VALIDATION REPORT

YUECHENG COALMINE METHANE POWER GENERATION PROJECT IN CHINA

REPORT NO. 2011-9359

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VALIDATION REPORT

Date of first issue: 2011-06-09	ConCert Project No.: PJRC-303193-2011-CCS-AUS
Appoved by: Michael Lehmann	Organisational unit: DNV KEMA Energy & Sustainability, Accredited Climate Change Services
Client: COzero Pty Ltd	Client ref.: Nicholas Armstrong

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Summary:

Project Name: Yuecheng Coal Mine Methane 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: 546 271 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 "Yuecheng Coal Mine Methane Power Generation Project" in the People's Republic of China, as described in the PDD of version 6 dated 18 December 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.: 2011-9359	Subject Group: Environment
Report title: Yuecheng coalmine methane power generation project in China	
Work carried out by: Jian Rong Gary Zhou, Mark Robinson, Chandrashekara Kumaraswamy, Jhonsen Zhang; Giovanni Tenderini	
Work verified by: Ole Flagstad, Zhu Chao	

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Indexing terms

Key words
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Kyoto Protocol
Validation
Clean Development Mechanism

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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	Chinese Yuan
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
NCPG	North China Power Grid
NGO	Non-governmental Organisation
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	Yuan 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
WHR	Waste Heat Recovery

1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the project activity "Yuecheng Coal Mine Methane 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 of Great Britain. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants Jincheng Runhong New Energy Power Co Ltd and Originate Carbon Limited of The United Kingdom of Great Britain. 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 546 271 tCO_2e per year over the selected 10 year fixed crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

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

In summary, it is DNV's opinion that the project activity "Yuecheng Coal Mine Methane Power Generation Project" in China, as described in the PDD, version 6 dated 18 December 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, 2012-12-19

Chandrashekara Kumaraswamy
Validator
DNV Bangalore, India

Michael Lehmann
Director of Services and Technologies
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 /17/. As such, COzero Ltd has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the Yuecheng coalmine methane 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. The validation was based on the recommendations in the Validation and Verification Manual /31/.

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 has consisted of the following the 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/ Greenensign (Beijing) New Energy Technology Ltd.: *CDM-PDD for project activity "Yuecheng Coal Mine Methane Power Generation Project" in China*, version 01 dated 25 March 2011.

/2/ Greenensign (Beijing) New Energy Technology Ltd.: *CDM-PDD for project activity "Yuecheng Coal Mine Methane Power Generation Project" in China*, version 6 dated 18 December 2012

/3/ Jincheng Environment Protection Research Institute: *Environmental Impact Assessment of Yuecheng Coal Mine Methane Power Generation Project (10MW, first phase)*, dated 29 June 2010.

Jincheng Environment Protection Research Institute: *Environmental Impact Assessment of Yuecheng Coal Mine Methane Power Generation Project (10MW, second phase)*, dated 9 July 2010.

/4/ Jincheng Runhong New Energy Power Co., Ltd. and Shanxi JINCHENG Smokeless Coal Industry Group Ltd: *CMM purchase agreement*, dated 17 December 2009.
Shanxi JINCHENG Smokeless Coal Industry Group Ltd: *Statement regarding incidental usage of Yuecheng Coal Mine CMM*, dated 25 April 2012.

/5/ Jincheng Environmental Protection Bureau: *EIA approval letter of Yuecheng Coal Mine Methane Power Generation Project (10MW, first phase)*, dated 20 July 2010.

Jincheng Environmental Protection Bureau: *EIA approval letter of Yuecheng Coal Mine Methane Power Generation Project (10MW, second phase)*, dated 20 July 2010.

/6/ Changzhi Branch of Dahua Engineering Management Group: *Feasibility Study Report of Yuecheng Coal Mine Methane Power Generation Project*, dated June 2010.

Changzhi Branch of Dahua Engineering Management Group: *Statement of Yuecheng CMM Power Plant auxiliary power consumption*, dated July 2012

Changzhi Branch of Dahua Engineering Management Group: *Statement of Yuecheng CMM Power Plant gas pre treatment requirements*, dated 20 July 2012

Shanxi province NDRC: *Shanxi Province Project Design and Approval Management Regulation*, dated 1 August 2011

/7/ Shanxi Province Development and Reform Commission: *FSR approval letter of Yuecheng Coal Mine Methane Power Generation Project*, dated 31 December 2010.

/8/ Jincheng Runhong New Energy Power Co., Ltd: *Board meeting minutes to develop the proposed project with the CDM assistance*, dated 18 May 2010.

/9/ Equipment purchase contracts:

Jincheng Runhong New Energy Power Co Ltd and Jincheng Jichai Trading Co Ltd: *30T anti-leakage water treatment equipment purchase contract*, dated 17 January 2012

Jincheng Runhong New Energy Power Co Ltd and Jincheng Xinde Power Design Co Ltd: *35KV step-up substation project design*, dated November 2011

Jincheng Runhong New Energy Power Co Ltd and Jincheng Chuanggao Electric Communication Automation Co Ltd: 35KV step-up substation telecommunication automation project construction, dated 2 May 2012

Jincheng Runhong New Energy Power Co Ltd and Jincheng BIaoyuan Trading Co Ltd: *35KV step-up substation Power cable, connectors and switches*, dated 15 February 2012

Jincheng Runhong New Energy Power Co Ltd and JIncheng Jichai Trading Co Ltd: *35KV step-up substationv automation system*, dated 17 October 2011

