the manometers installed at both the outlet of the steam and at the contracted receipting point at the receipting facility, the unit is MPa. The accuracy of the meters is 2.0. This parameter will be monitored daily and averaged yearly. The manometers will undergo regular maintenance/calibration according to the industry standards.
16. Extraction steam quantity of the outlet of the steam turbine in year y ($Q_{steam,y}$). This parameter is monitored by flow meters installed at both the outlet of the steam and at the contracted receipting point at the receipting facility, the unit is t/a. The accuracy of the meters is 2.5. This parameter will be monitored continuously and aggregated annually. The flow meters will undergo regular maintenance/calibration according to the industry standards.
17. Net quantity of heat supplied to the recipient facility j by the project activity during the year y in TJ ($HG_{j,y}$). As confirmed by the project design /28//29/, the supplied steam will be not recovered, and there is no condensate returning from the outlet of the turbine condensing stage. Therefore, in accordance with the applied methodology, the difference between the enthalpy of extraction steam supplied to recipient facility j ($H_{p,n,j,y}$) and the enthalpy of feed water ($H_{r,n,j,y}$) represents $HG_{j,y}$. this parameter will be calculated based on the monitoring of the energy content of the feed water to the boiler at the inlet of the boiler and the steam supplied to the recipient at the contracted receipting point, which were listed above.
18. Abnormal operation of the project facility including emergencies and shut down. This is monitored daily and aggregated annually. This is to demonstrate that no emission reductions are claimed for the abnormal operation.
19. Average technical transmission and distribution losses for providing electricity to source k in year y ($TDL_{k,y}$). This parameter will be monitored annually in accordance with the applied "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" /109/.

RINA reviewed the monitoring parameters listed in the section B.7 of the PDD version 03 /01/ and found that all the necessary parameters are included, the description of the parameters, the unit, the data sources, the monitoring procedures, meter accuracy and calibration are properly contained in the tables. Therefore, RINA is of opinion that the monitoring parameters are described appropriately in line with the applied ACM0012 version 04.0.0 /04/ and relevant guidance and tool.

3.7.3 Management system and quality assurance

The personnel training plan and the organizational and management structure, including the responsibilities for monitoring, data collection, reporting and QA/QC procedures are clearly described in section B.7 of the PDD version 03 /01/.

The monitoring equipment, e.g. the electric energy meters will be installed and maintained under the industry standards and calibrated by qualified institution annually, which is in line with relevant China regulations DL/T448-2000 /98/ and other energy meters will also be installed and maintained under the industry standards in accordance with the applied methodology and tools. The data collection and management system are clearly described in the PDD version 03 /01/. The data monitored will be aggregated, summarized, calculated and recorded as an electronic and a paper form at the end of each month. The sales records and purchase receipts are used to ensure the consistency in the QA/QC procedure. The data backup and storage system are well defined and all the data shall be kept until two years after the end of crediting period. The failure recovery procedure is also in place to secure the project operation and monitoring.

The application of the monitoring methodology is transparent and it is RINA's opinion the project participants are able to implement the monitoring plan.

3.8 Estimation of GHG emissions

The emission reductions ER_y by the project activity during the crediting period is the difference between the baseline emissions BE_y, project emissions PE_y and emissions due to leakage L_y in accordance with the applied ACM0012 version 04.0.0:

1) Baseline Emissions

The baseline emissions includes emissions from energy generated by the project activity during the year y in tons of CO_2 and the emissions from generation of steam, if any, using fossil fuel, that would have been used for flaring the waste COG in absence of the project activity (tCO2e per year).

Capping of baseline emissions

The applied methodology requires that baseline emissions should be capped irrespective of planned/unplanned or actual increase in output of plant, change in operational parameters and practices, change in fuel type and quantity resulting in an increase in generation of waste energy, as an introduction to the element of conservativeness.

By document review/28/ and on-site interview with PP and physical site visit, RINA was able to confirm that there is no foreseeable expansion of the project activity and the proposed project is a newly built project activity which is implemented in a new coking oven production line facility that operated since 12/2010 as per the operation explanation of the coke oven line by the existing production line owner Shandong Morningsun Coal Chemical Co., Ltd. in 01/2012 /67/. RINA thus considered the use of three years previous data (Method-1) is not applicable.

PP applied Method-2, i.e. the use of direct monitoring and manufacturer's data in PDD. RINA considered the project activities is implemented in the existing facilities where the required data is unavailable as assessed above, therefore is of opinion that the Method-2 is applicable to the project.

The capping of baseline emissions (i.e. f_{cap}) is thereby defined in PDD, in accordance with the applied ACM0012 version 04.0.0, as the formula below:

$$f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}}$$

$$Q_{WCM,BL} = Q_{BL,product} \times q_{wcm,product}$$

Where,

$Q_{WCM,BL}$	Quantity of waste energy generated prior to the start of the project activity (177,552,000Nm^3)
$Q_{WCM,y}$	Quantity of WECM used for energy generation during year y (158,604,000Nm^3)
$Q_{BL,product}$	Coke ovens production in the baseline scenario. (8000t) The minimum of the following two figures was used: (1) average annual historical production data from start-up of the facility, if the facility's operational history is less than three years, or (2) the most relevant manufacture's data for normal operating conditions.
$q_{wcm,product}$	Amount of waste COG per unit of coke generated by the coke oven (222Nm^3/t)

The parameters and the values have been listed in PDD and assessed in section 3.7.1 of this report. RINA is of opinion that the values of these parameters were based on reliable and credible sources (refer to section 3.7.1) in line with the applied methodology and confirmed that the calculation of f_{cap} in the PDD /01/ and ERCS /96/ is correct and transparent in accordance with the methodology. The principle that the ratio is 1 if the waste energy generated in project year y is the same or less than that generated at a historical level was correctly applied in the calculation.

It has been confirmed that the project activity involves electricity generation and steam generation that in absence of project would be supplied by fossil fuel consumption, using the waste COG which was flared to the atmosphere in the baseline scenario by reviewing the approved FSR /28//29/ and physical site visit. Therefore it is reasonable that the baseline emissions include emissions from energy generated by the project. It is validated that no fossil fuel is combusted for the directly flaring of waste COG or for steam generation in the absence of the project as per physical site visit and the approved FSR /28/, therefore RINA confirmed that no baseline emissions is generated from fossil fuel combustion, i.e. $BE_{flst,y}$=0.

The baseline emissions therefore consists of only the following two parts:

1. Baseline emissions from electricity during the year y

As per the baseline scenario identified in this report, the emissions due to displacement of electricity by the project activity, which would be generated by the coal-dominated NCPG in the absence of the project, is applied in PDD and is expressed as:

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

Where,

The f_{wcm} is the fraction of total electricity generated by the project activity using waste energy. The value of this parameter is determined as 1 ex-ante, since it is confirmed that the electricity generation is purely from use of waste COG which is in line with the approved FSR /28/.

The f_{cap} is defined and assessed in "Capping of baseline emissions" above. The value applied in the ex-ante estimation is 1, which is reasonable as using the conservative principle.

The $EG_{i,j,y}$ is the quantity of electricity supplied to the recipient j by generator, which in the absence of the project activity would have been source from i source during the year y in MWh. For the proposed project, the electricity generated will be supplied to the grid NCPG, which in the absence of the project would have been imported from NCPG as confirmed by the project design /28/. The applied electricity supplied to the grid is 229,219MWh sourced from the approved FSR /28/ which has been verified to be reasonable above in section 3.6.3.3 of this report. Therefore, the value of this parameter is equal to the electricity supplied by the project activity to the grid NCPG.

The $EF_{elec,i,j,y}$ is CO2 emission factor for the electricity source, displaced due to the project activity, during the year y in tons of CO2e/MWh. For the proposed project, the connected NCPG is the electricity source displaced due to the project activity as project design. Therefore the emission factor is of NCPG. "Tool to calculate the emission factor for an electricity system" version 02.2.1 /06/ is applied to determine the emission factor of NCPG in the PDD version 03, which is the latest tool available by the time of this report. Complying with the "Tool to calculate the emission factor for an electricity system" version 02.2.1, the baseline emission factor for the project activity is determined ex-ante as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM). The PDD version 01 of 01/12/2011 for the project activity was published for global stakeholder consultation on 03/12/2011. This version of PDD correctly applied the most recent data vintage for the baseline emissions calculation at the time of PDD submitted for validation, i.e. 2011 Baseline Emission Factor for Regional Grids in China issued by host country DNA China NDRC on 20/10/2011 /31/ based on the most recent available data from China Electric Power Yearbook/21/, China Energy Statistical Yearbook /22/ and IPCC 2006 default values /23/. OM is calculated to be 0.9803tCO_2e/MWh; BM is calculated to be 0.6426tCO_2e/MWh. The combined grid emission factor of NCPG is determined ex-ante for the fixed 10 years crediting period following the applied methodology ACM0012 version 04.0.0 /04/. It has been calculated as the weighted average (w_{OM}=0.5, w_{BM}=0.5) of the operating margin emission factor and the build margin emission factor. The combined margin emission factor is calculated as 0.81145tCO_2e/MWh.

Hence, the baseline emissions due to displacement of electricity by the project activity are calculated to be 186,000 tCO_2e over the fixed 10 years crediting period.

2. Baseline emissions from steam during the year y

As per the baseline scenario identified in this report, the emissions due to displacement of steam by the project activity, which would be generated by the coal-fired boilers in the absence of the project, is applied in PDD and is expressed as:

$$BE_{ther,y} = f_{cap} * \sum_{j} \left\{ \left(\sum_{n} f_{wcm,n,y} * HG_{n,j,y} \right) * EF_{heat,j,y} \right\}$$

Where

The f_{wcm} is the fraction of total heat generated by the project activity using waste energy. The value of this parameter is determined as 1 ex-ante, since it is confirmed that the heat generation is purely from use of waste COG which is in line with the approved FSR /28/.

The f_{cap} is defined and assessed in "Capping of baseline emissions" above. The value applied in the ex-ante estimation is 1, which is reasonable as using the conservative principle.

The $HG_{n,j,y}$ is the net quantity of heat supplied to the unit process/element process/reactor n in recipient facility j by the project activity during the year y, in case of the proposed project supplying steam to the consumers /92/ to replace that would be generated by steam boilers, this parameter is expressed as difference of energy content between the steam supplied to the recipient facility and the feed water to the boiler, which is in line with the applied methodology. RINA confirmed that there is no heat supplied to the recipient facility for supply of heat of reaction as per the signed steam supply agreement /92/. Therefore this parameter is calculated as:

$$HG_{n,j,y} = HG_{n,process,j,y} = \sum_{p} H_{p,n,j,y} - \sum_{r} H_{r,n,j,y}$$

Where

$H_{p,n,j,y}$ is the net enthalpy of the product p in the product mix at the outlet of the process/reactor/element process n in recipient facility j during the year y (TJ). In case of the proposed project, this parameter is the net enthalpy of the extraction steam from the steam turbine and supplied to the steam consumers, as per the approved FSR /28/ and physical site visit. To calculate this parameter, the thermal parameters of the steam, i.e. T_{steam} (the temperature of the extraction steam from the turbine, 332^{o}C), P_{steam} (the pressure of the extraction steam from the turbine, 1.27MPa) and h_{steam} (the unit enthalpy of the extraction steam from the turbine, 3,114.4237KJ/kg) were applied. The temperature and pressure of the steam were contracted by the steam supply agreement between the project developer and the steam consumers /92/ and were designed in the approved FSR /28/ and also consistent with the technical specification of the employed steam turbine /47/. The unit enthalpy of the steam was calculated based on the steam thermal data of the standard steam book /94/. This parameter is calculated as 747.46TJ and RINA checked the PDD /01/ and calculation spreadsheet ERCS /96/ and confirmed the calculation is correct and can be reproduced.

$H_{r,n,j,y}$ is the net enthalpy of the reactant r in the reactant mix at the inlet of the process/reactor/element process n in recipient facility j during the year y (TJ). In case of the proposed project, this parameter is the net enthalpy of the feed water to the WHRB, as per the approved FSR /28/ and physical site visit. To calculate this parameter, the thermal parameters of the feed water, i.e. $T_{feedwater}$ (the temperature of the feed water, 104^{o}C), $P_{feedwater}$ (the pressure of the feed water, 5.8MPa) and $h_{feedwater}$ (the unit enthalpy of the feed water, 400.1776KJ/kg) were applied. The temperature and pressure of the feed water were designed in the approved FSR /28/ and also consistent with the technical specification of the employed WHRB /49/. The unit enthalpy of the water was calculated based on the steam thermal data of the standard steam book /94/. This parameter is calculation as 105.64TJ and RINA checked the PDD /01/ and calculation spreadsheet ERCS /96/ and confirmed the calculation is correct and can be reproduced.

Therefore the parameter $HG_{n,j,y}$ is calculated as 641.82TJ which has been correctly reported in the PDD /01/ and the calculation spreadsheet ERCS /96/.

The $EF_{heat,j,y}$ is the CO2 emission factor of the element process that would have supplied the heat to recipient facility j in absence of the project activity (tCO2/TJ). In case of the proposed project, in absence of which, the steam heat would be supplied by the coal fired boilers, as per the approved project design /28/ and the identified baseline scenario. Therefore this parameter is expressed as the emission factor of coal and calculated in accordance with the methodology as:

$$EF_{heat,j,y} = \sum_{i} ws_{i,j} \frac{EF_{CO2,i,j}}{\eta_{EP,i,j}}$$

Where

$EF_{CO2,i,j}$ is the CO2 emission factor per unit of energy of the baseline fuel used in i^{th} element process used by recipient j, in tCO2/TJ, in absence of the project activity. For the proposed project, this parameter is expressed as the CO2 emission factor of the coal, which is reasonable in line with the baseline scenario and the value (94.6tCO2/TJ) was sourced from the default value of coal of IPCC 2006 /23/.

$\eta_{EP,i,j}$ is the efficiency of the i^{th} element process that has or would have supplied heat to j^{th} recipient in the absence of the project activity. This parameter has been assessed in section 3.7.1 of this report and considered conservative as the maximum value 100% was applied in the calculation.

$ws_{i,j}$ is the fraction of total heat that is used by the recipient j in the project that in absence of the project activity would have been supplied by the i^{th} element process. For the proposed project, this parameter is valued as 1 since the total heat that is used by the recipient would be supplied by coal-fired boilers in absence of the project, which is reasonable in line with the identified baseline scenario and the approved FSR /28/.

Therefore The $EF_{heat,j,y}$ is correctly calculated as 94.6tCO2/TJ and has been transparently reported in the PDD /01/ and ERCS /96/.

Hence, the annual baseline emissions due to displacement of steam heat by the project activity are calculated ex-ante to be 60,716 tCO_2e over the fixed 10 years crediting period.

The annual baseline emissions are calculated to be 246,716tCO2e (=186,000tCO2e+60,716tCO2e)

The baseline emissions estimation can be replicated using the data and parameter values provided in the PDD version 03 /01/ and the ER calculation spreadsheet (ERCS) /96/ submitted for registration. The data sources mentioned have been verified by RINA. RINA was able to confirm that the steps taken in the PDD version 03 for calculation of the emission factor is in line with the "Tool to calculate the emission factor for an electricity system" version 02.2.1. The formulas applied in the PDD and ERCS /96/ is correct and the calculation is traceable and transparent.

