VALIDATION REPORT

"WUJIA COALMINE POWER GENERATION PROJECT" IN CHINA

REPORT NO. 2011-9071

REVISION NO. 01

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VALIDATION REPORT

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2011-02-28	PRJC-263598-2010-CCS-AUS
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Summary:
Project Name: Wujia coalmine power generation project
Country: China
Methodology: ACM0008 **Version:** 07
GHG reducing Measure/Technology: Coal mine methane capture and utilization, electricity generation and displacement
ER estimate: 273 144 tCO_2e per year (average)
Size
☒ Large Scale ☐ Small Scale
Validation Phases:
☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues
Validation Status
☐ Corrective Actions Requested ☐ Clarifications Requested
☒ Full Approval and submission for registration ☐ Rejected

In summary, it is DNV's opinion that the "Wujia coalmine power generation project" in the People's Republic of China, as described in the PDD of version 05 dated 9 September 2012, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0008, version 7. DNV thus requests the registration of the project as a CDM project activity.

Report No.:	Subject Group:
2011-9071	Environment

Report title:
"Wujia coalmine power generation project" in China

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Abbreviations

CAR	Corrective Action Request
CBM	Coal bed methane
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CH_4	Methane
CL	Clarification request
CNY	RMB Renminbi
CMM	Coal mine methane
COP/MOP	Conference Of Parties / Meeting Of Parties
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
COP/MOP	Conference of Parties/Meeting of Parties
DOE	Designated Operational Entity
DNV	Det Norske Veritas
DNA	Designated National Authority
DRC	Development Reform Commission
EIA	Environmental Impact Assessment
ER	Emissions Reduction
ERPA	Emissions Reduction Purchase Agreement
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	Greenhouse gas(es)
GPS	Global Positioning System
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
LoA	Letter of approval
LLC	Limited Liability Company
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
NCPG	North China Power Grid
NDRC	Chinese National Development Reform Commission
ODA	Official Development Assistance
O&M	Operation and Maintenance
PDD	Project Design Document
QA/QC	Quality Assurance/Quality Control
RMB	RMB Renminbi
tCO_2e	Tonnes of CO_2 equivalents
UK	United Kingdom of Great Britain and Northern Ireland
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value Added Tax
VVM	Validation and Verification Manual

1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the project activity "Wujia coalmine power generation project" in China. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism and host Party criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

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

The host Party is China and the Annex I Party is the United Kingdom. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants Originate Carbon Limited of The United Kingdom of Great Britain and Jincheng Runhong New Energy Power Co., Ltd. The DNA from China confirmed that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology ACM0008, version 07 "Consolidated methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical or motive) and heat and/or destruction through flaring or flameless oxidation".

By burning CMM to generate electricity in gas engines, grid electricity from NCPG will be displaced in addition to destruction of methane. As a result, the project results in reductions of CO2 and CH4 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 273 144 tCO2e per year over the selected 10 year fixed crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

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

In summary, it is DNV's opinion that the project activity "Wujia coalmine power generation project" in China, as described in the PDD, version 05 dated 9 September 2012, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology ACM0008, version 07. Hence, DNV requests the registration of the project as a CDM project activity.

Bangalore and Oslo, 2012-09-11

Chandrashekara, Kumaraswamy	*Ole A. Flagstad*
CDM Validator	*Approver,*
DNV Bangalore, India	DNV Climate Change Services AS

2 INTRODUCTION

COzero Pty Ltd is the authorized Australian representative of Originate Carbon Ltd (the Annex 1 party (UK) project participant registered with the UNFCCC). The nomination and mandate for the relationship between COzero Pty Ltd and Originate Carbon Ltd is detailed in the ERPA for the proposed project /15/. As such, COzero Ltd commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the "Wujia coalmine power generation project" in China (hereafter called "the project"). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures and the subsequent decisions by the CDM Executive Board.

2.1 Objective

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

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0008 (version 07) /27/. The validation was based on the recommendations in the Validation and Verification Manual /26/.

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

3 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

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

The following sections outline each step in more detail.

3.1 Desk review of the project design documentation

The following tables list the documentation that was reviewed during the validation.

3.1.1 DOCUMENTATION PROVIDED BY THE PROJECT PARTICIPANTS

/1/ Beijing OC New Energy Technology Ltd (Formerly known as Greenensign (Beijing) New Energy Technology Ltd): *CDM-PDD for project activity "Wujia coalmine* power generation project*" in China*, version 01 dated 19 July 2010.

/2/ Beijing OC New Energy Technology Ltd (Formerly known as Greenensign (Beijing) New Energy Technology Ltd): *CDM-PDD for project activity "Wujia coalmine* power generation project*" in China*, version 05 dated 9 September 2012.

/3/ Jincheng Environment Protection Research Institute: *Environmental Impact Assessment of Wujia coalmine power generation project*, dated 20 October 2008.

Jincheng Environmental Protection Bureau: *EIA approval letter of Wujia coalmine power generation project*, dated 20 December 2008.

/4/ Jincheng Project Consulting Center: *Feasibility Study Report of Wujia coalmine power generation project (with total installed capacity of 15 MW)*, dated April 2009.

Shanxi Province Development and Reform Commission: *FSR approval letter of Wujia coalmine power generation project*, dated 9 September 2009.

/5/ Yangmei Coal Group Technical center VAM and CMM institute and Shanxi Guocheng Construction and Engineering Exploration designing Co Ltd: *Coal Mine Methane Extraction Design Report for Wujia Coal Mine*, dated July 2007.

/6/ Jincheng Runhong New Energy Power Co., Ltd: *Board meeting minutes to develop the proposed project with the CDM assistance*, dated 16 April 2009.

/7/ Equipment purchase contracts:

Jincheng Runhong New Energy Power Co., Ltd and Gaoping Constrution and Development Co., Ltd: *Civil engineering construction contract*, dated 5 March 2010

Jincheng Runhong New Energy Power Co., Ltd and Shandong Jichai Green Power Co., Ltd: *Equipment purchase contract (20 sets of 500GF-WK2 generators)*, dated 1 April 2010.

Jincheng Runhong New Energy Power Co., Ltd and Shandong Jichai Green Energy Co., Ltd: *Ancillary equipments for power plant contract*, dated 18 October 2011

Jincheng Runhong New Energy Power Co., Ltd and Shanxi Chuang'an

Electromechanical Equipments Co., Ltd: *Anti gas leakage system contract*, dated 5 August 2011

Jincheng Runhong New Energy Power Co., Ltd and JIncheng Chuangwei Materials Co., Ltd: *Painting contract for Wujia generator room floor*, dated 11 October 2011

Jincheng Runhong New Energy Power Co., Ltd and Taiyuan Tairuijie Electric Co., Ltd: *Load management terminal and electrical energy meter contract*, dated 7 November 2011

/8/ Jincheng Runhong New Energy Power Co., Ltd and Shandong Jichai Green Power Co., Ltd: *Technical agreement of generators*, dated 16 April 2010.

Jincheng Project Consulting Center: *Wujia CMM Power Plant auxiliary power consumption*, dated 22 July 2012

Jincheng Project Consulting Center: *Wujia 10 MW CMM power generation CMM gas pre-treatment statement*, dated 22 July 2012

/9/ Jincheng Runhong New Energy Power Co., Ltd and Gaoping County Construction and Development Co., Ltd: *Construction contract* dated 5 March 2010.

/10/ Beijing OC New Energy Technology Ltd (Formerly known as Greenensign (Beijing) New Energy Technology Ltd): I*RR calculation spreadsheet of Wujia coalmine power generation project*, dated 9 September 2012.

/11/ Beijing OC New Energy Technology Ltd *(Formerly* known as Greenensign (Beijing) New Energy Technology Ltd): *ER calculation spreadsheet of Wujia coalmine power generation project*, dated 9 September 2012.

/12/ Jincheng Runhong New Energy Power Co., Ltd: *CDM prior consideration notification to the Chinese DNA*, Tonnes of CO2 equivalents, dated 8 February 2010.

Confirmed by the Chinese DNA on 2 March 2010.

/13/ Jincheng Runhong New Energy Power Co., Ltd: *CDM prior consideration notification to UNFCCC*, dated 31 March 2010.

Confirmed by the UNFCCC on 31 March 2010:

http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html

/14/ Jincheng Runhong New Energy Power Co., Ltd: *40 copies of consultation questionnaires for the stakeholder comments*, dated 19 May 2009.

/15/ Jincheng Runhong New Energy Power Co., Ltd and Originate Carbon Ltd: *Emission reduction purchase agreement* dated 30 April 2010.

/16/ ShanXi province Power Company (Jincheng Office) and Jincheng Runhong New Energy Power Co., Ltd, *Grid connection approval* dated 6 April 2010.

/17/ Runhong coal mine methane power Co., Ltd and Shanxi Jingxin Co., Ltd: *Wujia Coalmine Gas Purchase Agreement*, dated 15 November 2008

/18/ Wujia 35 KV step-up equipment purchase and construction contracts:

Jincheng Wanlitong Power Equipment Company and Jincheng Runhong New Energy Power Co., Ltd, *AC-DC System & security system*, dated 10 March 2011.

Jincheng Wanlitong Power Equipment Company and Jincheng Runhong New Energy Power Co., Ltd, *Security Panel, Public use Panel, DC panel, AC power supply panel p[urchase contracts*, dated 10 March 2011.

Jincheng City CHIXUN Commerce Company and Jincheng Runhong New Energy

Power Co., Ltd, *Distribution Cabinet 1D-5D*, dated 15 April 2011.

Jincheng City CHIXUN Commerce Company and Jincheng Runhong New Energy Power Co., Ltd, *5 Power Transformers, 7 low-voltage switchgear, 5,040 meters power cable, 1,206 meters power cable, 7 high-voltage switchgear and 700 wire connections*, dated 8 April 2011.

Jincheng City Chuanggao Telecom Automation Company and Jincheng Runhong New Energy Power Co., Ltd, *Substation Telecom Automation construction contract*, dated 26 April 2011

Jincheng City JUNENG cable construction company and Jincheng Runhong New Energy Power Co., Ltd, *Substation cable construction contract*, dated May 2011.

Jincheng City DEXIN Power designing Co. Ltd and Jincheng Runhong New Energy Power Co., Ltd *Wujia 35 KV step-up substation design contract*, dated October 2010

/19/ Business and Commerce Administration Bureau of China and Jincheng Runhong New Energy Power Co Ltd: *Ownership and Equity record for Jincheng Runhong New Energy Power Co Ltd*, dated 30 April 2011.

/20/ Shanxi Provincial Government: *Ownership of Wujia Coal Mine*, dated 29 June 2006
http://www.shanxigov.cn/n16/n2382/n18501/n18958/n20968/6740234.html

/21/ Jincheng City Council: State owned corporations, dated 4 November 2008
http://xxgk.jconline.cn/Contents/2008/1104/content_3478.html

/22/ Shandong Jichai Green Power Driving Equipment Co Ltd: *500GF-WK2 Generator Operational Guidelines*, dated 23 February 2012

/23/ Shandong Jichai Green Power Driving Equipment Co Ltd: *Explanatory note on generator lifetime*, dated 23 February 2012

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3.1.2 LETTERS OF APPROVAL

/24/ National Development and Reform Commission of China (NDRC) (DNA of China): *Letter of approval*, dated December 2010

National Development and Reform Commission of China (NDRC) (DNA of China): *Letter of approval*, dated 12 September 2011

/25/ Department of Energy & Climate Change (DNA of the United Kingdom Department of Energy & Climate Change): *Letter of approval*- 21 February 2011

3.1.3 METHODOLOGIES, TOOLS AND OTHER GUIDANCE BY THE CDM EXECUTIVE BOARD

/26/ CDM Executive Board: *Validation and Verification Manual*, version 1.2

/27/ CDM Executive Board: *Baseline and monitoring methodology ACM0008*, version 07

/28/ CDM Executive Board: Tool to calculate the emission factor for an electricity system, Version 02

/29/ CDM Executive Board: Tool for the demonstration and assessment of additionality, Version 6.0

/30/ CDM Executive Board: Tool to calculate project or leakage CO_2 emissions from fossil

fuel combustion, Version 02

/31/ CDM Executive Board: Tool to determine project emissions from flaring gases containing methane, Version 01

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3.1.4 DOCUMENTATION USED BY DNV TO VALIDATE / CROSS-CHECK THE INFORMATION PROVIDED BY THE PROJECT PARTICIPANTS

/32/ State Administration of Work Safety: *National Coal Mines Safety Regulations on methane concentration for safety*, 2005

/33/ NDRC and the National Construction Committee:, *Economic Evaluation Code and Parameter for Construction Project*, Version 03, dated 2006

/34/ NDRC: *Provisional Regulations of the People's Republic of China on Value Added Tax (No. 538)*, dated 10 November 2008.

/35/ NDRC: *National Coal Mines Safety Regulation*, dated 2010

NDRC, Deputy Chinese Prime Minister: *Coal mining industry discussion paper*, dated 16 December 2009

http://www.gov.cn/ldhd/2009-12/16/content_1488732.htm

/36/ Chinese ministry of Environment Protection: *Emission Standard of Coal bed Methane/Coal Mine Gas (GB 21522-2008)* dated 2 April 2008.

/37/ Det Norske Veritas: *Response to request for review of project activity 3219 "SDIC Xiyang Baiyangling CMM to power generation project"* dated 12 July 2010

/38/ Methane purification:

YANG Xiong et al. University of Science and Technology Beijing: *Study on low concentration oxygen bearing coal mine methane enrichment by pressure swing adsorption*, dated 2010

Journal of Chemical Industry Engineering: *Volume 26 No. 6*, dated November 2010

China Petroleum News Centre: *Low concentration gas*, dated 12 May 2011

/39/ National Bureau of Statistics: *National Average Wages*, dated 3 May 2011

/40/ Ashland Ltd: *MSDS for PREMIUM BLUE® SAE 15W-40 DIESEL ENGINE OIL VV70506*, dated 19 November 2007

/41/ Qinghua University: *CMM pipeline transport*, dated 28 August 2002 http://www.ccchina.gov.cn/cn/NewsInfo.asp?NewsId=4149

/42/ World Coal Association: *Coal Seam Methane; Energy Generation*, as at 6 March 2012 http://www.worldcoal.org/coal/coal-seam-methane/

/43/ Shenyang Aode Gas Co Ltd: *Corporate publication and interview on service*, as at 7 March 2012

/44/ Chinese ministry of Environment Protection: *Emission Standard of Coal bed Methane/Coal Mine Gas (GB 21522-2008)*, dated 2 April 2008

/45/ Bureau of Price of Shanxi Province: *Notice on On-grid Price of Gas Generator Sets for the Enterprises at Yangquan Guzhuang Coal Mine and other Companies*, dated 18 March 2009

NDRC: *National Development and Reform Committee hearing; Electricity Regulatory*

Commission jointly deployed to carry out a special inspection of the national electricity, dated 16 July 2004

/46/ National Bureau of Statistics of China: *Inflation figures*, dated January 2012

/47/ Australian Coal Association: *Inquiry into the Clean Energy Future (CEF) Legislative Package*, dated 26 September 2011

/48/ UK Department of Trade and Industry: *A Market Assessment of Industrial Sized Coal Fired Boilers in China* http://www.berr.gov.uk/files/file18620.pdf (p30) (Price of gas fired boilers is much more expensive than that of coal fire boilers) as at 31 March 2012.

/49/ Wujia Coal Mine operation and construction permits:

Shanxi Province National Land Resource Administration: *Mining Permit*, dated 15 November 2011

Shanxi Province Business Administration: *Business License*, dated 23 November 2011

Jincheng City Environmental Protection Bureau: *Wujia Coal Mine Environmental Impact Assessment Approval*, dated 26 August 2010

/50/ CDM Project 4534: *Project Design Document version 2.3*, dated 24/02/2011 http://cdm.unfccc.int/filestorage/G/W/A/GWACZIHE81PUSVN07Y39TJOL4BF6X2/4534%20PDD.pdf?t=bGF8bTQyMTVkfDCfT_X0x_hHizwlBvP6G7ro

/51/ Chinese National Development Reform Commission: *Feed-in tariff Notification*, dated 9 December 2009

http://www.jzwj.gov.cn/tt.php?p=438

/52/ Jincheng City Government: *Coal Mine Methane sale price guidelines*, dated 28 October 2008

/53/ Qinghua University: *CMM pipeline transport*, dated 28 August 2002 http://www.ccchina.gov.cn/cn/NewsInfo.asp?NewsId=4149

/54/ Common practice analysis sources:

Shanxi NDRC, Shanxi Provincial government website (CMM power generation projects with Shanxi government approval or under application). http://www.sxdrc.gov.cn/xxlm/lxsp/

Methane Markets database. CMM projects listed for Shanxi Province China. http://www2.ergweb.com/cmm/index.aspx

/55/ Shanxi NDRC, Shanxi Provincial government website: Wujia Coalmine Project Approval Issued by Shanxi Provincial government coal industry department, dated 26 December 2010

http://www.shanxigov.cn/n16/n37321/n37681/n37906/n38941/14206173.html

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3.2 Follow-up interviews with project stakeholders

On 7 December and 8 December 2010 DNV visited Jincheng City, Shanxi Province where the proposed project located and performed interviews with project stakeholders.

The representatives of the project owner, Jincheng Runhong New Energy Power Co., Ltd; the CER buyer, Originate Carbon Ltd and the project consultant, Beijing OC New Energy Technology Ltd *(Formerly* known as Greenensign (Beijing) New Energy Technology Ltd)

were interviewed by DNV GHG auditor Xiaojun Zhang and Jianrong Zhou, to resolve the issues identified during the desk review.

	Date	Name	Organization	Topic
/56/	2010-12-7 and 2010-12-8	Ms. Tingting Bai	Originate Carbon Ltd (CER buyer)	➢ Baseline determination of the project
		Mr. Xiaofei Geng Ms. Li Chen	Beijing OC New Energy Technology Ltd (*Formerly* known as Greenensign (Beijing) New Energy Technology Ltd) (CDM consultant)	➢ Applicability of selected methodology ACM0008 ➢ Issues related to the additionality ➢ Common practice analysis ➢ Emission reductions calculation ➢ Emission reduction monitoring plan and project management
/57/	2010-12-7 and 2010-12-8	Mr. Xiangjin Yan Mr. Hongtao Lu	Jincheng Runhong New Energy Power Co., Ltd (project owner)	➢ Information of project construction ➢ The development of CMM power generation project in Shanxi Province
		Mr. Zhong Longxing	General Manager of Wujia coal mine	➢ The approval status (incl. EIA approval, the feasibility study report approval, CDM project approval)
		Mr. Jia Junlong	Technical Section Chief of Wujia coal mine	➢ Project management ➢ Emission reduction monitoring plan
		Mr. Zhang Xunliang	Officer of Yangcheng County Development and Reform Bureau	➢ Consulting process for stakeholder's comments ➢ Investment risks and barriers
/58/	2012-03-15	Dr. Zhang Li	Occupational Safety Strategy and Policy Institute	➢ Enforcement of the *Emission Standard of Coal bed Methane/Coal Mine Gas* (GB 21522-2008)

After reviewing the Incompleteness message dated 19 July 2012 updates to the project documentation and validation report were carried out. Subsequently after reviewing the PDD version 5 dated 9 September 2012 /2/, DNV issue this final validation report and deem the changes in accordance with requirements of "Clean Development Mechanism". Below have been listed main changes between the PDD version 01 /1/ published for the 30 days global

stakeholders' consultation and the final version PDD version 5 dated 9 September 2012 submitted for registration /2/:

- Editorial errors have been corrected;
- The description of the project activity has been updated;
- The project location coordinates have been updated;
- The information about main equipment used in the project have been updated to reflect that which is being employed by the project and also that which is inside the project boundary;
- The Estimated amount of emission reductions over the chosen crediting period have been updated to reflect corrections to the emissions reduction calculations;
- The tools used in conjunction with the methodology have been updated;
- The applicability of the project to the methodology has been updated to reflect the applicability conditions of the methodology.
- The description of the project boundary has been updated to reflect the boundary requirements of the methodology;
- The baseline determination of the project has been clarified and revised to include references where appropriate;
- The project timeline has been clarified and updated;
- The investment analysis and input parameters have been clarified, updated and further justified;
- The reasonability of input parameters and their sensitivity analysis in financial analysis about the proposed project has been clarified;
- The common practice analysis has been updated according to the latest available material and relevant evidences have been provided to verify the plausibility;
- Emissions reduction calculations have been clarified as per the methodology;
- Data and parameters that are available at validation have been updated and clarified as per the sources;
- Data and parameters monitored have been updated and clarified as per the methodology;
- Data and parameters monitored have been updated to assume $PE_{ME} = 0$ as per the explanation provided in section 4.7.1 of this report;
- The description of the Monitoring Plan has been updated to reflect the requirements of the methodology and the QA/QC requirements related;
- The starting date of the crediting period has been updated.

3.3 Resolution of outstanding issues

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

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

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "Wujia coalmine power generation project" in China is enclosed in Appendix A to this report.

Table 2 of the validation protocol documents the findings of the desk review of the project design documentation and follow-up interviews with project stakeholders. Any findings raised in Table 2 are listed in Table 3 of the protocol, and changes to the description of the project design as a result of these findings will be addressed in Table 3. Table 2 thus may not reflect all aspects of the project as described in the final PDD submitted for registration.

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

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

(b) The CDM requirements have not been met;

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

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

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

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

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

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

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

Figure 1: Validation protocol tables

3.4 Internal quality control

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

3.5 Validation team

				Type of involvement						
Role	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 8.2/10.2 competence	Financial expertise
Team Leader GHG Validator	Kumaraswamy	Chandrashekara	India	✓		✓	✓			
GHG Validator	Zhang	Xiaojun Johnsen	China	✓	✓	✓	✓			
GHG Validator	Zhou	Jian Rong	China	✓	✓	✓			✓	
Assessor under training	Robinson	Mark	Australia	✓		✓				
Financial Expert	Tenderini	Giovanni	Italy			✓				✓
Technical reviewer	Flagstad	Ole A.	Norway					✓		
TA input to TR	Toole O'Neil	Barbara	USA						✓	

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

4 VALIDATION FINDINGS

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

The final validation findings relate to the project design as documented and described in the PDD, version 05 dated 9 September 2012.

4.1 Participation requirements

The project participants are Jincheng Runhong New Energy Power Co., Ltd, was formerly known as Jincheng Runhong Coal Mine Methane Power Co., Ltd. This project participant underwent a name change confirmed by the updated LoA from the /24/ dated 12 September 2011 of host Party of China and Originate Carbon Ltd from the United Kingdom. The host Party (China) and the Annex I Party (United Kingdom) meet all relevant participation requirements.

A letter of approval (LoA) /24/ was issued by DNA of China in December 2010 and re issued for the name change on 12 September 2011, authorizing Jincheng Runhong New Energy Power Co., Ltd of host Party as project participant and confirming that the project assists in achieving sustainable development.

The DNA of the United Kingdom issued the LoA /25/ on 21 February 2011 and authorized Originate Carbon Ltd from Annex I Party as project participant.