Jincheng Runhong New Energy Power Co Ltd and Jincheng Juneng Grid engineering Co Ltd: *Yuechneg 35KV power transformer project*, dated Jan 2012

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

Jincheng Runhong New Energy Power Co Ltd and Jincheng Xinhua Cable Co Ltd: *Cable Purchase Contract*, dated 22 November 2011

Jincheng Runhong New Energy Power Co Ltd and Henan Zhongyuan Construction Co., Ltd.: *Civil Engineering Construction contract*, dated 8 May 2011:

Jincheng Runhong New Energy Power Co Ltd and Shanxi RUiyuan Electeric Engineering Co Ltd: *Construction and installation of Yuecheng Power Plant*, dated 24 May 2011

Jincheng Runhong New Energy Power Co Ltd and Xingtaiqiaoxi Subsidiary of Hebei Weitai Fire Safety Engineering Co. Ltd: *Fireproof equipment installation for Yuecheng Power Plant*, dated 20 December 2011

Jincheng Runhong New Energy Power Co Ltd and Shandong Jichai Green Power Co., Ltd: *Equipment purchase contract (20 sets of 1000GF9-WK generator)*, dated 29 April 2011.

Jincheng Runhong New Energy Power Co Ltd and Jincheng Yunling Coal Geological Service Co Ltd: *Geological survey and infrastructure construction*, dated 26 December 2011

Jincheng Runhong New Energy Power Co Ltd and Shanxi Jintong Engineering Project Management Consulting Co Ltd: Grid connection supervision contract, dated 15 February 2012

Jincheng Runhong New Energy Power Co Ltd and Jincheng Shenghao Photoelectricity Scientific Co Ltd: *Site lighting contract*, dated 24 May 2012

Jincheng Runhong New Energy Power Co Ltd and Jincheng Leian Electricmechanical Equipment Co., Ltd: *Lightning protection tower*, dated 18 November 2011

Jincheng Runhong New Energy Power Co Ltd and Shanxi Pengyue Transmission Engineering Co Ltd: Optical cable construction contract, dated 10 November 2011

Jincheng Runhong New Energy Power Co Ltd and Beijing MIngda XInhao Scientific Development Co Ltd: *Optical transimtter and receiver contract*, dated 9 November 2011

Jincheng Runhong New Energy Power Co Ltd and Jincheng JIchai Trading Co Ltd: *Power transformer, high strength cable, switch cabinet contract*, dated 14 November 2011

Jincheng Runhong New Energy Power Co Ltd and Jincheng Tianwang Trading Co Ltd: *Internet and data communication connection contract*, dated 7 March 2012

Jincheng Runhong New Energy Power Co Ltd and Shanxi Heli Innovative Scientific Co Ltd: *Scheduling data network contract*, dated 9 November 2011

Jincheng Runhong New Energy Power Co Ltd and Shanghai Kaiquan Pump Group Co Ltd: Pump (x6) purchase contract, dated 26 September 2011

Jincheng Runhong New Energy Power Co Ltd and Qinyang Huilong Industrial Co Ltd: *Wind and dust-proof barrier wall construction*, dated 12 June 2012

Jincheng Runhong New Energy Power Co Ltd and Shanxi Kewei Huadian Scientific Co Ltd: *XM130DRP+1 electrical cabinets purchase contract*, dated 9 November 2011

Jincheng Runhong New Energy Power Co., Ltd. and Henan Zhongyuan Construction Co., Ltd.: *Construction contract* dated 8 May 2011.

/10/ Jincheng Runhong New Energy Power Co., Ltd. and Shandong Jichai Green Power Co., Ltd: *Technical agreement of generators*, dated 29 April 2011.

/11/ Documentation and invoices supplied by the Yuecheng Coal Mine:

Jincheng City Longxing Commerce Co. Ltd. And Jincheng Qinxiu Coal Industrial Co. Ltd: *CMM transmission pipeline for Yuecheng Coal Mine*, dated 26 February 2012

HeBei province Installation engineering Co. Ltd. And Yuecheng Coalmine: *ShanXi Jin cheng Coal group Qinxiu Coal Industrial Co. Ltd, Yuecheng Coalmine CMM gas transmission equipment maintenance and repair Service contract*, dated 9 December 2010

Qinxiu Coal Industrial Co. Ltd. Yucheng Coalmine and China Ping'An Insurance Co. Ltd: *Insurance policy*, dated 6 February 2012

Heng,An Boiler Co. Ltd: *WNS4 gas-fired hot water boiler Specification*, as per plate specification

Shanxi Jincheng Electricity Supply Co. Ltd: *Electricity invoices for the Yuecheng Coal Mine*, December 2011.

Greenensign (Beijing) New Energy Technology Ltd: *Yuecheng CMM sale financial analysis.xls*, dated 10 December 2012

Jincheng Qinxiu Coal Industrial Co. Ltd: *Salary payment record*, for 2012

Shanxi jincheng Coal Group Qinxiu Coal Industrial Co. Ltd: *CMM purification plant quote*, dated 2 December 2012

/12/ Greenensign (Beijing) New Energy Technology *Ltd.*: *IRR calculation spreadsheet of Yuecheng Coal Mine Methane Power Generation Project*, dated 9 September 2012.

Greenensign (Beijing) New Energy Technology *Ltd.*: *Yuecheng project scenario v fin analysis.xls*, dated 9 September 2012.