2) Project Emissions

The project emissions include emissions due to combustion of auxiliary fuel to supplement waste gas and electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of energy or other supplementary electricity consumption. In case of the proposed project, it has been validated that 1) the project involves on-site consumption of diesel for the CCPP start and besides no other fuel fossils are consumed by the project activity, as per the project design FSR /28/ and the physical site visit; 2) the electricity consumption for cleaning gas or other supplementary electricity consumption have already been deducted from the electricity supplied to the grid, i.e. EG_y, and therefore the project emissions from electricity consumption as ZERO is considered reasonable, and this parameter will be monitored ex-post for calculation of actual emissions; 3) the project may also consume the coal by the backup boilers in case of the suspend of the CCPP activity, this situation was not considered in the project emissions calculation but the consumption of the coal will be monitored ex-post for the calculation of actual emissions, which is confirmed to be reasonable. Therefore project emissions are calculated as:

$$PE_y = PE_{AF,y} = \Sigma(FF_{i,y} \times NCV_i \times EF_{CO2,i})$$

Where

PE_y is the project emissions due to project activity. In case of the project, only emissions from consumption of diesel are considered as per the assessment above.

$PE_{AF,y}$ is the emissions from the project activity in year y due to combustion of auxiliary fuel in tonnes of CO2. In case of the project, the auxiliary fuel is diesel as assessed above.

$FF_{i,y}$ Quantity of fossil fuel type i combusted to supplement waste energy in the project activity during the year y, in energy or mass units. In case of the project, the quantity of diesel consumption is estimated by a qualified independent party Jinan City Construction Consultancy Institute and Shandong Province Light Industry Design Institute, who was contracted by the project developer /28/, based on the technology of ignition of the gas turbine generators as per the approved FSR /28//29/ and crosschecked by the specification of the gas turbine generators /46/. RINA thus confirmed that the value of diesel consumption (20ton/yr) is reasonable.

NCV_i is the net calorific value of the fossil fuel type i combusted as supplementary fuel, in TJ per unit of energy or mass units, obtained from reliable local or national data, if available, otherwise taken from the country specific IPCC default factors. In case of the project using diesel, this value was sourced from the IPCC default factors 0.0433TJ/t /23/, which is in line with the applied

methodology and using the upper limit of the uncertainty at a 95% confidence interval for conservativeness.

$EF_{CO2,I}$ is the CO2 emission factor per unit of energy or mass of the fuel type i in tons CO2 obtained from reliable local or national data, if available, otherwise taken from the country specific IPCC default factors. In case of the project using diesel, this value was sourced from the IPCC default factors 74.8tCO2e/TJ /23/, which is in line with the applied methodology and using the upper limit of the uncertainty at a 95% confidence interval for conservativeness.

Hence, the annual project emissions by the project activity are calculated ex-ante to be 65 tCO_2e over the fixed 10 years crediting period.

3) Leakage Emissions

No leakage has to be considered as per the applied methodology ACM0012 version 04.0.0 /04/.

4) Emission Reductions

The emission reductions calculation is

$ER_y = BE_y, - PE_y = 246{,}716\ tCO_2e – 65\ tCO_2e – 0 = 246{,}651 tCO_2e$.

As assessed the equation and parameters in the PDD version 03 /01/, ACM0012 version 04.0.0 /04/ and “Tool to calculate the emission factor for an electricity system” version 02.2.1 /06/, RINA was able to confirm that the baseline methodology has been applied correctly to calculate the emission reductions, all assumptions and data used by PP have been listed in the PDD. RINA confirms that the GHG emission reduction calculations are complete and transparent, and the data accuracy has been verified. No other project emission or leakage sources contributing more than 1% and not mentioned by the methodology has been found.

3.9 Environmental Impacts

An analysis of environmental impacts has been conducted. In China, an environmental impact assessment (EIA) is mandatory according to Country laws and regulations/25/ for construction projects. The EIA report was completed by a third qualified party Shandong Provincial Environmental Protection Science Research & Design Institute in 02/2010 /32/ and approved by Shandong Environmental Protection Bureau (EPB) on 26/03/2010 /33/.

RINA reviewed the EIA and the letters for approval, interviewed the local stakeholders and the PP and confirmed it is in compliance with the legal requirements of the host country.

The potential environmental impacts have been sufficiently identified, such as air pollution caused by NOx generated during combustion of COG, water pollution caused by chemical waste water and domestic water from staffs, noise caused by blower, compression and pump, etc. The conclusion of the analysis has been described in the PDD version 03 /01/, and no significant environmental impact is expected from the project activity in accordance with EIA report and EIA approval/32//33/.

3.10 Local stakeholders consultation

The stakeholder’s consultation process for the project activity was completed on 25/11/2009, which is prior to the publication of the PDD version 01/01/ on the UNFCCC website on 03/12/2011.

The stakeholders were invited to provide their comments on the project activity through a questionnaire provided to them. The PP has sent a total number of 40 questionnaires to the local stakeholders and obtained a reply from all the 40 stakeholders /35/. The questionnaires and summary sheet have been verified by RINA and it is confirmed the stakeholders are relevant, including local residents, workers and government representatives.

A summary of comments is provided and has been verified by RINA /35/ and it is noted that the local government and all the residents support the construction of the project activity, and it is the common view that the project activity will bring social and economic benefits to the local people. No due account needs to be taken as no negative comments were received from local stakeholders.

RINA can confirm that the process is adequate and credible for local stakeholder consultation.

4 COMMENTS BY PARTIES, STAKEHOLDERS AND NGOS

The PDD version 01 of 01/12/2011 /01/ was made publicly available on the CDM UNFCCC website and Parties, stakeholders and NGOs through the CDM website (http://cdm.unfccc.int/Projects/Validation/DB/VUEC297IIHTJWVLSVWNHDF7QJ5QUSP/view.html) invited to provide comments during a 30 days period from 03/12/2011 to 01/01/2012.

No public comments were received during that period.

5 VALIDATION OPINION

RINA Services S.p.A (RINA) has performed validation of the project activity “Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd” in China, with regard to the relevant requirements for CDM activities.

The review of the project design document and the subsequent follow-up interviews have provided RINA with sufficient evidence to determine the fulfillment of the stated criteria.

The host Party is People’s Republic of China and the Annex I Party is United Kingdom of Great Britain and Northern Ireland. Both parties fulfill the participation criteria and has approved the project and authorized the project participant “Shandong Jikuang Morningsun Thermal Power Co., Ltd” and “Lakewood Carbon Corp.”. The DNA from China confirmed that the project assists in achieving sustainable development.

The project correctly applies the approved baseline and monitoring methodology “ACM0012”, “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects”, version 04.0.0 of 15/04/2011.

By utilizing waste COG from the coking oven production line, which is flared to the atmosphere in the absence of project activity, to generate electricity and steam displacing the power that would be consumed from the grid NCPG and steam that would be supplied by the newly built coal fired boilers, the project results in reduction 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 “Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd” are estimated to be on an average 246,651 tCO_2e per year over the fixed 10 years crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

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

In conclusion, it is RINA’s opinion that the project activity “Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd” in China, as described in the PDD, version 03 of 07/08/2012, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology “ACM0012”, “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects”, version 04.0.0 of 15/04/2011.

RINA thus requests registration of the project as a CDM project activity.

APPENDIX A

VALIDATION PROTOCOL

TABLE 1 MANDATORY REQUIREMENTS

Requirement	Reference	Conclusion
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reductions commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
2. The project shall assist non Annex I Parties 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 Procedure §40	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 (ODA) 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 and Procedures §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedure §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 Procedure §31b	OK
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.	CDM Modalities and Procedure §43	~~CAR7-CAR10~~ ~~CL1-2~~ OK
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
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
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

Requirement	Reference	Conclusion
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30/45 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
15. Baseline and monitoring methodology shall be previously approved by the CDM Methodology Panel.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §47	OK
17. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords, and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

TABLE 2 REQUIREMENTS CHECKLIST

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
A Description of Project Activity						
A.1 Title of the project activity						
A.1.1.	Title of the project activity, revision number and date of PDD (section A.1). State the clearly identifiable title of the project activity, the version number and the date of the PDD.	/01/	DR	The title of the project activity is "Coke oven gas comprehensive utilization for co-generation project in Shandong Jikuang Morningsun Thermal Power Co., Ltd". The GSP PDD is of version 01 of 01/12/2011.		**OK**
A.1.2	Does the project comply with the applicable requirements for completing the PDDs?	/01/ /03/	DR	Yes, the PDD is in compliance with the "Guidelines for completing the project design document (CDM-PDD) and the proposed new baseline and monitoring methodologies (CDM-NM)" version 07 of 02/08/2008 for completing the PDD for large scale project.		**OK**
A.2 Description of the proposed project activity						
A.2.1	Does the PDD contain an accurate description of the project activity and provide the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation? How was the design of the project assessed?	/01/ /28/	DR I	The purpose of the proposed project activity is to generate electricity and steam by utilizing waste gas resources recovered from an existing coking plant. It is expected to reduce emissions of greenhouse gases by avoiding CO_2 emission from equivalent power generation in coal-dominated NCPG and from the steam delivered to consumers. The project activity is to construct one combined-cycle power plant (CCPP) with the total capacity of 42MW (two sets of 15MW gas turbine generators and one set of 12MW steam turbine generator) to use	~~**CAR1**~~	**OK**

[1] MoV: DR document review, I interview, CC cross checking

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				the recovered waste COG for cogeneration. The project will generate 229,219MWh of electricity and 240,000 tons of steam annually. The electricity generated will be exported to NCPG and the steam generated will be delivered to steam consumers. The emission reductions of the project activity are expected to be 246,651 tCO2e per year. By the physical site visit, the project was newly built and still under construction; the coking plant was existed nearby the proposed project and was on operation, and the waste COG was flared to the atmosphere by an open flaring system as confirmed by visiting the site, the process and the flame was watched; the construction of the pipeline that sent COG from the coking plant to the proposed project has been not completed. It was visited that the two sets of 15MW gas turbine generators, one set of 12MW steam turbine generator have been in place and were still under construction; also one 75t/h steam boiler was in place as a standby steam generator. The site visit confirmed that the project design is in conformity of the FSR. The description of the pre-project scenario in section A.2 of the PDD is not clear on whether there were or would be coal-fired boilers for steam supply. The description of the project activity is not consistent with the project design in FSR, i.e. the amount of steam		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				generation is 24,000 tons in PDD which is inconsistent with that in FSR.		
A.2.2	Does the project activity involve alteration of existing installations? If yes, have the differences between pre-project and post-project activity been clearly described in the PDD?	/01/ /28/	DR I	The project activity is to construct a new plant for power and heat generation at an existing coking plant. The project activity doesn't alter the existing coking plant. This has been confirmed by the approved FSR and through physical site visit.		**OK**
A.3 Project participants						
A.3.1	Have the Parties and project participants participating in the project been listed in tabular form in Section A.3 and are they consistent with the information detailed in Annex 1 of the PDD?	/01/	DR	The Shandong Jikuang Morningsun Thermal Power Co., Ltd from People's Republic of China (host party) and Lakewood Carbon Corp. from United Kingdom of Great Britain and Northern Ireland (Annex 1 party) are the parties involved in the project activity. The information provided in this section is in line with that of the information provided in the Annex 1 of the PDD.		**OK**
A.3.2	Do all participating Parties fulfil the participation requirements as follows: (a) Party has ratified the Kyoto Protocol (b) Party has a Designated National Authority (c) The assigned amount has been determined	/01/ /13/ /14/	DR	The details of DNA for both the parties involved in the project activity are listed below. People's Republic of China has ratified the Kyoto Protocol on 30/08/2002 and has a DNA of "National Development and Reform Commission" (NDRC). United Kingdom of Great Britain and Northern Ireland has ratified the Kyoto Protocol on 31/05/2002 and has a DNA of "Department of Energy & Climate Change" (DECC).		**OK**
A.3.3	Have the letters of approval have been issued?	/01/ /30/	DR	National Development and Reform Commission (NDRC) of China issued the LoA to Shandong Jikuang Morningsun Thermal Power Co., Ltd on 19/04/2011.	~~**CAR2**~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				The LoA from Annex 1 Party has been not available yet.		
A.3.4	Do the letters of approval meet the following requirements? (a) LoA confirms that the Party has ratified the Kyoto Protocol; (b) LoA confirms that participation is voluntary (c) The LoA confirms that the project contributes to the sustainable development of the Host Country? (d) The LoA refers to the precise project activity title in the PDD (e) The LoA was received directly by the DNA of the PP In case of doubt regarding the authenticity of the LoAs, describe how it was verified that the letter of approval is authentic.	/01/ /30/	DR	The LoA confirms to the following details: People's Republic of China: The party has ratified the Kyoto Protocol on 30/08/2002, the participation is voluntary, the project contributes to the sustainable development of the Host Country. The precise project activity title in the PDD is the same as in the LoA. The LoA from Annex 1 Party has been not available yet.	~~**CAR2**~~	**OK**
A.3.5	Have all private/public project participants been authorized by a Party to the Kyoto Protocol?	/01/ /30/	DR	LoA from Chinese DNA has been provided and reviewed which clearly indicates that Shandong Jikuang Morningsun Thermal Power Co., Ltd is authorized as China's participant to voluntarily participate in and carry out the project activity. The LoA from Annex 1 Party has been not available yet.	~~**CAR2**~~	**OK**
A.4 Technical description of the project						
A.4.1	Is the project location clearly defined?	/01/ /28/	DR I	The location of the project activity is clearly defined in the PDD. The project is located in the centre of Jining Chemical Industry Economic & Technological Development Zone in Huji Town, Jinxiang County, Jining City, Shandong province, P.R.China. The geographical coordinates of the project activity are East longitude 116^{O}23'31" and North latitude 35^{O}10'29"		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				which was confirmed by onsite measurement.		
A.4.2	Does the project design engineering reflect current good practices? Would the technology result in a significantly better performance than any commonly used technologies in the host Country? Is any transfer of technology from any Annex I Party involved?	/01/ /28/	DR I	The project activity comprises of two sets of 15MW gas turbine generators (model TITAN 130-20501) produced by Solar Turbines International Company; two complementary combustion heat recovery steam boilers (WHRB) (model BQ136.2/500) produced by Nanjing Nanguo Power; one set of steam turbine generator (Model C12-3.43/1.27) produced by Qingdao Jieneng Group. Further, the project activity also comprises of one circulating fluidized bed boiler (model UG-75/3.82-M41) produced by Wuxi Huaguang Boiler Co., Ltd. The technical details of the equipment included in the PDD have been reviewed and crossckecked with the nameplate of the equipment during physical site visit. It is validated that the technology used in the project activity is a commonly used technology in the host country. China greatly relies on fossil fuels for electricity generation today and in the upcoming decades. Comparing with current emission factor of North China Power Grid, the proposed project activity results in a significantly better performance due to the nature of waste gas power generation and as well as the heat generation. The equipment are almost domestically manufacturer; the two sets of gas turbine generators were imported from Solar Turbines International Company from U.S.A and no transfer of technology from	~~CAR3~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				Annex I Party was involved. The further explain of the purposed of the project, the scenario existing prior to the start of the project, as well as the baseline scenario have been not included in Section A.4.3 of PDD. The key technology parameters of the employed equipment described in table A.4.1 of PDD were not consistent with that indicated on the nameplate of the equipment, e.g. the feed water temperature of WHRB is 150 degree C in PDD while it is 104 degree C on the nameplate. The estimation of the emission reductions during the period 01/06/2012-31/12/2012 and 01/01/2022-31/05/2022 was not correct in section A.4.4 and section B.6.4 of PDD, considering the monthly average.		
A.4.3	If public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/01/ /28/ /29/	DR I	As per the section A.4.5 of the PDD the project activity does not involve any public funding. According to the FSR and project approval and the approval, the total investment of the proposed project is sourced by both the equity capital from the project developer and bank loan. No indication that any public funding is involved. This has been also confirmed by interview with the local government officials from DRC.		**OK**
B. Application of a baseline and monitoring methodology						
B.1 Methodology applied						