The letters of approval were received from the project participants. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /26/.

4.2 Project design

The Wujia coal mine power generation project is a newly built coal mine methane electricity generation project which results in creation of electrical energy from coal mine methane captured in the adjacent mine. The project is located in Qinchi Town, Yangcheng County, Jincheng City of Shanxi Province in the People's Republic of China.

The project geographic coordinates are stated in the PDD as 35°38'57'' North and 112°17'33'' East.

Wujia coal mine is a gassy coal mine, currently in the development stage, with the total relative gas emissions at 10.36 m^3 of methane per tonne of coal mined. The average concentration of drained CMM from Wujia drainage station is 35%. It is detailed on page 2 of the FSR /4/ that the estimated pure methane drained in one year from the Wujia Coal Mine is 99.864 million m^3 as per Coal Mine Methane Extraction Design Report /5/. The estimated total usage of the proposed project is detailed on page 8 of the FSR /4/ as being approximately 54.86 million m^3, equivalent to 54.93% of the total reported methane extracted per year. No existing use of the extracted methane from the Wujia Coal Mine exists due to the ongoing construction of the mine as per the FSR /4/.According to the drainage capability of Wujia CMM drainage station, 20 sets of 500 KW generator units will be installed with a total capacity of 10 MW.

In the absence of the project, all CMM will be released into the atmosphere directly which may cause not only the waste of resources but also serious air pollution. The project utilizes the CMM to produce electricity for exporting to the power grid. The project only includes CMM. It does not include coal bed methane (CBM). The electricity generated from the proposed project will be supplied to Wujia coalmine and Shanxi Provincial Power Grid which is a part of the North China Power Grid.

The project mitigates greenhouse gas emission via the combustion of CMM. Furthermore, the utilisation of CMM enables electricity generation from a waste gas source. The electricity will partially displace electricity generated by the fossil-fuelled power plants connecting to the North China Power Grid. The estimated annual power generation can reach 57 600 MWh. The annual emission reductions of the proposed project are estimated to be 273 144 t CO_2e.
The project start date is defined in the PDD as 5 March 2010, being the starting date of the project construction. A fixed crediting period of 10 years has been chosen for the project, starting on 1 December 2012. This corresponds with the expected starting date of the Wujia coal mine operations, which according to the Wujia coal mine project approval detailed on the Shanxi Government website /55/ is due to begin operations in December 2012.

The associated equipment will be sourced domestically – from Shandong Jichai Green Power Co., (20 sets of 500GF-WK2 generators). Based on DNV's sector expertise, after review of the equipment purchase contracts /7/ /18/ and the project engineering design technical specifications of the FSR /4/the project technology has been evaluated to be best practice.

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

4.3 Application of selected baseline and monitoring methodology

The project applies the approved methodology ACM0008, "*Consolidated baseline methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical or motive) and heat and/or destruction through flaring or flameless oxidation*"., version 7 /27/. The project fulfills the following conditions under which ACM0008, version 7 is applicable:

ACM0008: Applicable Conditions	Proposed Project Activity
To projects where surface goaf wells, underground boreholes, gas drainage galleries or other goaf gas capture techniques, including gas from sealed areas, to capture post mining CMM.	This is the case in the proposed project and is included as per the diagram B.3-1 of the PDD /2/ the CMM extraction equipment (detailed in section B.3 of the PDD and discussed in Section 4.4 of the validation report, below) is inside the project boundary.
Only when the baseline is the partial or total atmosphere release of the methane.	The baseline for the project is the total release of methane to the atmosphere.
To project activities that include methane that is captured and destroyed through utilisation to produce electricity, motive power and/or thermal energy; emission reductions may or	The captured methane is used to generate electricity, which will displace the power from the North China Power Grid. The emission reductions will be claimed.

may not be claimed for displacing or avoiding energy from other sources.	
Capture/use of virgin coal bed methane, e.g. methane of high quality extracted from coal seams independently of any mining activities.	All the project methane is sourced from underground coal mine. No CBM drainage will be involved in the project.
Project participants must be able to supply the necessary data for ex-ante projections of methane demand as described in sections Baseline Emissions and Leakage to use this methodology.	The project participant has the necessary data for ex-ante projections of the methane demand. Discussed further below.

The Wujia coal mine is a new mine with no demonstrated record of CMM drainage, however as per the CMM Extraction Design Report by Shanxi Guocheng Construction and Engineering Exploration designing Co. Ltd. Dated July 2007 /5/, the expected annual CMM drainage capacity of the mine is expected to be 99.86 million m^3. Of this volume, the proposed project has a contractual agreement to secure approximately 54.86 million m^3 of the drained CMM representing approximately 54.94% of the total available CMM.

The gas purchase agreement between the project participant and Shanxi Jingxin Co Ltd was dated 15 November 2008 and states that no other contractual agreement is in place for the supply of CMM at the time of signing.

As a result it is concluded that the proposed project does not displace existing demand for CMM in the project area.

The assessment of the project's compliance with the applicability criteria of ACM0008 (version 7) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

Thus, it has been concluded that the project activity meets the applicability criteria of ACM0008 version 7.

4.4 Project boundary

The project boundary is defined as the site of the project activity including the CMM gas drainage system, gas engines and ancillary equipment as per figure 3-1 in the PDD /2/.) and all power plants connected physically to the North China Power Grid to which the project is connected.

The CMM gas drainage system involves the following components:

Existing extraction equipment associated with the coal mine includes:

- Underground boreholes and gas drainage galleries used to capture and extract CMM utilising:
- Water drainage equipment (to separate water during drilling)

- Extraction pump and flow meter
- Explosion-proofing
- Transmission pipe to CMM vent
- Fire-proof equipment

Gas drainage equipment to be installed for the proposed project includes:

- Linkage pipeline from existing transmission pipe to the pre-treatment equipment
- Pre-treatment equipment (dust and water filters for extracted gas) and compression equipment for gas

It is noted by DNV that the gas drainage infrastructure from the drainage boreholes all the way back to the transmission pipe to the CMM vent is required by the coal mine to meet methane drainage requirements for safety purposes. This infrastructure would be in place in the absence of the proposed project and it's construction has been financed by the coal mine owner, not the project participant.

After the installation of a transformer unit on the site, there were no significant transmission constraints between the power plants of the NCPG grid, nor with the proposed project.
The selected sources and gases are justified for the project activity. The defined project boundary is in line with ACM0008 (version 7) /27/.
The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by ACM0008 (version 7).

	GHGs involved	*Description*
Baseline emissions	*CH_4 and CO_2 are included, N_2O is not included.*	*As per ACM0008 version 7, CH_4 Is the main GHG produced in the baseline due to venting of CMM. CO_2 is the main source of emissions from the grid electricity generation and N_2O is excluded for simplification. This is conservative.*
Project emissions	*CH_4 and CO_2 are included, N_2O is not included.*	*As per ACM0008 version 7, CO_2 is an emissions source from auxiliary power consumption of the generators. CH_4 emissions are included as small amounts of methane will remain unburned in heat/power generation. N_2O is excluded for simplification. This is conservative.*
Leakage	*CH_4, CO_2 and N_2O are excluded.*	*The project participant claims there is no leakage.*

4.5 Baseline identification

Step 1: Options for CMM extraction, for CMM treatment, and for energy production are identified.

The three options for CMM extraction are:

A. Pre mining CMM extraction;
B. Post mining CMM extraction;
C. Possible combinations of A, and B, This option is the CDM project activity not implemented as a CDM project.

The eight options for extracted CMM treatment are:

i. Venting;
ii. Using/destroying ventilation air methane rather than venting it;
iii. Flaring of CMM;
iv. Use for additional grid power generation; This option is the CDM project activity not implemented as a CDM project;
v. Use for additional captive power generation;
vi. Use for additional heat generation;
vii. Feeding into gas pipelines (to be used as fuel for vehicles or heat/power generation);
viii. Possible combinations of options i to vii with the relative shares of gas treated under each option specified.

The three options for energy production are:

P1. Purchasing equivalent quantity of electricity from the North China Power Grid;
P2. Construction of a coal-fired captive power plant with equivalent installed capacity (10MW);
P3. CMM power generation, this is the project activity not implemented as a CDM project.

DNV considers the list of realistic and credible alternatives to be complete.

Step 2: Baseline options that do not comply with legal or regulatory requirements are eliminated.

Options for CMM extraction

Of the three options for CMM extraction, only option C, the combination of pre mining CMM and post mining CMM could be met due to the following:

Item 136 the "*National coalmine safety regulation (version 2010)*" /35/ specifies that methane concentrations in the mine air should be below 1% in order to negate the risk of explosion. However, a concentration of this level would be unachievable at the Wujia Coalmine solely through the use of ventilation. Furthermore, Item 145 of the regulations /35/ specifies that an above ground gas drainage station be constructed above ground when the CMM emission rate of a mine exceeds $40m^3$/min. At the Wujia coalmine (currently under construction) the CMM gas emission rate can be estimated using the CMM extraction forecast for the Wujia Coalmine detailed in the FSR /4/ and *Coal Mine Methane Extraction Design Report for Wujia Coal Mine* /5/ as follows:

$99,864,000m^3$ / 365 days / 24 hours / 60 minutes = $190m^3$/min

It can be seen that this CMM emission rate would far exceed the threshold of 40m^3/min specified in Item 145 of the regulations /35/. Therefore the project activity will require gas to be extracted through the use of underground boreholes. As a result, the relative shares of pre-mining and post mining CMM are difficult to quantify, as they will both be brought to the surface through the same extraction system. /32/ Hence options A and B can be eliminated.

The regulation /32/ also states that for reasons of safety, methane concentrations shall not be lower than 30% for CMM utilization. According to the FSR /4/ of the proposed project, the average content of CH_4 in CMM extracted from Wujia coalmine is estimated as 35%.

Options for extracted CMM treatment

The treatment of extracted CMM is theoretically subject to the "Emission Standard of Coal bed Methane/Coal Mine Gas (GB 21522-2008)" that was promulgated by the Chinese ministry of Environment Protection on 2 April 2008 /44/ This provision, effective as of 1st July 2008, states that for existing coal mines direct CMM venting is prohibited from 1st July 2010 in case that methane concentration of coal mine gas is above 30%. This provision is however not considered to impact the baseline determination or be enforced as per the following:

- While the regional Environmental Protection agencies have been tasked with its enforcement, no guidance or instruction on the enforcement of the standard has been provided.
- In response to the Request for review for Project Activity 3219 /37/ "SDIC Xiyang Baiyangling CMM to power generation project. Together with Wilson Tang from CCC, DNV was also able to meet up with Mr. Liu Wenge, director of China Coal Information Institute. These discussions on 28 June 2009 indicated that the implementation of the emission standard is a challenge as there is no system or procedure in place for a) implementation, b) checking methodology (monitoring of implementation), c) supervision of such implementation and d) penalty/punishment.
- In order to gain an updated and more recent understanding of the enforcement of the regulation, DNV held a telephone interview /58/ on 15 March 2012 with Dr. Zhang Li, Director at the Occupational Safety Strategy and Policy Institute, a part of the National Institute for Occupational Safety and China Coal Information Institute. Dr Zhang informed DNV that the regulation Emission Standard of Coal bed Methane/Coal Mine Gas (GB 21522-2008) /41/ was at the time of the interview, systematically unenforced and that no penalties were being imposed for non-compliance with the standard.
- The project participant has acknowledged the potential for changes to the enforcement of this regulation in the future and has included provision for its monitoring in the monitoring plan /1/.
- DNV has verified through physical inspection /49/ that the state owned Wujia Coal Mine has secured its Business Operation License dated 23 November 2011 /49/, Mining License dated 15 November 2011 /49/ and Wujia Coal Mine Environmental Impact Assessment Approval dated 26 August 2010 /49/ from the Shanxi Provincial Government departments indicating that the business and mining operations are licensed and permitted in compliance with applicable business, mining and environmental regulations. The Jincheng City

Environmental Protection Bureau is the local regulator for performance standards and regulations promulgated by the national Chinese ministry of Environment Protection. The EIA Approval from the local regulator clearly indicates compliance with all applicable standards and regulations the Wujia Coal Mine is subject to. This indicates that the compliance with regulation GB 21522-2008 is not required for current environmental compliance purposes.

As a result, no options for extracted CMM treatment are excluded due to legal or regulatory requirements.

Options for energy production
According to the "Decision on strictly forbidding the illegal construction of fuel-fired power plant with the capacity 135 MW and below", General Office of the State Council, 15 April 2002, the construction of fuel fired power plants with output capacity of less than 135 MW is forbidden. Therefore option P2 does not comply with legal and regulatory requirements may not be considered

Step 3: Formulation of combined baseline scenario alternatives
As per Step 1 and Step 2, the technically feasible and legally compliant baseline alternatives include:

Options for CMM extraction:
Scenario C
The combination of A (Pre mining CMM extraction) and B (Post mining CMM extraction), with pre mining CMM/post mining CMM.

Options for extracted CMM treatment:
Scenario i: Venting;
Scenario ii: Using/destroying ventilation air methane rather than venting it;
Scenario iii: Destroyed via flaring;
Scenario iv: Use for additional grid power generation;
Scenario v: Use for captive power generation;
Scenario vi: Use for additional heat generation;
Scenario vii: Feed into pipeline (used by vehicles or used for power or heat generation);
Scenario viii: The combination of scenarios i and vii.

Options for energy production
Scenario P1. Continuation of the current situation (coal mine although under construction is already connected to the NCPG as observed during the site visit /57/), purchasing electricity from the North China Power Grid; or,
Scenario P3. Use CMM for power production, this is the project activity not implemented as a CDM project.

Step 4: Elimination of baseline scenario alternatives that face prohibitive barriers

Barriers analysis made on baseline alternatives for CMM extraction

Scenario C is the necessitated extraction situation and faces no barriers. This includes the coal mine's investment in CMM drainage infrastructure from the drainage boreholes and galleries to the transmission line to the CMM vent.

Barriers analysis made on baseline alternatives for extracted CMM treatment
Scenario i is the current practice in the region /35/ and faces no barriers.

Scenario ii is utilisation/destruction ventilation air methane rather than venting it. This would involve a technology built to oxidize VAM either through a thermal or flameless oxidation. The equipment for VAM oxidation is expensive and technologies for VAM oxidation for electricity and for heat generation are immature /47/ and not widely adopted in China. Hence, this scenario can be excluded for further consideration due to the high risk of VAM project.

Scenario iii, the destruction of methane by flaring requires investment without revenue. As a result scenario iii faces investment barriers and has been eliminated.

Scenario iv is the proposed project activity not implemented as a CDM project which faces investment barriers, These are discussed in section 4.6.3 of this report. As a result this scenario has been eliminated.

Scenario v is the use of extracted CMM for captive power generation. As per the financial analysis validated in section 4.6.3 of this report, the construction of a CMM power plant for captive generation (without CDM revenue) faces a low IRR of -1.14%, which is below the industry benchmark for electricity generation of 8%. Therefore the construction of a captive power plant by the mine owner is demonstrated to be financially unattractive (due to the low IRR).

The mine owner may instead generate income from the sale of the CMM to a third party such as the project participant for the purposes of electricity generation as part of the proposed CDM project without facing the technical barriers associated with internally developing the project.

Scenario vi is use for additional heat generation. It was verified during the site visit /57/ that seasonal heat demand for existing buildings at the mine site is currently met by coal fired boilers.
Since the price of gas fired boilers are generally 2~3 times that of coal fire boilers with a similar capacity /48/, extra investment in the new gas holder and supportive gas transmission pipeline prevent this scenario from being a feasible baseline alternative.

Scenario vii is the feed of CMM into pipelines for vehicular use, heat or power generation.
The concentration of CMM extracted from the Wujia coalmine is at approximately 35% concentration /4/. As per the publication from Qinghua University available at http://www.ccchina.gov.cn/cn/NewsInfo.asp?NewsId=4149 /41/ *"If you want to coalbed methane compressed into long-distance transportation of natural gas pipeline, the methane concentration to achieve 95% or more"* and guidance from the World Coal Association

which indicates a concentration level of over 93% is required for transportation in existing natural gas pipelines; see http://www.worldcoal.org/coal/coal-seam-methane/ /42/. Therefore the extracted CMM from the Wujia coalmine would require purification.

Existing methods of the methane purification process (e.g. pressure swing adsorption /38/, membrane separation /38/ and low temperature separation /38/) are all in the experimental stages and not yet suitable for commercial application. At the time of validation 54 projects using the methodology ACM0008 had been registered. Of those projects, none involve methane purification.

The project participant has considered the NPV of a hypothetical pipeline project using the costing data from the most similar registered project, registered project activity 1880. Although project 1880 consumes approximately 4 times the annual volume of CMM from the proposed project, proportional adoption of the investment costs into the proposed project results in a negative NPV of -93,219,533 RMB. Project 1880 has been selected for comparison as a CMM project closest to the size of the proposed project that transports the gas via pipeline for sale instead of utilising the CMM for electricity or heat generation inside the project boundary.

In addition, as per the Shenyang Aode Gas Co Ltd, the minimum concentration of heating gas for domestic applications should be 41% methane content /43/, higher than the concentration of the CMM from the Wujia Coal Mine at 35% /1/.

As a result, scenario vii may be eliminated.

Scenario viii is the combination of available options for extracted CMM treatment. As per Step 4, scenarios ii, iii, iv, v, vi, vii were evaluated to be unfeasible and therefore scenario viii is eliminated from baseline scenario.

Scenario I prevails for options for extracted CMM.

Barrier analysis made on baseline alternatives for energy production

Scenario P1 involves the coal mine purchasing electricity from the North China Power Grid, which at the time of the site visit, when the mine was under construction, was already the case /57/ and faces no barriers.

Scenario P3 involves the implementation of the project without CDM, which faces investment barriers, these are discussed in section 4.6.3 of this report. As a result this scenario has been eliminated.

After Step 4 “Elimination of baseline scenario alternatives that face prohibitive barriers”, only Scenario i and Scenario P1 are the remaining alternatives that do not face prohibitive barriers and through the investment analysis in section 4.6.3, DNV can verify that the Scenario iv (electricity generation from CMM), has the financial result of project-IRR as -1.14%, which is lower than the IRR hurdle rate of 8%, thus it is not the baseline scenario.

According to the above, DNV was able to verify that the baseline determination is transparent and reasonable, and among all the identified baseline scenarios, the most likely baseline is the continuation of the current regional practices, i.e. venting pre-mining CMM/post mining CMM and purchasing power from the North China Power Grid. For the projects electricity generation, the baseline is that the electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. This is reflected in the combined margin (CM) - the weighted average of the operating margin (OM) emission factor and the build margin (BM) emission factor.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.
All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.

4.6 Additionality

The project applies the "Tool for demonstration and assessment of additionality" version 6.0 /29/ to demonstrate the additionality.

4.6.1 EVIDENCE FOR PRIOR CDM CONSIDERATION AND CONTINUOUS ACTIONS TO SECURE CDM STATUS

The proposed project activity starting date was 5 March 2010, which corresponds to the start of construction /9/ and the commencement of validation (date of publication of the PDD for stakeholder) was on 26 October 2010.
The project participant informed the host party DNA (the NDRC) of the project activity and of their intention to seek CDM status on the 8 February 2010. The NDRC confirmed this notification on the 2 March 2010 /12/. The project participant informed the UNFCCC of their intention to seek CDM status on the 31 March 2010. The UNFCCC confirmed this notification on the 31 March 2010 /13/. Hence, no further justification of prior consideration and continued efforts to secure CDM status in parallel with the implementation is needed.

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

4.6.2 IDENTIFICATION OF ALTERNATIVES TO THE PROJECT ACTIVITY

The alternatives have already been listed in the baseline scenario determination and are presented in section 4.3. DNV considers the list of realistic and credible alternatives to be complete. As presented in section 4.5, through discussion of technological barriers, investment barriers and barriers due to prevailing practices, and economic analysis, only two

alternatives as the continuation of the current practice and the proposed project not undertaken as a CDM project activity are left and are the realistic and credible alternative available to the project developer.

4.6.3 INVESTMENT ANALYSIS

(I) CHOICE OF APPROACH

The benchmark analysis (Option III) is justified because

1) The proposed project has financial benefits other than CER revenue;

2) The alternative to the project does not involve any investment.

(II) BENCHMARK SELECTION

The benchmark pre-tax project-IRR is selected as 8%. To justify the benchmark IRR selection, different suitable benchmark rates of returns were analyzed during the validation process:

1) The benchmark published in the "Economic Evaluation Method and Parameters for Construction Projects (Version 03)" for the coal mining industry in China is 13% and for electricity generation is 8%. Minimum internal rates of returns proposed by NDRC are commonly used as a benchmark for the financial analysis of proposed CDM project activities in China.

2) The project activity is captive power generation and the project owner does not own or control a coal mine, therefore the benchmark for electricity generation is selected. The references provided by the project developer were assessed by DNV and found correct.

(III) INPUT PARAMETERS

The input parameters used in the financial analysis are taken from the FSR /4/ developed by Jincheng Project Consulting Center in April 2009 and approved by Shanxi Province Development and Reform Commission on 9 September 2009, except the CMM gas price which is sourced from the Gas Purchase Agreement /16/ 0.17 RMB/m^3. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognised source.

DNV has verified all the input values used for the IRR calculations. It has been confirmed that the input values have been sourced from revised FSR /4/ except the CMM gas price which is sourced from the Gas Purchase Agreement /17/

The other financial input parameters used in the financial analysis of spreadsheet /10/ and PDD version 05 dated 9 September 2012 /2/ were verified by the validation team to be same and adhered to FSR /4/, and those assumptions and calculations can be regarded as information provided by an independent and recognised source and be regarded to also reflect the situation of the project activity at the time of decision making.

The FSR /4/ was finalised by Jincheng Project Consulting Center in April 2009 and about one year before the decision to proceed with the project activity (i.e. the expected project activity start date as the signing of the construction contract) which was on 5 March 2010. Given this

relative short period of time between revised FSR finalization and the decision to proceed with the project activity it is unlikely in the context of the project that the input values would have materially changed and that it is thus reasonable to assume that the revised FSR has been the basis of the decision to proceed with the investment in the project.
According to the VVM version 1.2 paragraph 95, DNV performed the cross-check analysis from documentation for other similar projects in Shanxi Province, shown in the table below to assess the appropriateness of the assumption in the FSR for the proposed project.

Table 1 Parameters for registered CMM projects exporting electricity to the NCPG in Shanxi Province.