Greenensign (Beijing) New Energy Technology *Ltd.*: *Yuecheng project scenario vii fin analysis.xls*, dated 9 September 2012.

/13/ Greenensign (Beijing) New Energy Technology *Ltd.*: *ER calculation spreadsheet of Yuecheng Coal Mine Methane Power Generation Project*, dated 9 September 2012.

/14/ Jincheng Runhong New Energy Power Co., Ltd: *CDM prior consideration notification to the Chinese DNA*, dated 15 March 2011.

It was confirmed by the Chinese DNA on 28 March 2011.

Jincheng Runhong New Energy Power Co., Ltd: *CDM prior consideration notification to UNFCCC*, dated 16 March 2011.

Confirmed by the UNFCCC on 17 March 2011:

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

/15/ Shanxi JINCHENG Smokeless Coal Industry Group Ltd operational compliance certificates:

Shanxi Province Environment Protection Bureau *: Environmental Permit*, dated 30 December 2011.

ShanXi Province Coal Industry Administration: Coal Mining License, dated 22 December 2010.

ShanXi province Business and Commerce Administration: Business License, dated 23 February 2012.

/16/ Jincheng Runhong New Energy Power Co., Ltd: *40 copies of consultation questionnaires for the stakeholder comments*, dated 19 October 2010.

/17/ Jincheng Runhong New Energy Power Co., Ltd and Originate Carbon Ltd: *Emission reduction purchase agreement* dated 9 November 2010.

Jincheng Runhong New Energy Power Co., Ltd and Greenensign (Beijing) New Energy Technology Ltd.: *Emission reduction purchase agreement* dated 27 September 2010.

/18/ Gas drainage and usage records:

Shanxi Jin Coal Group Qinxiu Coal industrial Co. Ltd.: *Gas drainage and usage record of Yuecheng Coal Mine* dated January 2010.

Shanxi Jin Coal Group Qinxiu Coal industrial Co. Ltd.: *Gas drainage and usage record of Yuecheng Coal Mine* dated January 2011.

Shanxi Jin Coal Group Qinxiu Coal industrial Co. Ltd.: *Gas drainage and usage record of Yuecheng Coal Mine* dated February 2012.

/19/ Jincheng Runhong New Energy Power Co., Ltd. and Shanxi Ruiyuan Power Engineering Co., Ltd.: *Gas power plant installation project contract*, dated 24 May 2011.

/20/ Jincheng Bureau of Industry and Commerce: *Business License (original and copy) for Jincheng Runhong New Energy Power Co., Ltd*, dated 19 May 2011.

/21/ Jincheng City Gas Testing centre: *CMM component analysis report J091223.12*, dated 23 December 2009.

/22/ Jincheng Runhong New Energy Power Co., Ltd and Yuecheng Coal Mine: *Cooperation agreement on the development of Yuecheng Coal Mine Methane Power Generation Project*, 17 December 2009.

/23/ 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.

/24/ Qinshui Economy and Commerce Bureau of Qinshui Government: Ownership of Yuecheng Coal Mine by Shanxi JINCHENG Smokeless Coal Industry Group, as at 20 March 2012
http://www.qsjsj.gov.cn/qxmygs.html

/25/ Jincheng City Council: *State owned corporations*, dated 4 November 2008
http://xxgk.jconline.cn/Contents/2008/1104/content_3478.html

/26/ Shandong Jichai Green Power Driving Equipment Co Ltd: *1000GF9-WK Generator Operational Guidelines*, dated 23 February 2012
Shandong Jichai Green Power Driving Equipment Co Ltd: *1000GF9-WK Generator Operational Efficiency*, dated 21 March 2012
Shandong Jichai Green Power Driving Equipment Co Ltd: *Explanatory note on generator lifetime*, dated 23 February 2012
Shandong Jichai Green Power Driving Equipment Co Ltd: *Statement on peak performance operation for 1000GF9-WK generator*, dated 23 July 2012

/27/ ShanXi province Jincheng City Power Group: *Grid connection approval*, dated 17 May 2011

/28/ Jincheng Bureau of Industry and Commerce: *Name change certificate (the project owner changed its name from Jincheng Runhong Coal Mine Methane Power Co., Ltd to Jincheng Runhong New Energy Power Co., Ltd.)*, 18 January 2011.

3.1.2 LETTERS OF APPROVAL

/29/ National Development and Reform Commission of China (NDRC) (DNA of China): *Letter of approval*, dated December 2011

/30/ Department of Energy & Climate Change (DNA of the United Kingdom Department of Energy & Climate Change): *Letter of approval*- 19 January 2012

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

/31/ CDM Executive Board: *Validation and Verification Manual*, version 1.2

/32/ CDM Executive Board: *Baseline and monitoring methodology ACM0008*, version 07

/33/ CDM Executive Board: *Tool to calculate the emission factor for an electricity system*, Version 02.2.1

/34/ CDM Executive Board: *Tool for the demonstration and assessment of additionality*, Version 6.0

/35/ CDM Executive Board: T*ool to calculate project or leakage CO_2 emissions from fossil fuel combustion*, Version 02

/36/ CDM Executive Board: *Tool to determine project emissions from flaring gases containing methane*, Version 01

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

/37/ NDRC: *National Coal Mines Safety Regulations on methane concentration for safety*, 2005

/38/ NDRC and the National Construction Committee, 2006, Economic Evaluation Code and Parameter for Construction Project, Version 03

/39/ NDRC: *Provisional Regulations of the People's Republic of China on Value Added Tax (No. 538),* dated 10 November 2008.