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
B.1.1	Does the project activity apply an approved methodology and the correct version thereof?	/01/ /04/ /05/ /06/ /07/ /08/ /09/	DR I	Yes, the project activity applies the approved methodology ACM0012 titled "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" version 04.0.0 of 15/04/2011 The project activity also applies the tools "Tool for the demonstration and assessment of additionality" version 06.0.0 of 25/11/2011, "Tool to calculate the emission factor for an electricity system" Version 02.2.1 of 29/09/2011, "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", version 02 of 02/08/2008, "Tool to determine the baseline efficiency of thermal or electric energy generation systems", version 01 of 17/07/2009 and "Tool to Determine the Remaining Lifetime of Equipment", version 01of 16/10/2009.		**OK**
B.2 Applicability criteria of the methodology/tools						
B.2.1	How was it validated that the project activity complies with the applicability criteria?	/01/ /04/ /05/ /06/ /07/ /08/ /09/ /28/ /29/	DR I	The applied consolidated methodology ACM0012 version 04.0.0 is applicable to project activities implemented in an existing or Greenfield facility converting waste energy carried in identified WECM stream(s) into useful energy. The proposed project activity is implemented in an existing coking plant and utilizes the waste energy in COG to generate electricity and steam. The WECM is the waste coking oven gas (COG) which is used for cogeneration. It has been confirmed by the physical site visit and from the FSR that, in the absence of the project activity, the waste	~~**CAR4**~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				COG was not recovered and is flared into atmosphere. During the site visit, the project was under construction, the waste COG has been not utilized and flared in the flaring system, the flame was visible upon the flaring system. The applicability of the methodology was also analyzed in PDD under several conditions as below: 1. The project activity recovers the waste gas (COG) and doesn't involve recovery of waste pressure, as per FSR and physical site visit. 2. By interview with local government officials (DRC), it is confirmed that no regulations require the project facility to recover and/or utilize the waste COG prior to the implementation of the project activity. The recovery of such waste gas is encouraged but not a mandate. 3. The project activity is implemented at an existing waste energy generation facilities (coking plant), which has been confirmed by physical site visit and the capacity of the coking plant will not be expanded. 4. As per the design, under abnormal operation, the waste COG will be flared and vented to the atmosphere and the emissions in the abnormal period will not be accounted for as claimed by PP. *5.* It is validated that the proposed project involves recovery of only one waste gas COG from the coking plant		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				and no other waste gas is recovered by the project. PP claimed no waste gas was used in the absence of the project activity. 6. As per the design and physical site visit with the expertise of the installed equipment, the project activity involves a co-generation combined-cycle power plant (CCPP) generating electricity and steam. The waste gas recovery is not implemented in a single-cycle power plant. 7. The emission reductions credits are claimed for 10 years fixed period as per the PDD. PP justified in PDD that the technical lifetime of the existing coke oven production line is 25 years and has been operated for one year, and concluded that the remaining lifetime of the coke oven production is over 10 years. *The remaining lifetime of the existing plant, i.e. the technical lifetime of the existing coke oven production line (25 years) and the operation year (1 year) have not been substantiated.* *8.* PP claimed that the proposed project activity applied Annex 2 guidelines to prove the extent of use of waste energy in the absence of the waste energy generation facilities. However relevant evidences have been not provided and this was raised in relevant to point 5 of this section. *The demonstration that the waste COG utilized in the project activity was flared into the atmosphere in the absence of the*		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				project activity at the existing coking oven production plant, in section B.2 of PDD is not in line with the requirement of Annex 2 of the applied methodology ACM0012. *The applicability conditions of the referred tools in the methodology have not been justified in section B.2 of PDD.*		
B.2.2	Is the selected baseline one of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/01/ /04/	DR I	The baseline scenario for the project activity is that the surplus COG flaring to the atmosphere, equivalent electricity drawn from NCPG and the heat would be supplied by coal fired based boiler system in absence of the project activity, which is one of the combinations of the baselines described in the methodology ACM0012 version 04.0.0. CAR4 is raised in regard to the applicability of the methodology in section B.2.1 of this protocol.	**~~CAR4~~**	**OK**
B.3 Project boundary						
B.3.1	Is the project boundary are clearly defined and in accordance with the applied methodology?	/01/ /04/ /28/ /29/ /31/	DR I	As per the approved methodology ACM0012 version 04.0.0 and relevant tools, the project boundary of the project activity includes the following: (1) The industrial facility where waste energy is generated, i.e. the project facility existing coke oven production line; (2) the facility where electricity is generated/exported, i.e. the CDM project power and heat generation plant and the connected power grid by the proposed project activity, NCPG; (3) The recipient facilities in Jining		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				Chemical Industry Economic & Technological Development Zone, which is the consumer of the heat generated by the proposed project. The boundary are clearly defined and in accordance with the applied methodology.		
B.3.2	What are the project's system boundaries (components and facilities used to mitigate GHGs)?	/01/ /04/ /28/ /29/ /31/	DR I	The project activity includes usage of the following components in reducing the GHG emissions. They are two sets of 15MW gas turbine generators, one set of 12MW steam turbine generator, one 75t/h steam boiler as a standby steam generator. Apart from these components the project boundary also includes the coking plant and NCPG which includes Beijing, Tianjin, Hebei, Shanxi, Shandong and Inner-Mongolia Autonomous Region Power Grid. The heat consumer in the Jining Chemical Industry Economic & Technological Development Zone is also included in the project boundary.		**OK**
B.3.3	Which sources are identified for the project? Does the identified project boundary cover all possible sources linked to the project activity?	/01/ /04/ /28/ /29/ /31/	DR I	Baseline: the source for the baseline emissions are considered from 1) the NCPG which is a regional grid and dominated by fossil fuel fired power generation plants (CO2); 2) the consumption of fossil fuel in gas/steam turbines for thermal energy (CO2). Project activity: the sources for the project activity emissions are considered from 1) the supplemental fossil fuel consumption at the project plant (CO2); 2) the supplemental electricity consumption. Since the electricity generation in baseline has considered this supplemental electricity consumption, the source is excluded in project activity; 3) emissions		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				from cleaning of gas. The sources included in project boundary have been not completely identified in table B.3.1 of PDD and the description in table B.3.1 is not completely in line with the applied methodology. The baseline emission sources from fossil fuel consumption in gas turbines for thermal energy, as included in table B.3.1 of PDD has been not justified. The justification of the emission sources from cleaning of gas is not sufficient.	~~CAR5~~	
B.3.4	Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute by more than 1% to the estimated emission reductions of the project?	/01/ /04/ /28/ /29/ /31/	DR I	No, the project involves no other emissions sources not foreseen by the methodology as per the physical site visit and project design.		**OK**
B.4 Baseline scenario identification						
B.4.1	Which baseline scenarios have been identified? Is the list of the baseline scenarios complete?	/01/ /04/ /28/ /29/ /31/ /51/ /52/ /53/ /54/	DR I	The baseline scenarios have been identified in PDD and the list of the scenarios is complete in accordance with the applied methodology. The proposed project activity involves recovery of the COG and generation of the electricity and heat; no mechanical energy is involved in the project. The realistic and credible alternatives are identified as follows. For the use of waste energy: W1: WECM is directly vented to the atmosphere without incineration; - It is properly excluded as the national	~~CAR4~~ ~~CAR6~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				code for COG (GB16171-1996) stipulates that the excess COG must be flared to the atmosphere and prohibited to be released into atmosphere directly. W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released (or vented) to the atmosphere or waste pressure energy is not utilized; - It is a plausible scenario as the utilization of waste COG is not widely presented in coking industry in China and the release of the COG after incineration to atmosphere is common in China, as per the survey results issued by Coke Industry Association in China. W3: Waste energy is sold as an energy source; - PP claimed that to sell the waste COG is not a feasible option for no industrial facilities could use the waste COG and no local demand for the residents. However it is validated that the waste COG was provided by the generator (Shandong Morningsun Coal Chemical Co., Ltd) to the CDM project developer (Shandong Morningsun Thermal Power Co., Ltd) and there was an economic relation between the two parties for the use of the waste COG. *The elimination of alternative W3-"Waste COG is sold as an energy source" is not reasonable considering the waste COG has been purchase by the project*		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				developer from the energy generator. W4 Waste energy is used for meeting energy demand at the recipient facility(ies); - It is considered as a possible baseline scenario as the waste COG is used for power and heat generation to meet the energy demand of local area and the industrial zone as designed in the FSR. The alternative is also in compliance with legal laws and regulations. PP demonstrated the fuel gas was wasted from the coke plant by the energy balance. *However the balance evidence has been not provided. CAR4 is raised in this regard.* W5: A portion of the quantity or energy of WECM is recovered for generation of heat and/or electricity and/or mechanical energy, while the rest of the waste energy produced at the project facility is flared/released to atmosphere/ unutilized; - PP claimed that the project is aimed to recover all the waste COG and comparably demonstrated the recovery of portion waste COG will face the same barrier with the proposed project. *The justification of the elimination of alternative W5 is not substantiated.* W6: All the waste energy produced at the facility is captured and used for export electricity generation or steam. - It is considered as a possible baseline scenario as the proposed project is to		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				capture and utilize al the waste COG for export electricity and heat generation as per the FSR, which can be interpreted as the Project activity not undertaken as a CDM project. For power generation: P1: Proposed project activity not undertaken as a CDM project activity; - It is considered as a possible scenario, which complies with the relevant national regulations and laws, and is technically feasible. P2: On-site or off-site existing fossil fuel fired cogeneration plant; - PP demonstrated that the electricity generation should be supplied to NCPG and the electricity consumption would be supplied by NCPG. It is validated by physical site visit that no existing cogeneration plant on-site or off-site and the electricity consumption is supplied by the power grid NCPG. Therefore the elimination is reasonable. P3: On-site or off-site Greenfield fossil fuel fired cogeneration plant; - It is validated that Chinese regulations forbid to build a thermal power station (cogeneration) with an installed capacity less than 135MW and therefore confirmed that building a Greenfield fossil fuel fired cogeneration plant on-site or off-site is not allowed by the China government. P4: On-site or off-site existing renewable energy based cogeneration		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				plant; - Please refer to assessment for alternative P2. P5: On-site or off-site Greenfield renewable energy based cogeneration plant; - It is properly excluded as the renewable energy resources are lack at the project location. Based on RINA's local knowledge and expertise and also interview with local government officials, RINA confirmed that the project location area is lack of water resource, wind resource and solar resource; also there is not enough biomass near the project site for cogeneration. RINA thus confirmed that P5 is not a necessary and plausible scenario. P6: On-site or off-site existing fossil fuel based existing identified captive power plant; - It is properly excluded as there is no existing fossil fuel fired identified captive power plant on-site or off-site, as confirmed by physical site visit. P7: On-site or off-site existing identified renewable energy or other waste energy based captive power plant; - It is properly excluded as there is no existing identified renewable energy or other waste energy based captive power plant as per physical site visit and interview with local government officials. P8: On-site or off-site Greenfield fossil		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				fuel based captive plant; - The justification is the same as alternative P5. Please refer to the assessment for P5. And the proposed project will delivered electricity to power grid. Captive plant is not a plausible scenario providing the same production as the proposed project activity. P9: On-site or off-site Greenfield renewable energy or other waste energy based captive plant; - The justification is the same as alternative P8. Please refer to assessment of P8. P10: Sourced from grid-connected power plants; - It is a plausible scenario that in absence of the project activity, the power would be sourced by the coal fired dominated power grid NCPG. P11: Existing captive electricity generation using waste energy (if the project activity is captive generation using waste energy, this scenario represents captive generation with lower efficiency or lower recovery than the project activity); - It is properly excluded as the proposed project is a cogeneration plant and export power to NCPG. And no existing captive electricity generation as per the physical site visit. P12: Existing cogeneration using waste energy, but at a lower efficiency or lower recovery.		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				- No existing cogeneration as per the physical site visit and therefore properly excluded. For heat generation: H1: The proposed project activity is not undertaken as a CDM project activity; - Utilization of COG to generate electricity and heat not undertaken as a CDM project is in compliance with all applicable laws and regulations and is also technically feasible. H1 is a plausible scenario. H2: On-site or off-site existing fossil fuel based cogeneration plant; - Physical site visit confirmed that no on-site or off-site existing fossil fuel based cogeneration plant. H3: On-site or off-site Greenfield fossil fuel based cogeneration plant; - It is validated that Chinese regulations forbid to build a thermal power station (cogeneration) with an installed capacity less than 135MW and therefore confirmed that building a Greenfield fossil fuel fired cogeneration plant on-site or off-site is not allowed by the China government. H4: On-site or off-site existing renewable energy based cogeneration plant; - Physical site visit confirmed that no on-site or off-site existing renewable energy based cogeneration plant. H5: On-site or off-site Greenfield renewable energy based cogeneration		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				plant; - Please refer to assessment for alternative H3. H6: An existing fossil fuel based element process; - Physical site visit confirmed that no existing fossil fuel based element process can provide the same heat production other than the waste COG energy. H7: A new fossil fuel based element process; - A new fossil fuel based element process may provide the same heat as the project activity and the fossil fuel based element process is a common in project location area to provide heat production as per project design FSR, local expertise and interview with the government officials. Therefore it is a realistic and credible baseline alternative. H8: An existing renewable energy or other waste energy based element process to supply heat; - Physical site visit confirmed that no existing renewable energy or other waste energy based element process can provide the same heat production other than the waste COG energy. H9: A new renewable energy or other waste energy based element process to supply heat; - *The justification of elimination of alternative H9 is not reasonable.*		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				H10: Any other source such as district heat; - Physical site visit and interview with local government officials confirmed that no other source of heat in the project location. It is properly excluded. H11: Other heat generation technologies (e.g. heat pumps or solar energy); - *The justification of elimination of alternative H11 is not substantiated.* H12: Steam/process heat generation from waste energy, but with lower efficiency or lower recovery; - It is properly excluded as that the lower efficiency or lower recovery would have financial barriers as the proposed project activity and steam/process heat generation provide only heat which cannot produce the same electricity as the proposed project. H13: Cogeneration with waste energy, but at a lower efficiency or lower recovery; - It is properly excluded as that lower efficiency or lower recovery cogeneration with waste energy faces financial barrier with less revenue than the proposed project. H14: On-site fossil fuel consumption to supply heat. - *The justification of elimination of alternative H14 is not reasonable as that new on-site fossil fuel*		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				consumption may supply the same heat and is the plausible scenario.		
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/01/ /04/ /28/ /29/ /31/ /51/ /52/ /53/ /54/	DR I	The justification of elimination for alternatives has been assessed in section B.4.1 of this protocol.	~~CAR4~~ ~~CAR6~~	**OK**
B.4.3	What is the baseline scenario? Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/01/ /04/ /28/ /29/ /31/ /51/ /52/ /53/ /54/	DR I	The steps taken in determination of the baseline scenario in PDD is in accordance with the guidance in the methodology, as well as the additionality tool. Based on the alternative analysis in PDD, PP concluded two combinations of the baseline scenarios applicable to the proposed project, i.e. S1 – W2+P10+H7 and S2 – W4/W6+P1+H1. S1 is the scenario that the waste COG is flared to the atmosphere after incineration; the equivalent electricity is sourced from grid-connected power plants; the new fossil fuel based boiler in the centralized steam plant supply steam. S2 is the scenario that utilizing waste COG for cogeneration, but not undertaken as a CDM project activity. Using benchmark analysis in section B.5 of PDD, PP concluded S2 is not attractive and S1 is determined as the credible baseline scenario.	~~CAR4~~ ~~CAR6~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				However the elimination of alternatives is not properly justified/substantiated in PDD as that assessed in section B.4.1 of this protocol with pending issues raised as CAR4 and CAR6. *The determination of the baseline scenario is based on the elimination of alternatives and thus pending on close of the CAR4 and CAR6.*		
B.4.4	Has the baseline scenario been determined using conservative assumptions? Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/01/ /04/ /28/ /29/ /31/ /51/ /52/ /53/ /54/	DR I	Please refer to section B.4.1-B.4.3 of this protocol.	~~CAR4~~ ~~CAR6~~	**OK**
B.5 Additionality determination						
B.5.1	What tool does the project use to assess additionality? Is this in line with the methodology?	/01/ /04/ /05/	DR	The project activity uses the "Tool for the Demonstration and Assessment of Additionality" version 06.0.0 of 25/11/2011 for demonstrating the additionality. This tool is in line with the methodology applied for the project activity.		**OK**
B.5.2	What is the project additionality mainly based on?	/01/ /04/ /05/	DR	The PP has chosen the Investment analysis to demonstrate the additionality of the project activity.		**OK**
B.5.3	Prior consideration of CDM					
B.5.3.1	What is the starting date of the proposed project activity?	/01/ /04/ /05/ /10/ /12/	DR I	The glossary of CDM terms defines the starting date is the earliest date at which either the implementation or construction of real action of a project activity begins. The starting date of the project activity is 12/04/2010 when the		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
		/28/ /29/ /32/ /33/ /34/ /35/ /36/ /37/ /38/ /39/ /40/ /41/ /42/ /43/ /44/ /45/		purchase contract on main equipment was signed, as stated in PDD. To assess the project starting date, RINA based the timeline of the project in PDD reviewed the following evidences provided by PP: The Advisory agreement on CDM (signed on 02/12/2009) The Feasibility Study Report (FSR) (completed in 01/2010) The stakeholder survey records on the project construction (completed on 25/01/2010) The Environmental Impact Assessment (EIA) (completed in 02/2010) The Board of Directors Resolutions and decision on project implementation (completed on 16/02/2010) The EIA approved (issued on 26/03/2010) The project approved (issued preliminarily by Jining City DRC on 06/04/2010 and approved by Shandong Provincial DRC on 30/09/2010) The purchase contract on Equipment TITAN 130 Turbine Generator Sets signed (on 12/04/2010) The purchase contract on Equipment Circulating Fluidized Bed Boiler, COG Compressor, Steam Turbine and Generator, WHRB were signed on 18/04/2010 The construction order was issued on 04/05/2010		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				The construction and installation contract was signed on 05/05/2010 Among these events, RINA confirmed the provided evidences are credible. It is validated that the earliest date at which either the implementation or construction of real action of a project activity begins is on 12/04/2010 when the purchase agreement for TITAN 130 Turbine Generator Sets was signed.		
B.5.3.2	What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/01/ /04/ /05/ /10/ /12/ /28/ /34/ /36/	DR I	Among the events listed in section B.5.3.1 of this protocol, RINA validated that the PP considered the CDM earlier when the advisory agreement on CDM was signed by the project developer with Uniufa for the CDM advisory on 02/12/2009. The project FSR was completed in 01/2010, which also concluded that the application of CDM may strengthen the financial attractive to reach the benchmark. On 16/02/2010 the board meeting decided to invest the project and start CDM application. In conclusion, CDM was seriously considered prior to the time of decision to proceed with the project activity.		**OK**
B.5.3.3	What initiatives were taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/01/ /04/ /05/ /10/ /12/ /27/ /44/ /45/	DR I	The starting date of the project activity has been determined as 12/04/2010 as per section B.5.3.1 of this protocol, which is after 02/08/2008. In accordance with the “Guidelines on the demonstration and assessment of prior consideration of the CDM” version 04, PP submitted the notification of prior consideration of CDM Form to EB	~~**CAR7**~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				secretariat on 16/08/2010 and EB confirmed the receipt on 18/08/2010 on UNFCCC website. PP also submitted the notification of prior consideration of CDM Form to China DNA NDRC on 27/08/2010 and China DNA confirmed the receipt on 13/09/2010. The date of submission of the notification of prior consideration of CDM form to EB secretariat indicated in PDD is not consistent with that in the copy of the form provided by PP.		
B.5.3.4	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/01/ /04/ /05/ /10/ /12/ /27/ /44/ /45/	DR I	Referring to the assessment in section B.5.3.1-B.5.3.3 of this protocol, it is confirmed that continuous actions in parallel with the implementation were taken to secure CDM status and in line with "Guidelines on the demonstration and assessment of prior consideration of the CDM" version 04.		**OK**
B.5.4	Investment analysis					
B.5.4.1	What is the analysis method used to determine whether the proposed project activity is not (a) the most economically or financially attractive; or (b) economically or financially feasible, without the revenue from the sale of certified emission reductions?	/01/ /04/ /05/ /11/	DR	The benchmark analysis was adopted in the GSP PDD for investment analysis. This can be accepted since the project activity generates economic benefits from sell of electricity and heat other than CDM revenue.		**OK**
B.5.4.2	What the financial indicator is used?	/01/ /04/ /05/ /11/ /15/	DR I	The project Internal Return Rate (IRR) is chosen as the financial indicator for benchmark analysis. A benchmark Project IRR before tax of 8% was adopted as per the "Economic Evaluation Methods and Parameters for Construction Projects (3rd Edition)". This regulation was issued by the		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				National Development and Reform Commission and the Ministry of Construction of the P.R.China. (the government) and is the latest version available at the time of investment decision and also at the time of this report. It indicates the applicable benchmark for each category of business. According to this regulation, the applicable benchmark IRR for the thermal power industry (including cogeneration) is 8% (Project IRR before tax) or 10% (Equity IRR after tax). This benchmark was also applied in the project FSR referred to the regulation. Based on RINA's financial expertise, the project IRR before tax 8% is widely used in China for thermal power generation (including cogeneration). Hence RINA was able to confirm that the 8% benchmark Project IRR before tax chosen for the proposed project is reasonable, and this benchmark is considered conservative for the investment of waste energy power and heat generation project that may have a higher perceived risk profile than investments in conventional thermal energy generation (yet face the same benchmark in China).		
B.5.4.3	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the Host Country?	/01/ /02/ /04/ /05/ /11/	DR I	As per the IRR calculation spreadsheet, the depreciation has been taken into account for income tax calculation. The depreciation period is 15 years for		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
		/15/ /19/ /20/ /55/		equipment and 20 years for buildings as per the approved project application report. The depreciation period for the project activity is a common practice in China, according to the Chinese income tax law and regulation.		
B.5.4.4	Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is the working capital returned in the last year of the operation?	/01/ /02/ /04/ /05/ /11/ /15/ /28/ /55/	DR I	The investment analysis has been done for 15 years as per the IRR calculation spreadsheet while the operating time of the project activity is also 15 years as per the approved FSR, which is in consistency with each other and is also in line with the technical lifetime of the main equipment (equal to or more than 15 years). A 5% of salvage value for both equipment and buildings and capitals have been taken into account in the IRR calculation spreadsheet. The working capital is 13,866,000 RMB as per the approved FSR; it has been taken into account in the IRR calculation spreadsheet and returned in the last year of the operation.		**OK**
B.5.4.5	Cross-check of main parameters used in the financial analysis: electricity generation, electricity tariff, investment costs, operating and maintenance costs, taxes, other costs. The main parameters can be changed for the different project category.	/01/ /02/ /04/ /05/ /11/ /15/ /19/ /28/ /53/ /55/ /56/	DR I	The input parameters used in the financial analysis has been validated according to the VVM, and the following steps have been followed to assess the investment analysis: 1) Assessment of the sources used for input parameters. All the input parameters used in the financial analysis are taken from the approved FSR developed in 01/2010 by an independent officially accredited entity, Jinan City Construction Consultancy Institute and Shandong Province Light		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
		/57/ /60/ /61/ /62/ /63/ /64/ /65/		Industry Design Institute. The FSR was approved by Shandong Provincial Development and Reform Commission (DRC) on 30/09/2010 and can thus considered information provided by independent and recognized source. 2) Confirmation that the values used in the PDD and investment analysis are fully consistent with the FSR. The input parameters used in the financial analysis included in the PDD have been compared with the parameters stated in the approved FSR and it is confirmed that most of the values applied are consistent with the values stated in the document mentioned before. The value of insurance cost and the urban maintenance and construction tax rate in PDD is not consistent with that indicated in the approved FSR. 3) Assessment of the period between of time of the finalization of the FSR and the investment decision. The investment decision to proceed with the project activity was taken on 16/02/2010 (board decision on project implementation) which was right after the FSR was completed, 01/2010. Thus it is reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project activity. 4) Cross check of the main input parameters used in the financial analysis. Total static investment. The total static	~~CAR8~~	