No.	Project name	WHR installed (Y/N)	Installed capacity (MW)	Net annual electricity generation (MWh)	PLF	Static Investment/ Capacity (Million RMB/MW)	Static Investment/ net power supply (Million RMB/MWh)	O&M (Million RMB) O&M/I	IRR (%)	Power tariff (RMB) (Incl. VAT)	CMM conc. %
1	Shanxi Herui Coal Mine Methane Power Generation Project	Yes	45	255 360	0.69	7.5	0.001	7.19%	5.51	0.35	≥30%
2	Shanxi Wangpo Low Concentration Coal Mine Methane Utilization Project	No	7	34 195	0.59	8.4	0.0017	12.4%	0.85	0.499	<30%
3	Lanhua Daning Coal Mine Methane Power Generation Project, Shanxi Province, P. R. China	Yes	35	221 400	0.77	7.3	0.0012	16.8%	4.83	0.35	≥30%
4	SDIC Xiyang Baiyangling CMM to power generation project	Yes	16	98 978	0.74	10.62	0.0017	8.5%	4.03	0.275	≥30%
5	Malan Coal Mine Methane Utilisation Project	Yes	7.48	49 548	0.76	16.94	0.0025	4.3%	7.4	0.38	≥30%
6	SDIC Xiyang Huangyanhui CMM to Power Generation Project	Yes	10	61 236	0.74	11.17	0.0018	8.5%	3.15	0.275	≥30%
7	Yangquan Yinying Coal Mine Methane (CMM) Power Generation Project of Yangquan City, Shanxi Province, P.R.China	No	5	29 100	0.66	4.46	0.0007	20.3%*	4.24	0.27	<30%
8	Shaqu Coal mine CMM to power generation Phase 2 Project	Yes	62	328 574	0.64	6.52	0.0012	9.1%	5.87	0.269	≥30%
9	Shaqu 14 MW CMM Power Generation Project in Shanxi Province (Phase I)	Yes	14	60 515	0.52	4.71	0.001	14.4%	1.54	0.30	≥30%
10	Shanxi Coal Transport Market Co., Ltd. Yangquan Branch CMM Utilization Project	Yes	30	138 960	0.53	3.8	0.008	18.6%	2.19	0.30	≥30%
11	Shanxi Yangcheng Coal Mine Methane Utilization Project	Yes	16.5	76 824	0.53	4.3	0.009	22.2%	7.8	0.28	≥30%
12	Shanxi Liulin Coal Mine Methane Utilization Project	No	12	68 126	0.65	3.0	0.0015	24%	6.16	0.23	≥30%
13	Duerping Coal Mine Methane Utilization Project	Yes	12	83 300	0.8	9.23	0.0018	-	4.30	0.36	≥30%

No.	Project name	WHR installed (Y/N)	Installed capacity (MW)	Net annual electricity generation (MWh)	PLF	Static Investment/ Capacity (Million RMB/MW)	Static Investment/ net power supply (Million RMB/MWh)	O&M (Million RMB) O&M/I	IRR (%)	Power tariff (RMB) (Incl. VAT)	CMM conc. %
14	Jincheng Sihe 120MW Coal Mine Methane Power Generation Project	Yes	120	823 200	0.78	6.6	0.0010	7.5%	11.74	0.27	≥30%
15	Shanxi Datuhe Coal Mine Methane Utilization Project	Yes	17	68 000	0.46	4.6	0.0011	20.3%	6.93	0.38	≥30%
16	Jincheng Fengrun CMM Utilisation from Nine Mines in Jincheng City Shanxi Province	No	24	116 618	0.56	3.4	0.0007	13.2%	6.19	0.32	≥30%
17	Yangquan Coal Mine Methane (CMM) Utilization for Power Generation project, Shanxi Province, China	Yes	90	600 000	0.76	9.7	0.0015	3%	5.98	0.29	≥30%
18	Yangquan Nanmei (Group) Co., Ltd. Coalmine Methane Utilization Project	Yes	10	48 000	0.55	7.4	0.0015	13.3%	2.82	0.37	<30%
19	Jincheng Chengzhuang 18 MW coal mine methane power generation project	Yes	18	120 600	0.79	7.9	0.0011	23%	5.04	0.29	>30%
20	Duanwang CMM Power Generation Project	Yes	4	19 584	0.62	6.8	0.0014	14.1	5.3	0.38	<30%
21	**The proposed project**	**No**	**10**	**51 840**	**0.66**	**4.29**	**0.0008**	**29.6%***	**-1.14**	**0.38**	**≥30%**

* Including raw material (CMM cost)

It should be noted that the list of projects in Table 1 above does not match the list of projects compared in the common practice analysis due to the consideration in Table 1 above of registered projects in Shanxi province exporting at least part of the electricity generated to the NCPG with no capacity restrictions such as + or – 50% installed capacity.

It is also noted that some projects listed in Table 1 above have WHR equipment installed. The projects above with WHR equipment installed have not been used for comparison regarding total investment, IRR or O&M parameters wherever possible, however these projects are still useful for electricity tariff comparison purposes in this report.

The main input parameters are assessed by DNV as the following:

Total static investment

The total static investment includes 1) capital expenditures (gas engines and ancillary equipment purchase) of 32 836 700 RMB which was verified by the validation team and through the FSR /4/; and 2) the 35 KV step-up substation (purchase and installation costs) of 10 039 076 RMB verified to be same as detailed in the 35 KV step-up equipment purchase and construction contracts /18/ and required under the Grid Connection approval /16/; DNV verified that total static investment is 42 875 776 RMB in the PDD and IRR spreadsheet applied the same.

For the proposed project, the investment per MW is 4.29 million RMB/MW which is reasonable to the validation team when compared with the other similar projects as per Table 1 above, whose unit cost per MW in the range of 3-8.4 million RMB/MW in Shanxi province. DNV verified the FSR and confirmed that the investment estimations are in compliance with governmental economic regulations /33/ by Jincheng Project Consulting Center Co. Ltd.

DNV has validated the forecast cost for total static investment not including the existing CMM extraction system equipment required for the operation of the coal mine itself (as defined in section B.3 of the PDD) of 42.875 million RMB through comparison with purchase receipts and invoices /7/ /18/ as follows:

Equipment purchase cost Table:

Item	**Cost (RMB)**
Civil engineering construction	9 550 000
35KV step-up substation AC-DC System & security system Jincheng Wanlitong Power Equipment Company 10 March 2011	113 000
35KV step-up substation Security Panel, Public use Panel, DC panel, AC power supply panel Jincheng Wanlitong Power Equipment Company 10 March 2011	702 000
35KV step-up substation Distribution Cabinet 1D-5D Jincheng City CHIXUN Commerce Company 15 April 2011	158 200
35KV step-up substation 5 Power Transformers 7 low-voltage switchgear 5 040 meters power cable 1 206 meters power cable 7 high-voltage switchgear 700 wire connections Jincheng City CHIXUN Commerce Company 08 April 2011	6 018 000
35KV step-up substation construction contract Jincheng City JUNENG cable construction company May 2011	1 319 676
35KV step-up substation Automation contract Jincheng City Chuanggao Telecom Automation company 26 April 2011	1 380 000
Generators and low pressure cable cabinet	18 525 000

Ancillary equipment for power plant including*: • Power Transformer (x 5) • Low pressure switch board (x 7) • Power cable YJV0.6/1KV3 • Power cable YJV0.6/1KV1 • High pressure switch board (x 7) • Copper connecting rod (x 700) • Low pressure power distribution cabinet 1D (x 1) • Low pressure power distribution cabinet 2D (x 1) • Low pressure power distribution cabinet 3D (x 1) • Low pressure power distribution cabinet 4D (x 1) • Low pressure power distribution cabinet 5D (x 1) • Copper plate (1281 kg) • Soft connection wire (x 30) • Insulation board (x 10) • Insulation board (x 10) • Accessories (Screw, Heat shrinkable tube, processor, plates etc)	6 938 115
Anti gas leakage system	63 000
Painting generator room	28 700
Load management terminal and electrical energy meter	194 050
TOTAL	**44 989 741**

* The purchase contract for ancillary equipment /7/ details the package cost only and does not itemize the individual components on a cost basis, however the total cost of 6 938 115 RMB representing approximately 15% of the total equipment cost or 44 989 741 RMB is considered to be reasonable for the fitout and connection of the project equipment listed in the above table.

As per the table above, costs incurred by the project participant during the construction of the project (project under remained construction at the time of validation) it may be seen that the actual cost incurred by the project participant is already exceeding the estimated 42.875 million RMB by 2.11 million RMB.

As such DNV can conclude that the total static investment cost used in the financial analysis of 42.875 million RMB is conservative, reasonable and realistic

CMM price

DNV has verified the Wujia Coal Mine gas purchase contract entered into by Jincheng Runhong new energy power Co., Ltd and Shanxi Jingxin Co., Ltd. /17/ The purchase price of 0.17 RMB/m^3 was further confirmed during the site visit through interviews with Mr. Zhong Longxing, general manager of Wujia coal mine /57/ and Mr. Yan Xiangjin of Jincheng Runhong New Energy Power Co Ltd, one of the project owners /56/.

The project participant Jincheng Runhong New Energy Power Co Ltd, has been verified by DNV to be separate entity to the Wujia Coal Mine. This was confirmed through the verification of the record held by Business and Commerce Administration Bureau of China Ownership nominating Mr Yan Xingjian as owner of 100 shares of the company and Jin Jianping as owner of 4 900 shares out of a total of 5 000 shares /19/.

It was verified that the Wujia Coal Mine is wholly owned by Shanxi JINGXIN Industrial Co. Ltd via the Shanxi Provincial government website /20/. In addition it is listed in the Jincheng City Council website that Shanxi JINGXIN Industrial Co. Ltd is a state owned corporation /21/. As a result it can be confirmed that the project participant and the coal mine owner are independent entities.

In light of the clear separation of the Wujia coal mine and the project participant, the CMM price of 0.17 RMB/m^3 is considered reasonable in comparison to other CMM projects in Shanxi province as per Table 2 below. After adjustment to the relative 35% concentration, CMM prices across similar projects in Shanxi Province range from 0.13 to 0.286 RMB/m^3 and when projects registered since January 2011 are considered the range is limited to 0.15 to 0.286 RMB/m^3.

The suitability of the CMM cost has been justified by consideration of a publication by Jincheng City Government *Coal Mine Methane sale price guidelines* /52/ which provides gas prices according to end user detailing an industrial user price of 0.65 RMB/m^3. As distance transport of CMM/CBM via pipeline for usage requires concentrations of 93-95% minimum /53/ the concentration at 0.65 RMB/m^3 is taken to be 100%. From this it may be seen that 100% methane at 0.65 RMB/m^3 is equivalent to 0.23 RMB/m^3 at 35% concentration.

Equivalent gas cost from 100% to 35% = (0.65 RMB/m^3 / 100) * 35
= 0.2275 RMB/m^3
= 0.23 RMB/m^3 (2 decimal places)

DNV assumes a linear relationship in the conversion of methane concentration and price here which is reasonable given the resulting 35% methane cost of 0.23 RMB/m^3 corresponding to the CMM cost listed in other registered CMM projects in Table 2 below which range from 0.10 to 0.28 RMB/m^3.

The credibility of the gas price of 0.17 RMB/m^3 is further demonstrated through comparison with other CDM project activities as follows:

Table 2 CMM gas costs associated with other CDM project activities in China (not including costs of gas treatment)

Project No.	Project Name	Registration Date	Concentration of CMM (%)	Listed CMM price (RMB/m^3)	Pure Methane Price (RMB/m^3)	Adjusted CMM Price (RMB/m^3) *
n/a	Wujia coalmine power generation	n/a	35	0.17	n/a	0.17

	project (the proposed project)					
4098	Shanxi Herui Coal Mine Methane Power Generation Project	25/5/2011	36.1	n/a	1.1206	0.286
4534	Shanxi Wangpo Low Concentration Coal Mine Methane Utilization Project	10/3/2011	6 - 22	0.15	n/a	0.239**
3194	Lanhua Daning Coal Mine Methane Power Generation Project, Shanxi Province, P. R. China	21/12/2010	~50	n/a	0.37	0.13
3179	Jincheng Chengzhuang 18 MW coal mine methane power generation project	2/12/2010	38	n/a	0.4	0.14
1928	Jincheng Fengrun CMM Utilisation from Nine Mines in Jincheng City Shanxi Province China	22/4/2009	52.5	0.15	n/a	0.10

* Gas concentration conversion for prices has been conducted by dividing the price for CMM detailed in the registered CDM project by the concentration of the gas quoted for in the project documentation and multiplied by 35 to result in a comparable figure (for example 0.15 (RMB/m^3) / 52.5 (%) * 35 (%) = 0.10 RMB/m^3 in the case of project 1928).
It may be seen from the list of CDM projects utilizing CMM gas that the range of costs associated with CMM gas of a relative concentration of 35% methane is from 0.10 – 0.286 RMB/m^3 with the price used in the proposed project being at the lower end of this range.
** Based on the 22% scenario.

It may be seen from the list of CDM projects utilizing CMM gas that the range of costs associated with CMM gas of a relative concentration of 35% methane is from 0.10 – 0.286 RMB/m^3 with a mean price of 0.179 RMB/ m^3.

In this context DNV considers the cost associated with CMM gas in the proposed project of 0.17 RMB/ m^3 to be reasonable and credible.

Electricity tariff

The electricity tariff for the project of 0.38 (incl. VAT) RMB/kWh is sourced from the FSR /4/. As at March 2012, the Grid connection approval had been provided /16/, however, as the project was under construction at the time of validation, a grid connection agreement with the local electricity utility had not yet been finalised. The project participant demonstrated the validity and suitability of the electricity tariff through reference to an online notification provided by the Shanxi Price Bureau and Shanxi Power Co. Ltd dated 9 December 2009 /45/, which indicates an electricity tariff price rise for coal gas generation to 0.38 RMB/kWh.

The electricity tariff range of similar projects in Shanxi province as per Table 1 is 0.23-0.499 RMB/kWh. The proposed project within this range at 0.38 RMB/kWh. In conjunction with the notification from the Shanxi Price Bureau and Shanxi Power Co. Ltd, DNV considers the electricity tariff to be valid and suitable.

The registered CDM project Project 4534: Shanxi Wangpo Low Concentration Coal Mine Methane Utilization Project utilises a tariff of 0.499 including VAT (as detailed in Table 1 above) acknowledging that the NDRC nominated tariff for CMM projects generating electricity for export to the grid is 0.38 RMB/kWh including VAT. The project activity 4534, however includes the consideration of a subsidy for renewable energy, raising the tariff from 0.38 RMB/kWh to 0.499 RMB/kWh stating:

"*The tariff assumed in the IRR calculation consists of a base tariff for coal fired power generation and a subsidy granted to renewable energy projects*."

According to the NDRC however, CMM electricity generation projects are not considered to be renewable energy projects /51/ and as a result do not qualify for any renewable energy subsidy.

As a result, from Table 1 above, the range of electricity tariff of similar projects in Shanxi Province does not exceed 0.38 RMB/kWh.

Annual power generation

As per Annex 11 of CDM-EB's 48th meeting report titled, Guidelines and validation of plant load factors version 01 paragraph 3, (a) one option is to use plant load factor provided to the government while applying the project activity for implementation approval. The FSR has this purpose and hence according to current CDM regulation, the checking that the value is in line with the FSR should be considered sufficient for validation of plant load factor. This was the case for this project.

DNV has verified that, according to the FSR /4/, the project has an installed capacity of 10 MW. The annual generation in FSR /4/ is estimated to be 57 600 MWh. The project installed capacity is 10MW, hence, the plant load factor is approximately 66%. The PLF of the proposed project is considered to be appropriate (although at the higher end of the range) when compared with other similar high concentration utilization CMM projects (without WHR installed) registered whose PLF is in the range of 0.56-0.66 as per Table 1 above.

The effective operating capacity is 8 MW, considering the installed capacity as of 10 MW. According to the FSR /4/, the effective operating capacity of 80% (400 kW) for a 500 GF1-3RW gas engine was verified by validation team to be reasonable after validation of the manufacturers guidelines /22/ which detail that maintenance can be due after 7 200 hours or 12 months. The designed power generation of the proposed project is 57.6 GWh (20 engines x 400 kW x 7 200 h), corresponding to 7 200 hours each year. The auxiliary power consumption is 10% and it is subtracted for the financial analysis and for project emissions.

The auxiliary power consumption nominated by the project participant is 10% as per the FSR /4/. The estimated level of self use was validated by DNV through review of the component usage analysis and calculation provided by the FSR author Jincheng Project Consulting Center /8/.

As per the document *Wujia CMM Power Plant auxiliary power consumption* /6/, the following components of auxiliary power usage or self use of power, have been accounted for in Table 3 below.

Table 3: Auxiliary power consumption by component

Equipment	Power / unit (kW)	Number of units	Total power (kW)
Cycling pump (cooling system)	55	7	385
Well make-up pump (water extraction well)	30	2	60
Booster pump (water supply station)	30	2	60
Fire pump (fire suppression system)	30	2	60
Fire regulator pump (fire suppression system)	3	2	6
Cooling fan (cooling system – tower)	11	8	88
Water Scavenging pump	5.5	1	5.5
Air conditioner (control room)	4.75	2	9.5
Axial fan (power distribution room)	2	10	20
Generator starter (Generator sets)	5	10	50
Facility lighting (street and pathways)	1	40	40
Office (internal electrical office/kitchen/amenities demand)	50	1	50
System management electronics (repair/maintenance power)	30	1	30
Monitoring system (metering system)	10	1	10
Total			874

CMM pre-treatment in the proposed project involves the use of a gas/water separator and 2 in line dust filters as per the FSR author Jincheng Engineering Consulting Center statement dated 22 July 2012 /8/. The gas pre-treatment process does involve electric or fossil fuel powered filtration devices /8/ as such gas pre treatment is not considered in evaluation of auxiliary power demand.

As detailed in Table 3, the total forecast auxiliary power consumption for the proposed project is then:

874 kW * 7 200 hours = 6 292 800kWh
= 6 292.8 MWh

Total generated electricity is:

0.5MW * 20 generators * 7 200 hours * 80% efficiency = 57 600 MWh

Percentage self-use (auxiliary use) is:

6 292.8 MWh / 57 600 MWh * 100 = 10.925%

This involves an assumption that all auxiliary items are operating at the 7 200 hours per year. While it is unlikely that the fire suppression equipment, generator start-up and street lighting will function to the same regime as the generators, the elimination of the loads associated with fire suppression and generator start up and the consideration of street lighting at half the load (corresponding to night time use) results in:

(874 kW – 66 kW (fire suppression) – 50 kW (generator starter) -20kW (half of the lighting)) * 7 200 hours = 1 478 kW * 7 200 hours
= 5 313 600 kWh
= 5 314 MWh

Resulting in a self-use of:

10 642 MWh / 115 200 MWh * 100 = 9.23%

Some self-use of the fire suppression equipment and generator start up equipment will however occur subsequently raising the percentage of self-use towards the estimated 10%. As such, the use of 10% self-use by the project participant is considered to be reasonable and realistic.

While the summary of expected usage provided by the FSR author on 22 July 2012 /8/ is 0.925% greater than the figure of 10% used in the FSR published in April 2009 and in the IRR calculation spread sheet /10/. The assumption that the lighting, generator start-up and fire suppression system will operate the same hours as the generators results in a slight over estimation.

As such, DNV considers the 10% electricity self-use by the proposed project to be reasonable, conservative and realistic.

Annual O&M cost
The annual O&M cost for the proposed project is 12.70 million RMB.

Operating Cost	**12.70 million RMB**
Raw Material	9.33 million RMB
Fuel Expense	0.36 million RMB
Salary and Welfare	0.33 million RMB
Repair Fee	1.29 million RMB
Other operate and management fee*	1.40 million RMB

* Listed across two separate rows (row 12 and row 16) on the Total Costs tab of the IRR spread sheet /10/.

Of this, fuel expenditures (Raw material) account for approximately 9.33 million RMB per year /4/ /12/. Other costs contributing to the O&M cost for the proposed project include the purchase of engine oil and water associated with the operation of the generator sets.

The purchase price of water is 2.0 RMB/m^3. The annual consumption is around 2 064 m^3/year resulting in a cost of 4 128 RMB/year.

The purchase price of engine oil (entered in the PDD as "Fuel expense" along with cooling water expenses) for the proposed project is 12 RMB/L and a forecast usage of 30 000 litres would result in a cost of 360 000 RMB/year. This was validated by DNV through consideration of assumptions and information provided in the FSR /4/ and the equipment purchase contract /7/. As per these documents, the generator usage of engine oil per kWh is 1.6 grams. The project participant makes the assumption that the engine oil has a density of 850 kg/m^3, which is conservative considering SAE 15W-40 diesel engine oil has a density of around 0.8744 g/cm^3 at 15.6 degrees Celsius /40/.

(57 600 000 kWh generated x 0.0016 kg lube oil per kWh) / 0.85 kg/l oil density
= 108 423 litres engine oil consumed per year

As such, the assumed consumption of 30 000 litres lube oil per year is very conservative.

The salary and welfare component of the O&M expenses of 0.3283 million RMB/year is composed of an assumed 20 employees receiving a salary of 1 200 RMB/month with a welfare contribution of 14% equivalent to an annual salary of 16,416 RMB/year (1,200 * 12 * 1.14). As per the PDD, the average salary for workers in the Shanxi Province in 2010 was 33,544 RMB/year (a 17.8% increase on the 2009 salary) /39/. In addition, the same source shows that the average salary in the power generation industry in 2010 was 48,323 RMB/year (a 13.3% increase on the 2009 salary). The referenced rates far exceed the FSR estimations of salary used in the financial analysis of the proposed project, which can be considered conservative in comparison.

The repair fee associated with the main equipment of the project is based on the assumption that equipment repairs will be equivalent to 3% of total static investment per year representing 1.286 million RMB. This is in line with registered project activities 3219, 5227, 3661, 3542 which incorporate repair costs in the O&M expenditure ranging from 2-5% of total static investment.

Other associated costs and management fees represent 1.40 million RMB/year of the O&M costs and per MWh of generation represents 27.0 RMB/MWh. This is in line with registered project activities 3219, 5227 and 3661 which have cost per MWh generation ranging from 25.6 to 50 RMB/MWh. It is noted that these registered project activities include WHR, however these have been considered as the most similar projects providing this cost available for comparison.

The relative share of the O&M per total investment of the proposed project is 29.6%, of which the total cost of CMM per year is 73%. However for the purposes of comparison with other similar projects as per Table 1 above, consideration of the annual O&M costs not including CMM purchases reduces the O&M expenditure to 3.37 million RMB/year which represents 7.9% of total static investment. When compared to other similar projects in Shanxi Province without WHR installed in Table 1, this is below the range of 12.4 – 24% of O&M cost per total static investment.

DNV considers these costs to be reasonable.

Other financial calculations and assumptions

- The period of financial assessment (project IRR) is 11 years, reflecting the period of expected technical lifetime /23/ of the main equipment as per the manufacturers guidelines and is in line with the Economic Evaluation Code and Parameter for Construction Projects published by the NDRC /33/ .
- The circulating capital of 203 300 RMB has been considered in the initial investment and is recovered in the final year.
- The project is fully funded by the project participant and is not conducted with finance.
- Operating expenditure was broken down and reflects the local accounting principles
- according to revised FSR /4/.
- Taxes, tax exemptions and VAT refunds were considered by the project participant, however due to the nature of the project activity, no exemption or refund were applicable according to the Provisional Regulations of the People's Republic of China on Value Added Tax (No. 538) /34/.
- The 80% operational period in the first year of the project assumes:
    - The purchase of 80% of the normal CMM purchase
    - The requirement for only 80% of the normal Fuel Expense cost (O&M)
    - The requirement for only 80% of the normal Repair fee (O&M)

The financial calculations and assumptions have been assessed and are considered correct and conservative. By validating the financial and technical information provided to DNV against the sources indicated and comparison with public data sources (Table 1 and 2), DNV was able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.