China Ministry of Finance and China National Taxation office: *The Urban maintenance and construction tax*, dated 1 December 2010

China state council: *Education surcharge Levy*, dated 18 October 2010

China National Taxation office: *The VAT preferential policies*, dated 7 February 2007

China NDRC and Construction Ministry: *Item 9: The pre-requisite for building up cogeneration project is central heating in the regions without central heating*, dated 17 January 2007

/40/ State Administration of Work Safety: *National Coal Mines Safety Regulation*, dated 2010

/41/ Standard *GB 21522-2008* and related documentation:

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

SEPA order no. 28, *Measures for the Administration of Automatic Monitoring of Pollution Sources,* 2005 and available at http://www.nnhb.gov.cn/uploadfile/2008314153359411.pdf (Chinese) and http://faolex.fao.org/docs/texts/chn61891.doc (English)

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Shanxi Environmental Protection Bureau: *The written statement by Xiyang Xian Environmental Protection Department* dated 20 August 2010 and the written statement by dated 9 October 2010

Economics Institute of Shanxi Academy of Social Sciences, *Special Report on CMM Drainage and Utilisation In Shanxi Province*, dated October 2010

Shanxi government Coal Industry Department: *High concentration CMM gas drainage and usage in Shanxi province*, dated November 2012

Inner Monglia News Net: *Shanxi Post-coal resource integration Age*, dated 2 June 2010

State Council of the P.R. of China, *12th Five-Year Plan for Development and Utilization of Coalbed Methane and Coal Mine Methane* (2011-2015)

State Council of the P.R. of China, 11th *Five-Year Plan for Development and Utilization of Coalbed Methane and Coal Mine Methane* (2006-2010)

International Energy Agency, *Coal Mine Methane in China: A Budding Asset with the Potential to Bloom,* 2009 (available at http://www.iea.org/papers/2009/china_cmm_report.pdf).

World Bank, CCII and ESMAP, *Economically, socially and environmentally sustainable coal mining sector in China*, December 2008 (available at http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/01/15/000333037_20090115224330/Rendered/PDF/471310WP0CHA0E1tor0P09839401PUBLIC1.pdf

Yang Guang, Yang Changkai, *The comments on regulation* published in 17 July 2009 in China requiring CMM utilization where gas concentration was >30%; http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=3719)

/42/ Det Norske Veritas: *Response to request for review of project activity 3219 "SDIC Xiyang Baiyangling CMM to power generation project"* dated 12 July 2010

/43/ 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

/44/ National Bureau of Statistics: *National Average Wages*, dated 3 May 2011

/45/ Ashland Ltd: *MSDS for PREMIUM BLUE® SAE 15W-40 DIESEL ENGINE OIL VV70506*, dated 19 November 2007

/46/ Qinghua University: *CMM pipeline transport*, dated 28 August 2002 http://www.ccchina.gov.cn/cn/NewsInfo.asp?NewsId=4149

/47/ World Coal Association: *Coal Seam Methane; Energy Generation*, as at 6 March 2012 http://www.worldcoal.org/coal/coal-seam-methane/

/48/ Shenyang Aode Gas Co Ltd: *Corporate publication and interview on service*, as at 7 March 2012

/49/ General Office of the State Council, China: *Decision on strictly forbidding the illegal construction of fuel-fired power plant with the capacity 135 MW and below*, dated 15 April 2002.

/50/ Shanxi Price Bureau and Shanxi Power Co: *Electricity tariff notification*, dated 9 December 2009

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

/51/ Price Bureau of Shanxi Province: *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

http://www.ndrc.gov.cn/xwfb/t20050628_27624.htm

/52/ Australian Coal Association: *Inquiry into the Clean Energy Future (CEF) Legislative Package*, dated 26 September 2011

/53/ Price of gas fired boilers is much more expensive than that of coal fire boilers

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).

/54/ Zhuping, Study on captive power plant,

http://www.dss.gov.cn/Article_Print.asp?ArticleID=197921

/55/ Taihang Daily Newspaper: *Shanxi census results*, dated 16 May 2011

/56/ Environment Agency UK: Email correspondence with DNV, dated 17 April 2012

/57/ Cummins Power Generation Inc: *Derate and Gas Analysis Tool*, as at 20 April 2012
https://quickserve.cummins.com/gas_analysis_tool/index.html

/58/ The People's Republic of China: *Article 7 of the Environmental Protection Law of the People's Republic of China*, dated 26 December 1989

/59 / Tydao Regional Information Centre: *Qinshui County Geography*, as at 20 April 2012
http://www.tydao.com/baixian/jincheng/qingshuixian.htm

/60/ Taihang Daily Newspaper: Jincheng Population Growth; Shanxi census, dated 16 May 2011

/61/ U.S. Energy Information Administration: China energy Statistics: Coal, as at 25 March 2012
http://www.eia.gov/countries/

/62/ National Bureau of Statistics China: *China inflation rate and interest rate*, January 2012
http://www.tradingeconomics.com/china/inflation-cpi

/63/ 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

/64/ Chinese National Development Reform Commission: *Feed-in tariff Notification*, dated 9 December 2009
http://www.sxprice.gov.cn/sy/tzgg/20091209/084629.html