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				investment is sourced from the approved FSR and was designated to be 352,891,700RMB including fixed asset value 339,025,700RMB and working capital value 13,866,000RMB. The bank loan interest in construction period is estimated to be 8,915,150RMB with total loan amount 150,086,700 and interest rate 5.94% as designed; the equity capital is 211,720,150RMB as indicated in approved FSR. According to the information published by the People's Bank of China, the loan interest rate since 10/2010 (the time point when the FSR was completed) should be 5.94% which is the same as applied in FSR and PDD. Information on the investment cost is insufficient that 1) the investment cost has not been substantiated or crosschecked by supportive evidences, e.g. contracts, financial reports or other related documents of total investment. 2) the appropriateness of the portion of loans from the bank has not been substantiated by supportive evidences, e.g. the loan contract Electricity Tariff. The electricity tariff is sourced from the approved FSR and it was 0.4105RMB/KWh including VAT. The tariff for the power generation of the proposed project has been approved by local government Jining City Price Bureau on 16/09/2011. The	~~CL1~~ ~~CL1~~	

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				approved tariff is 0.435RMB/kWh. The information of the electricity tariff is not clear on how the electricity tariff in FSR was determined . Steam Price. The steam price is sourced from the approved FSR and it was 150RMB/ton including VAT. The steam tariff has been approved by local government Jining City Price Bureau on 20/04/2011. The approved steam tariff is 150RMB/ton which is the same as that in FSR and PDD. Taxes. The tax rates were taken from the approved FSR and account to 17% of VAT for electricity and 13% of VAT for steam, 7% for additional urban construction surtax, 3% for educational surtax and 25% for income tax. These can be crosschecked against relevant Chinese regulations issued by Chinese government. The urban maintenance and construction tax rate indicated in PDD is 5% which is inconsistent with that in FSR 7%. This issue has been raised in this section above. Operating costs. The operation cost is sourced from approved FSR and accounts to 82,014,014RMB. The operating costs are mainly composed of the following parts: a) the annual COG cost: it is validated that the waste COG is purchased by the project developer from the energy generator Shandong Morningsun Coal Chemical Co., Ltd as per the purchase		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				contract signed between the two parties on 09/12/2011. According to the approved FSR, the waste COG price is estimated 0.35RMB/m3 while as per the signed purchase contract, the actual price agreed between the two parties is 0.40RMB/m3. PDD applies 0.35RMB/m3 in accordance with the approved FSR which is lower than the actual price and deemed to be conservative. b) annual labor cost. The labor cost is sourced from the approved FSR. The labor cost was 42,000 RMB per year for each staff. According to the "Average salary of industry" published by Shandong Statistical Information Net, the average salary in power generation and cogeneration industry is 41,910RMB, which is lower and closed to the value adopted for the project activity. The welfare is 14% of the labor cost, which is in line with the Income Tax Law of the People's Republic of China for Enterprises. c) Maintenance cost. The maintenance cost is sourced from the approved FSR. The maintenance cost was 2.5% of the fixed assets, and is within the range regulated by "Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects". d) Administration cost. The administration cost is sourced from the approved FSR. e) Insurance cost. The insurance cost is sourced from approved FSR and in		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				line with related insurance laws and regulations in China. For property insurance, according to the "Property Insurance", the project activity shall be classified as type V industry, and the corresponding property insurance rate is 0.5% of the fixed assets, which is the same as adopted in investment analysis. The additional property insurance rate is 0.2% of the fixed assets. The employer's liability insurance was calculated as 775,975.20RMB per year, which is in full compliance with the regulations described in the "Employer's Liability Insurance". The total amount of public liability insurance was calculated as 74,160 RMB per year in the investment analysis. f) Material cost. The material cost is sourced from the approved FSR, including the consumption of N2 and diesel. The annual quantity of N2 gas consumed by the project activity was estimated to be 2,400,000m3 and the unit cost for N2 gas was 1.2RMB/m3; the annual quantity of diesel consumed by the project activity was estimated to be 20t/year and the unit cost for diesel was 5,800RMB/t. the diesel price is in line with the market price at the time of FSR finalization. g) Water cost. The water cost is sourced from the approved FSR. The annual water quantity needed is 900,000tons. The water price is 2.3RMB/ton, which is in line with the market price in project local area.	~~CL1~~ ~~CL1~~	