(IV) CALCULATION AND CONCLUSION

The IRR calculations were provided in a spread sheet. The calculations were verified and found to be correct by DNV. The assumptions used in the calculations were deemed to be correct by DNV. The project IRR without CDM revenues is -1.14%; this confirms that the project without CDM benefits is not financially attractive /10/ compared to the benchmark. With CER revenues the project IRR increases to 47.54%, this is above the benchmark of 8%.

(V) SENSITIVITY ANALYSIS

A sensitivity analysis has been carried out for parameters contributing more than 20% to revenues or costs. Reasonable variations of Static total investment, CMM price, operational costs, electricity tariff and annual power supply were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation. The result of the analysis is as follows:

Table 3 Sensitivity analysis variations of parameters to reach the benchmark

Parameter	Static total investment	CMM price	Operational costs	Electricity tariff	Annual power supply
Parameter variation required	-33.50	-27.67	-20.25%	15.55%	15.55%
Benchmark	8%				

Based on the arguments and the evidences presented by the project developer, DNV assessed the likelihood of above mentioned scenarios. The results are as follows:

Static total investment:
Static total investment savings of 33.50% are not considered to be realistic. The cost associated with the static total investment can be considered to be reasonable and at the lower end of investments per output capacity in comparison to other CMM CDM projects as per Table 1 above.

CMM price:
The CMM price negotiated with Wujia Coal Mine in the Gas Purchase Agreement of 0.17 RMB/m^3 /17/ is in line with the prices quoted by Jincheng City Government: *Coal Mine Methane sale price guidelines*, dated 28 October 2008 /52/ and at the lower end of the spectrum of CMM prices listed in Table 2 above. As such it would be unreasonable to suggest a discount of 27.67% is achievable.

Operational Costs:
While the CMM cost has been considered in the overall operational cost by the project participant the remaining costs associated such as engine oil, water, salary, and welfare contributions are unlikely to decrease by 20.25% during the project lifetime due to the upwards pressure on these factors by inflation which has averaged 4.29% from 1994 to 2012 /46/.

Electricity tariff:
DNV was able to confirm that the tariff of the proposed project will be regulated by the Bureau of Price of Shanxi Province through the *Notice on On-grid Price of Gas Generator Sets for the Enterprises at Yangquan Guzhuang Coal Mine and other Companies- [2009] No.62 dated 18 March* 2009 /45/ and the tariff will not be changed frequently indicated by the notice of electricity tariff supervision in order to control inflation (http://www.ndrc.gov.cn/xwfb/t20050628_27624.htm) /45/ and this price has not changed since then according to regulations.

The registered CDM project Project 4534: Shanxi Wangpo Low Concentration Coal Mine Methane Utilization Project utilises a tariff of 0.499 including VAT (as detailed in Table 1 above) acknowledging that the NDRC nominated tariff for CMM projects generating electricity for export to the grid is 0.38 RMB/kWh including VAT in the PDD /50/. The project PDD /50/, however includes the consideration of a subsidy for renewable energy, raising the tariff from 0.38 RMB/kWh to 0.499 RMB/kWh stating:

"The tariff assumed in the IRR calculation consists of a base tariff for coal fired power generation and a subsidy granted to renewable energy projects."

According to the NDRC however, CMM electricity generation projects are not considered to be renewable energy projects /51/ and as a result do not qualify for any renewable energy subsidy.

As a result, from Table 1 above, the range of electricity tariff of similar projects in Shanxi Province does not exceed 0.38 RMB/kWh.

The trigger point for the electricity tariff (including VAT) to enable the project IRR to cross the benchmark is 0.44 RMB/kWh (15.55% increase) or an escalation of 2.88% per year.

Given the *Notice on On-grid Price of Gas Generator Sets for the Enterprises at Yangquan Guzhuang Coal Mine and other Companies* published by Bureau of Price of Shanxi Province /45/ the immediate increase of the electricity tariff from the published level of 0.38 RMB/kWh to the trigger level of 0.44 RMB/kWh (an increase of 15.55%) would be contrary to the statements made in the notice /45/ and unlikely as a result.

The possibility of a 2.88% rise in electricity tariff independently of other O&M costs is very unlikely due in part to the impact of an electricity tariff rise across Shanxi Province, therefore the impact of a 2.88% annual rise in electricity tariff was modelled by DNV along with a corresponding rise in raw material (CMM) costs of 1%. This increase of CMM at 1% per year is considered to be conservative given the average rate of inflation in China being 4.25% from 1994 to 2010 as per the National Bureau of Statistics of China published January 2012 /46/.

The result of this scenario is an IRR of 6.90%, which is below the benchmark of 8%. If the rate of both electricity tariff and CMM price increase together at the historical average annual inflation rate of 4.25% /46/ the project IRR will be 3.08%, which is also below the benchmark of 8%. This scenario does not consider the other components of the O&M costs, which if increased at the above rates would result in an even lower IRR in both cases.

As a result, DNV considers the electricity tariff of 0.38 RMB/kWh to be reasonable and the possibility of its increase resulting in the project IRR crossing the benchmark to be unrealistic.

Over all, the financially related variances required to cross the benchmark do not correspond to China's historical average annual inflation rate from 1994 to 2010 of 4.25% /46/.

Annual power supply:
Due to the technical specifications and related limitations of the generator sets 500GF-WK2 as per the Generator Operational Guidelines /22/, which recommend an annual operational time of 7 200 hours. To increase output by either operational time or physical output by 15.55% would require significantly exceeding the manufacturer's operation guidelines. An increase in operational time by 15.55% would result in annual operational hours of 8 320 per year. Resulting in 1 120 hours or around 46 less days per year to conduct the required

maintenance. This is a significant departure from the manufacturer's operational guidelines /22/ and is not considered to be a realistic scenario.

The manufacturer has stated that the maximum operational efficiency of the generator units is 90% /22/. The ER calculations use a normal operation at 80% efficiency resulting in an annual generation of 57,600 MWh /1/ so an increase in output of 15.55% would be required to cross the benchmark with an annual generation of 66 557 MWh. However the maximum generator output of 90% would only result in generation of 64 800 MWh so the generators are not physically capable of a generation increase of 15.55% at the manufacturers specification of 7 200 hours annual operation.

The analysis above shows that very unrealistic, favorable circumstances would be needed for the IRR to reach the benchmark. Therefore the project is not financially attractive. This demonstrates that the project activity would not be implemented without the CDM.

In conclusion, the investment analysis and sensitivity analysis have demonstrated that the project activity is not the most financially attractive option.

4.6.4 BARRIER ANALYSIS

The project participant has elected to demonstrate additionality through investment analysis.

4.6.5 COMMON PRACTICE ANALYSIS

It is reasonable in DNV's opinion that the scope for the common practice analysis is defined as: 1) Geographic proximity within Shanxi Province as the Shanxi Province is a major coal production area in China, and 2) Similar projects have been defined as those using a similar technology (i.e. power generation from CMM using foreign and domestic technology) and a ±50% capacity range (i.e. between 5 and 15MW).

It is noted that in the financial analysis, comparison with similar registered CDM projects not using WHR was conducted to provide analogous comparison for financial purposes. This level of resolution was not available using the common practice analysis sources listed below and as such, the presence or absence of WHR is not one of the qualifying technical factors in the common practice analysis.

Within Shanxi Province, 20 projects were identified by the project participant and verified by DNV to be a complete list for consideration in the Common Practice Analysis using the following sources:

- Shanxi NDRC, Shanxi Provincial government website Register of all approved electricity generating projects with approval to export electricity to the power grid. Available at http://www.sxdrc.gov.cn/xxlm/lxsp/ /54/
- Clean Development Mechanism in China government website (CMM power generation projects with China LoA). Available at http://cdm.ccchina.gov.cn
- UNFCCC website (Registered CMM power generation projects or CMM power generation projects in the UNFCCC validation process)
- Methane Markets database. CMM projects listed for Shanxi Province China. http://www2.ergweb.com/cmm/index.aspx /54/

Of the sources listed above, the Shanxi NDRC, Shanxi Provincial government website /54/ is a central list of all provincial government approved development projects across industries and applications. This is considered by DNV to be a comprehensive source or the common practice analysis as it details all projects within the province with development approval.

Projects identified during common practice analysis:

	Project Name	Installation capacity	Applied for CDM
1	Shanxi Majunyu CMM Power Generation Project	5MW	Yes Webhosted (UNFCCC)
2	Shaqu 14MW CMM Power Generation Project in Shanxi Province (Phase I)	14 MW	Yes (3190)
3	Shanxi Yaoyuan Coal Mine Methance Developing Co., Ltd, Coal Mine Methance (Coal Mine Gas) Unilization (Nanyu) Project	10MW	Yes Webhosted (UNFCCC)
4	Coal Mine Methane (CMM) and Ventilation Air Methane (VAM) Comprehensive Utilization Project of Taiyuan, Shanxi Province	10MW	Yes Webhosted (UNFCCC)
5	Yanguan Nanmei (Group) Co. Ltd. Coalmine Methance Utilization Project (Project set up two separate 5 MW power plants at Nanzhuang and Dayangquan Coalmine.	10 MW	Yes (3016)
6	Hengtai Huanghou Coal Mine 5 MW CMM Power Project This project is part of the registered project: Shanxi Coal Transport Market Co., Ltd. Yangquan Branch CMM Utilization Project (1319)	5MW	Yes (1319)
7	Xingyu Coal Mine CMM to Power Generation Project	10 MW	Yes Webhosted (UNFCCC)
8	Shanxi Wangpo Low Concentration Coal Mine Methane Utilization Project	7MW	Yes (4534)
9	Qinshui Longxin CMM Power Project	8MW	No
10	Tunlan Coal Mine Methane Utilization Project, Shanxi Province, People's Republic of China	7.5MW	Yes (3067)
11	SDIC Xiyang Huangyanhui CMM to Power Generation Project	10 MW	Yes (2929)
12	Yangquan Yinying Coal Mine Methane (CMM) Power Generation Project of Yangquan City, Shanxi Province, P.R.China	5 MW	Yes (3266)
13	Qinxin CMM Power Generation Project	6MW	Yes (3200)
14	Shanxi Liulin Coal Mine Methane Utilization Project	12 MW	Yes (1230)
15	Shanxi Jincheng Daning Coalmine CMM power generation project (PP is Jincheng City Fengrun CMM Utilization Co. Ltd. project was set up at Daning and Nanaosi Coalmine)	15 MW	Yes Webhosted (UNFCCC)
16	Shanxi Xiyang Fenghui Coal Industry Co. Ltd. Mahui Coal Mine Utilization for Power Generation Project	10 MW	Yes Webhosted (UNFCCC)

17	Duerping Coal Mine Methane Utilization Project	12 MW	Yes (1929)
18	Yangquan Coal Mine Methane (CMM) Utilization for Power Generation Project, Shanxi Province, China (Chengzhuang Coalmine CMM power generation project is part of the registered project: Shanxi Coal Transport Market Co., Ltd. Yangquan Branch CMM Utilization Project (1319))	8 MW (Chengzhuang Coalmine)	Yes (1319)
19	Huineng Coal Industry 12MW CMM Power Project http://www.sxdrc.gov.cn/xxlm/xny/zhdt/201203/t20120322_64189.htm	12MW	Yes Webhosted (UNFCCC)
20	Xiyang Fengyuan Anping CMM Power Project	12 MW	No
21	Wujia coalmine power generation project	10MW	Yes Webhosted (UNFCCC)

The project participant identified 20 projects meeting the common practice criteria, of which 18 were applying for CDM status and two projects:

- Qinshui Longxin CMM Power Project, and;
- Xiyang Fengyuan Anping CMM Power Project

had been approved by the Shanxi NDRC had not applied for CDM status.

Qinshui Longxin CMM Power Project documents detail total static investment of 17.41 million RMB /54/, while other technical information was not able to be located by the project participant or DNV, if the proposed project is considered to have a PLF at the average level of the projects listed in Table 1 of 0.66, (which is also the PLF of the proposed project), the expected output would be:

Output = 8 MW * 8 760 hours/year * 0.66 (PLF)
= 46 252.8 MWh annual generation

Therefore the total static investment per expected net output may be considered as:

Investment/net output = 17.41 RMB / 46 252.8 MWh
= 0.0003764 million RMB/MWh

As per Table 1, the proposed project's total static investment per net output is 0.0008 million RMB/MWh. Therefore the Qinshui Longxin CMM Power Project has a total static investment per unit of output of only 47% of the proposed project. As per paragraph 9 (e) (i) of the Tool for the demonstration and assessment of additionality version 6.0, technologies that have a unit cost of output that differs by 20% or more when compared to the proposed project may be considered different. The proposed project has a unit cost of investment 53% greater that the Qinshui Longxin CMM Power Project, when the average PLF of registered CDM projects is considered.

The unit cost of output for the Qinshui Longxin CMM Power Project would fall within 20% of the proposed project if its PLF was reduced to below 0.39, which is lower than any project listed in Table 1 by approximately 7% and is 41% lower than the mean PLF of projects in

Table 1 (0.66). As such DNV considers that in comparison to the registered projects in Table 1, it is unreasonable and unlikely to expect the PLF of the Qinshui Longxin CMM Power Project to be below 0.39. As such DNV considers that the decision by the project participant to consider the project Qinshui Longxin CMM Power Project as a different technology under paragraph 9 (e) (i) of the Tool for the demonstration and assessment of additionality version 6.0 /29/ as reasonable and realistic.

Xiyang Fengyuan Anping CMM Power Project received construction approval from the Shanxi NDRC in June 2012 /54/ and is not yet operational, therefore as per paragraph (44) the Tool for the demonstration and assessment of additionality version 6.0 /29/, is not required to be considered in the common practice analysis.

Based on the analysis of the 20 projects both above and in the PDD /2/:

- 11 projects are registered as CDM projects
- 7 projects (including the proposed project) have been webhosted on the UNFCCC website and have commenced the CDM process
- 2 projects do not qualify for common practice analysis (based on operational status and the definition of different technologies provided in the tool /29/)

All projects can be excluded based on the Tool for the demonstration and assessment of additionality version 6.0 /29/ and it is determined that there are no similar projects to the proposed project. Therefore, Sub step 4a and 4b of the tool /29/ have been satisfied and proposed project is not common practice in Shanxi Province.

According to the common practice analysis provided conducted in the PDD /2/ and analysed above, CMM power generation from out puts of 5 MW to 15 MW within Shanxi province are not common practice and the project is not a likely baseline scenario and the emission reductions are additional to what would have happened in absence of the project activity.

In conclusion, it is demonstrated that the project is not a likely baseline scenario, and that emission reductions resulting from the project are additional.

4.7 Monitoring

The monitoring methodology ACM0008 (version 7) is correctly applied for the monitoring. The monitoring plan is in accordance with the monitoring methodology. The monitoring plan will give opportunity for real measurements of achieved emission reductions.

The project participant has included the requirement for the monitoring of applicable legal and regulatory requirements facing the utilization of CMM in section B.7-2 of the PDD /1/.
The monitoring plan provides for the collection and archiving of all relevant data:

Project emissions:

- CMM undestroyed in the project activity;
- the relative proportion of NMHC compared to CH_4.

Baseline emissions:

- CMM sent to and destroyed in the project activity that would be released to the atmosphere in the baseline – their concentration, flow, temperature and pressure;
- the electricity generated by the project that is sent to the grid.

Leakage:

- No leakage needs to be addressed in the project.

All of the above parameters will be monitored continuously except for the non-methane hydrocarbons (NMHC) concentration and its carbon emission factor, which will be monitored annually.

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

4.7.1 PARAMETERS DETERMINED EX-ANTE

The following parameters are determined ex-ante and were verified by DNV.

Parameter	Description	Value applied	Unit	Source
CEF_{CH4}	Carbon emission factor for combusted methane	2.75	tCO_2e/tCH_4	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2Energy, Table 1.3 and 1.4, page 1.21-1.24, chapter 1.
GWP_{CH4}	Global warming potential of methane	21	tCO_2e/tCH_4	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2Energy, Table 1.3 and 1.4, page 1.21-1.24, chapter 1.
Installed capacity	Installed capacity of provincial sub-girds in the North China Power Grid	Various (Appendix 3 of PDD)	kW	China Electric Power Yearbook 2007-2009
$EF_{Coal,Adv,y}$	Electricity supply efficiency of the best commercially available technology for coal-fired power generation in China.	39.08%	%	*Chinese DNA: Bulletin on China's Regional Grid Baseline Emission Factor 2010*
$EF_{Gas,Adv,y}$	Electricity supply efficiency of the best commercially available technology for gas-fired power generation in China.	51.46	%	*Chinese DNA: Bulletin on China's Regional Grid Baseline Emission Factor 2010*
$EF_{Oil,Adv,y}$	Electricity supply efficiency of the best commercially available technology for oil-fired power generation in China.	51.46	%	*Chinese DNA: Bulletin on China's Regional Grid Baseline Emission Factor 2010*
$CAP_{Thermal,y}$	The newly added thermal power capacity in the project electricity system, NCPG, in year *y*	Various (Appendix 3 of PDD)	MW	*China Electric Power Yearbook 2007-2009*
$CAP_{Total,y}$	The total newly added capacity in the project electricity system, NCPG, in year *y*	Various (Appendix 3 of PDD)	MW	*China Electric Power Yearbook 2007-2009*

NCV_i	Net calorific value of fuel *i*	Various (Appendix 3 of PDD)	GJ/tce or m^3	China Energy Statistical Yearbook 2007-2009
$F_{i,j,y}$	The amount of fuel i (in a mass or volume unit) consumed by relevant provincial sub-grid j in year y.	Various (Appendix 3 of PDD)	t or m^3	China Energy Statistical Yearbook 2007-2009
EF_i	The carbon emission factor per unit of energy of the fuel i	Various (Appendix 3 of PDD)	tC/TJ	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2Energy, Table 1.3 and 1.4, page 1.21-1.24, chapter 1.
Eff_{ELEC}	Efficiency of methane destruction / oxidation in power plant	99.5	%	ACM0008 (Version 7)

It is noted that the parameter $CONS_{ELEC}$ is assumed to be 0 for ex ante calculation. As per the PDD /2/, CMM power generation units adopted in the project activity only use CMM and no additional fuels. CMM utilization (auxiliary) facilities will consume a small amount of electricity (10%) and the electricity will be supplied by the CMM power plant itself. When calculating emission reductions, the net electricity supplied by the project activity will be used, after excluding the auxiliary electricity consumed at the power plant site. Thus the power consumption for the project is ex-ante set as 0. Hence, emission from the consumption of energy is ex-ante calculated as 0.

This simplification of the ex ante emissions reduction calculations detailed above for the proposed project reflect those presented in the registered project activity 5026, the Wuda Wuhushan Coal Mine Methane Power Generation Project.

The grid emission factor for the project is determined *ex-ante* as a combined margin, consisting of combination of the operating margin (OM) and build margin (BM) according to "Tool to calculate the emission factor for an electricity system" of version 2 /28/.

The combined margin emission factor of NCPG is determined *ex-ante* based on the most recent information available; It has been calculated as the weighted average (wOM = 0.50 : wBM = 0.50) of the operating margin and the build margin emission factors. The detailed calculations of the combined margin emission factor are described in the following section 4.6. The parameters are listed in below table and found acceptable by DNV.

Data and Parameters	***Unit***	***Value***	***Source of data used***
Density of methane	tCH_4/m^3CH_4	0.00067	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Average carbon content of coal	tC/TJ	25.8	China Energy Statistical Yearbook 2009
Operating margin of CCPG (OM)	tCO_2/MWh	0.9914	China Electric Power Yearbook 2006, 2007, 2008, 2009
Build Margin of CCPG (BM)	tCO_2/MWh	0.7495	
Emission factor of NCPG (CM)	tCO_2/MWh	0.87045	China Energy Statistical Yearbook 2006, 2007, 2008, 2009

4.7.2 PARAMETERS MONITORED EX-POST

The following data and parameters from the Methodology ACM0008 version 07 are required to be monitored; while the methodology lists many more parameters the project does not include the consideration of CBM or VAM and as such these are considered appropriate for this project.

Parameter	Description	Unit	Source
MM_{ELEC}	Volume of methane sent to power generators	m^3	Temperature and pressure will be recorded and the volume adjusted to NTP
PC_{CH4}	Percentage of pure methane (wet basis) in drained gas (by volume)	%	Gas concentration meter
PC_{NMHC}	NMHC concentration in coal mine methane	%	Annual sampling and analysis
GEN_y	Annual net power generation by the project activity	MWh	Electricity meter readings
$CONS_{ELEC}$	Additional electricity consumption for capture and use or destruction of methane, if any.	MWh	Electricity meter readings
CEF_{NMHC}	Carbon emission factor for combusted non methane hydrocarbons	$tCO_2/tNMHC$	Calculation

4.7.3 MANAGEMENT SYSTEM AND QUALITY ASSURANCE

The project applies the approved monitoring methodology ACM0008 version 7 “Consolidated baseline methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical and motive) and heat and /or destruction through flaring or flameless oxidation”.

The requirement for personnel training and management review in addition to responsibilities and authorities for project management, procedures for monitoring and reporting, QA/QC procedures are clearly stated in the Monitoring Plan, section B.7.2 of the PDD /2/.

All the monitoring data and parameters as depicted in the PDD could sufficiently be continuously monitored and recorded as required by the methodology and data in the relevant documents will be kept for at least two years after the end of the crediting period.

Calibrations will be subject to regular maintenance and testing according to technical specifications from the manufacturers to ensure accuracy and good performance.

The quality control and quality assurance procedures will guarantee the data and parameters in compliance with the requirement of the monitoring plan.

The application of the monitoring methodology is transparent and DNV considers the project participants able to implement the monitoring plan.

4.8 Algorithms and/or formulae used to determine emission reductions

Estimate of GHG emissions are in accordance with the formulae given in the baseline and monitoring methodology ACM0008 version 7 "Consolidated baseline methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical and motive) and heat and /or destruction through flaring or flameless oxidation". The emission reductions ER_y by the project activity during a given year y is the difference between the baseline emissions (BE_y), project emissions (PE_y) and leakage (LE_y), as follows:

$ER_y = BE_y - PE_y - Le_y$
$ER_y = 315\ 268 - 36\ 550 - 0$
ER_y =278 718 tCO_2e/year

where:
ER_y Emissions reductions of the project activity during year y (tCO_2e)
BE_y Baseline emissions during year y (tCO_2e)
PE_y Project emissions during year y (tCO_2e)
LE_y Leakage emissions in year y (tCO_2e)

The project participant has elected to operate the project equipment at 80% of normal operation in the proposed first year of the operation as per the PDD /2/ and FSR /4/. As a result the forecast average annual emission reduction for the first 12 months is reduced from 278 718 tCO_2e/year to 222 974 tCO_2e/year. This has the effect of reducing the average annual emissions reductions per year from 278 718 tCO_2e to 273 144 tCO_2e. The calculations in this section relate to the 100% operation level.