/65/ Research Institute of Standards & Norms, Ministry of Construction: *Economic Evaluation Method and Parameters for Construction Projects (Version 03)*, dated 2003

/66/ State Information Center Economics Prediction Department: *Power Industry Operation Report*, dated 2008

/67/ PAN Weier from State Coalmine Safety Supervision Bureau Control Center: *Coal Economic Operation in China Report*, dated 2008

/68/ Jincheng City Government: *Coal Mine Methane sale price guidelines*, dated 28 October 2008
Jincheng City Government: *Item 2 of the Notice Regarding CMM Pricing*, No. 301 of 2003

/69/ China Electric Power Press: *China Electric Power Yearbook*, dated 2007
China Electric Power Press: *China Electric Power Yearbook*, dated 2008
China Electric Power Press: *China Electric Power Yearbook*, dated 2009
China Statistics Press: *China Energy Statistical Yearbook*, dated 2007
China Statistics Press: *China Energy Statistical Yearbook*, dated 2008
China Statistics Press: *China Energy Statistical Yearbook*, dated 2009

/70/ IPCC: *Guidelines for National Greenhouse Gas Inventories*, dated 2006

/71/ NDRC: *Notification on Determining Baseline Emission Factor of China's Grid, dated 2009*

/72/ Shanxi NDRC, Shanxi Provincial government website. Register of approved electricity generating projects with approval to export electricity to the power grid.
http://www.sxdrc.gov.cn/xxlm/lxsp/
Methane Markets database. CMM projects listed for Shanxi Province China.

http://www2.ergweb.com/cmm/index.aspx

Xiyang County Fengyuan construction approval' issued by Shanxi Provincial NDRC on 12/6/2012. Available at http://www.sxdrc.gov.cn/xxlm/xny/zhdt/201206/t20120612_64893.htm

3.2 Follow-up interviews with project stakeholders

On 25 May 2011 Mark Robinson and Jian Rong Zhou of DNV visited the Jincheng Runhong New Energy Power Co Ltd (formerly Jincheng Runhong Coal Mine Methane Power Co., Ltd /28/) site office and performed interviews with project stakeholders.

	Date	Name	Organization	Topic
/73/	2011-5-25 and 2011-5-26	Mr. Geng Xiaofei Ms. Chen Li	Greenensign (Beijing) New Energy Technology *Ltd.* (CDM consultant)	➢ Baseline determination of the project ➢ Applicability of selected methodology ACM0008 ➢ Issues related to the additionality ➢ Common practice analysis ➢ Emission reductions calculation ➢ Emission reduction monitoring plan and project management
/74/	2011-5-25 and 2011-5-26	Mr. Yan Xiangjin Mr. Lu Jiangtao Mr. Pan Xiaoguang	Jincheng Runhong New Energy Power Co., Ltd (project owner)	➢ Information of project construction ➢ The development of CMM power generation project in Shanxi Province ➢ The approval status (incl. EIA approval, the feasibility study report approval, CDM project approval) ➢ Project management ➢ Emission reduction monitoring plan ➢ Consulting process for stakeholder's comments ➢ Investment risks and barriers
/75/	2011-5-25	Mr. Chaopeng	Deputy general	➢ Relationship between coal

	and 2011-5-26 And 2012-05-08	Li	manager of Yuecheng coal mine.	mine and project participant ➢ Gas purchase agreement ➢ Supply of CMM to other mines
/76/	2011-5-25 and 2011-5-26	Mr. Qingsheng Li	Officer of Qinshui County Development and Reform Bureau	➢ Regulation of CMM emissions and other regulatory compliance
/77/	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)

The websites listed in the references are confirmed to be available on 9 September 2012.

After reviewing the Request for Review dated 26 November 2012 and the Incompleteness message dated 12 July 2012 updates to the project documentation and validation report were carried out. Subsequently after reviewing the PDD version 6 dated 18 December 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 6 dated 18 December 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 name of the project participant has been updated in the PDD and LoA;
- 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 f 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 3.8 of this report;
- Data and parameters monitored have been updated to remove the monitoring of $GEN_{PJ\ to\ yuecheng}$ and GEN_y to be net electricity produced after self use;
- The description of the Monitoring Plan has been updated to reflect the requirements of the methodology and the QA/QC requirements related;
- Data, references and analysis related to responding to the Request for Review dated 26 November 2012.

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 "Yuecheng coal mine methane 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.

The validation protocol in Appendix A is based on the project design as documented and described in the PDD, version 6 dated 18 December 2012, and Table 3 of the validation protocol will as applicable describe any changes made to this version of the PDD as a result of CARs and CLs raised by DNV.

The findings of the validation of the project design as documented and described in earlier version(s) of the PDD are described in the initial validation protocol included in Appendix B to this report.

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 review performed by a team leader 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 8.2competence	TA 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	Chao	Zhu	China						✓	✓	

The qualification of each individual validation team member is detailed in Appendix C 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 6 dated 18 December 2012.

4.1 Participation requirements

The project participants are Jincheng Runhong New Energy Power Co Ltd (formerly Jincheng Runhong Coal Mine Methane Power Co., Ltd) of China and Originate Carbon Ltd. from the United Kingdom. The host Party (China) and the Annex I Party the United Kingdom meet all relevant participation requirements.

A letter of approval (LoA) /29/ has been issued by DNA of China. The DNA of the United Kingdom has issued an LoA /30/ authorizing Originate Carbon from the United Kingdom as project participant on the 19 January 2012.