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				Information of the O&M cost, i.e. the number of staffs, the administration cost, the amount of N2 gas consumption, the unit price of the N2 gas and the amount of diesel consumed has not been evidenced. Annual electricity supplied to the grid. The annual electricity delivered to the grid is sourced from the approved FSR. The installed capacity of the project activity is 42MW, the annual operation hour is 6000 hours, and the internal electricity using rate is 9.04%, therefore, the estimated calculation result of electricity supplied to NCPG is 229,219MWh. The annual operation hour 6,000h was determined in the approved FSR by an independent party Jinan City Construction Consultancy Institute and Shandong Province Light Industry Design Institute contracted with the project developer. Annual Steam output. The annual steam output is sourced from the approved FSR. Information of the internal plant power consumption rate 9.04%, the administration cost, the amount of N2 gas consumption, the unit price of the N2 gas, the amount of diesel consumed and the annual steam output has not been evidenced. The value included in IRR calculation spreadsheet was checked to be consistent with that in approved FSR. The calculation of IRR is in line with the Chinese normal accounting practice		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				and the "Guidance on the Assessment of Investment Analysis"		
B.5.4.6	Sensitivity analysis: have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified?	/01/ /02/ /04/ /05/ /11/ /15/ /19/ /28/	DR I	A sensitivity analysis has been carried out for parameters contributing more than 20% revenues and costs to demonstrate the robustness of the financial analysis. Reasonable variations of the electricity revenue (including electricity output and tariff), steam revenue (including steam output and price), investment cost and operation cost have been considered by calculating the variation necessary to reach the benchmark. Electricity revenue. The IRR reaches the benchmark 8% if the electricity revenue increases 14%. PP claimed that the installed capacity has been chosen by FSR based on maximum hourly COG flow rate at normal operation of coking plant and the expected operational hours 6,000 hours for a grid connected power plant is a very aggressive assumption under the limitation of grid connection hours. The electricity tariff is sourced from the approved FSR and it was 0.4105RMB/KWh including VAT. The tariff for the power generation of the proposed project has been approved by local government Jining City Price Bureau on 16/09/2011. The approved tariff is 0.435RMB/kWh. PP claimed the electricity tariff in the past 10 years increased with 2.15% rate average annually. Steam revenue. The IRR reaches the	~~**CL2**~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				benchmark 8% if the electricity revenue increases 35%. The parameter is based on the steam output and steam price. It is validated that the steam output is extracted from the steam turbine and based on the rated extraction capacity of the employed steam turbine. Technically the steam output is impossible to increase under the normal operation of the plant. PP claimed that steam price in the past 10 years increased with 2.15% rate average annually. Investment cost. The IRR reaches the benchmark 10% if the investment costs decrease by 21%. PP claimed that the average annual growth rate of fixed asset investment is 17.67%. As the project has been almost completed by physical site visit, the equipment and other signed contracts can be provide for crosscheck the actual investment cost. This issue has been raised in CL1. Operating costs. The IRR reaches the benchmark 10% if the operating costs decrease by 13%. PP claimed that over the past 10 years the average annual growth rate of raw material purchase price index is 4.39% and the average annual growth rate of labor costs is 13.5. As designed in FSR, the waste COG generated by the coke oven production line is 177,552,000m3 while the CDM project plant utilizes only		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				158,604,000m3 annually. The information is not clear enough to determine whether the waste COG is partially or all utilized. The information is not clear enough to determine the description that the expected operational hour 6,000h is a very aggressive assumption under the limitation of grid connection hours. The information is not clear enough on the electricity tariff index, heat supply and production price index, as the Shandong Statistical Yearbook (1999-2009) has not been provided.		
B.5.4.7	Sensitivity analysis: is the range of variations is reasonable in the project activity? The main parameters can be changed for the different project category.	/01/ /02/ /04/ /05/ /11/ /15/ /19/ /28/	DR I	Please refer to section B.5.4.6.	~~**CL2**~~	**OK**
B.5.4.8	Have the key parameters been varied to reach the benchmark and the likelihood of this happening been justified to be small?	/01/ /02/ /04/ /05/ /11/ /15/ /19/ /28/	DR I	Please refer to section B.5.4.6.	~~**CL2**~~	**OK**
B.5.5 Barrier analysis						
B.5.5.1	Are the barriers identified complimentary to a potential investment analysis?	/01/ /02/	DR I	Barrier analysis was not conducted in accordance with “Tool for the		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
		/04/ /05/		demonstration and assessment of additionality".		
B.5.5.2	How were the investment barriers assessed to be real? How does CDM alleviate the investment barriers?	/01/ /02/ /04/ /05/	DR I	Barrier analysis was not conducted in accordance with "Tool for the demonstration and assessment of additionality".		**OK**
B.5.5.3	Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/01/ /02/ /04/ /05/	DR I	Barrier analysis was not conducted in accordance with "Tool for the demonstration and assessment of additionality".		**OK**
B.5.5.4	How were the technological barriers assessed to be real? How does CDM alleviate the technological barriers?	/01/ /02/ /04/ /05/	DR I	Barrier analysis was not conducted in accordance with "Tool for the demonstration and assessment of additionality".		**OK**
B.5.5.5	Is the project activity prevented by the technological barriers and is at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/01/ /02/ /04/ /05/	DR I	Barrier analysis was not conducted in accordance with "Tool for the demonstration and assessment of additionality".		**OK**
B.5.5.6	How were the barriers due to prevailing practise assessed to be real? How does CDM alleviate the barriers due to prevailing practice?	/01/ /02/ /04/ /05/	DR I	Barrier analysis was not conducted in accordance with "Tool for the demonstration and assessment of additionality".		**OK**
B.5.5.7	Is the project activity prevented by the barriers due to prevailing practice and is at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/01/ /02/ /04/ /05/	DR I	Barrier analysis was not conducted in accordance with "Tool for the demonstration and assessment of additionality".		**OK**
B.5.5.8	How were the other barriers assessed to be real?	/01/	DR	Barrier analysis was not conducted in		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
	How does CDM alleviate the other barriers?	/02/ /04/ /05/	I	accordance with "Tool for the demonstration and assessment of additionality".		
B.5.5.9	Is the project activity prevented by the other barriers and is at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/01/ /02/ /04/ /05/	DR I	Barrier analysis was not conducted in accordance with "Tool for the demonstration and assessment of additionality".		**OK**
B.5.6 Common practice analysis						
B.5.6.1	What are the geographical scope and scope of technology of the common practice analysis?	/01/ /02/ /04/ /05/	DR I	The PP has chosen the geographical area of Shandong province for carrying out the common practice analysis and claimed that the natural resources, industrial structure, fundamental infrastructure, development strategy and the policy framework varies from different provinces in China. It is validated based on RINA's local expertise, the above situations are different from province to province and the tariff policies, the natural resources and the investment climate in Shandong province are quite different from other province in China. The guideline of common practice version 01 was applied in common practice analysis, which was replaced by "Tool for the demonstration and assessment of additionality" version 06.0.0 available at the time of validation.	~~**CAR9**~~	**OK**
B.5.6.2	How many similar non-CDM-projects exist in the region within the scope?	/01/ /02/ /04/ /05/	DR I	3 similar projects were included in the analysis. "Tool for the demonstration and assessment of additionality" version	~~**CAR9**~~ ~~**CAR10**~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				06.0.0 is available at the time of validation. This issue is raised in CAR8. The provided references for these 3 projects in common practice analysis were not able to demonstrate whether the projects registered CDM or requested for registration of CDM and the data sources used for the common practice analysis is not clear.		
B.5.6.3	How were possible essential distinctions between the project activity and similar activities assessed?	/01/ /02/ /04/ /05/	DR I	This issue is pending on the close of raised CAR8 and CAR9.	~~CAR9~~ ~~CAR10~~	**OK**
B.5.6.4	What is the data source(s) used for the common practice analysis?	/01/ /02/ /04/ /05/	DR I	Please refer to B.5.6.2 of this protocol.	~~CAR10~~	**OK**
B.5.7 Conclusion on the additionality assessment						
B.5.7.1	What is the conclusion with regard to the additionality of the project activity?	/01/ /02/ /04/ /05/	DR I	Please refer to B.5 above of this protocol.	~~CAR7-10~~ ~~CL1-2~~	**OK**
B.6 Calculation of GHG emission reductions						
B.6.1 Baseline emissions						
B.6.1.1	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/01/ /02/ /04/ /06/ /07/ /08/ /09/ /28/	DR I	The calculations provided in PDD are in accordance with the approved methodology. The baseline emissions from electricity supplied by the grid would be replaced by the project and the heat that would be generated by coal-fired boilers were included in the	~~CAR11~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				calculation, as the baseline scenario 2 is determined as the baseline and no mechanical energy is involved in the project. PP claimed no complementary fossil fuel to flare waste COG in the absence of the project and the baseline emission from the generation of steam is zero. By physical site visit, no complementary fossil fuel was found to flare waste COG. Therefore it is considered reasonable. The baseline emissions from thermal energy and electricity generation have been considered in the PDD. The capping factors have been considered and Method-2 was applied in the PDD in line with the methodology. The parameters of steam, water, i.e. the temperature, pressure and the quality, the electricity and steam output, as well as the operation hours are sourced from the approved design report FSR. The fraction of total heat/electricity generated by the project using waste energy is determined as 1 considering the steam/electricity generation is purely from the use of the waste COG which is reasonable. The factor f_{cap} is 1 as conservative for both calculation of baseline emissions for electricity and heat generation. The determination of each parameter available at validation in baseline emission calculations is assessed in section B.6.5 of this protocol.		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				The calculation of the baseline emissions form thermal energy is not completed in PDD, i.e. the determination of $EF_{heat,j,y}$ and $HG_{n,process,j,y}$ have been not completely included in PDD. The calculation formula of the net enthalpy of feed water is not correctly described in section B.6.3 of PDD and is not in line with the methodology. The ER calculation spreadsheet for the proposed project activity has been not provided.		
B.6.1.2	Have conservative assumptions been used when calculating the baseline emissions and are the uncertainty estimates properly addressed?	/01/ /02/ /04/ /06/ /07/ /08/ /09/ /28/	DR I	Please refer to section B.6.1.1 above.	~~**CAR11**~~	**OK**
B.6.2 Project emissions						
B.6.2.1	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/01/ /02/ /04/ /06/ /07/ /08/ /09/ /28/	DR I	Project emissions include emissions due to 1) combustion of auxiliary fuel to supplement waste gas/heat and 2) electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of energy or other supplementary electricity consumption, as per the methodology. PP claimed that diesel will be consumed by the project activity and has been considered in the calculation. The consumption of electricity for cleaning gas has already been deducted from the electricity supplied	~~**CAR12**~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				to the grid. These are confirmed to be reasonable. The quantity of consumed fossil fuel (diesel) is sourced from the approved FSR. The determination of each parameter in project emission calculations available at validation is assessed in section B.6.5 of this protocol. As per description in PDD and FSR, the 75t/h steam boiler could be fuelled by raw coal or COG. PP is requested to clarify why the baseline emissions from the consumption of raw coal are not considered in the project emissions calculation.		
B.6.2.2	Have conservative assumptions been used when calculating the project emissions and are the uncertainty estimates properly addressed?	/01/ /02/ /04/ /06/ /07/ /08/ /09/ /28/	DR I	Please refer to section B.6.2.1 above.	~~CAR12~~	**OK**
B.6.3 Leakage						
B.6.3.1	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/01/ /02/ /04/	DR I	No leakage is considered according to the applied methodology.		**OK**
B.6.3.2	Have conservative assumptions been used when calculating the leakage and are the uncertainty estimates properly addressed?	/01/ /02/ /04/	DR I	Please refer to section B.6.3.1 above.		**OK**
B.6.4 Emission reductions						
B.6.4.1	Has the methodology been correctly applied to calculate the emission reductions and can this be replicated by the data provided in the PDD and supporting files to be submitted for registration?	/01/ /02/ /04/	DR I	The emission reductions calculation has been included in section B.6.3 of PDD. The determination of each parameter in	~~CAR11~~ ~~CAR12~~ ~~CAR3~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				project emission calculations spreadsheet is assessed in section B.6.5 of this protocol. The estimation of the emission reductions during the period 01/06/2012-31/12/2012 and 01/01/2022-31/05/2022 was not correct in section B.6.4 of PDD, considering the monthly average. CAR2 is raised in this regard.		
B.6.5 Data and parameters that are available at validation and that are not monitored						
B.6.5.1	How were the parameters available at validation verified?	/01/ /02/ /04/	DR I	The following are the parameters available at the time of validation. These parameters are not monitored during the crediting period. 1. Installed Capacity of the Project activity – 42MW. This can be confirmed by the approved FSR and the nameplate of the equipment by physical site visit. 2. Amount of fossil fuel type i consumed in the project electricity system in year y (FCi,y) - the GSP PDD claims as per China Energy Statistics Yearbooks (2008-2010) 3. Net calorific value (energy content) of fossil fuel type i in year y (NCVi,y) - the GSP PDD claims as per China Energy Statistics Yearbook 2010 4. the fuel consumption rate of fossil fuel fired power plants which are applied by the most advanced commercially technology ($EF_{Coal,Adv,y}$, $EF_{Gas,Adv,y}$, $EF_{Oil,Adv,y}$ - the GSP PDD claims as per Baseline Emission Factor of China's Grid in 2011	~~**CAR13**~~ ~~**CAR4**~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				5. The electricity generation by source j in year y of each province connected to the NCPG (GENj,y) - the GSP PDD claims as per China Electric Power Yearbooks (2008-2010) 6. The rate of electricity consumption of thermal power platns in NCPG in year y (ECR_y) - the GSP PDD claims as per China Energy Statistics Yearbooks (2008-2010) 7. The aggregate incrementally installed power capacity of all kinds of power generation sources j (MW) in the NCPG in year y (CAPj,y) - the GSP PDD claims as per China Electric Power Yearbooks (2006-2008) 8. Carbon emission factor per unit of energy of the baseline fuel used in I boiler used by recipient j, in tCO2/TJ, in absence of the project activity ($EF_{coal,i,j}$) – the GSP PDD claims as per 2006 IPCC Guideline. 9. the annual coke production ($Q_{BL,product}$) – 800,000 ton. The GSP PDD claims as per Energy balance from manufacturer's data. *This has been not provided by the PP and CAR 3 is raised in this regard.* 10. Specific waste energy production per ton of coke generated as per manufacturer's or external expert's data ($q_{wcm,product}$) – the GSP PDD claims as per Energy balance from manufacturer's data. *This has been not provided by the PP and CAR 3 is raised in this regard.*		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				11. Enthalpy of the reactor (feed waster) for the WHRB (TE_p) – GSP PDD claims as per standard data books/ steam tables. *This has been not provided by the PP.* 12. Enthalpy of the production (extraction steam) from the steam turbine (TE_r) – GSP PDD claimed as per standard data books/ steam tables. *This has been not provided by the PP.* 13. Net calorific value of the fossil fuel (diesel) combusted as supplementary fuel (NCV_{diesel}) – GSP PDD claimed as per China Energy Statistical Yearbook 2010 14. the CO2 emission factor per unit of diesel oil ($EF_{CO2,diesel}$) – GSP PDD claimed as per 2006 IPCC Guidelines 15. CO2 emission factor per unit of energy of the fossil fuel (coal) used in the reference baseline generation source (centralized steam plant) providing steam to consumers ($EF_{CO2,coal}$) – GSP PDD claimed as per 2006 IPCC Guidelines. It has been validated that the values applied for the parameters are consistent with the referred sources except the following issues not evidenced: PP is requested to provide the source evidences for the parameters $Q_{BL,product}$, $q_{wcm,product}$, TE_p, TE_r. The parameters related to the emissions in case of operation of the		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				coal-fire based 75t/h steam boiler have been not considered at the validation.		
B.7 Monitoring plan						
B.7.1 Data and parameters monitored						
B.7.1.1	Does the monitoring plan described in the PDD comply with the requirements of the methodology?	/01/ /04/	DR	Yes. The monitoring plan described in the PDD is in accordance with the applied methodologies ACM0012.		**OK**
B.7.1.2	Does the monitoring plan contain all necessary parameters and are they clearly described?	/01/ /04/	DR	The following are the list of parameters that are to be monitored during the crediting period. 1. $ws_{i,j}$ – Fraction of total heat that is used by the steam consumers in the project that in absence of the project activity would have been supplied by the district heating process. This value will be estimated from data on heat consumption by steam customers in line with the methodology. 2. $EG_{i,j,y}$ – Quantity of net electricity supplied to the recipient by generator, which in the absence of the project activity would have been sourced from the grid. This value will be measured continuously by the electricity meter installed at the main outgoing line of the CCPP generator and cross checked with electricity sales records. The data will be recorded monthly. The meter will be calibrated yearly. 3. $Q_{WCM,y}$ – Quantity of Waste COG used for energy generation during year y. this value will be monitored by flow meter installed before the inlet of the COG compressor continuously. The data will be record daily. The flow meter will be calibrated yearly. 4. $FF_{diesel,y}$ – Quantity of fossil fuel	~~**CAR14**~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				(diesel) combusted in the project activity during the year y. the value will be monitored by flow meter at diesel inlet for gas turbine generator. The value will be measured monthly and aggregated yearly. The calibration will be conducted annually. 5. T_{water} – Feed water temperature of the WHRB. This value will be monitored by the thermometer at the inlet of WHRB daily and averaged yearly. The calibration will be conducted annually. 6. Q_{water} – feed water volume of the inlet of the WHRB. This value will be monitored by flow meter continuously installed at inlet of WHRB. The calibration will be conducted annually. 7. $HG_{n,process,j,y}$ – Net quantity of heat supplied to the steam customers by the project activity during the year y in TJ. This value will be calculated using the data monitored. The relevant monitoring parameters are included in this section. 8. T_{steam} – Extraction steam temperature generated by the steam turbine. This value will be monitored by the thermometer at the outlet of steam turbine daily and averaged yearly. The calibration will be conducted annually. It is recorded in both paper and electronic way. 9. P_{steam} – Extraction steam pressure generated by the steam turbine. This value will be monitored by the manometer at the outlet of steam		