Baseline emissions BE_y:

$BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y}$
$BE_y = 0 + 270\ 144 + 45\ 124$
BE_y = 315 268 tCO_2e/year

where:

BE_y	=	Baseline emissions in year y (tCO_2e)
$BE_{MD,y}$	=	Baseline emissions from destruction of methane in the baseline scenario in year y (tCO_2e)
$BE_{MR,y}$	=	Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO_2e)
$BE_{Use,y}$	=	Baseline emissions from the net production of power, heat or supply to gas grid replaced by the project activity in year y (tCO_2e)

Methane destruction in the Baseline $BE_{MD,y}$ and utilization in baseline $BE_{Use,y}$

In the baseline, DNV assessed that all the extracted CMM are vented by checking the flowchart and pipeline construction site on site visit; there was to be no utilization for the methane destructed by the project. Therefore $BE_{MD,y}$ is zero.

Methane released into the atmosphere $BE_{MR,y}$

$BE_{MR,y} = GWP_{CH4} \times MM_{ELEC}$

$BE_{MR,y} = 21 \times 12\ 864$
$BE_{MR,y}$ = 270 144 tCO_2e

where:
$BE_{MR,y}$: Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO_2e);
$GWP_{CH4:}$ Global warming potential for Methane;
MM_{ELEC}: Methane measured sent to power generators (tCH_4).

Emissions from generation replaced by project $BE_{Use,y}$ are considered on a net basis:

$$BE_{Use,y} = GEN_y \times EF_{ELEC} + HEAT_y \times EF_{HEAT} = GEN_y \times EF_{ELEC}$$

$BE_{Use,y} = GEN_y \times EF_{ELEC}$
$BE_{Use,y} = (57\ 600 \times 0.9) \times 0.87045$
$BE_{Use,y}$ = 45 124 tCO_2e/year

Where
$BE_{Use,y}$: total baseline emissions from the net production of power or heat replaced by the project activity in year y (tCO_2e);
GEN_y: net electricity generated by the project activity in year y (MWh);
EF_{ELEC}: emission factor of the North China Power Grid (tCO_2e/MWh);
$HEAT_y$: heat generation by the project activity in year y (GJ);
EF_{HEAT}: emission factor for heat production replaced by project activity (tCO_2/GJ)

Project Emissions （PE_y）

Project emissions are defined by the following equation

$PE_y = PE_{ME} + PE_{MD} + PE_{UM}$
$PE_y = 0 + 35\ 199 + 1{,}351$
***PE_y* = 36 550 tCO_2e/year**

where:
PE_y: Project emissions in year y (tCO_2e)
PE_{ME} : Project emissions from energy use to capture and use methane (tCO_2e)
PE_{MD} : Project emissions from methane destroyed (tCO_2e)
PE_{UM} : Project emissions from un-combusted methane (tCO_2e)

Project emissions from energy use to capture and use methane PE_{ME} have been considered by the project participant to be 0 for ex ante emissions calculations. The project participant has proposed that CMM power generation units adopted in the project activity only use CMM and no additional fuels. CMM utilization facilities will consume a small amount of electricity and the electricity will be supplied by the CMM power plant itself.

Therefore, when calculating emission reductions, the net electricity supplied by the project activity is considered when calculating the displaced electricity from the grid. As a result the electricity used in auxiliary consumption at the power plant site is excluded and $BE_{Use,y}$ is

calculated based on the net (rather than gross) electricity output for the purposes of emissions reductions calculations.

It is noted by DNV, that the parameter $CONS_{ELEC,PJ}$ is still to be monitored as per the monitoring plan /2/.

This simplification of the emissions reductions calculations detailed above for the proposed project reflect those presented in the registered project activity 5026, the Wuda Wuhushan Coal Mine Methane Power Generation Project.

$PE_{ME} = CONS_{ELEC,PJ} \times CEF_{ELEC}$
$PE_{ME} = (0\ MWh) \times 0.87045 tCO_2e/tCH_4$
$\mathbf{PE_{ME} = 0\ tCO_2e/year}$

Where:

PE_{ME}:	Project emissions from energy use to capture and use methane(tCO_2e）；
$CONS_{ELEC,PJ}$：	Additional electricity consumption for power generation by using of methane（MWh；
CEF_{ELEC}:	CO_2 emission factor of the North China Power Grid（tCO_2e/MWh）.

Project emission from CMM/CBM destroyed PE_{MD}

$PE_{MD} = MD_{ELEC} \times (CEF_{CH4} + r \times CEF_{NMHC})$

$r = Pc_{NMHC} / Pc_{CH4}$

$PE_{MD} = MM_{ELEC} \times Eff_{ELEC} \times CEF_{CH4}$
$PE_{MD} = 12\ 864\ tCH_4/year \times 99.5\% \times 2.75\ tCO_2e/tCH_4$
$\mathbf{PE_{MD} = 35\ 199\ tCO_2/year}$

Where:

PE_{MD}：	project emission from CMM/CBM destroyed（tCO_2e）；
MD_{ELEC}:	methane destroyed through power generation（tCH_4）；
CEF_{CH4}:	carbon emission factor for combusted methane ($2.75 tCO_2e/tCH_4$)；
CEF_{NMHC}：	Carbon emission factor for combusted non methane hydrocarbons (the concentration varies and, therefore, to be obtained through periodical analysis of captured methane) (tCO_2e/tNMHC）；
r ：	relative proportion of NMHC compared to methane；
Pc_{CH4} ：	concentration (in mass)of methane in extracted gas (%), measured in wet basis；
Pc_{NMHC} ：	NMHC concentration (in mass) in extracted gas (%).

$MD_{ELEC} = MM_{ELEC} \times Eff_{ELEC}$

where:

MD_{ELEC}：	methane destroyed through power generation（tCH_4）；

MM_{ELEC} : methane measured sent to power plant（tCH_4） ;
Eff_{ELEC} : efficiency of methane destruction/oxidation in power plant (taken as 99.5% from IPCC).

Un-combusted methane from end uses (PE_{UM})

$PE_{UM}= GWP_{CH4} \times [MM_{ELEC} \times (1-Eff_{ELEC})]$
PE_{UM}=21 $tCO_2e/tCH_4 \times 12\,864$ tCH_4/year $\times$ (1-99.5%)
PE_{UM}= 1 351 tCO_2e/year

where:
PE_{UM} : project emission from un-combusted methane（tCO_2e） ;
GWP_{CH4} : global warming potential of methane（$21tCO_2e/tCH_4$） ;
MM_{ELEC}: methane measured sent to power plant（tCH_4） ;
Eff_{ELEC} : efficiency of methane destruction/oxidation in power plant（taken as 99.5% from IPCC）.

Leakage LE_y

According to the methodology, only 3 types of leakage need to be addressed.

- The displacement of baseline thermal energy use ;
- CBM extraction from out of the de-stressed zone;
- Impact of CDM project activity on coal production
- Impact of CDM project activity on coal prices and market dynamics;

Considering the following situations of the proposed project:
- All the CMM is released into the atmosphere without any utilization or associated thermal energy use. It should be noted that Wujia coal Mine is a relatively new coal mine with no existing heat or CMM customers as per the FSR /4/;
- No CBM drainage is involved;
- No noticeable impact of CDM project activity on coal production since there is no change in the extraction system.
- As per the methodology ACM0008 version 7; *"While this impact is theoretically possible, reliable scientific information is not currently available to assess this risk and check if the phenomenon would be negligible or not. Moreover, it is difficult to assess ex ante the contribution of any particular project given the dynamic nature of local and global coal markets."*

To summarize, no leakage effects need to be accounted for under the proposed project.
Therefore, **$LE_{o,y}$ = 0**.

As per Table 3 below, the project participant has planned operation of the project in the first 12 months to operate at 80% of the full project scenario in order to facilitate training and avoid damage to the main equipment as per the FSR /4/. As a result this has affected the forecast emissions reductions from 1 December 2012 to 31 December 2013 as per the table below.

Table 3: Forecast emissions reductions as per PDD /2/

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
1/12/2012-31/12/2012	2,437	21,018	0	18 581
2013	29,849	257,469	0	227 620
2014	36,550	315,268	0	278 718
2015	36,550	315,268	0	278 718
2016	36,550	315,268	0	278 718
2017	36,550	315,268	0	278 718
2018	36,550	315,268	0	278 718
2019	36,550	315,268	0	278 718
2020	36,550	315,268	0	278 718
2021	36,550	315,268	0	278 718
1/1/2022 - 30/11/2022	33,504	288,996	0	255 492
Total (tCO_2e)	**358,190**	**3,089,626***	**0**	**2 731 436***

* It is noted that in the table above, the correct total for Estimation of baseline emissions is 3 089 626 tCO_2e and not 3 089 627 tCO_2e, likewise, the Estimation of overall emission reductions is 2 731 436 tCO_2e and not 2 731 437 tCO_2e as the summation of the corresponding tabled data above suggests. This is due to the rounding of annual emissions data to the nearest tCO_2e. This is noted in the PDD /2/ and demonstrated in the ER calculation spread sheet /11/.

Uncertainty

The major uncertainty related to the project's emission reductions is the amount of CMM captured in the future. To estimate future CMM, the project owner provided its formal coal production plan for the 10 years after project starts. The mine is in early the development stages in an area known to be rich in gassy coal. Based on the FSR /4/ and the *Coal Mine Methane Extraction Design Report for Wujia Coal Mine* /5/, CMM utilised by the project is expected to comprise approximately 55% of the total estimated CMM extracted from the Wujia Coal Mine.

Relative emissions are not likely to vary significantly at the Wujia Coal Mine and the gas availability can hence be reasonably predicted from the product of relative emissions and projected annual coal production levels, given that demand for coal will remain at the same level for at least the crediting period.

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 273 144 tCO_2e per year for the selected crediting period.

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

project and leakage emissions can be replicated using the data and parameter values provided in the PDD.

4.9 Environmental impacts

An Environmental Impact Assessment (EIA) has been conducted according to Chinese law and regulation /3/. The potential environmental impacts have been sufficiently identified. No significant environmental impacts are expected from the project activity. The relevant environmental impacts are sufficiently documented in the PDD.

The Jincheng Environmental Protection Bureau approved the project activity on 20 December 2008 /3/.

4.10 Comments by local stakeholders

According to the requirement of relevant environmental law, a public consultation process has been carried out during the EIA stage in October 2008 /3/. For stakeholder comments, a public meeting was held at its headquarters in Jincheng city on 19 May 2009 /33//14/.

Participants were invited via posted invitation with the assistance of the local village committee and included both male and female villagers across a range of ages and educational backgrounds. Comments are summarized in the PDD. No concerns were raised in any of the 40 questionnaires which were distributed and returned completed.

DNV considers the local stakeholder consultation carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 1 dated 19 July 2010, was made publicly available on the CDM website and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 26 October 2010 to 24 November 2010 (http://cdm.unfccc.int/Projects/Validation/DB/ZBGMHYZ6DPM5LGPGKHPJWAVP5Y53KT/view.html). No comments were received.

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APPENDIX A

CDM VALIDATION PROTOCOL

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

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	OK
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	OK
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	OK
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		~~CAR 1~~ ~~CL 5~~ ~~CL 7~~ ~~CL 8~~ ~~CL 9~~ ~~CL 10~~ ~~CL 11~~ ~~CL 12~~ ~~CL 13~~ ~~CL 14~~ ~~CL 15~~ ~~CL 16~~ ~~CL 17~~ ~~CL 18~~
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK ~~CL 19~~ ~~CL 20~~ ~~CL 21~~
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK ~~CL 29~~

Requirement	Reference	Conclusion
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK ~~CL 30~~
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	~~OK~~ ~~CL 3~~ ~~CL 4~~ ~~CL 5~~ ~~CL 6~~
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	~~OK~~ ~~CL 24~~ ~~CL 25~~ ~~CL 26~~ ~~CL 27~~

Table 2 Requirements checklist

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity					
A.1 Title of the project activity (VVM para 55-57)					
A.1.1 Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ Date of the PDD is included.		OK
A.1.2 Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	☒ Yes *If no, list where the PDD is not in accordance:*		OK
A.2 Description of the project activity (VVM para 58-64)					
A.2.1 How was the design of the project assessed?	/1/	DR	*What type is the project?* ☒ Project in existing facility or utilizing existing equipment(s) ☒ Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO_2e per year. In this case, a site visit must be performed. ☐ Project is a bundled small scale project, with each project in the bundle with emission reductions not exceeding 15 000 tCO_2e per year. In such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis. ☐ The project is an individual small scale		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			project activity with emission reductions not exceeding 15 000 tCO_2e per year. In this case, DOE may not conduct a physical site visit as appropriate. ☐ Greenfield project *How was the design of the project assessed?* ☒ Physical site inspection ☒ Reviewing available designs and feasibility studies *If a physical site inspection is not undertaken, justify why no site visit was undertaken:*		
A.2.2 If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR	*Not Applicable*		OK
A.2.3 If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year), justify the sampling through a statistical analysis:	/1/	DR	*Not Applicable*		OK
A.2.4 Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/	DR	The PDD provides clear understanding of the nature of the proposed CDM project activity, however the location of the project in or near the Wujia Coal Mine is unclear from the description in the PDD. The project participant is requested to clarify this in the PDD. During the site visit it was confirmed through visual inspection that the coal mine associated with the project activity, the Wujia coal mine, is an underground mine and that no open cut mining activities are associated with the project activity. The project geographic coordinates are requested	~~CL 1~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			to be clarified by the project participant as the coordinates stated in the PDD E35°12'01'' and N112°01'02'' are incorrect and possibly mislabelled with regards to N and E.		
A.2.5 Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/	DR	Yes. The project activity involves the installation of 20 new 500 kW power generation units in or near the Wujia Coal Mine, which were not present prior to the project activity.		OK
A.2.6 Does the project design engineering reflect current good practices?	/1/ /7/ /8/	DR I	Yes. The applied technology reflect current good practices in China.		OK
A.2.7 Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/ /7/ /8/	DR I	Yes. The technology will result in a better performance. There is no transfer of technology from any Annex I Party involved.		OK
A.3 Participation requirements (VVM para 51-54, 125-127)					
A.3.1 Do all participating Parties fulfil the participation requirements as follows:	/1/	DR			OK
			China (host) / The UK / Country Y		
a) Party has ratified the Kyoto Protocol			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
b) Party has designated a Designated National Authority			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
c) The assigned amount has been determined			☒ Yes ☐ No / ☐ Yes ☒ No / ☐ Yes ☐ No		
A.3.2 Do the letters of approval meet the following requirements?	/1/ /24/ /25/	DR			OK
			China (host) / The UK / Country Y		
a) LoA confirms that Party has ratified the Kyoto Protocol			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		
b) LoA confirms that participation is voluntary			☒ Yes ☐ No / ☒ Yes ☐ No / ☐ Yes ☐ No		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
c) The LoA confirms that the project contributes to the sustainable development of the host country?	☒ Yes ☐ No		NA NA		
d) The LoA refers to the precise project activity title in the PDD	☒ Yes ☐ No		☒ Yes ☐ No ☐ Yes ☐ No		
e) The LoA is unconditional with respect to (a) to (d) above	☒ Yes ☐ No		☒ Yes ☐ No ☐ Yes ☐ No		
f) The LoA is issued by the respective Party's DNA	☒ Yes ☐ No		☒ Yes ☐ No ☐ Yes ☐ No		
g) The LoA was received directly by the DNA or the PP	☐ DNA ☒ PP		☐ DNA ☒ PP ☐ DNA ☐ PP		
h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic					
A.3.3 Have all private/public project participants been authorized by an involved Party?	/1/	DR	LoAs from the Designated National Authorities have been received for both the People's Republic of China and the United Kingdom		OK
A.4 Technical description of the project activity (VVM para 58-64)					
A.4.1 Is the project's location clearly defined?	/1/	DR	The projects location is clearly defined within China, Shanxi Province, Yangcheng City and Qinchi Town, however the projects location in relation to the Wujia Coal Mine is unclear in the PDD. The project participant is requested to include the location of gas wells in the PDD.	~~CL 1~~	OK
A.5 Public funding of the project activity					
A.5.1 In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/1/	DR	No public funding is involved as the project is funded internally and from loans.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B Application of a baseline and monitoring methodology					
B.1 Methodology applied (VVM para 65-76					
B.1.1 Does the project apply an approved methodology and the correct and valid version thereof?	/1/ /27/	DR	The project applies the approved consolidated methodology ACM0008 version 7 *"Consolidated methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical or motive) and heat and/or destruction through flaring or flameless oxidation"*		OK
B.1.2 If applicable, has any specific guidance provided by the CDM EB in respect to the applied methodology been considered?	/1/	DR	Not applicable		OK
B.2 Applicability of methodology (and tools) (VVM para 65-76) *Insert a row for each applicability criteria of the applied methodology (and tools)*					
B.2.1 How was it validated that project complies with the following applicability criteria? This methodology applies to project activities that involve the use of any of the following extraction activities: - Surface drainage boreholes to capture CBM associated with mining activities; - Underground boreholes in the mine to capture pre mining CMM; - Surface goaf wells, underground boreholes, gas drainage galleries or other goaf gas capture techniques, including gas from sealed areas, to capture post mining CMM; - Ventilation air methane that would normally be vented.	/1/ /27/	DR	The project utilises: - underground boreholes in the mine to capture pre mining activities; and - underground boreholes, gas drainage galleries or other goaf gas capture techniques, including gas from sealed areas, to capture post mining CMM. Thus the project is in compliance with applicability criteria 1. The project participant is requested to clarify the apparent contradiction between the statement in table B.2-1 that ventilation CMM that would normally be vented is not included in the project		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			where as in table B.2-2 it is stated that part of CMM is still vented for safety reason.		
B.2.2 How was it validated that project complies with the following applicability criteria:? This methodology applies to CMM and VAM capture, utilisation and destruction project activities at a working coal mine, where the baseline is the partial or total atmospheric release of the methane and the project activities include the following method to treat the gas captured: - The methane is captured and destroyed through flaring; and/or - The methane is captured and destroyed through flameless oxidation and/or - The methane is captured and destroyed through utilisation to produce electricity, motive power and/or thermal energy; emission reductions may or may not be claimed for displacing or avoiding energy from other sources; - The remaining share of the methane, to be diluted for safety reason, may still be vented; - All the CBM or CMM captured by the project should either be used or destroyed, and cannot be vented.	/1/ /27/	DR	For the Project: - The baseline is the total or partial or total atmospheric release of the methane from the Wujia Coal Mine; - The captured methane is used to generate electricity, which will displace the power from the North China Power Grid. The emission reductions will be claimed; - Part of CMM is still vented for safety reasons; and - CMM captured in the project will be utilized for power generation. Thus the project is in compliance with applicability criteria 2.		OK
B.2.3 How was it validated that project complies with the following applicability criteria? In the case of opencast mines, the methodology also limits the following: - The mines should have had a working mining concession for at least three years prior to the start of project; - Only pre-mine drainage from wells placed within the area to be mined are considered as eligible for crediting; - Such pre-mine drainage well life may be credited up to but no more than ten years prior to actual mining or the date of issuance of mining concession, whichever is later; - For open cast mines, avoided emissions from methane	/1/ /27/	DR	The Wujia Coal Mine is not an open cast mine. This was confirmed through visual inspection during the site visit. Applicability criteria 3 is not applicable to the project.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
extracted should only be credited in the year in which the seam is mined through the well zone of influence or the de-stressing zone.					
B.2.4 How was it validated that project complies with the following applicability criteria? Project participants must be able to supply the necessary to data for ex ante projections of methane demand as described in sections Baseline Emissions and Leakage to use this methodology.	/1/ /27/	DR	Methane demand is fixed at the rated maximum capacity of the 10MW generator capacity.		OK
B.2.5 How was it validated that project complies with the following applicability criteria? The methodology does not apply to project activities with any of the following features: - Capture methane from abandoned/decommissioned coalmines; - Capture/use of virgin coal bed methane, e.g. methane of high quality extracted from coal seams independently of any mining activities; - Use CO_2 or any other fluid/gas to enhance CBM drainage before mining takes place.	/1/ /4/ /27/ /57/	DR	The project: - is being conducted simultaneously to the coal mining activity; and - does not capture or utilise coal bed methane. This was confirmed through visual inspection of the working coal mine during the site visit, review of FSR and interviews with mine management representative Mr Xiangjin Yan. Thus the project is in compliance with applicability criteria 5.		OK
B.2.6 Is the selected baseline one of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?	/1/ /27/	DR	The selected baseline of venting pre-mining CMM/post mining CMM; purchasing power from the North China Power Grid is one of the baselines described in the methodology ACM0008 version 7.		OK
B.3 Project boundary (VVM para 78-80)					
B.3.1 What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?	/1/ /27/	DR	The project's system boundaries include all of the equipment and instrument installed in the system from gas inlet of the CMM pretreatment to power output of the power station, as well as all of the power plants that are connecting to the North		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			China Power Grid. This is in compliance with the spatial boundary requirements detailed in the methodology ACM0008 version 7.		
B.3.2 Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/	DR	The PDD identifies GHG sources as: - CH4 related to the avoided methane emissions from CMM utilised for electricity production and fugitive emissions of unburned methane. - CO_2 related to the combustion of CMM during electricity production, the production of grid electricity and emissions from non methane hydrocarbon destruction.		OK
B.3.3 Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/1/ /27/	DR	No other sources contribute with more than 1% of the estimated emission reductions of the project has been identified that is not foreseen by the methodology ACM0008 version 7.		OK
B.4 Baseline scenario determination (VVM para 81-88, 105-107) *Ensure that the evaluation of all alternatives provided in the PDD and required by the methodology and also possible alternatives/offshoots of alternatives are discussed. Check that all alternatives required to be considered by the methodology are included in the final PDD. If baseline alternatives required to be considered by the methodology are considered not applicable, please assess the justification for this.*					
B.4.1 Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/ /27/	DR	1. Baseline scenario alternatives for CMM extraction Scenario C		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			The combination of A and B, with pre mining CMM/post mining CMM. The project participant is requested to clarify how it has been concluded that there are no more heat consumers in the Wujia coal mine area.	~~CL 2~~	
			The project participant is requested to clarify the relative shares of each gas in the baseline as required by the methodology ACM0008.	~~CL 3~~	
			2. Baseline scenario alternatives for extracted CMM treatment i Venting iii Flaring of CMM; iv Use for additional grid power generation; v Use for additional captive power generation; vii Feed into gas pipeline (to be used as fuel for vehicles or heat/power generation); viii The combination of scenarios i and i. The project participant is requested to clarify the characters used in step 2 Baseline scenario alternatives for CMM extraction on page 11 of the PDD as characters are represented as boxes.	~~CL 4~~	
			The project participant is requested to clarify the relative shares of gas treated under each option specified.	~~CL 3~~	