The letters of approval were received from the project participants. The Chinese DNA, the NDRC allows an internet search of projects approved by the DNA that have been issued LoAs at the address http://cdm.ccchina.gov.cn/english. DNV conducted a search of this database which confirmed that the proposed project is recorded as being approved by the Chinese DNA on 17 November 2011, several days before the official certificate was stamped and send to the project participant (dated December 2011). DNV is able to confirm the LoA provided by the project participant was emailed by the Environment Agency to the project participant on 20 January 2012 at 16:59:12 AEST via email communication with the Agency /56/. As a result 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 /31/.

4.2 Project design

The Yuecheng coal mine methane power generation project is a newly built coal mine methane electricity generation project within the grounds of an existing coal mine, which results in creation of electrical energy from coal mine methane captured in the adjacent mine. The project is located in Qinshui County, Jincheng City of Shanxi Province in the People's Republic of China.

The average concentration of drained CMM from Yuecheng Coal Mine is expected to be around 35%. It is detailed in the FSR /6/ that the pure methane drained in one year from the Yuecheng Coal Mine will reach is 80 million m^3. The estimated total usage of the proposed project is detailed in the FSR /6/ as being 37.69 million m^3, equivalent to 45% of the total reported pure methane extracted per year. Some existing use of the extracted methane from the Yuecheng Coal Mine exists however as per the FSR /6/ and the Gas drainage and usage record of Yuecheng Coal Mine /18/ historically (2009-2011), this has been demonstrated to compose on average an incidental 19.48% to maintenance of the Jincheng Group assets during a temporary assistance program /4/ /75/ and 4.88% self use by the Yuecheng Coal Mine and 3.64% use by local residents, totaling 28% of the total CMM supply from the mine

/18/. A total of 20 sets of 1000KW generator units will be installed with a total capacity of 20MW.

The project participant Jincheng Runhong New Energy Power Co Ltd, has been verified by DNV to be separate entity to the Yuecheng 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 /23/.

The Yuecheng Coal Mine is wholly owned by Shanxi JINCHENG Smokeless Coal Industry Group Ltd via the Qinshui Economy and Commerce Bureau of Qinshui Government /24/. In addition it is listed in the Jincheng City Council website that Shanxi JINCHENG Smokeless Coal Industry Group Ltd is a state owned corporation /25/.

As per the Gas drainage and usage record of Yuecheng Coal Mine 2009-2011 /18/; In the absence of the project 28% of the methane drained from the Yuecheng Coal Mine is expected to be utilized by the coal mine, the coal mine owner and local residents, the remainder of 72% is released into the atmosphere directly which results not only in the waste of potential resources but also the emission of greenhouse gases. The proposed project utilizes the CMM to produce electricity for exporting to the North China 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 the 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 net power generation can reach 100 080 MWh (after 3 600 MWh of electricity generated by the project is supplied to Yuecheng coal mine). The annual emission reductions of the proposed project are estimated to be 557 419 t CO_2e at 100% operation with a ten year average of 546 271 tCO_2e when the first year operation at 80% is taken into consideration.

The project start date is defined in the PDD as the 29 April 2011 /9/. A fixed crediting period of 10 years has been chosen for the project, starting on 1 December 2012.

The associated equipment will be sourced domestically – from Shandong Jichai Green Power Co., Ltd. (20 sets of 1000GF9-WK generators).

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 /32/. The project fulfills the following conditions under which ACM0008 Version 7 is applicable:

CMM drainage activities and the applicability of ACM0008

Surface drainage wells to capture CBM associated with mining activities.

- Not conducted and not applicable.

Operate in open cast mines.

- The Yuecheng coal mine is entirely underground. Not applicable.

Underground boreholes in the mine to capture pre-mining activities.

- This is the case in the proposed project and is included as per the diagram B.3-1 of the PDD /2/ the CMM gas drainage infrastructure is inside the project boundary.

Surface goaf wells, underground boreholes, gas drainage galleries or other goaf gas capture techniques, including gas from sealed areas, to capture post mining CMM.

- The proposed project involves the use of underground boreholes, gas drainage galleries to capture post mining CMM.

Ventilation air methane that would normally be vented.

- This is the case in the proposed project and is included.

CMM utilization activities and the applicability of ACM0008

The methane is captured and destroyed through flameless oxidation.

- No methane is destroyed through flameless oxidation.

The methane is captured and destroyed through flaring.

- No flaring is involved in the proposed project.

The methane is captured and destroyed through utilization 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 captured methane proposed to be used to generate electricity, which is to displace the power from the North China Power Grid. The emission reductions from this activity will be claimed in the proposed project.

The remaining share of the methane, to be diluted for safety reason, may still be vented.

- In the coal mine, the remaining share of the methane is to be diluted for safety reason, and is still be vented as VAM. Under the project scenario, this is expected to comprise approximately 26.98% of the total CMM generated by the Yuecheng Coal Mine in the first year of operation /18/. Of the 45% of the methane generated by the Yuecheng Coal Mine allocated to the proposed project, the first year of operation is proposed to be run at 80% of normal output as a trial period to ensure safe and reliable operation of the project.

All CBM and CMM captured in this project must be utilized or flared, and cannot be vented.

- CMM captured by the proposed project will be utilized for power generation.

The proposed project activity and the inapplicability of ACM0008

Capture methane from abandoned/decommissioned coalmines.

- The proposed project is to occur simultaneously with mining activities.