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				turbine daily and averaged yearly. The calibration will be conducted annually. It is recorded in both paper and electronic way. 10. Q_{steam} – Extraction steam volume generated by the steam turbine. This value will be monitored by the flow meter at the outlet of steam turbine daily and aggregated yearly. The calibration will be conducted annually. 11. Abnormal operation of the project facility including emergencies and shutdown. This value is sourced from the operation of the project facility and monitored daily and aggregated annually. The parameters related to the emissions caused by consumption of the coal from 75t/h steam boiler have been not considered in the monitoring.		
B.7.1.3	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate? Are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate?	/01/ /04/	DR I	The measurement equipment has been described in the monitoring plan. The accuracy of the measurement equipment has been not addressed in the monitoring plan.	~~**CAR15**~~	**OK**
B.7.1.4	Is the monitoring frequency adequate for all monitoring parameters? Is it in line with the monitoring methodology?	/01/ /04/	DR I	The monitoring frequency has been adequate for all the monitoring parameters and in line with the monitoring methodology. Please refer to section B.7.1.2 of this protocol.		**OK**
B.7.1.5	Is the recording frequency adequate for all monitoring parameters? Is it in line with the monitoring methodology?	/01/ /04/	DR I	The recording frequency has been adequate for all monitoring parameters and is in line with the monitoring methodology. Please refer to section B.7.1.2 of this protocol.		**OK**
B.7.2 Monitoring of sustainable development indicators/environmental impacts						

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
B.7.2.1	Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/01/ /04/	DR I	According to the approved methodologies ACM0012 do not need to monitor the sustainable development indicators. Otherwise the monitoring of sustainable indicators is not required by Chinese legislation.		**OK**
B.7.2.2	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/01/ /04/	DR I	Chinese regulation does not require collection and archiving of relevant data related to environmental, social and economic impacts. Environmental impacts will be monitored by local environmental authority.		**OK**
B.7.2.3	Are the sustainable development indicators in line with stated national priorities in the host country?	/01/ /04/	DR I	According to the approved methodologies ACM0012 do not need to monitor the sustainable development indicators. Otherwise the monitoring of sustainable indicators is not required by Chinese legislation.		**OK**
B.7.3 Management, quality assurance and quality control						
B.7.3.1	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/01/ /04/	DR I	At the date of the site visit the project was under construction and the monitoring arrangements were also under construction. RINA reviewed the monitoring plan in PDD and interview with the project developer and confirmed that the monitoring arrangements will be implemented in accordance with the plan. The construction of the project and the monitoring is going on in line with the project design. It is thus confirmed that the monitoring arrangements described in the monitoring plan are feasible within the project design.		**OK**
B.7.3.2	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	/01/ /04/	DR I	Procedures for day-to-day records handling has been described in the monitoring plan, including records of the monitoring data of the parameters, data achieving, the storage of the records. All		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
				the data record will be archived until 2 years after the credit period. Data to be used for emission reductions calculation will be aggregated, summarized, calculated and recorded as an electronic and paper form every month. All relevant written documentations are systematically stored in order to use for checking appropriateness of data and data management.		
B.7.3.3	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/01/ /04/	DR I	The quality control and quality assurance procedures are included in the monitoring plan. The maintenance, calibration of the equipment will be taken in accordance with manufacturer's specification and national standard. These procedures are sufficient to ensure that the emission reductions achieved by/resulting from the project.		**OK**
B.7.3.4	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?	/01/ /04/	DR I	All the monitored data will be kept until two years after the end of the crediting period.		**OK**
C. Duration of the project activity and crediting period.						
C.1 Start date of project activity						
C.1.1	What is the expected starting date of the project activity and how has been determined? When was the first construction activity?	/01/ /04/ /37/ /43/	DR I	It has been confirmed in section B.5.3.1 of this protocol that the earliest date at which either the implementation or construction of real action of a project activity begins is on 12/04/2010 when the purchase agreement for TITAN 130 Turbine Generator Sets was signed. The construction order was issued on 04/05/2010 after which the project developer started the construction activity.		**OK**
C.1.2	What is the expected operational lifetime of the project activity? Is it reasonable?	/01/ /04/ /09/	DR I	The expected operational lifetime of the project is 15 years and 0 months, which is consistent with the project design. The	~~**CAR4**~~	**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
		/46/ /47/ /48/ /49/		technical lifetime of the main equipment has been confirmed to be more than 15 years as per the specifications. PP also claimed the technical lifetime of the waste energy generation equipment (coke oven) is 25 years and has operated only one year. *This shall be substantiated by relevant evidence and has been raised in CAR4*		
C.2 Start date of crediting period						
C.2.1	What is the expected starting date of the proposed project activity? Does the crediting period start eight week after the request for registration?	/01/ /04/	DR I	The expected starting date of the project crediting period is 01/06/2012.		**OK**
C.2.2	What is the length of the crediting period? Is it clearly defined and reasonable?	/01/ /04/	DR I	The PP has chosen the fixed crediting period of 10 years. This fixed 10 years is reasonable considering the technical lifetime and operation lifetime of the project. PP also claimed the technical lifetime of the waste energy generation equipment (coke oven) is 25 years and has operated only one year. *This shall be substantiated by relevant evidence and has been raised in CAR4*	~~**CAR4**~~	**OK**
D. Environmental Impact						
D.1.1	Has an analysis of the environment impacts of the project activity been undertaken? Is it clearly and sufficiently described in the PDD?	/01/ /04/ /25/ /32/ /33/	DR I	Yes, the analysis of environmental impacts has been undertaken for the project activity. The PP has obtained the EIA approval letter from the Shandong Environmental Protection Department (EPB) on 26/03/2010		**OK**
D.1.3	Is the analysis of the environmental impacts required by the legislation of the host Country? If yes, has the EIA has been approved by local Government? Does the approval contain any conditions that need monitoring?	/01/ /04/ /25/ /32/ /33/	DR I	Yes. The analysis of the environmental impacts is required by the EIA law of China. The EIA was completed in 02/2010 and approved by Shandong EPB on 26/03/2010		**OK**
D.1.4	Is it the project in line with the current environmental legislation in the host Country?	/01/ /04/	DR I	Yes, according to the approved EIA report, the project activity is in line with		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
		/25/ /32/ /33/		the current environmental legislation in China. This has been also confirmed by the local EPB officials.		
E. Local stakeholder consultation						
E.1.1	Are the local stakeholders be invited by the PP prior to the publication of the PDD to the UNFCCC website?	/01/ /04/ /25/ /32/ /33/ /35/	DR I	Yes, the stakeholder's consultation process for the project activity was completed on 25/11/2009, which is prior to the publication of the PDD to the UNFCCC website. The stakeholders are invited to provide their comments on the project activity through a questionnaire provided to them. The PP has sent a total number of 40 questionnaires to the local stakeholders and obtained a reply from all the 40 stakeholders.		**OK**
E.1.2	Area the stakeholders invited be considered as regards commenting the proposed project activity?	/01/ /04/ /25/ /32/ /33/ /35/	DR I	By reviewing the questionnaires, the consultation covered the residents in the neighbouring area, the governmental officials, staff of the project owner company and other related persons. It is confirmed that the questionnaires are adequate for commenting.		**OK**
E.1.3	Is the summary of the comments received from the stakeholders, provided in the PDD complete?	/01/ /04/ /25/ /32/ /33/ /35/	DR I	The comments received from the stakeholders are provided in the PDD and found to be completed. Further confirmation was done through the interview with the local stakeholder during the on-site inspection. As per the comments and interview, the local stakeholders support the proposed project.		**OK**
E.1.4	Has due account been taken by the project participants of any stakeholder comments received?	/01/ /04/ /25/ /32/ /33/ /35/	DR I	As per the summary of the questionnaire survey, all the affected people supported the proposed project and no negative comments were received. Therefore no need to take additional measures for the project.		**OK**

Checklist Question		Reference	MoV[1]	Comments	Draft Conclusion	Final Conclusion
E.1.5	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?	/01/ /04/ /25/ /32/ /33/ /35/	DR I	The stakeholder consultation process is not required by regulations of laws in China as the project is a small scale project as defined by China regulation.		**OK**

TABLE 3 RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
CAR 1 The description of the pre-project scenario in section A.2 of the PDD is not clear on whether there were or would be coal-fired boilers for steam supply. The description of the project activity is not consistent with the project design in FSR, i.e. the amount of steam generation is 24,000 tons in PDD which is inconsistent with that in FSR.	A.2.1	The description about the pre-project scenario and the steam generation in section A.2 is refined.	The description of the pre-project scenario was refined in PDD. There was no existing boiler prior to the project for steam supplying in the zone. This was confirmed by physical site visit. The amount of steam generation was corrected to be 240,000 tons in updated PDD, which is consistent with the approved FSR. Hence CAR1 is closed.
CAR 2 The LoA from Annex 1 Party has been not available yet.	A.3.3 A.3.4 A.3.5	Both of the LoAs from China and United Kingdom have been provided to the DOE.	The LoAs from China and UK were provided. By review of the LoAs, the information of PPs in updated PDD are consistent with the LoAs directly provided by PPs. Hence CAR2 is closed.
CAR 3 The further explain of the purposed of the project, the scenario existing prior to the start of the project, as well as the baseline scenario have been not included in Section A.4.3 of PDD. The key technology parameters of the employed equipment described in table A.4.1 of PDD were not consistent with that indicated on the nameplate of the equipment, e.g. the feed water temperature of WHRB is 150 degree C in PDD while it is 104 degree C on the nameplate. *The estimation of the emission reductions during the period 01/06/2012-31/12/2012 and 01/01/2022-31/05/2022 was not correct in section*	A.4.2 B.6.4.1	The purpose of the project, the existing scenario, and the baseline scenario have been described in section A.4.3 of the updated PDD. The key technology parameters of the employed equipments have been check with nameplate and manufacture's specification and revised in the PDD. The crediting period has been changed to be 01/07/2012 – 30/12/2022.	The purpose of the project was refined in updated PDD; the existing scenario has been described in the updated PDD. In the scenario prior to the start of the project activity, the waste COG from the existing coke oven production line was flared to the atmosphere; the electricity was supplied by NCPG and there was no existing steam supplier in the project location zone which would be supplied by coal-fired boilers to meet the steam demand for production. The description was in line with the physical site visit. The key technology parameters of the main equipment have been updated in

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
A.4.4 and section B.6.4 of PDD, considering the monthly average.			PDD to be consistent with that indicated on the nameplates and the technical specifications of the installed equipment, which were accessed directly by physical site visit. The starting date of the crediting period has been updated to 01/07/2012 and the estimation of ERs was also updated. Hence CAR3 is closed.
CAR 4 *The remaining lifetime of the existing plant, i.e. the technical lifetime of the existing coke oven production line (25 years) and the operation year (1 year) have not been substantiated.* *The demonstration that the waste COG utilized in the project activity was flared into the atmosphere in the absence of the project activity at the existing coking oven production plant, in section B.2 of PDD is not in line with the requirement of Annex 2 of the applied methodology ACM0012.* *The applicability conditions of the referred tools in the methodology have not been justified in section B.2 of PDD.*	B.2.1 B.2.2 B.4.1 B.4.2 B.4.3 B.4.4 B.6.5.1 C.1.2 C.2.2	The technical lifetime of the existing coke oven would be demonstrated by a clarification from its designer, as document "CAR_4.1 Technical lifetime of coke oven" as 25years from its operation beginning in Dec., 2010. The operation situation would be demonstrated by its owner, as document "CAR_4.2 Operation situation of coke oven". The demonstration that the waste COG utilized in the project activity was flared into the atmosphere in the absence of the project activity at the existing coking oven production plant would follow the 2nd method prescribed in Annex 2 of ACM0012 (version 04.0.0). The document of "CAR_4.3 Energy balance of coke oven" provided by the coke oven's designer demonstrated that the waste COG utilized in the project activity was flared into the atmosphere in the absence of the project activity. And the description in B.2 of PDD has been revised. As to why DOE was not invited to conduct the on site checks prior to project implementation, there are several objective reasons. At first, the project	The technical lifetime of the existing coke oven was determined as 25 years, which was substantiated by the clarification in the format of confirmation letter from the coke oven designer "Angang Group Design Institute" in 01/2012. The coke oven production line has been operated for 1 year, which was substantiated by the clarification in the format of confirmation letter from the production line owner "Shandong Morningsun Coal Chemical Co., Ltd" in 01/2012. Therefore RINA confirmed the technical lifetime (25years) and operation year (1 year) for the existing coking oven line and the remaining lifetime of the waste energy generation equipment is 24 years. The PP demonstrated the release and non-utilization of the waste COG though providing an energy balance of the relevant sections of the existing coking oven production line, which is in line with the requirement of Annex 2 of the applied methodology ACM0012. An energy balance sheet was provided by the existing coke over production line designer "Angang Group Design Institute"