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			3. Baseline scenario alternatives for energy production Scenario P1, the continuation of the current situation, purchasing electricity from the North China Power Grid; Scenario P3, the use CMM for power production, this is the project activity not implemented as a CDM project.		
B.4.2 How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/	DR	The baseline scenarios have been eliminated as follows: 1. Barriers analysis made on baseline alternatives for CMM extraction Scenario C It is the continuation of the current situation, facing no barriers. The project participant is requested to provide the translated reference for the "National coalmine safety regulation (version 2010)"-chapter 2, section 2, item 136. As the link provided in the PDD is broken. 2. Barriers analysis made on baseline alternatives for extracted CMM treatment Scenario i It is the continuation of the current situation, facing no barriers.	~~CL 5~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Scenario iii Destroying methane by flaring does not utilize the energy potential of CMM, but requires great investment without any revenues. Thus scenario iii faces investment barriers and will be eliminated. The project proponent is requested to clarify how the use of low concentration CMM (<30% CH_4) is not systematically enforced as per (GB 21522-2008) and also that non-compliance with this requirement is widespread in the country Scenario iv This is the proposed project activity not implemented as a CDM project. This scenario is technically feasible because of many CMM power generation project has been carried out in China. However, as described in B.5, the scenario has investment barriers. This scenario could be eliminated. Scenario v This scenario has same investment barriers as Scenario IV mentioned above, because same CMM power generation units would be installed and operated at the CMM power plant. The total amount of electricity consumed by the mine annually is estimated about 5 760 MWh, which is only 10 % of the total electricity generated by the CMM power plant. Thus almost of electricity generated should be supplied to the Grid. Furthermore, if the gas drainage, gas supplying or gas generating system would have some troubles,		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			the electricity to the mine would be stopped. This will result in serious problem for mine safety such as shut down of fans for ventilation. Therefore, this scenario could be eliminated. Scenario vii There are no residents and enterprises near the project site. Laying gas pipe in long distance will cost too much, so scenario vii faces investment barrier and will be eliminated. Scenario viii As analyzed above, scenario ii，iii，iv ，v，vi ，vii are not feasible scenarios therefore scenario viii is eliminated from baseline scenario. As a result of above consideration, Scenario I (business as usual scenario) is the only scenario that does not face prohibitive barriers. Therefore, it is considered to be the baseline scenario. 3. Barrier analysis made on baseline alternatives for energy production Scenario P1 Purchasing electricity from the North China Power Grid is the continuation of the current situation and faces no barrier. Scenario P3 The project is not financially attractive. Therefore, scenario v faces investment barrier and should be eliminated.		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4.3 What is the baseline scenario?	/1/	DR	The selected baseline is venting pre-mining CMM/post mining CMM and purchasing power from the North China Power Grid. Pending resolution of CL 4 and CL 5. Refer to B.4.1 and B.4.2.	~~CL 4~~ ~~CL 5~~	OK
B.4.4 Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/	DR	Pending resolution of CL 4 and CL 5. Refer to B.4.1 and B.4.2.	~~CL 4~~ ~~CL 5~~	OK
B.4.5 Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Pending resolution of CL 5. Refer to B.4.2.	~~CL 5~~	OK
B.4.6 Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Pending resolution of CL 5. Refer to B.4.2. The baseline scenario has taken into account all relevant national and sectoral policies, including the National Coalmine Safety Regulation (2005), Emission standard of Coal bed Methane/Coal Mine Gas (on trial), GB21522-2008" on April 2, 2008, Coalmine Methane Treatment and Utilization Macro Plan.	~~CL 5~~	OK
B.4.7 Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Pending resolution of CL 5, the baseline scenario determination is compatible with the available data and all literature and sources clearly referenced.	~~CL 5~~	OK
B.4.8 Is the baseline determination adequately documented in the PDD? • All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and	/1/	DR	Pending resolution of CL 5. Refer to B.4.2. Clarification is requested to demonstrate that VAM technology is still experimental and utilising VAM is cost prohibitive.	~~CL 5~~ ~~CL 6~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity					
B.5 Additionality determination (VVM para 94-121					
B.5.1 What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/ /27/	DR	The methodology ACM0008 specifies the use of the "Tools for the demonstration and assessment of additionality"(version 06.0). Step 1 of the tool can be ignored in accordance with ACM0008. Investment analysis has been selected to demonstrate additionality of the project using option II, benchmark analysis as the project generates income other than CDM generated income.		OK
B.5.2 Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR	Pending resolution of CL 5. Refer to B.4.2.	~~CL 5~~	OK
B.5.3 Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	For Table B.5-2 in the PDD, no references have been provided. The PDD refers to Table B.5-1 for the IRR calculation data, however this data is presented in table B.5-2 in the PDD.	~~CL 7~~	OK
B.5.4 What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	Project additionality is mainly based on financial analysis.		OK
Prior consideration of CDM (VVM para 98-103)					
B.5.5 What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/	DR	The format of dates supplied in Table B.5-1 of the PDD is inconsistent. Full dates including day, month and year are required for each entry. Evidence for serious consideration of CDM prior to the time of decision to proceed with CDM includes the publishing of the FSR in January 2009 and the completion of the EIA on 20	~~CL 8~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			October 2009 and approval of the EIA on 20 December 2009.		
B.5.6 If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/ /12/ /13/	DR	The starting date of the project is detailed in the PDD as being 5 March 2010, the date of construction starting. Notification of the UNFCCC of the project participant intention to seek CDM status is listed on the UNFCCC website as 31 March 2010. Notification of the Chinese DNA of intention to seek CDM status confirmed during site visit as 8 February 2010.		OK
Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)					
B.5.7 What initiatives where taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/1/ /7/ /13/	DR	From the starting date of the project activity the following initiatives were taken by the project participant in parallel to the physical implementation of the project: - 31 March, 2010 Informed UNFCCC of the project status for seeking the help of CDM - 1 April, 2010 Equipment contract signed - 30 April, 2010 ERPA signed		OK
B.5.8 When did the construction of the project activity start?	/1/ /30/	DR	Construction of the projects started on 5 March 2010. This was confirmed during the site visit through interviews with Mr. Xiangjin Yan and Mr. Hongtao Lu of Jincheng Runhong Coal Mine Methane Power Co. Ltd.		OK
B.5.9 When was the project commissioned?	/1/	DR	The project was commissioned in January 2011. The project proponent is requested to provide the full date for the project commissioning. Refer to B.5.5 and CL 8.	~~CL 8~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.10 Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	Yes, continuous actions in parallel with the implementation were taken to secure CDM status.		OK
Investment analysis (VVM para 108-114) *The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.*					
B.5.11 Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/	DR	Yes, the sale of electricity generated by the project generates income. This is reflected in the PDD.		OK
B.5.12 Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	Yes other alternatives to the project involve investment including the implementation of the project without CDM revenue and the flaring of CMM. This is reflected in the PDD.		OK
B.5.13 Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	The choice of benchmark analysis is correct due to the project activity generating revenue apart from CDM revenue.		OK
B.5.14 Is the benchmark/discount rate the latest available at the time of decision?	/1/	DR	The benchmark rate of 8% for the coal mining industry is in reference to the Economic Evaluation Method and Parameters for Construction Projects/Version 03", China Plan Press, 2006. The project participant is requested to substantiate the appropriateness of the applied benchmark and the suitability of the input values applied in the benchmark selection considering the primary activity of the project is electricity generation from coal mine methane.	~~CL 9~~	OK
B.5.15 What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the	/1/	DR	The financial indicator used is the Internal Rate of Return based on total investment before		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
benchmark?			income tax.		
B.5.16 Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/	DR	It is stated in the PDD that the CMM in the baseline will be vented directly to the atmosphere. However, in the financial analysis the CMM is assigned a value of 0.17 RMB/M^3. The project proponent is requested to clarify the validity and suitability of the CMM price. The project participant is requested to demonstrate that all applicable government subsidies have been considered such as tax exemptions and VAT refunds.	~~CL 10~~	OK
B.5.17 Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/	DR	Clarification is requested to provide the IRR calculation spreadsheet in a transparent way including links to basic parameters and formulae.	~~CL 11~~	OK
B.5.18 Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/	DR	Refer to B.5.17 and CL 10.	~~CL 11~~	OK
B.5.19 When a feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?	/1/ /4/ /7/	DR	The project participant is requested to justify the validity and suitability of the input parameters for the financial analysis. The FSR details a total installed capacity of 15 MW, however the FSR approval, the PDD and the equipment purchase contract only detail 10 MW installed capacity.	~~CL 12~~	OK
B.5.20 How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/	DR	☐ The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval ☒ The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company)	~~CL 12~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			☐ Other approach. *Provide details on how the load factor was validated::* The financial analysis of the project is based on that conducted in the FSR. The FSR details a total installed capacity of 15 MW, however the FSR approval, the PDD and the equipment purchase contract only detail 10 MW installed capacity. Refer to CL 12 and B.5.19.		
B.5.21 How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the output price was validated:* The output price of electricity stated in the PDD and FSR is 0.3248 RMB before tax and 0.38 RMB after tax. The project participant is requested to provide the reference to clarify the validity and suitability of the electricity tariff.	~~CL 13~~	OK
B.5.22 How were the investment costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /4/ /7/ /8/ /9/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements, contracts and annual financial reports related to the project and the project participants *Provide details on how the investment costs were validated:* The financial analysis of the project is based on	~~CL 12~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			that conducted in the FSR. The FSR details a total installed capacity of 15 MW, however the FSR approval, the PDD and the equipment purchase contract only detail 10 MW installed capacity. Refer to CL 12 and B.5.19.		
B.5.23 How were the O&M costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/	DR	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how the O&M costs were validated:* Input parameters for O&M costs in the financial analysis have considered quotations provided by different quotations and proposals. It was verified that the O&M costs were estimated at the time of decision making and that the input for the investment costs were correct and appropriate. The breakdown of the operational and plant overhead costs should be included in the PDD and referenced accordingly.	~~CL 14~~	OK
B.5.24 Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /4/	DR	☐ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☒ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants *Provide details on how other input parameters were validated:* The project participant is requested to justify the validity and suitability of the input parameters for the financial analysis.	~~CL 12~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.25 Was the financial calculation spreadsheet verified and found to be correct?	/1/	DR	Pending resolution of CL 10 and CL 11. Refer to B.5.17 and B.5.19.	~~CL 11~~ ~~CL 12~~	OK
B.5.26 Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/	DR	The cost of electricity tariff has not been included in the sensitivity analysis in the PDD and it is not clear if it is included in the sensitivity analysis parameter titled operating cost.	~~CL 15~~	OK
B.5.27 Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	The project participant is requested to clarify the validity and suitability of the + and – 10% range for the sensitivity analysis.	~~CL 15~~	OK
B.5.28 Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/	DR	The project participant is requested to extent the sensitivity analysis to reach the benchmark and provide justification relating to the likelihood of this to happen.	~~CL 15~~	OK
Barrier analysis (VVM para 115-118)					
B.5.29 Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.	/1/	DR	Barrier analysis not opted for by the Project Participant for additionality assessment and demonstration. Guidance for barrier analysis requires elaboration as to why barrier analysis has not been conducted. The project participant is requested to address this.	~~CL 16~~	OK
B.5.30 How were the investment barriers assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.31 How does CDM alleviate the investment barriers?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.32 Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.33 How were the technological barriers assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.34 How does CDM alleviate the technological barriers?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.35 Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.36 How were the barriers due to prevailing practise assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.37 How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.38 Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.39 How were the other barriers assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.40 How does CDM alleviate the other barriers?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
B.5.41 Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Refer to B.5.29.	~~CL 16~~	OK
Common practice analysis (VVM para 119-121)					
B.5.42 What is the geographical scope of the common practice analysis? Is this justified?	/1/	DR	The geographical scope of the common practice analysis has been defined as Shanxi province, China. The project participant is requested to justify the geographical scope of the common practice analysis as Shanxi Province and not all of China.	~~CL 17~~	OK
B.5.43 What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/	DR	The scope of technology has included CMM projects of all capacity ranges.		OK
B.5.44 What is the data source(s) used for the common practice	/1/	DR	The data source for the common practice analysis	~~CL 18~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
analysis?			is the Methane to Markets International Coal Mine Methane Projects Database located at http://www2.ergweb.com/cmm/index.aspx. The project participant is requested to clarify the justification and suitability of using a single source of information for the common practice analysis.		
B.5.45 How many similar non-CDM-projects exist in the region within the scope?	/1/	DR	According to the PDD and the referenced Methane to Markets International Coal Mine Methane Projects Database, there are no CMM projects that are not currently seeking CDM income. Refer to CL 18 and B.5.44.	~~CL 18~~	OK
B.5.46 How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	All CMM projects within Shanxi Province have been invited to comparison in the common practice analysis. Refer to CL 18 and B.5.44.	~~CL 18~~	OK
B.5.47 What is the conclusion of the common practice analysis?	/1/	DR	The conclusion of the common practice analysis is: That all other similar projects in Shanxi province are also applying for CDM finance and are therefore excluded from the analysis. There are therefore no projects that are similar to the proposed projects that have proceeded without the CDM. This further demonstrates the barriers that the project faces and that the project is additional. Refer to CL 18 and B.5.44.	~~CL 18~~	OK
Conclusion					
B.5.48 What is the conclusion with regard to the additionality of the project activity?	/1/	DR	In conclusion, it is demonstrated that the project is not a likely baseline scenario, and that emission reductions resulting from the project are		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			additional.		
B.6 Calculations of GHG emission reductions					
Data and parameters that are available at validation and that are not monitored (VVM para 199-203)					
B.6.1 How was Carbon emission factor for combusted methane verified?	/1/ /27/	DR	The carbon emissions factor for combusted methane used in the PDD is 2.75 tCO_2e/tCH_4 as per the methodology ACM0008 version 7 and Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2Energy, Table 1.3 and 1.4, page 1.21-1.24, chapter 1. Clarification is requested to justify the data and parameters that are available at validation included in the PDD.	~~CL 19~~	OK
B.6.2 How was Global warming potential of methane verified?	/1/ /27/	DR	The global warming potential for methane used in the PDD is 21 tCO_2e/tCH_4 as per the methodology ACM0008 version 7 Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2Energy, Table 1.3 and 1.4, page 1.21-1.24, chapter 1. Refer to CL 19 and B.6.1.	~~CL 19~~	OK
B.6.3 How was Carbon emission factor for combusted non methane hydrocarbons verified?	/1/	DR	The carbon emission factor for combusted non methane hydrocarbons is included in the section B.6.2 for data and parameters that are available at validation. The carbon emission factor for combusted non methane hydrocarbons should be moved to section B.7.1 data and parameters monitored. Refer to CL 19 and B.6.1.	~~CL 19~~ ~~CL 20~~	OK
B.6.4 How was the Power generation of provincial sub-girds in the North China Power Grid verified?	/1/	DR	The Power generation of provincial sub-girds in the North China Power Grid for 2005 has been included in Annex 3 of the PDD.	~~CL 19~~ ~~CL 21~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			The project participant is requested to justify why the 2005 data is valid and suitable.		
B.6.5 How was the electricity consumed by each provincial sub-grids connected with the North China Power Grid verified?	/1/	DR	The electricity consumed by each provincial sub-grids connected with the North China Power Grid has been included in Annex 3 of the PDD. Refer to CL 19 and B.6.1	~~CL 19~~	OK
B.6.6 How was the Installed capacity of provincial sub-girds in the North China Power Grid verified?	/1/	DR	The Installed capacity of provincial sub-girds in the North China Power Grid has been included in Annex 3 of the PDD. Refer to CL 19 and B.6.1	~~CL 19~~	OK
B.6.7 How was the Coal consumption rate of power supply of commercialized optimal efficient coal-fired power generation technology verified?	/1/	DR	The project participant is requested to provide the full reference for the Coal consumption rate of power supply of commercialized optimal efficient coal-fired power generation technology and include the reference in Annex 3 of the PDD.	~~CL 19~~ ~~CL 20~~	OK
B.6.8 How was the Coal consumption rate on power supply of commercialized optimal efficient oil-fired and gas-fired power generation technologies verified?	/1/	DR	The project participant is requested to provide the full reference for the Coal consumption rate on power supply of commercialized optimal efficient oil-fired and gas-fired power generation technologies and include the reference in Annex 3 of the PDD.	~~CL 19~~ ~~CL 20~~	OK
B.6.9 How was the Net calorific value of fuel *I* verified?	/1/	DR	The Net calorific value of fuel *i* has been included in Annex 3 of the PDD. The reference was verified during the site visit.	~~CL 19~~	OK
B.6.10 How was the The amount of fuel I (in a mass or volume unit) consumed by relevant provincial sub-grid j in year y verified?	/1/	DR	The amount of fuel i (in a mass or volume unit) consumed by relevant provincial sub-grid j in year y has been included in Annex 3 of the PDD. The reference was verified during the site visit.	~~CL 19~~	OK
Baseline emissions (VVM para 89-93)					
B.6.11 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /27/	DR	Pending resolution of CL 5, baseline emissions were calculated in accordance with ACM0008,	~~CL 5~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			taking into account emissions due to: - Methane destroyed in the baseline scenario (assumed to be 0), - Methane released to the atmosphere, - emissions from the production of power supplied to the grid replaced by the project activity.		
B.6.12 Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	Methane destroyed in the baseline scenario is assumed to be 0. According to standard (GB 21522-2008) for extracted CMM utilization issued by Ministry of Environmental Protection in April 2008 and valid from 1 July 2008: For gassy coal mines which started operation before 1 July 2008, including Wujia coal mine, the extracted CMM can be vented until 31 December 2009. The extracted CMM has to be utilized after 1 January 2010. Refer to CL 5 in B.4.2.	~~CL 5~~	OK
B.6.13 Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	Uncertainties in the baseline are mainly related to measured parameters.		OK
Project emissions (VVM para 89-93)					
B.6.14 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /27/	DR	Project emissions were calculated in accordance with ACM0008, taking into account emissions due to: - Project emissions from energy use to capture and use methane, - Project emissions from methane destroyed, and - Project emissions from un-combusted		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			methane.		
B.6.15 Have conservative assumptions been used when calculating the project emissions?	/1/	DR	Efficiency of methane destruction/oxidation in power plant（taken as 99.5% from IPCC）is considered conservative. As per tool to calculate emission factor for an electricity system, the date vintages should be based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. The PDD was webhosted on 26 October 2010, the China Energy Statistical Yearbooks 2009 and China Electric Power Yearbook 2008 has been published prior to that, the calculation of the grid emission factor should be updated to the latest data in ER spreadsheet and PDD Section B6.	~~CL 22~~	OK
B.6.16 Are uncertainties in the project emission estimates properly addressed?	/1/	DR	Uncertainties in the project emissions are mainly related to measured parameters.		OK
Leakage (VVM para 89-93)					
B.6.17 Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/	DR	It is stated in the PDD that there is no leakage for this project because: - No displacement of baseline thermal energy uses in the project. - The project does not involve CBM. - The baseline scenario of the project activity involves methane extraction, the impact on the coal production is not relevant. Refer to CL 2 and B.4.1.	~~CL 2~~	OK
B.6.18 Have conservative assumptions been used when calculating	/1/	DR	Not applicable.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
the leakage emissions?					
B.6.19 Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	Not applicable.		OK
Emission Reductions (VVM para 89-93)					
B.6.20 Algorithms and/or formulae used to determine emission reductions: • All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.	/1/	DR	Clarification is requested to provide the emissions reduction calculation spreadsheet in a transparent way including links to basic parameters and formulae. The project participant is requested to correct the emissions reduction calculations related to the operation of the proposed project at 80% during the first 12 months.	~~CL 23~~ ~~CAR 1~~	OK
B.7 Monitoring plan (VVM para 122-124)					
Data and parameters monitored					
B.7.1 Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/ /27/	DR	The monitoring plan in the PDD refers to monitoring methodology ACM0008 version 6. The version identified in section B.1 of the PDD is version 7, which is the current monitoring methodology at the time of publication of the PDD. The project participant shall monitor pre -mining CMM and post-mining CMM destroyed in the project activity separately as required by the monitoring methodology of ACM0008 version 7.	~~CL 24~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.7.2 Does the monitoring plan contain all necessary parameters, and are they clearly described?	/1/ /27/	DR	The monitoring plan does not include parameters for: - Pre-mining CMM captured, sent to and destroyed by use *i* in the project activity in year *y* ($CMM_{PJ, i,y}$) - Post-mining CMM captured, sent to and destroyed by use *i* in the project activity in year *y* ($PMM_{PJ, i,y}$) As is required by the methodology ACM0008	~~CL 24~~	OK
B.7.3 In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	The following parameters are measured: - MM_{ELEC} Methane sent to power generators. A flow meter with differential pressure measurement function will be used to determine the flow to all generator sets. - PC_{CH4} Concentration of pure methane (wet basis) in drained gas (by volume). Methane meter at the inlet to each generator. - PC_{NMHC} NMHC concentration in coal mine methane. Samples of gas will be extracted into gas sampling bottles using the appropriate procedures and analyzed by an accredited laboratory. - GENPJ to Grid, y The readings of electricity meter will be continuously measured and monthly recorded. Automatic measurement and automatic recording will be made by computers. Double checking by the receipt of electricity sales. - GENPJ to Wujia, y Electricity supplied	~~CL 24~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			to Wujia Coal mine by the proposed project in year y. Power generation will be metered on generator. - **T** Temperature of CMM. Measured by thermocouple.		
B.7.4 In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	The measurement accuracy of measured parameters has been included in the monitoring plan of the PDD for: - PC_{CH4} Percentage of pure methane (wet basis) in drained gas (by volume). Accuracy of analysis +/-2.5%FSD (full scale deflection) and reproducibility +/-1% of reading. Measurement accuracy has not been addressed for other measured parameters. The project proponent is requested to clarify this.	~~CL 25~~	OK
B.7.5 In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/	DR	The following parameters are measured: - MM_{ELEC} Methane sent to power generators. Flow meters will be calibrated according to the manufacturer's specifications. - PC_{CH4} Concentration of pure methane (wet basis) in drained gas (by volume). Methane meters will be calibrated according to the manufacturer's specifications. - PC_{NMHC} NMHC concentration in coal mine methane. Samples of gas will be extracted into gas sampling bottles using the appropriate procedures and analyzed by an accredited laboratory. Calibration and maintenance should be made		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			regularly to the analyzing instrument. - GENPJ to Grid, y The readings of electricity meter will be continuously measured and monthly recorded. These equipment and systems should be calibrated and checked every year. - GENPJ to Wujia, y Electricity supplied to Wujia Coal mine by the proposed project in year y. These equipment and systems should be calibrated and checked every year. - **T** Temperature of CMM. Calibration as per manufacturers' instructions.		
B.7.6 Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	The following parameters are measured: - MM_{ELEC} Methane sent to power generators. Monitoring frequency not nominated. Project participant is requested to clarify. - PC_{CH4} Concentration of pure methane (wet basis) in drained gas (by volume). Monitoring frequency not nominated. Project participant is requested to clarify. - PC_{NMHC} NMHC concentration in coal mine methane. Monitoring frequency annual. - GENPJ to Grid, y The readings of electricity meter will be continuously measured and monthly recorded. - GENPJ to Wujia, y Electricity supplied to Wujia Coal mine by the proposed project in year y. Monitoring frequency not nominated. Project participant is	~~CL 26~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			requested to clarify. - **T** Temperature of CMM. Monitoring frequency not nominated. Project participant is requested to clarify.		
B.7.7 Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	The following parameters are measured: - MM_{ELEC} Methane sent to power generators. Recording frequency not nominated. Project participant is requested to clarify. - PC_{CH4} Concentration of pure methane (wet basis) in drained gas (by volume). Recording frequency not nominated. Project participant is requested to clarify. - PC_{NMHC} NMHC concentration in coal mine methane. Annual analysis. - GEN_{PJ} to Grid, y The readings of electricity meter will be continuously measured and monthly recorded. - GEN_{PJ} to Wujia, y Electricity supplied to Wujia Coal mine by the proposed project in year y. Recording frequency not nominated. Project participant is requested to clarify. - **T** Temperature of CMM. Recording frequency not nominated. Project participant is requested to clarify.	~~CL 26~~	OK
Ability of project participants to implement monitoring plan					
B.7.8 How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR	The monitoring arrangements are seen as feasible within the project design. This is provided the CL 24, CL 25 and CL 26 are closed.	~~CL 24~~ ~~CL 25~~ ~~CL 26~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.7.9 Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?			Responsibilities for day to day records handling have been assigned in the PDD. Procedures for data collection and management have been detailed in the PDD.		OK
B.7.10 Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR	Data management procedures and quality assurance procedures including data storage, cross checking and internal auditing have been described in the monitoring plan. Quality assurance measures such as internal audit of monitoring systems and data management have not been discussed in the monitoring plan. The project participant is requested to clarify this.	~~CL 27~~	OK
B.7.11 Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	The monitoring plan states that data will be stored until 2 years after the end of the crediting period, however does not consider the last issuance of CERs. The project participant is requested to clarify this.	~~CL 27~~	OK
Monitoring of sustainable development indicators/ environmental impacts					
B.7.12 Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	Chinese DNA does not require collection and archiving of data related to environmental, social and economic impacts of the CMM fired power plant. The environmental impacts will be monitored by local environmental authority.		OK
B.7.13 Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Refer to B.7.12.		OK
B.7.14 Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	Refer to B.7.12.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
C Duration of the project activity / crediting period					
C.1.1 Start date of project activity (VVM para 99-100, 104)					
C.1.2 How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/	DR	The starting date of the project activity has been determined to be the start of construction, 5 March 2010. According to the PDD the CDM Consultation contract was signed 3 December 2010. The signing date for the construction contract has not been provided in the PDD. The project proponent is requested to clarify this. The project participant is requested to justify the selected starting date for the project.	~~CL 28~~	OK
C.1.3 Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR	The operational lifetime of the project has been stated as 11 years. The project participant is requested to provide justification for this.	~~CL 28~~	OK
C.1.4 Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	The start date of the fixed crediting period is provided in section C.2.2.1 as 1 January 2011. The project participant is requested to clarify the selected starting date of the crediting period .	~~CL 28~~	OK
D Environmental Impacts (VVM para 131-133)					
D.1.1 Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?	/1/ /3/	DR	An EIA has been conducted for the project and approved by Environmental Protection Bureau of Jincheng city on 20 December 2008.		OK
D.1.2 Does the project comply with environmental legislation in the host country?	/1/ /3/	DR	The EIA concludes that "The proposed project is in compliance with the national policies of industrial development, energy resource and		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			environmental protection".		
D.1.3 Will the project create any adverse environmental effects?	/1/ /3/	DR	According to the EIA report, the project will not cause any adverse impacts to the environment. The project participant is requested to demonstrate how the technology applied comply with the emissions standard GB13271-2001.	~~CL 29~~	OK
D.1.4 Have identified environmental impacts been addressed in the project design?	/1/ /3/	DR	Identified environmental impacts including those limited to the construction phase including noise, solid waste and air pollution and those associated with the on going operation of the project including noise and air pollution have been addressed in the project design. Generators used in the project are claimed to be compliant with Emission standard of air pollutants for coal-burning oil-burning gas-fired boilers-II " (GB13271-2001).		OK
D.1.5 Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/	DR	The project's environmental impacts have been elaborated sufficiently in the PDD.		OK
D.1.6 Are transboundary environmental impacts considered in the analysis?			Transboundary environmental impacts have not been considered in the PDD. Environmental impacts across the project boundary are unlikely as the only export from the site boundary is electricity to the North China Power Grid.		OK
E Stakeholder Comments (VVM para 128-130)					
E.1.1 Have relevant stakeholders been consulted?	/1/ /14/	DR	Local residents were invited to comment on the project through a questionnaire. Clarification is requested to regarding how the distribution of questionnaires was conducted.	~~CL 30~~	OK
E.1.2 Have appropriate media been used to invite comments by local	/1/	DR	Media used to invite stakeholder comment not	~~CL 30~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
stakeholders?			included in the PDD. Project participant is requested to clarify.		
E.1.3 If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	Pending resolution of CL 30, refer to E.1.1	~~CL 30~~	OK
E.1.4 Is a summary of the stakeholder comments received provided?	/1/	DR	The project participant is requested to update the summary of comments in the PDD to reflect the questionnaires verified during the site visit.	~~CL 30~~	OK
E.1.5 Has due account been taken of any stakeholder comments received?	/1/	DR	Refer to CL 30 and E.1.4.	~~CL 30~~	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 project participant is requested to correct the emissions reduction calculations related to the operation of the proposed project at 80% during the first 12 months.	B.6.20	The emissions reduction calculation in the emissions reduction spread sheet and PDD have been updated to correctly reflect the effect of applying operation at 80% of normal year operation due to project commissioning.	The project participant has corrected and updated the ER spreadsheet and PDD to accurately reflect the impact of operation at 80% of forecast normal operation. This has resulted in emissions reductions of 222 974 tCO_2e in the first 12 months of operation. The CAR is closed.
CL 1 The location of the project in or near the Wujia Coal Mine is unclear from the description in the PDD. The project participant is requested to clarify this in the PDD. The project geographic coordinates are requested to be clarified by the project participant as the coordinates stated in the PDD E35°12'01'' and N112°01'02'' are incorrect and possibly mislabelled with regards to N and E. The project participant is requested to include the location of gas wells in the PDD. The project participant is requested to clarify the apparent contradiction between the statement in table B.2-1 that ventilation CMM that would normally be vented is not included in the project where as in table B.2-2 it is stated that part of CMM is still vented for safety reason.	A.2.4 B.2.1	The proposed project is located in the Wujia Coal Mine and close to Wujia CMM drainage station. This has been amended in A.2. on Page 2 of PDD (Version 4). The details project site has been updated to reflect this clarification under A.4.1.4. on page 3 of PDD (Version 4). Refer to the Figure A.4-2 in the PDD (Version 4) for location details of the project facilities (including gas wells) within the project site The project activity does not include the utilization of ventilation air methane. CMM is used to generate electricity in this project; and only remaining CMM will be vented for safety reasons. Tables B.2-1 and B.2-2 have been updated to reflect this in the PDD (Version 4).	PDD has been revised by the project participant as follows: • The location of the project is within the boundary of Wujia Coalmine. The project site is close to the Wujia CMM drainage station • The project coordinates have been correctly detailed in the PDD. • CMM is used for generation of electricity in the project and that the project activity does not include any utilization of ventilation air methane The CL is closed.
CL 2 The project participant is requested to clarify how it has been concluded that there are no more heat consumers in the Wujia coal mine area.	B.4.1	Lack of sufficient heat demand: According to the FSR, heat requirements stem mainly from the living quarters at the project site and the Wujia coal mine, or	The project participant has elaborated and clarified the justification for the lack of sufficient heat demand in the area surrounding the project, in section B.4