Capture/use of virgin coal-bed methane.

- CMM captured and used in the proposed project is dependent upon the mining activity in the Yuecheng coal mine. CBM is not involved in the proposed project.

Use CO_2 or any other fluid/gas to enhance CBM drainage before mining takes place.

- There are no CBM extraction activities at Yuecheng Coal Mine.

Ex-ante projections of methane demand

The project participant, through the application of the methodology ACM0008 (version 07) /32/ and the supplied project documentation /1/ /4/ is able to supply the necessary data /18/ for ex-ante projections of methane demand.

As per the steps detailed in the methodology ACM0008 version 7, the project participant has demonstrated the lack of leakage related to baseline users as follows:

As per the methodology ACM0008 version 7, “Calculation of the mean annual demand (Thy) for each year of the crediting period” The project participant has calculated $TH_{BL,k}$, the Methane used to serve estimated thermal energy demand in the baseline for day k of year y (tCH_4) using option c) as only 2.5 years’ worth of historical data are available /18/.

The project participant has clarified the consideration of leakage due to the displacement of baseline thermal energy uses. Accordingly, DNV can confirm that:

The Yuecheng Coal Mine distribution system comprises 3 WNS4 gas fired boilers /11/. As per option c) “Maximum throughput estimates should be based on a detailed engineering description of the existing pipeline infrastructure.”

The temporary usage by other mines in the Jincheng group was by vehicular transport /6/. These mines are not connected by existing pipeline infrastructure. The Jincheng group has issued a statement confirming that there is to be no future demand from these mines. In addition such demand is not considered as per the wording in option c) due to the lack of pipeline connection. This is in line with the methodology.

According to the specification of the WNS4 gas-fired hot water boilers /11/ the gas (pure methane) consumption is: 340 m^3 per hour. In order to be conservative, it is assumed the boilers are working as 24 hours per day. Therefore, the maximum usage of CMM for day k is:

340 m^3/hour *24 hours*3 = 24,480 m^3 pure methane per day

Therefore, Methane used to serve estimated thermal energy demand in the baseline for day k of year y (tCH_4)

$TH_{BL,k}$ = 24,480 m^3 pure methane per day

$$ME_k - (MM_{ELEC,k} + MM_{HEAT,k}) < TH_k \quad (35)$$

According to the projection report and the FSR /6/, the extraction of CMM gas (35% concentration) in Yuecheng coalmine is: 239,670,000 m^3 per year /6/, which is 83,884,500 m^3 pure methane per year. Therefore:

ME_k Methane extracted on day k (tCH_4)
= 83,884,500/365=229,820,55 m^3

According to the project FSR /6/, the annual consumption of 35% concentration CMM gas in the proposed project is 109,710,000 m^3, which is 38,398,500 m^3 pure methane. Therefore:

$MM_{ELEC,k}$ Methane measured sent to power plant on day k (tCH_4)
= 38,398,500/365 = 105,201.37 m^3 pure methane

The proposed project is a power generation project, not a cogeneration project, therefore:

$MM_{HEAT,k}$ Methane measured sent to new heat generation uses on day k in the Project Scenario that would not have been sent in the Baseline Scenario on day k (tCH_4)

=0

229,820.55 – (105,201.37 + 0) = 124.619.18 m^3 > 22,480 m^3

Therefore, there is no leakage in the project.

Furthermore, to be conservative, DNV has considered the potential usage demands into the crediting period. This is in addition to the analysis stipulated under ACM0008 version 7 to comprehensively explore the likelihood of leakage.

The project participant has provided a forecast of thermal demand based on historical data /18/, contractual arrangements /4/ and established regional growth rates for both local population /60/ and coal production /61/.

The Yuecheng coal mine was refurbished in the period 2008-2009, with the coal mine resuming operation in July 2009 /18/. As a result gas drainage records for the mine are available from 2009 onwards /18/.

Historical data

Presented in section B.2 of the PDD /2/, the project participant has detailed the historic use of CMM drained from the Yuecheng coal mine during 2009, 2010 and 2011. Historical demand and contractual arrangements identify the following sources of demand:

- The Yuecheng coal mine, which has demonstrated that during periods of normal mine operation from July 2009 to December 2011 an average rate of self use is 4.08 million m^3 CMM or 4.88% of the total drained CMM from Yuecheng coal mine /18/.
- The local residents, which has demonstrated that during periods of normal mine operation from July 2009 to December 2011 an average rate of use is 3.05 million m^3 CMM or 3.64% of the total drained CMM from Yuecheng coal mine /18/.
- The proposed project, which as per the gas purchase agreement will be entitled to consume 37.69 million m^3 CMM or 45% of the total drained CMM from Yuecheng coal mine /4/.
- JINCHENG group (Shanxi Jin Coal Group Qinxiu Coal industrial Co Ltd). While the demand from maintenance projects at other JINCHENG Group properties has been confirmed by the Yuecheng coal mine management to be incidental, discretionary, non-contractual and unpaid for as per the *Statement regarding incidental usage of Yuecheng Coal Mine* /4/ (due to those JINCHENG Group assets being refurbished and unable to generate their own CMM /4/).