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
		started in Apr. 2010, when they signed the main equipment purchase contract. And the real action of construction was followed in May, when the notification of project construction is published, which would be demonstrated by documents "11.1 Construction order" and "11.2 Contract of turbine generator sets". At that time, the ERPA of the project was not signed, the PDD for GSP was not prepared, the LoA of DNA was not available and the DOE for the project was not contracted. So it was not prepared for the on site validation at that time. Secondly, the requirement of "on-site checks prior to project implementation to confirm that no equipment for waste energy recovery and utilisation had been installed on the specific WECM stream prior to the implementation of the CDM project activity" is stressed by the updated methodology ACM0012 in version 04, which is valid since April, 2011, after the project implementation starting. So it's impractical for the DOE to conduct it prior to the implementation of the project. Additionally, when DOE conducted the on-site visit for validation in Jan., 2012, the proposed project is still undergoing construction. The main equipments are on site and undergoing installation and/or debugging. The COG pipeline was being put up and not connected to the project site. So the flare was still on working to fire the waste COG for lack of utilization. Please refer to "CAR_4.4 Photos on project site".	in 01/2012 that has the qualification certificate of the engineering design and is an independent party. According to the sheet, the energy related to the existing facilities is balanced that total 328,800,000m3 is generated by the coking oven and 151,248,000m3 is consumed by the production line, therefore the waste COG is 177,552,000m3. The energy content of the COG is normally in the range 16,726~17,981 kJ/Nm3, which is sourced from China Energy Statistics Yearbook. The energy content of waste COG from the existing production line is 17,020kJ/Nm3, within the range, thus is reasonable. Otherwise the energy balance of the coke oven line shows that the COG excess rate of this coke plant is 46%, which is lower than the average COG excess rate in China for independent coke plant (52%). Furthermore, the estimated waste COG utilized is 158,604,000Nm3 which is lower than that in the energy balance, considering an un-avoided flaring during the start-up of the project and equipment repairing, which account about 10.67% of the total waste COG as estimated in the FSR. By crosschecking against similar registered CDM project activities in Shandong province, RINA found that the COG utilization of similar projects is in the range of 83%-96%, into which the proposed project falls. It is thus confirmed that the estimation of the amount of waste energy released was reasonable and the amount of the waste COG utilized by the project is conservative.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
		The applicability conditions of the referred tools in the methodology have been justified in section B.2 of updated PDD.	The applied ACM0012 version 04 was updated and recommended DOE to supplement the analysis of extent of use of WECM in the existing facility through the on-site checks prior to project implementation to confirm that no equipment for waste energy recovery and utilization had been installed on the specific WECM steam prior to the implementation of the CDM project activity. RINA studied the project implementation, and found that the project developer decided to invest the project as CDM on 16/02/2010 and started on 12/04/2010 as main equipment purchase agreement was signed, and started project construction on 04/05/2010. The main equipment was manufactured in the end of year 2010 as per the nameplates of equipment. RINA is of opinion that when the latest version 04.0.0 of ACM0012 was available in 04/2011, the project has started construction for almost one year and it is impractical to conduct the on-site check prior to project construction. However by the physical site visit on 10/01/2012 the proposed CDM project activity was not completely implemented and prior to which the equipment for waste COG recovery and utilization were still under installation or construction; the flaring system was existed at the coke oven line plant for the disposal of the waste COG and the flame was glaring upon the flare in the sky. Therefore, RINA ensured that the waste COG utilized in the proposed project activity was not used and was flared into the atmosphere in the absence of the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
			project activity at the existing facility, which demonstrated the same as the requirement of Annex 2 of the applied methodology. The applicability conditions of the applied tools in the methodology have been justified in section B.2 of PDD. The methodology requires additionality demonstration using "Tool for the demonstration and assessment of additionality", therefore the additionality tool is reasonably applied; the proposed CDM project activity generates electricity and delivers to the grid NCPG, which is located in host country China, therefore "Tool to calculate the emission factor for an electricity system" is applicable to the project; the CDM project is implemented at an existing facility and the methodology requires demonstration of the remaining lifetime of the existing facility, therefore "Tool to determine the remaining lifetime of equipment" is applicable to the project; the project activity involves the combustion of fossil fuels, e.g. diesel, coal, the methodology requires using "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" to calculate the project emissions, therefore the tool is applicable to the project. Hence CAR4 is closed.
CAR 5 The sources included in project boundary have been not completely identified in table B.3.1 of PDD and the description in table B.3.1 is not completely in line with the applied	B.3.3	The description of GHG sources in table B.3.1 has been improved according to the applied methodology.	The description of how the sources and gases included in the project boundary has been updated in table B.3.1 of PDD and is completed in line with the applied methodology.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
methodology. The baseline emission sources from fossil fuel consumption in gas turbines for thermal energy, as included in table B.3.1 of PDD has been not justified. *The justification of the emission sources from cleaning of gas is not sufficient.*			The baseline emission sources from fossil fuel consumption in gas turbines for thermal energy have been revised as the fossil fuel was consumed by boilers which would be existed prior to the project implementation and therefore CO2 emissions are included as main emission sources. The energy consumption for gas cleaning is sourced from electricity consumption by the relevant equipment as per the project design and physical site visit. This has been included in the supplemental electricity consumption by the project and eliminated when to determine the baseline emissions. Therefore it is included as an emission source, but not considered in project emissions. Hence CAR5 is closed.
CAR 6 *The elimination of alternative W3-"Waste COG is sold as an energy source" is not reasonable considering the waste COG has been purchased by the project developer from the energy generator.* *The justification of the elimination of alternative W5 is not substantiated.* *The justification of elimination of alternative H9 is not reasonable.* *The justification of elimination of alternative H11 is not substantiated.* *The justification of elimination of alternative H14 is not reasonable as that new on-site fossil fuel consumption may supply the same heat and is the plausible scenario.*	B.4.1 B.4.2 B.4.3 B.4.4	The alternative W3 is justified to be possible baseline scenario in the updated PDD. The justification of elimination of W5 has been revised in updated PDD. And the referred energy balance would be provided as "CAR_4.3 Energy balance of coke oven". The description of H9, H11 have been revised in PDD. The alternative H14 is justified to be possible baseline scenario in the updated PDD. The description on the renewable source biomass based cogeneration plant has	The justification of alternative W3 has been revised that considering W3 as a possible baseline scenario as that the waste COG was sold as an energy source to the project developer. Furthermore, sold of waste COG as an energy source to residential users is not possible as the location of rural residential is far away from the energy source and the distribution system and the safety issues are technically difficult than sold to industry uses. Therefore it is reasonable. The justification of elimination of W5 has been revised in PDD. It is properly excluded as the proposed project purpose is to utilize all of the waste COG to generate power and heat stream, while the alternative W5 uses a portion of the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
		been revised to be consistent. There is no existing biomass cogeneration on-site or off-site. And there is one biomass cogeneration plant in planning near the project site. So there will be no more biomass for the project owner to construct another one. Further more, the planning biomass cogeneration plant will supply heat to another industry zone, but not the project zone. So it could not be a possible baseline scenario of the proposed project. A clarification from the local government on the renewable energy utilization situation would be applied as "CAR_6.6 Clarification on renewable energy situation".	waste gas and also only a portion of waste COG recovery would be a waste of the rest COG and is technically impractical based on RINA's technical expertise. It is validated that all of the waste COG will be utilized as per the FSR and the energy balance sheet. For H9, PP demonstrated that there is not enough water or wind resource in Jining City, and the technology of biomass or solar energy plant are not mature in China. By survey of public information through internet, RINA confirmed that Jining City, where the project located, is lack of water, wind and solar energy resource; the use of water, wind or solar technology for heat generation is high technology in host country; biomass resources are comparatively rich in the project location and through interview with the local government officials it was confirmed that there is one biomass based cogeneration plant in planning near the project site; the Jining DRC also clarified that the area of 100km of the planned cogeneration plant has no new biomass based plant due to the consumption by the planned plant and the lack of biomass in this area /84/. And RINA confirmed through physical site visit and interview with local government official, there is no other waste energy to be recovered in element process that can supply equivalent heat at the project located zone. RINA thus confirmed that waste energy based existing captive plant is not a necessary and plausible scenario. For H11, PP demonstrated that using solar energy to generate heat is not

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
			feasible as the solar technology is novel and the use of heat pumps technology could not meet the requirement of the project activity. This was confirmed through public information demonstrating that the use of solar or heat pump technology for heat generation is technically unfeasible or practically rare for the kinds of the proposed project in host country. For H14, it was considered as a possible baseline scenario in the updated PDD which is reasonable. Hence CAR6 is closed.
CAR 7 *The date of submission of the notification of prior consideration of CDM form to EB secretariat indicated in PDD is not consistent with that in the copy of the form provided by PP.*	B.5.3.3	The submission date has been corrected according to public information on UNFCCC-CDM website.	The submission date of the notification of prior consideration of CDM form to EB secretariat was corrected be 18/08/2010 in PDD, consistent with the original copy of the form. Hence CAR7 is closed.
CAR 8 The value of insurance cost and the urban maintenance and construction tax rate in PDD is not consistent with that indicated in the approved FSR.	B.5.4.5	The PDD has been corrected according to FSR.	The insurance cost was corrected to be 3,226,705RMB and the urban maintenance and construction tax rate was corrected to be 7%, which are consistent with the approved FSR and are also consistent with the IRR calculation spreadsheet. Hence CAR8 is closed.
CAR 9 *The guideline of common practice version 01 was applied in common practice analysis, which was replaced by "Tool for the demonstration and assessment of additionality" version 06.0.0 available at the time of validation.*	B.5.6.1 B.5.6.2 B.5.6.3	The applied guideline has been replaced by "Tool for the demonstration and assessment of additionality" version 06.0.0 for common practice analysis.	The "tool for demonstration and assessment of additioniality" (version06.0.0) was applied in the common practice analysis of PDD. The steps taken in the analysis in PDD were in line with the tool. Hence CAR9 is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
CAR 10 *The provided references for these 3 projects in common practice analysis were not able to demonstrate whether the projects registered CDM or requested for registration of CDM and the data sources used for the common practice analysis is not clear.*	B.5.6.2 B.5.6.3 B.5.6.4	The references and the description in PDD have been updated. One reference in Chinese website has been translated as document "CAR_10 reference of similar project " The survey has been conducted by the designer of FSR, the clarification from whom would be provided. Please refer to "CAR_10.1 CCPP project survey"	The references linkage to the common practice projects were updated to be directly linked to the project information page on UNFCCC website and they were clear to indicate these 3 projects applied CDM and undergone CDM. Furthermore, the project design institute made a survey indicating that only three similar projects in Shandong Province Hence CAR10 is closed.
CAR 11 The calculation of the baseline emissions form thermal energy is not completed in PDD, i.e. the determination of $EF_{heat,j,y}$ and $HG_{n,process,j,y}$ have been not completely included in PDD. The calculation formula of the net enthalpy of feed water is not correctly described in section B.6.3 of PDD and is not in line with the methodology. *The ER calculation spreadsheet for the proposed project activity has been not provided.*	B.6.1.1 B.6.1.2 B.6.4.1	The determination of $EF_{heat,j,y}$ and $HG_{n,process,j,y}$ have been included in the updated PDD. The calculation of net enthalpy of feed water has been corrected in B.6.3 according to methodology. The following document would be provided about ER calculation. "CAR_11.1 ER calculation sheet", "CAR_11.2 ER calculation sheet for GSP", "CAR_11.3 Enthalpy calculation", "CAR_11.4 Referred Enthalpy value", "CAR_11.5 EF & NCV".	The determination of $EF_{heat,j,y}$ and $HG_{n,process,j,y}$ have been included in the updated PDD, which is in line with the applied methodology. The calculation of net enthalpy of feed water was corrected in the updated PDD, which is in line with the applied methodology. The ER calculation spreadsheet has been provided and RINA checked the calculation and confirmed that the value applied in the calculation is consistent with the updated PDD and in line with the methodology and IPCC values. The formulas were in accordance with the methodology and the result can be reproduced. Hence CAR 11 is closed.
CAR 12 As per description in PDD and FSR, the 75t/h steam boiler could be fuelled by raw coal or COG. PP is requested to clarify why the baseline emissions from the consumption of raw coal are not considered in the project emissions calculation.	B.6.2.1 B.6.2.2 B.6.4.1	The possible project emission from coal consumption by the backup 75t/h boiler and its monitoring plan are added to the updated PDD.	The potential project emissions from coal consumption by the backup 75t/h boiler were considered in the emission reductions calculation. PP demonstrated that the 75t/h boiler was backup only operated when CCPP is not available. The consumption of coal is not considered in the ex-ante baseline

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
			emissions and will be monitored ex-post. Therefore it is reasonable. The parameter $FF_{coal,y}$ was included in the monitoring parameters. Hence CAR 12 is closed.
CAR 13 PP is requested to provide the source evidences for the parameters $Q_{BL,product}$, $q_{wcm,product}$, TE_p, TE_r. *The parameters related to the emissions in case of operation of the coal-fire based 75t/h steam boiler have been not considered at the validation.*	B.6.5.1	As to parameter $Q_{BL,product}$, the minimum of the following two figures is used: (1) average annual historical production data from start-up of the facility, if the facility's operational history is less than three years, or (2) the most relevant manufacture's data for normal operating conditions. For the project, the historical coke production is 800,080t annually, the designed production for normal operating conditions is 800,000t annually. So the minimum production of 800,000t annually is applied in the project. Please refer to re-provided "CAR_13.1 Coke production history data" and provided "CAR_4.3 Energy balance of coke oven". As to parameter $q_{wcm,product}$,, the calculation is applied. According to "CAR_4.3 Energy balance of coke oven", the annual waste COG 177,552,000 m3 divided by the annual coke production 800,000 ton, the waste COG per unit of coke generated by the coke oven is 222 m^3/t. After the review of the public information, it's found that for one ton of coke production there would be 400 m^3 to 470 m^3 COG would be generated. And about 48% of the COG would be reused for the coke production, and 52% would be surplus and waste COG. That means	For the parameter $Q_{BL,product}$, the PP applied the minimum value of 1) the average annual historical production data and 2) the most relevant manufacture's data for normal operating conditions. By review of the historical data and the project design, RINA confirmed that the historical coke production of the past year 2011 was 800,080t annually and the designed production for normal operation is 800,000t annually. Therefore RINA is of opinion that the use of value 800,000t is reasonable and conservative. For the parameter, the value was calculated based on the Energy balance sheet provided by an independent qualified party, as 177,552,000m3/800,000ton = 222m3/ton. It was crosschecked with the public technical information and confirmed that this value is in the normal practical range and thus is reasonable. The parameter $h_{steam,y}$ and $h_{feedwater,y}$ were included in the table, represent the unit enthalpy of the output steam and the feed water to calculate the net enthalpy of the extraction steam from the steam turbine and the feed water to the WHRB. The value applied for the two parameters (440.1776kJ/kg and 3,114.42374kJ/kg) was calculated based on the data from

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
		there would be 208m^3 to 244m^3 waste COG generation for one ton coke production. So the applied value of 222m^3/t is reliable. Please refer to "CAR_13.2 Waste COG generation per unit of coke". The parameter TE_p and TE_r. are replaced by $h_{steam,y}$ and $h_{feedwater,y}$ respectively. The data source is proved as "CAR_11.3 Enthalpy calculation". The parameters related to the emissions in case of operation of the coal-fire based 75t/h steam boiler have been added to the updated PDD. In the PDD, Parameter NCV_i indicate the NCV of Coal in baseline emission calculation, and NCV_{diesel} and NCV_{coal} are applied for project emission calculation. The values of them are the default one and the upper limit of 95% confidence interval of IPCC respectively in the consideration of conservative.	standard data books issued in China. RINA checked the calculation spreadsheet and confirmed the calculation is correct and can be reproduced. The relevant parameters, $EF_{CO2,i,j}$, NCV_{coal}, NCV_{diesel}, $EF_{CO2,coal}$, $EF_{CO2,diesel}$ were included in the parameters available at validation, in section B.6.2 of PDD, using the default values of IPCC. The limits of the uncertainty at a 95% confidence interval were considered for these parameters which is conservative. Hence CAR13 is closed.
CAR 14 *The parameters related to the emissions caused by consumption of the coal from 75t/h steam boiler have been not considered in the monitoring.*	B.7.1.2	The parameters related to the emissions caused by consumption of the coal from 75t/h steam boiler have been added to the monitoring plan.	The parameter $FF_{coal,y}$ was included in the monitoring, which is the quantity of fossil fuel (coal) combusted in the project activity during the year y. It is in line with the methodology. Hence CAR14 is closed.
CAR 15 *The accuracy of the measurement equipment has been not addressed in the monitoring plan.*	B.7.1.3	The accuracy of the measurement equipment has been added to section B.7.2.	The accuracy of the measurement equipment are included in the monitoring plan. Hence CAR15 is closed.
CL 1	B.5.4.5		The signed contracts were provided by PP. By crosschecking these contracts, it