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		nearby villages, including Wujia village, Lvjiahe village and Dayugou village. The amounts of heat required for these areas altogether are very small and there is no additional heat demand from nearby industry or residents. Currently, these villages' heat demand has been met by using existing coal fired household stoves. The project activity and the coal mine are under construction, so the heat demand is ex ante forecasts. Therefore, in the baseline scenario for the proposed project, only the heat demand of villages in the heating season will continue to be supplied by the existing coal fired household stoves. There are no further heat consumers in the Wujia coal mine area. This has been added B.4 on page 11 of the PDD (Version 4).	(Description of how the baseline scenario is identified and description of the identified baseline scenario) of the PDD. The project participant's description of the potential heat customers near the project site is in line with the information provided by Mr. Zhang Xunliang, officer of Yangcheng County Development and Reform Bureau during the site visit interview /30/. The CL is closed.
CL 3 The project participant is requested to clarify the relative shares of each gas in the baseline as required by the methodology ACM0008.	B.4.1 B.7.1	Both the proposal project and the coalmine are new projects currently under construction. As such, the relative shares of each gas in the baseline will be monitored after the construction of coalmine is completed. Currently there is no CBM extraction adopted at the Wujia coalmine. The methane concentration of the VAM is very low, thus there is no plan to utilize VAM. Therefore, CBM and VAM options need not be dealt with in the project activities, as only CMM will be utilised for electricity	The project participant has clarified in the PDD that according to the methodology ACM0008 (version 07 EB55 CMM) allows pre-mining and post-mining CMM to be measured together. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		generation. The Wujia coalmine will use same extraction system, according to the methodology ACM0008 (version 07 EB55 CMM) allowing pre-mining and post-mining CMM to be measured together, meaning the relative measurement of each gas in the baseline is not necessary. Please see the amended "Step 1a: Options for CMM extraction" under B.4 on PDD v 04	
CL 4 The project participant is requested to clarify the characters used in step 2 Baseline scenario alternatives for CMM extraction on page 11 of the PDD as characters are represented as boxes.	B.4.1	The undefined characters in version 01 of the PDD have been revised to be Roman numerals. The characters have been corrected in Section B.4. of PDD (Version 4).	The project participant has clarified the characters in section B.4. The CL is closed.
CL 5 The project participant is requested to provide the translated reference for the "National coalmine safety regulation (version 2010)"-chapter 2, section 2, item 136. As the link provided in the PDD is broken. The project proponent is requested to clarify how the use of low concentration CMM (<30% CH4) is not systematically enforced as per (GB 21522-2008) and also that non-compliance with this requirement is widespread in the country.	B.4.2	The link provided in version 4 of the PDD has been amended to link to a translated version of the National Coalmine Safety Regulation (2010) – Chapter 2 (136). 1. Please refer to the revised "2. Options for extracted CMM treatment in the PDD (version 04, on page 12- 13) as below: "For CMM utilization, it is regulated that if methane concentration is lower than 30% (National Coalmine Safety Regulation item 148) gas utilization and transportation must be in accordance with the relevant standards and the related safety technology measures need to be considered."	The link to National coalmine safety regulation (version 2010)"-chapter 2, section 2, item 136 has been provided by the project participant and translated. The project participant has clarified the justification for the emission standard GB 21522-2008 not being considered in the baseline determination through: • The precedent set in EB22 annex 3 paragraph 6 (b) that the standard was published in April 2008, which fell after the *decision 17/CP.7, 11 November 2001*. • No further guidance on the standard has been provided by the Chinese

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		While the Chinese government promotes the utilization of CMM, in June 2005 the NDRC announced the Coalmine Methane Treatment and Utilization Macro Plan to encourage CMM drainage and utilization and calling for the incentives from CDM to overcome barriers in the country to implement CMM drainage and utilization activities. The treatment of extracted CMM is generally subject to the "Emission Standard of Coal bed Methane/Coal Mine Gas (GB 21522-2008)" that was promulgated by the Chinese ministry of Environment Protection on 2nd April 2008. This provision, effective as of 1st July 2008, states that for existing coal mines direct CMM venting is prohibited from 1st July 2010 in case that methane concentration of coal mine gas is above 30%. However, according to the applied methodology ACM0008 (version 07), if it is demonstrated that such regulations are systematically not enforced and that non-compliance with those requirements is widespread in the country or region, the alternative does not need to be excluded from further consideration. Extensive research on the current practice with regard to the Emission Standard proved that neither widespread implementation nor any	Government with regards to it's compliance. • In response to the Request for review for Project Activity 3219 "SDIC Xiyang Baiyangling CMM to power generation project. Together with Wilson Tang from CCC, DNV was also able to meet up with Mr. Liu Wenge, director of China Coal Information Institute. These discussions indicated that the implementation of the emission standard is a challenge as there is no system or procedure in place for a) implementation, b) checking methodology (monitoring of implementation), c) supervision of such implementation and d) penalty/punishment. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		measures to supervise compliance exist. Thus, the above mentioned regulation is not considered for identification of possible baseline scenarios. In China the Emission Standard of CBM/CMM (on trial) (GB 21522-2008) is not systematically enforced and that non-compliance with those is widespread. " 2. Please refer to the FSR of the proposed project, on the page 8 of the report, the average content of CH_4 in CMM extracted from Wujia coalmine is estimated as 35%. 3. Based on the "1.1.2 General information of Wujia coalmine" on page 1-2 of FSR, every year the average amount of extracted CMM from Wujia Coal Mine is estimated as 99.864 million cubic meters. Based on the "3. Gas Electricity Generation system" on page 7-8 on FSR: "the CH_4 concentration of the CMM extracted from Wujia coalmine is 35% averagely, the proposed project is estimated to consume approximately 54.86 million cubic meters CMM (35% pure CH_4) each year The estimated usage accounts for approximately 55% of the estimated of extracted CMM (35% pure CH_4), the	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		amount of gas extracted from the Wujia Coal Mine is sufficient to supply the project usage.	
CL 6 Clarification is requested to demonstrate that VAM technology is still experimental and utilising VAM is cost prohibitive.	B.4.8	B.4. on page 11 of the PDD (Version 4) has been revised to discuss VAM technology. As a developing technology, it is not appealing to investors making the cost of its utilisation prohibitive.	The project participant has elaborated and clarified the justification for VAM technology being eliminated as an option for extracted CMM treatment in the baseline scenario determination. The CL is closed.
CL 7 For Table B.5-2 in the PDD, no references have been provided. The PDD refers to Table B.5-1 for the IRR calculation data, however this data is presented in table B.5-2 in the PDD.	B.5.3	Source data for Table B.5-2 in the PDD (Version 4) has been referenced The reference to Table B.5-1 has also been amended in the PDD (Version 4) to refer instead to Table B.5-2.	The project participant has included the source of basic data provided in the PDD Table B.5-2 (Basic data used for IRR calculation) and corrected the reference to Table B.5-1 (Timeline of project implementation) for IRR calculation data in the PDD to refer instead to Table B.5-2. The CL is closed.
CL 8 The format of dates supplied in Table B.5-1 of the PDD is inconsistent. Full dates including day, month and year are required for each entry.	B.5.5	Table B.5-1 has been revised in the PDD (Version 4) to include full dates (where possible) in the format DD/MM/YYYY.	The project participant has clarified the dates in table B.5-1 (Timeline of the project implementation) to include full dates in the format DD/MM/YYYY where possible. The CL is closed.
CL 9 The project participant is requested to justify the choice of benchmark for the investment analysis considering the primary activity of the project is electricity generation.	B.5.14	All potential benchmarks are considered on page 16 under B.4. in the PDD (Version 4). considered all for the demonstration of additionality including coal mining (13%), electricity generation (8%) and gas drainage (12%). As the main activity of the project is electricity generation, the selection of the electricity generation benchmark is considered appropriate. In addition the	The project participant has considered all potentially appropriate benchmarks for the demonstration of additionality including coal mining (13%), electricity generation (8%) and gas drainage (12%). As the main activity of the project is electricity generation, the selection of the electricity generation benchmark is considered appropriate. In addition the electricity

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		electricity generation benchmark is the lowest of the benchmarks considered. This is considered to be conservative. This is discussed further in "Sub-step 2b. Benchmark analysis (Option III) " on PDD (Version 4).	generation benchmark is the lowest of the benchmarks considered. This is considered to be conservative. The CL is closed.
CL 10 It is stated in the PDD that the CMM in the baseline will be vented directly to the atmosphere. However, in the financial analysis the CMM is assigned a value of 0.17 RMB/M3. The project proponent is requested to clarify the validity and suitability of the CMM price. The project participant is requested to demonstrate that all applicable government subsidies have been considered such as tax exemptions and VAT refunds.	B.5.16	As to CL10, it is revised in PDD. According to Gas purchase and supply agreement between the project owner and Wujia coal mine, CMM used for project activity is purchased at the stated fixed price in the period of project implementation. The price is regulated and determined through negotiation based on market mechanism. As to similar project, there were ref number 3179, 3289 and 3194, which gas price was 0.4 RMB/m^3 (100% methane), 0.15 RMB/m^3 (with 40% of methane) and 0.37 RMB/m^3 (100% of methane), respectively. The price in this project is the result of discussing between PO and the gas supplier. Although the selected baseline scenario involves the venting of CMM to the atmosphere, the CMM does have a commercial value related to it's calorific value. At the same time, the reason of difference among the projects is sourced from the different time, place and the supplier, especially the market demand. Tax exemptions and VAT refunds were considered because no related regulation	The project participant has provided the gas purchase and supply agreement entered into by the project owner and the Wujia Coal Mine. The agreement details a CMM price of 0.17RMB/m^3 for CMM of 35% methane content. The project participant has acknowledged that although the selected baseline scenario involves the venting of CMM to the atmosphere, the CMM does have a commercial value related to it's calorific value. In addition, through comparison with registered CDM project activities 3179, 3289 and 3194 the proposed CMM price of 0. 17RMB/m^3 is considered to be reasonable. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		can be applied by the project. Government regulation on this can be seen in *Provisional Regulations of the People's Republic of China on Value Added Tax (No. 538) issued by the Prime minister on 10th Nov 2008*. In this regulation there is no subsidy or VAT incentive of CMM power generation. To access this resource follow the following link: http://www.gov.cn/flfg/2008-11/14/content_1149549.htm	
CL 11 Clarification is requested to provide the IRR calculation spreadsheet in a transparent way including links to basic parameters and formulae.	B.5.17	The data was sourced from FSR and the spreadsheet is a linking model. It is clear know the process of calculation from the spreadsheet. Refer to IRR calculation spreadsheet.	The project participant has updated the IRR spreadsheet to include a tab for basic financial information and updated the spreadsheet to include active calculation with links to basic parameters and formulae. The CL is closed.
CL 12 The project participant is requested to justify the validity and suitability of the input parameters for the financial analysis. The FSR details a total installed capacity of 15MW, however the FSR approval, the PDD and the equipment purchase contract only detail 10MW installed capacity.	B.5.19	At the primary design of the FSR, it is 15 MW, but because of considering the volume of CMM, it is modified to 10 MW, please see the latest version of FSR, so the FSR approval, the PDD and the equipment purchase contract detail 10 MW installed capacity. Section A.2 of PDD (Version 4) has also been updated to show changes to the installed capacity.	The project participant has clarified that the latest and approved version of the FSR was revised down to 10 MW to be in line with the expected volume of CMM to be extracted /4/. The CL is closed.
CL 13 The output price of electricity stated in the PDD and FSR is 0.3248 RMB/kWh before tax and 0.38	B.5.21	Because the project is still under construction, electricity is not yet being exported to the NCGP. As such, the	The electricity tariff for the project of 0.38 (incl. VAT) RMB/kWh is sourced from the FSR /4/. CL 13 was raised to clarify the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
RMB/kWh after tax. The project participant is requested to provide the reference to clarify the validity and suitability of the electricity tariff.		purchase of electricity tariff has not been finalised with the grid company. Evidence for the electricity tariff of the similar projects is provided in Shanxi Price Bureau and Shanxi Power Co. Ltd document. This document was issued on 25th Nov 2009 around the time that the FSR was approved. This evidence shows the electricity tariff from CMM power generation as 0.38 RMB/kWh (including tax). This document can be found at the following website: http://www.sxprice.gov.cn/sy/tzgg/20091209/084629.html Refer to Item 2: Regulating the feed-in tariff of electricity generated by new energy: "我省利用煤层气（煤矿瓦斯）发电项目上网电价统一提高为每千瓦时 0.380 元。 "(Translation) The feed-in tariff of electricity generated by coal mine methane in the Shanxi province is 0.38 RMB/kWh."	validity and suitability of the selected electricity tariff for the project. As the project was in construction at the time of validation, a grid connection agreement with the local electricity utility had not yet been finalised. The project participant demonstrated the validity and suitability of the electricity tariff through reference to an online notification provided by the Shanxi Price Bureau and Shanxi Power Co. Ltd dated 9 December 2009 (http://www.sxprice.gov.cn/sy/tzgg/20091209/084629.html), which indicates an electricity tariff price rise for coal gas generation to 0.38 RMB/kWh. The electricity tariff range of similar projects in Shanxi province as per Table 1 in section 4.6.3 of the validation report is 0.23-0.38 RMB/kWh. The proposed project is at the upper end of this range, however in conjunction with the notification from the Shanxi Price Bureau and Shanxi Power Co. Ltd, DNV considers the electricity tariff to be valid and suitable. The CL is closed.
CL 14 The breakdown of the operational and plant overhead costs should be included in the PDD for transparency purposes and referenced accordingly.	B.5.23	The breakdown of costs is given in Table B.5-2 on page 16 of the PDD (Version 4). It is revised in PDD with the breakdown of the cost.	The project participant has included the breakdown of operational costs on the PDD, which have been referenced to and reflect the costs in the FSR. The CL is closed.
CL 15	B.5.26	The cost of electricity tariff has been	The project participant has included the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
The cost of electricity tariff has not been included in the sensitivity analysis in the PDD and it is not clear if it is included in the sensitivity analysis parameter Titles operating cost. The project participant is requested to clarify the validity and suitability of the + and – 10% range for the sensitivity analysis. The project participant is requested to extent the sensitivity analysis to reach the benchmark and provide justification relating to the likelihood of this to happen.	B.5.27 B.5.28	included in the sensitivity analysis in the PDD. The + and – 10% range for the sensitivity analysis is valid and suitable according to guidelines on the assessment of investment analysis (EB51, Annex 58). The following comparisons are provided to assist in validation: • Reference 3542，Sichuan Guang'an Caishandong Coal Mine CMM Power Generation Project ,the extent of the sensitivity analysis is ±10% • Reference 3180, Malan Coal Mine Methane Utilisation Project the sensitivity analysis is±10% • Reference 3179, Jincheng Chengzhuang 18 MW coal mine methane power generation project the sensitivity analysis is ±10% • Reference 1896, Jincheng Sihe Coal Mine CMM Generation Project The critical points for benchmark factors would need to fluctuate by a: 42.20% decrease in total static investment 19.57% increase in annual power supply 24.22% decrease in annual operating costs	electricity tariff cost in the sensitivity analysis. The project participant has demonstrated the sensitivity analysis to + and – 10% in the PDD and also included the critical point at which the sensitivity analysis parameters would push the project IRR over the benchmark of 8%. The project participant has demonstrated the benchmark factors would need to fluctuate by a: 46% decrease in total static investment 21.5% increase in annual power supply 26% decrease in annual operating costs 37% decrease in CMM price 21.5% increase in electricity tariff For the benchmark of 8% to be crossed. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		34.84% decrease in CMM price 19.57% increase in electricity tariff For the benchmark of 8% to be crossed. For the full sensitivity analysis see Table B.5-4 on page 19 of PDD (Version 4). Regarding the increase of electricity tariff: Note: According to the Grid Connection Agreement, the voltage level of Wujia power plant should increase to 35 KV. The voltage level of the installed generators under the project activity is only 400 V, the PP is required by the Grid Connection Agreement to build a substation that will increase the voltage level of the Wujia power plant. The additional investment required to construct substation and purchase related equipment were not taken into account during the financial analysis (investment & sensitivity analysis) in the PDD as this part of the investment was not included in the FSR. The FSR did not include the necessary investment in infrastructure that would enable grid connection and the export of electricity generated. The PDD did not include the additional information because the data relied upon was extracted from the FSR; however the PP was aware and advised DNV during the onsite	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		investigation that further investment in additional infrastructure was required to allow the export of electricity form the Wujia power plant. Without this additional investment in the substation infrastructure, the PP cannot export electricity and the Grid will not purchase the electricity generated by Wujia CMM power generation project. The Grid connection agreement states this requirement clearly and the construction contract can be used to validate the additional investment amount. During the on-site interview, this information was provided to DNV. However, without the additional investment in the substation the project still satisfies the additionality requirement according to the methodology. However, to explain how the additional investment impacts on the sensitivity analysis, we have provided an elaborated calculation to identify how the additional investment impacts upon the IRR. In particular the in order to reach the IRR threshold value in the sensitivity analysis the electricity tariff would need to appreciate 19.57% which is a highly unlikely scenario. The Chinese Government orders an	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		adjustment in the electricity tariff after internal negotiations between several government departments. It is difficult to forecast these adjustments. In China electricity is a necessary input for people's daily life and industry operation; therefore the electricity tariff has a significant impact on social stability and the national economy. In order to maintain social stability and economic growth, the electricity tariff is strictly regulated by the Chinese Government and is not expected to fluctuate significantly. It is very unlikely that the electricity tariff will appreciate by more than 19.57%. The following is provided to support the statements above: 1. Grid connection approval; The Grid connection approval was issued by the Electric Power Company of Shanxi, State Grid on 4th Jan 2010. In "I. System Program" on the page 2 of the approval, it states that the electricity generated from the 20 X 0.5 MW generators needs to be increased to 35 KW via a substation before being exported into the Grid. Also, in "V. Other", it states that all the costs included in necessary infrastructures for Grid connection should be born by	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		the PP. 2. The contracts for the additional investment in the substation; 7 contracts provided for validation, including: **"Wujia 35KV step-up substation design contract"** signed by Jincheng City Xinde Power Designing Company in Oct 2010: The designing fee is: **350,000 CNY** **"Wujia 35 KV step-up equipment purchase and construction contracts"** including**:** 4 equipment purchase contracts, including: AC-DC System & security system from Jincheng Wanlitong Power Equipment Company on 10 March 2011: Purchase cost: **113,000 CNY** Security Panel, Public use Panel, DC panel, AC power supply panel from Jincheng Wanlitong Power Equipment Company on 10 March 2011: Purchase cost: **702,000 CNY** Distribution Cabinet 1D-5D from Jincheng City CHIXUN Commerce Company on 15 April 2011: Purchase cost: **158,200 CNY** 5 Power Transformers, 7 low-	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		voltage switchgear, 5,040 meters power cable, 1,206 meters power cable, 7 high-voltage switchgear and 700 wire connections from Jincheng City CHIXUN Commerce Company on 08 April 2011: Purchase cost: **6,018,000 CNY** The total purchase cost above is: **6,989,400 CNY** Substation Telecom Automation construction contract (constructed by Jincheng City Chuanggao Telecom Automation company, contract signed on 26 April 2011) The construction cost is: **1,319,676 CNY** Substation cable construction contract (constructed by Jincheng City JUNENG cable construction company, contract signed in May 2011) The construction cost is: **1,380,000 CNY** **Total cost of substation construction: 10,039,076 CNY** 3. An amended IRR spreadsheet that includes the substation demonstrating the impact on IRR	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		and critical points after including the additional investment for the substation required.	
CL 16 Barrier analysis not opted for by the Project Participant for additionality assessment and demonstration. Guidance for barrier analysis requires elaboration as to why barrier analysis has not been conducted. The project participant is requested to address this.	B.5.29	Since the investment analysis has already proved that the Project is additional, the barrier analysis is not necessary to demonstrate in the PDD according to "Tool for the demonstration and assessment of additionality" which states: *Based on the information about activities similar to the proposed project activity, the common practice analysis will be used to complement and reinforce the investment and/or barriers analysis.*[2] *(Project participants can use either investment analysis or barrier analysis step. They may, if they so wish, use both investment and barrier analysis steps.)* Therefore it is reasonable to demonstrate the project additionally through investment analysis.	in line with the to "Tool for the demonstration and assessment of additionality" version 06.0 the project participant has elected to demonstrate the project additionality through investment analysis. The CL is closed.
CL 17 The project participant is requested to justify the geographical scope of the common practice analysis as Shanxi Province and not all of China.	B.5.42	The geographical scope of the project's common practice analysis has been maintained as Shanxi Province. This is the reasonable scope for this analysis due to the differences in feed-in tariffs, costs of materials, costs of electricity, water, labour and services between provinces of China. These large spatial variations of these factors across the country limit the	The project participant has clarified the justification for the geographical scope of the common practice analysis to be limited to Shanxi Province due to variances in the feed-in tariffs, costs of materials, costs of electricity, water, labour and services between provinces of China. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		geographical scale of common practice analysis making Shanxi Province the reasonable choice. Sub-step 4a under B.5.in the PDD (Version 4) has been revised to reflect this.	
CL 18 The project participant is requested to clarify the justification and suitability of using a single source of information for the common practice analysis.	B.5.44	The common practice analysis is performed on projects employing similar technologies Hence, projects that are using CMM to generate power are considered in this analysis. In line with the requirements of the additionality tool (Step 4), this approach can be considered reasonable. The following sources were used to cross-check and validate the list of similar projects: • Public information on the "Methane to Markets International Coal Mine Methane Projects Database" (see Database (http://www2.ergweb.com/cmm/index.aspx); and • The UNFCCC webpage. As already outlined in the validation report and the PDD, all other similar projects are applying for CDM or are already registered as CDM projects. This information has been included in full under Sub-Step 4a in B.5. of PDD (version 4).	The project participant has clarified the sources of information for the common practice analysis to be from both the Methane to Markets International Coal Mine Methane Projects Database and the UNFCCC webpage to gather information regarding similar projects for the common practice analysis. The CL is closed.
CL 19 Clarification is requested to justify the data and	B.6.1	The data and parameters included in B.6.2. of the PDD (Version 4) have been selected	The project participant has updated section B.6.2 of the PDD to include specific