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
Information on the investment cost is insufficient that *1) the investment cost has not been substantiated or crosschecked by supportive evidences, e.g. contracts, financial reports or other related documents of total investment.* *2) the appropriateness of the portion of loans from the bank has not been substantiated by supportive evidences, e.g. the loan contract* *The information of the electricity tariff is not clear on how the electricity tariff in FSR was determined.* *Information of the O&M cost, i.e. the number of staffs, the administration cost, the amount of N2 gas consumption, the unit price of the N2 gas and the amount of diesel consumed has not been evidenced.* *Information of the internal plant power consumption rate 9.04%, the administration cost, the amount of N2 gas consumption, the unit price of the N2 gas, the amount of diesel consumed and the annual steam output has not been evidenced.*		1) The total real investment cost of the project is about 360,160,000 RMB, a little higher than the planed 352,891,700 RMB in the FSR. Please refer to document "CL_1.1 List of main investment contracts", "13.14 Contract for grid connection system". 2) The loans portion 58.5% has been approved by the government, and is in line with regulation. Please refer to document "CL_1.2 Regulation about the equity rate of investment project". The electricity tariff in FSR was determined according relative tariff regulation of the government. And the tariff is in line with the regulation of Shandong province at the time of FSR preparing. Please refer to document "CL_1.3 Electricity tariff application" The number of staffs would be crosschecked with a regulation as document "CL_1.4 Staff crosscheck". The administration cost would be demonstrated by document "CL_1.5 Administration cost " The diesel consumption is sourced from the FSR. P14 described that one gas turbine start would need diesel 4,000kg/h for 16 minutes. P77 indicated that the turbine would start 5 times in one year. Based these data, the diesel consumption would be about 11 t/a (4,000kg/h *16/60 *2 sets* 5 times), less than the data 20t/a in P77 and the financial analysis sheet. If the 11t/a applied for the IRR calculation, the project IRR remain to be 3.8% but no	was found that the total contracted cost amount was 360,160,000RMB, including the cost of main equipment and construction and installation service, and also the grid connection system. This value was a little higher than the estimation in approved FSR (352,891,700MRB). The portion of loans from the bank was sourced from the approved FSR and approved by local government. This portion is in line with the equity rate of investment project regulated by government. Hence the bank loans and equity value indicated in IRR spreadsheet is reasonable. It is noted that the financial analysis is based on the project IRR (pre-tax), in which the loans and interest have no impact on the project IRR. The applied electricity tariff (0.4105RMB/kWh including VAT) is sourced from the approved FSR based on the Notification regarding the tariff of power electricity in local area that issued by the government in year 2008, where regulated the tariff of the cogeneration projects as 0.4105RMB/kWh including VAT. Therefore RINA considered the determination of the tariff in FSR is reasonable. The number of staffs is 136 which is less than the standard of the position arrangement for thermal power plants issued by State Grid Company in year 1998 (total 168 staffs are needed as per the standard for the proposed project). Therefore RINA is of opinion that the estimation of staff number is conservative.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
		change. It's likely that this part of cost from diesel consumption is very small. As to N2 consumption, the P27 in FSR indicated 400m3/h demand. So it would need 240,000m3/a (400m3/h * 6000h/a), which is in line with P77 in FSR and financial analysis. And the N2 price could be crosschecked with public information as document "CL_1.6 N2 price crosscheck". The internal plant power consumption rate is derived from the FSR, P31. This rate could be crosschecked with several similar project as document "CL_1.7_Internal plant power consumption rate". The annual steam output is determined by the steam demand and the steam generation capacity of the project. According to the contracts with the customers, the total demand of steam is 40t/h, which is applied in the FSR and financial analysis. And the rated steam extraction capacity of turbine extraction is 50t/h, a little higher than the demand, which would service as insurance to the stable steam supplying in case the gas turbine and WHRB are not in rated operation. Additionally, even if the value of 50t/h was applied for financial analysis, the project IRR would be 6.9%, still under the benchmark of 8%.	The annual quantity of N2 gas and diesel consumed by the project activity was estimated by a qualified independent party Jinan City Construction Consultancy Institute and Shandong Province Light Industry Design Institute, who was contracted by the project developer and was reviewed and approved by the government. The diesel consumption was based on the technical specification of the employed turbine generators; the N2 gas consumption was based on the technical specification of the sealing of COG compressor, the protection of gas engines and WHRB. Therefore RINA considered the estimation is reasonable. By considering the internal electricity using rate 9.04% as stated in approved FSR /28/, the annual electricity supplied to the grid can be estimated as 229,219MWh (=252,000MWh*90.96%). By review of the registered similar projects in UNFCCC website, the internal electricity using rate 9.04% is close to the lowest of the range of 6%~25% of similar projects. Therefore, RINA ensured that the estimation of the electricity supplied to the grid is reasonable. The annual steam output is estimated to be 240,000ton/yr in approved FSR /28/ and relies on the steam demand by the consumers and the capacity of the steam generator of the project. Based on the balance of demand and supply of the steam, the total demand of steam is 40t/h which was applied in the FSR and consistent with the contracted amount with the customers. Therefore RINA is of

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
			opinion that the use of 40t/h steam in the analysis is reasonable. Hence CL1 is closed.
CL 2 As designed in FSR, the waste COG generated by the coke oven production line is 177,552,000m3 while the CDM project plant utilizes only 158,604,000m3 annually. The information is not clear enough to determine whether the waste COG is partially or all utilized. The information is not clear enough to determine the description that the expected operational hour 6,000h is a very aggressive assumption under the limitation of grid connection hours. *The information is not clear enough on the electricity tariff index, heat supply and production price index, as the Shandong Statistical Yearbook (1999-2009) has not been provided.*	B.5.4.6 B.5.4.7 B.5.4.8	According to the COG consumption to generation rate, which is about 90%, it seems intuitively right that the waste COG will be partly used by the project. But considering the unavoidable process loss, and the given CCPP capacity for choice, it's hard to make a design to utilize 100% of the waste gas. And the primary purpose of the project is to utilize all of the waste gas and the ultimately surplus COG has no other use. So it is more reasonable to say that the project would use all the waste gas but not a portion of that. And according to the power purchase agreement signed with Shandong Electric Power Corporation Jining Power Supply, the contracted on-grid electricity quantity is $2.2 * 10^8$ KWh annually, which need an operation for 5,759 hours considering the internal plant power consumption of 9.04%. So the applied operation hour of 6,000h is conservative. Please refer to document "CL_2.1 Power purchase agreement". The description of the sensibility analysis has been elaborated. Reference information in Statistical Yearbook of Shandong (2007-2011) will be provided as "CL_2.2 Price index"	The estimated waste COG utilized by the proposed project activity, as designed in the approved FSR, is 158,604,000Nm3 which is lower than that in the energy balance, considering an un-avoided flaring during the start-up of the project and equipment repairing, which account about 10.67% of the total waste COG as estimated in the FSR. By crosschecking against similar registered CDM project activities in Shandong province (Ref. No. 3166, 812), RINA found that the COG utilization of similar projects is in the range of 83%-96%, into which the proposed project falls. It is thus confirmed that the estimation of the amount of waste energy released was reasonable and the amount of the waste COG utilized by the project is reasonable and it is deemed that all the waste COG is used in the project activity. The expected operational hour is controlled by the connected grid company in general in China. As per the signed power purchase agreement by the project developer with the grid company, the on-grid electricity quantity is about 220,000MWh annually which is lower than the estimation in the approved FSR, which demonstrates that the operational hour would not be exceed 6,000h under the normal operation of the generators. Therefore use of 6,000h is conservative. The sensitivity analysis in PDD has been

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation Conclusion
			elaborated to include the actual situation of the investment. The Statistical Yearbook of Shandong was provided in which the price index is indicated and well demonstrates the variation of the sensitivity parameters. Hence CL2 is closed.

TABLE 4 FORWARD ACTION REQUEST

Forward action request	Reference to Table 2	Response by project participants Validation Conclusion

RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Yan Tong (Nitrix Tong)**
è qualificato come[1]: *is qualified as:*	**CDM-TEC, CDM-VAL, CDM-VER, CDM-TL**
per le seguenti aree tecniche: for the following technical areas:	**1.2, 13.1**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
1.2	Energy generation from renewable energy sources	1
13.1	Waste Handling and Disposal	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	10-09-2010	-
1	18-10-2010	Changes in certificate module
2	17-03-2011	Changes due to new accreditation standard
3	13-06-2011	Annual Revision
4	20-06-2011	Changes due to qualification updating to CDM validator
5	14-07-2011	Changes due to qualification updating to CDM verifier
6	29-11-2011	Changes due to qualification updating to CDM Team Leader

Il Responsabile di Schema
Scheme Manager

Il Resp. Tecnico della Divisione
Head of CRT

[1] Legend:

VAL:	Validator	CDM: Clean Development Mechanism
VER:	Verifier	VCS : Verified Carbon Standard:
TEC:	Technical Expert	GS: Gold Standard
TL:	Team Leader	SCS: SocialCarbon Standard
FIN-EXP:	Financial Expert	JI: Joint Implementation
DET:	Determiner	

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RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Xia Zheng**
è qualificato come[1]: *is qualified as:*	**CDM-TEC, CDM-VER, CDM-VAL**
per le seguenti aree tecniche: for the following technical areas:	**1.2**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
1.2	Energy generation from renewable energy sources	1

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	13-06-2011	-
1	29-11-2011	Changes due to updating qualification as CDM validator and verifier

Il Responsabile di Schema
Scheme Manager

Il Resp. Tecnico della Divisione
Head of CRT

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RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Fan Lin Ran**
è qualificato come[1]: *is qualified as:*	**CDM-TEC, VCS-TEC, GS-TEC, JI-TEC, CDM-VAL**
per le seguenti aree tecniche: for the following technical areas:	**1.2**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
1.2	Energy generation from renewable energy sources	1

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	25-11-2011	-
1	24-04-2012	Updating the qualification as CDM-VAL

Il Responsabile di Schema
Scheme Manager

Il Resp. Tecnico della Divisione
Head of CRT

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DET:	Determiner	

RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Xuebin Zhang**
è qualificato come[1]: *is qualified as:*	**CDM-TEC**
per le seguenti aree tecniche: for the following technical areas:	**1.1, 3.1, 4.3, 4.10**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
1.1	Thermal Energy generation from fossil fuels and biomass including thermal electricity from solar	1
3.1	Energy demand	3
4.3	Iron and Steel	4
4.10	Fuel switching and/or energy efficiency and/or waste heat/gas/pressure recovered and utilization for power generation at manufacturing industries	4

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	14-04-2011	-
1	12-09-2011	Changes to module structure
2	11-04-2012	TA 1.3 has been deleted and substituted by TA 1.1

Il Responsabile di Schema
Scheme Manager

Il Resp. Tecnico della Divisione
Head of CRT

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RINA

CERTIFICATO DI QUALIFICA GHG
GHG QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Jie Li**
è qualificato come[1]: *is qualified as:*	**CDM-FIN-EXP**
per le seguenti aree tecniche: for the following technical areas:	-

AREA TECNICA ***TECHNICAL AREA***	**CODICE RINA** **RINA CODE**	**SCOPO SETTORIALE** ***SECTORAL SCOPE***	**CODICE RINA** **RINA CODE**
-	-	-	-

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	20-10-2010	-
1	04-04-2011	Changed module structure

Il Responsabile di Schema
Scheme Manager

Il Resp. Tecnico della Divisione
Head of CRT

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TL:	Team Leader	SCS: Social Carbon Standard
TEC-FIN:	Financial Expert	JI: Joint Implementation
DET:	Determiner	

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: *We declare that Mr/Mrs/Ms:*	**Rita Valoroso**
è qualificato come[1]: *is qualified as:*	**CDM-TEC, CDM-VAL, CDM-VER, CDM-TL, CDM-FIN-EXP VCS-VAL, VCS-VER, VCS-TL GS-VAL, GS-VER, GS-TL SCS-VAL, SCS-VER, SCS-TL**
per le seguenti aree tecniche: for the following technical areas:	**1.2, 13.1**

AREE TECNICHE **TECHNICAL AREAS**	**DESCRIZIONE DELL'AREA TECNICA** ***TECHNICAL AREA DESCRIPTION***	**SCOPO SETTORIALE** ***SECTORAL SCOPE***
1.2	Energy generation from renewable Energy sources	1
13.1	Waste Handling and Disposal	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE ***REVISION***	**DATA** ***DATE***	**MOTIVAZIONI PER LA REVISIONE** ***REASON FOR THE REVISION***
0	18-01-10	-
1	03-05-10	Annual Revision
2	18-10-10	Changes in certificate module
3	04-01-11	Removed TAs taken through the ETS/EPD verifications/validations
4	17-03-11	Changes due to new accreditation standard
5	14-07-11	Annual Revision

Il Responsabile di Schema
Scheme Manager

Il Resp. Tecnico della Divisione
Head of CRT

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RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: **Paolo Teramo**
We declare that Mr/Mrs/Ms:

è qualificato come[1]: **CDM-TEC, CDM-VAL, CDM-VER**
is qualified as: **VCS-VAL, VCS-VER**
GS-VAL, GS-VER

per le seguenti aree tecniche: **1.1, 4.4, 5.1, 8.2, 10.2, 11.1, 13.1**
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA *TECHNICAL AREA DESCRIPTION*	SCOPO SETTORIALE *SECTORAL SCOPE*
1.1	Thermal Energy generation from fossil fuels and biomass including thermal electricity from solar	1
4.4	Refinery	4
5.1	Chemical process industries	5
8.2	Oil and gas industry, coal mine methane recovery and use	8
10.2	Oil and gas industry, coal mine methane recovery and use	10
11.1	Chemical process industries	11
13.1	Waste Handling and Disposal	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	31-01-2008	-
1	27-05-2009	Annual revision
2	25-09-2009	Added validation qualification
3	13-11-2009	Added qualification in C103
4	14-12-2009	Changes in module structure
5	06-05-2010	Annual revision
6	18-10-2010	Changes in certificate module
7	04-01-2011	Removed TAs taken through ETS/EPD verifications/validations
8	17-03-2011	Changes due to new accreditation standard
9	14-07-2011	Annual Revision

Il Responsabile di Schema
Scheme Manager

Il Resp. Tecnico della Divisione
Head of CRT

[1] Legend:

VAL:	Validator	CDM: Clean Development Mechanism
VER:	Verifier	VCS : Verified Carbon Standard:
TEC:	Technical Expert	GS: Gold Standard
TL:	Team Leader	SCS: SocialCarbon Standard
FIN-EXP:	Financial Expert	JI: Joint Implementation
DET:	Determiner	

RINA Services S.p.A. è accreditato da UNFCCC, quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM, da VCSA per condurre la Validazione e la Verifica di Progetti VCS, da GS Foundation, per condurre la Validazione e la Verifica di Progetti GS, da Ecologica Institute per condurre la Validazione e la Verifica di rapporti SCS

RINA Services S.p.A. is accredited by the UNFCCC, as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects, by the VCSA, to carry out Validation and Verification of VCS Projects, by the GS Foundation, to carry out Validation and Verification of GS Projects and by the Ecologica Institute, to carry out Validation and Verification of SCS Reports

RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: **Kumar Praveen Krishnan**

We declare that Mr/Mrs/Ms:

è qualificato come[1]: **CDM-TEC, CDM-VAL, CDM-VER**
is qualified as:

per le seguenti aree tecniche: **1.1, 2.2, 4.10, 13.1**
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA *TECHNICAL AREA DESCRIPTION*	SCOPO SETTORIALE *SECTORAL SCOPE*
1.1	Thermal energy generation from fossil fuel and biomass including thermal electricity from solar	1
2.2	Heat Distribution	2
4.10	Fuel switching and/or energy efficiency and/or waste heat/gas/pressure recovered and utilization for power generation at manufacturing industries	4
13.1	Waste Handling and Disposal	13

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	09-12-2010	-
1	17-03-2011	Changes due to new accreditation standard
2	06-06-2011	Annual Revision
3	01-12-2011	Changes due to the updating qualification to validator and verifier
4	11-04-2012	TA 1.3 has been deleted and substituted by TA 1.1

Il Responsabile di Schema
Scheme Manager

Il Resp. Tecnico della Divisione
Head of CRT

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RINA

CERTIFICATO DI QUALIFICA
QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra: **Wing Yu Tong**

We declare that Mr/Mrs/Ms:

è qualificato come[1]: **CDM-TEC, VCS-TEC, GS-TEC, VCS-VAL**
is qualified as:

per le seguenti aree tecniche: **1.2**
for the following technical areas:

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA *TECHNICAL AREA DESCRIPTION*	SCOPO SETTORIALE *SECTORAL SCOPE*
1.2	Energy generation from renewable Energy sources	1

in accordo alle istruzioni della Divisione Certificazione.
in accordance with the instructions of the Certification Division.

REVISIONE *REVISION*	DATA *DATE*	MOTIVAZIONI PER LA REVISIONE *REASON FOR THE REVISION*
0	04-12-2010	-
1	17-03-2011	Changes due to new accreditation standard
2	25-07-2011	Annual Revision
3	09-03-2012	Updating qualification as VCS validator
4	19-03-2012	Updating qualification as VCS-TEC, GS-TEC

Il Responsabile di Schema
Scheme Manager

Il Resp. Tecnico della Divisione
Head of CRT

[1] Legend:

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