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
parameters that are available at validation included in the PDD.		from a range of authorative national publications. Where national data was un-available, IPCC default values have been chosen as the most reasonable proxies. .	references for data and parameters that are available at validation. The CL is closed.
CL 20 The carbon emission factor for combusted non methane hydrocarbons should be moved to section B.7.1 data and parameters monitored.	B.6.3	The carbon emission factor for combusted non-methane hydrocarbons has been moved to section B.7.1 - Data and parameters monitored.	The carbon emissions factor for non methane hydrocarbons has been moved to section B.7.1 of the PDD (Data and parameters monitored). The CL is closed.
CL 21 The Power generation of provincial sub-girds in the North China Power Grid for 2005 has been included in Annex 3 of the PDD. The project participant is requested to justify why the 2005 data is valid and suitable.	B.6.4	The operating margin emission factor and the build margin emission factor were calculated based on fossil fuel consumption data, electricity generation data as well as fuel specific emission factors and the capacity additions data sourced from the China Energy Statistical Yearbooks and the China Electric Power Yearbooks. The project lies within the North China Power Grid. The validation of this project commenced on 26/11/ 2010. At this time, the most recent data was from 2006, 2007, 2008 which is typically published in the yearbooks one year later (i.e. the 2006 data is published in the year 2007). The 2010 edition was not published at the time of the commencement of this validation. The China Electric Power Yearbooks are published by the China Electric Power Press and the China Energy Statistical Bureau	The project participant has updated Annex 3 of the PDD to include data from the China Energy Statistical Yearbook published in 2007, 2008 and 2009 and The State Electric Industry Yearbook published in 2007, 2008 and 2009. The project participant has clarified that at the time of validation (the PDD was published on the UNFCCC website for public stakeholder consultation on 26 October 2010. At the time of publication, the most recent data were the 2007, 2008 and 2009 versions of the publications The China Energy Statistical Yearbook and The State Electric Industry Yearbook. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		The PDD has been amended to include data from the North China Power Grid for the following years 2006, 2007 and 2008. Yearbooks published by the Department of Industry and Transport Statistics, National Bureau of Statistics of P.R. China, and Energy Bureau of National Development and Reform Commission of P.R. China, were used to reference these numbers in the PDD (Version 4).	
CL 22 As per tool to calculate emission factor for an electricity system, the data vintages should be based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. The PDD was webhosted on 26 October 2010, the China Energy Statistical Yearbooks 2009 and China Electric Power Yearbook 2008 has been published prior to that, the calculation of the grid emission factor should be updated to the latest data in ER spreadsheet and PDD Section B6.	B.6.15	As mentioned in CL21, B.6.2. in PDD (Version 4) has been updated with the most recent available data. The ER spreadsheet has also been amended. Correspondingly, the calculation of the grid emissions factor has been updated with data from the China Energy Statistical Yearbooks for 2009 and The China Electric Power Yearbook 2008. These are the most recent available data sources for the calculation for grid emissions factor	The project participant has updated the PDD to include the most recent data for the calculation of the emissions factors including data available from the China Energy Statistical Yearbooks for 2009 and The China Electric Power Yearbook 2008. The CL is closed.
CL 23 Clarification is requested to provide the emissions reduction calculation spreadsheet in a transparent way including links to basic parameters and formulae.	B.6.20	Refer to the ER calculation spreadsheet.	The project participant has updated the ER spreadsheet to include a tab for basic financial information and updated the spreadsheet to include active calculation with links to basic parameters and formulae. The project participant has revised the emissions reduction spread sheet to accurately reflect the operation of the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			proposed project equipment in the first year of operation at 80% of normal maximum as per the FSR. The CL is closed.
CL 24 The project participant shall monitor pre -mining CMM and post-mining CMM destroyed in the project activity separately as required by the monitoring methodology of ACM0008 version 7.	B.7.1	As outlined in paragraph 81 of the last EB55 meeting report,, the combined monitoring of CMM and PMM is now allowed: "The Board further clarified that when gas is extracted from a mine within the project boundary of a CDM project activity and a connection between $CMM_{PJ, i}$ (pre-mining CMM captured, sent to and destroyed) and $PMM_{PJ, i}$ (post-mining CMM captured, sent to and destroyed) is in the underground mine, as specified in the version 7 of the methodology ACM0008, the practice of combined measurement of $CMM_{PJ, i}$ and $PMM_{PJ, i}$ is allowed. Therefore, DOEs are not required to submit a request for revision of monitoring plan to address this inconsistency with the requirement of the methodology."	The project participant has clarified as per EB55 meeting report paragraph 81, that the combined monitoring of CMM and PMM is permitted. The CL is closed.
CL 25 Measurement accuracy has not been addressed for measured parameters other than Percentage of pure methane (wet basis) in drained gas (by volume). The project proponent is requested to clarify this.	B.7.4	As the project and the coal mine are still in construction, the relative monitoring equipment has not yet been purchased. However, all monitoring meters to be used on the project will meet industry standards for accuracy. The accuracy of Pressure Transmitter is ±0.075% Industry standard: JB/T 10726-2007	The project participant has nominated the measurement accuracy for measured parameters in the PDD either specifically or to be in line with industry standards as nominated in section B.7.2 of the PDD. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		The accuracy of Temperature Transmitter is 0.2 Industry standard: JB/T 10202-2000 For PCNMHC: an external qualified laboratory will conduct the analysis. Section 4 (Measurement of Accuracy) under B.7.2. of the PDD (Version 4) has been updated all relevant information.	
CL 26 The project participant is requested to provide the monitoring frequency for the following parameters: - MM_{ELEC} Volume of methane sent to power generators. - PC_{CH4} Percentage of pure methane (wet basis) in drained gas (by volume). - $GEN_{PJ\ to\ Wujia,\ y}$ Electricity supplied to Wujia Coal mine by the proposed project in year y. - **T** Temperature of CMM. The project participant is requested to provide the recording frequency for the following parameters: - MM_{ELEC} Volume of methane sent to power generators. - PC_{CH4} Percentage of pure methane (wet basis) in drained gas (by volume). - $GENPJ\ to\ Wujia,\ y$ Electricity supplied to Wujia	B.7.6 B.7.7	The monitoring frequencies and details have been included for each parameter in the revised section B.7.1 of the PDD (Version 4). Please refer to this for details on monitoring frequencies for each of the following parameters. • $MM_{ELEC:}$ Continuous monitoring and monthly recording • $PC_{CH4:\ Daily\ monitoring\ and\ monthly\ recording}$ • GEN_y: Continuously measured and monthly recorded (renamed from $GEN_{PJ\ to\ Wujia,\ y}$) • $CONS_{ELEC}$: Continuously measured and monthly recorded • T: Continuous monitoring and monthly recording (Please note: Temperature and pressure are to be	The project participant has nominated monitoring and recording frequency for all parameters in Section B.7.1. including: • $MM_{ELEC:}$ Continuous monitoring and monthly recording • $PC_{CH4:\ Daily\ monitoring\ and\ monthly\ recording}$ • GEN_y: Continuously measured and monthly recorded • $CONS_{ELEC}$: Continuously measured and monthly recorded • T: Continuous monitoring and monthly recording (Please note: Temperature and pressure are to be monitored under the parameter: MM_{ELEC}) The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
Coal mine by the proposed project in year y. - **T** Temperature of CMM.		monitored under the parameter: MM_{ELEC})	
CL 27 Quality assurance measures such as internal audit of monitoring systems and data management have not been discussed in the monitoring plan. The project participant is requested to clarify this. The monitoring plan states that data will be stored until 2 years after the end of the crediting period, however does not consider the last issuance of CERs. The project participant is requested to clarify this.	B.7.10 B.7.11	To ensure Quality Assurance, there will be regular internal auditing of the monitoring systems and data management detailed in PDD. This process has been explained in B.7.2.2. of PDD (Version 4). With regards to the data storage, B.7.2.2. of the PDD (Version 4) has been updated to state that data will be stored until 2 years after the last issuance of CERs from the project.	The project participant has updated the monitoring plan in section B.7.2 of the PDD to include provision for the internal auditing of the management system annually. The project participant has nominated the inclusion of the implementation of the monitoring procedure and the preparation of the monitoring report. The project participant has updated the monitoring plan in section B.7.2 of the PDD to state that data will be stored until 2 years after the last issuance of CERs from the project. The CL is closed.
CL 28 Regarding the duration of the project activity: - The project participant is requested to justify the selected starting date for the project. - The operational lifetime of the project has been stated as 11 years. The project participant is requested to provide justification for this. - The project participant is requested to clarify the selected starting date of the crediting period.	C.1.2 C.1.3 C.1.4	According to the Glossary of CDM Terms (V5): The start date of the project can be considered 02/03/2010, the date the construction contract was signed by the project participant. This is the first instance that the project participant committed to expenses relating to the project. The Table B.5-1 in PDD (Version 4), gives the full list of contracts involving a "commitment to expenditures related to the	The starting date of the project activity has been correctly identified by the project participant to be 2 March 2010, which is the date of signing the construction contract and the date when the project proponent was committed to making expenditures. The project participant has demonstrated that the operational lifetime of the project activity (equivalent to the expected lifetime of the equipment) has been sourced from the FSR.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		implementation or related to the construction of the project activity". The operational lifetime of the project (11 years) is dictated by the expected lifetime of the main equipment. This Information is sourced from the FSR. The starting date of the crediting period is 10/01/2012 or the date of registration for completeness, whichever is later.	The starting date of the crediting period has been revised by the project participant in the PDD to 1 January 2012. The CL is closed.
CL 29 The project participant is requested to demonstrate how the technology applied comply with the emissions standard GB13271-2001.	D.1.3	Through filtering and the control of the combustion temperature, the dust, SO_x and NO_x content of the flue gas can be controlled. These measures will ensure that emissions meet the requirements of "Limits and Measurement Methods for Exhaust Pollutants from Compression Ignition and Gas Fuelled Positive Ignition Engines of Vehicles (IV)" (GB17691-2005). D.1. of PDD (Version 4) has been amended to include this.	The PDD has been revised to correctly refer to the emissions standard - "Limits and Measurement Methods for Exhaust Pollutants from Compression Ignition and Gas Fuelled Positive Ignition Engines of Vehicles (IV)" (GB17691-2005). The main equipment for the project activity, the 500GF-WK2 generator set is a modern low concentration engine capable of compliance with the emissions standard GB17691-2005 with proper care and maintenance. The CL is closed.
CL 30 Regarding stakeholder comments: - Clarification is requested to regarding how the distribution of questionnaires was conducted. - Media used to invite stakeholder comment not included in the PDD.	E.1.1 E.1.2 E.1.4	Section E.1 of PDD (Version 4) has been updated to cover stakeholder comments more comprehensively. The main steps are shown below. 1) Postal notification and broadcast in the nearby village and Wujia coal mine. 2) Notification, broadcast.	The revised PDD has been verified to confirm the following: • Identified stakeholders were invited for a meeting through notification and all relevant project information was provided. During the meeting questionnaires prepared were also

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
Project participant is requested to clarify. - The project participant is requested to update the summary of comments in the PDD to reflect the questionnaires verified during the site visit.		3) Summary comments are provided in E.2. of PDD (Version 4). Feedback from the various stakeholders was seen to be mostly positive toward the project.	distributed. • The feedback from the stakeholders were verified to be positive The CL is closed.

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
FAR 1 Not Applicable	Not Applicable	Not Applicable

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Include short CV summary of all validation team members and the technical reviewer(s).

Technical Team Leader / CDM Validators

Kumaraswamy Chandrashekara holds a Bachelor's Degree in Chemical Engineering and has an overall experience of around 24 years. Prior to joining DNV, has worked for 11 years in the Chemical Process Industry covering Plant Operations, Technical Services and Process Design activities, primarily in the fertilisers and chemicals manufacturing sector. During this tenure of 11 years in the industry, responsibilities included production, process optimization, energy efficiency improvements, environmental performance, process design, energy auditing and technical auditing.

He has experience of around six years in the validation and verification of numerous CDM projects both in India and abroad. His qualification, industrial experience and experience in CDM sufficiently demonstrate his sectoral competence in the areas of chemical process industries, energy generation from renewable sources and waste handling & disposal.

Mr Zhang Xiaojun, Johnsen holds a Master Degree in Metallurgical Physical Chemistry and obtained his MBA in project management. Also he majored in Chemistry, which involves organic, inorganic, structure and analysis chemistry as bachelor degree. He has an overall experience of 26 years. Prior to joining DNV, Johnsen had an overall experience of 4 years in glass manufacturing industry covering production, energy efficiency improvement and commissioning. Later on he gained combined experience of more than 15 years in the iron and steel industry, while he worked as researcher and management personnel in Central Iron and Steel Institute, the sector covering the refractory, iron & steel, waste heat recovery, solid waste disposal, waste fuel treatment, waste energy efficiency and relevant environmental affairs. His experience also covers the fields of environmental management, resource conservation and cleaner production in various manufacturing and metallurgical industries. He has also gained the experience in Management System Audits such as ISO 9001, ISO 140001 standards in various industrial sectors for more than 3 years for industrial plants.

For financial analysis and investment, he has gained the relevant knowledge through his MBA course; and through the feasibility case study in the iron and steel sector while he worked as management personnel, he gradually gained concerted experience in cost accounting, financial analysis and investment input parameter assessment.

He has experience of more than 3 years in validation and verification of numerous CDM projects in DNV in China.

His qualification, industrial and investment experience and experience in CDM demonstrate him sufficient sectoral competence in "Glass", "Iron and Steel" and "Energy Generation from Renewable Energy Sources".

GHG Auditor

Mr Zhou Jian Rong, Gary holds a Master Degree in Mining Engineering.

He has an overall experience of around four years. Prior to joining DNV, having three years direct working experience in coal mines in different discipline and capacities such as technician, assistant engineer, principal staff and certified safety engineer, with responsibility for mining and excavation engineering quality management, production planning and coordinating with mining and excavation engineering teams in different districts. He had gained the knowledge and experience with regards to the laws and regulations governing safety in production, rules and regulations related the coal industry& coal mining enterprises and Safety Regulations in Coal Mine. He is knowledgeable in coal production system operating processes.

He has experience of around one year in validation and verification of numerous CDM projects. His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in "Oil and Gas industry, CMM Recovery and Use".

Assessor under training

Mr Mark Robinson holds a Bachelor Degree in Marine Science. Having an overall experience of around 8 years. Prior to joining DNV having 2 years experience in water and wastewater management, 4 years experience in environmental investigation and remediation. He has experience in environmental auditing including GHG emissions, energy, ISO 14001, environmental due diligence, environmental compliance and industry benchmark audits.

Mark has been involved in the validation of numerous CDM projects in China since 2010.

Mark has acquired GHG auditing experience across a range of standards including the Greenhouse Gas Protocol, ISO 14064 and regulatory standards including the National Energy and Greenhouse Reporting System (NGERS) which requires over 1,000 Australian corporations to report energy use and greenhouse gas emissions to the Australian Department of Climate Change. His experience with NGERS has included consultancy to the resources sector for NGERS measurement and reporting systems and working with Australian businesses required to report under the system to minimise emissions exposure and achieve energy efficiency gains

Financial Expert

Mr Giovanni Tenderini has a master degree in Energy Engineering focused on energy generation and conversion. He gained his three years professional experience in the power sector where he became familiar with International Financing Institutions project implementation methodologies (ADB, WB, IBRD, EBRD and other international banks) for organization and management of tender procedures for the award of engineering services and construction in the field of hydro and thermal power plants.

Moreover, as Power Engineer he has been in charge of the electro-mechanical design review, construction supervision, preparation of due diligences, feasibility studies, technical specifications and cost estimate of power generation projects mainly located in the Middle East area.

The current Project Manager position involves executing and managing CDM/JI validation and verification assignments, executing and managing verification under voluntary schemes, and providing global support and training in the relevant specialized technical areas within the DNV global Climate Change Services team.

His qualification, industrial experience and experience in CDM demonstrate his sufficient financial expertise.

Technical Reviewer

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

Ole Andreas Flagstad has 5 years experience in validation and verification of projects within CDM, JI and other carbon credit schemes. His qualifications and experience in carbon credit schemes (primarily CDM and JI), qualifies him for different roles in a broad group of technical areas.

Sector Expert

Barbara Toole O'Neil holds a Master in Chemical Engineering from the University of Akron and a Bachelor of Science in Chemistry from Carnegie Mellon University. She gained over 20 years experience in the Engineering, Regulatory and Consulting spaces related to coal mining and was an Advisory Panel member of the Illinois Clean Coal Institute for 5 years from 1990 to 1995.

Her qualifications and experience qualify her as a Sector Expert in Coal Mining and Coal Mine Methane.