  A telephone interview was conducted on 8 May 2012 with Mr Chaopeng Li the Deputy General Manager of Shanxi Jin Coal Group Qinxiu Coal industrial Co. Ltd. Subsidiary, Yuecheng Coal Mine /75/. Mr Li confirmed:
  - That the JINCHENG Group is conscious of the gas purchase agreement /4/ being signed in 2009 and the inability of the proposed project to utilize any CMM until its expected commissioning in 2012 resulting in a vast amount of unutilized CMM that was suitable for the incidental use of assisting the other JINCHENG Group company assets that had previously provided the same assistance to the Yuecheng Mine.

- This was short term assistance by the company to other mines that had previously provided similar assistance to the Yuecheng mine during its 2008-2009 upgrade.
- The temporary nature of the assistance to other mines (no investment in permanent infrastructure such as pipelines)
- The method of CMM transport and temporary storage (LNG truck tankers)

Analysis of CMM usage from the Yuecheng Coal Mine by the JINCHENG Group based on drainage records /18/ shows a total lack of demand by the JINCHENG Group for CMM during normal mine operations in 2009 followed by a spike in demand for CMM in 2010 to 25.33 million m^3 (30.3% of the CMM drained in 2010), which subsequently dropped to 15.41 million m^3 CMM demand in 2011(18.4% of the CMM drained in 2011). This presents a pattern of irregular usage with a negative growth trend for demand in the 2010 to 2011 CMM drainage records /18/ underpinning the statements from the JINCHENG Group Management /4/ /74/ that the demand from other JINCHENG group assets is temporary and irregular.

Despite the assurance from the JINCHENG Group management /4/ /75/ that the CMM demand from other JINCHENG Group assets is temporary and irregular (with the drainage and usage data supporting this assurance /18/), the project participant has elected to evaluate demand including an unlikely but conservative on-going demand from the JINCHENG group assets to demonstrate that even if the demand from the JINCHENG Group assets remained and grew, there would still remain a surplus of CMM drained from the Yuecheng Coal mine based on the historical average from July 2009 to December 2011 representing 16.3 million m^3 CMM or 19.48% of the total drained CMM from Yuecheng coal mine /18/.

Assumptions and calculations

The calculation for the Crediting Period Year 1 (CP Year 1) figures for the demand sources have been determined as follows:

Amount used by local residences:
Calculated considering the 30 months from July 2009 to December 2011 when the mine was in normal operations.

*Annual average usage = (July to December 2009 + 2010 + 2011) / 30 months * 12 months*
*Annual average usage = (0 + 384.63 + 378.54) / 30 * 12*
Annual average usage =3 052 680 m^3

Amount used for self used by Yuecheng Coal Mine:
Calculated considering the 30 months from July 2009 to December 2011 when the mine was in normal operations.

*Annual average usage = (July to December 2009 + 2010 + 2011) / 30 months * 12 months*
*Annual average usage = (268 + 380.45 + 372.6) / 30 * 12*
Annual average usage = 4 084 200 m^3

Amount used by other mines in the Jincheng Coal mine group:
Calculated considering the 30 months from July 2009 to December 2011 when the mine was in normal operations.

*Annual average usage = (July to December 2009 + 2010 + 2011) / 30 months * 12 months*
*Annual average usage = (0 + 2 533 + 1 540.78) / 30 * 12*
Annual average usage = 16 295 120 m^3

Total CH4 extracted from the Yuecheng Coal Mine:
Calculated considering the 24 months from January 2010 to December 2011 when the mine had resumed operations. The six months from July 2009 to December 2009 has not been considered due to the lack of data at a monthly level in the 2009 year meaning that inclusion of accurate figures from July to December 2009 is not possible.

*Annual average extraction = (2010 + 2011) / 24 months * 12 months*
*Annual average extraction = (8 364.93 + 8 373.69) / 24 * 12*
Annual average extraction = 83 693 100 m^3

The average consumption figures for these sources of demand have been used as the basis for 2012 usage in the absence of more recent data. The rate of change of these demand sources has been extrapolated using the following growth factors:

- Annual Population growth rate (for residential demand) based on Qinshui County population growth as detailed in the recent Shanxi Province Census figure of 0.53% /60/.
- Annual Chinese coal production growth rate (for self use and JINCHENG Group use of CMM) based on data published by the US Energy Information Administration of 6.21% /61/ (based on the increase in coal production growth from 2000-2009).

The application of the historical data, contractual arrangements and stated assumptions on growth results in the following demand through the crediting period:

Year	Total CH_4 extracted from the Yuecheng Coal Mine	Amount used by other mines in the Jincheng Coal mine group	Amount used by the boilers at the Yuecheng Coal Mine	Amount used by local residences	Amount used by the Proposed Project	Total Methane Used	Remaining Methane
2009	6815	0	268	0	0	268	96.06%
2010	8365	2533	381	385	0	3298	60.06%
2011	8374	1541	373	379	0	2292	72.63%
CP Year 1	8369	1630	408	305	3769	6112	26.97%
CP Year 2	8369	1731	433	307	3769	6240	25.45%
CP Year 3	8369	1839	460	308	3769	6376	23.82%
CP Year 4	8369	1953	489	310	3769	6520	22.09%
CP Year 5	8369	2074	519	312	3769	6673	20.26%
CP Year 6	8369	2203	551	313	3769	6836	18.32%
CP Year 7	8369	2340	586	315	3769	7009	16.26%
CP Year 8	8369	2485	622	316	3769	7192	14.06%
CP Year 9	8369	2639	661	318	3769	7387	11.74%
CP Year 10	8369	2803	702	320	3769	7593	9.27%

Volumes listed are in 10 000 m^3.

The CMM demand at the end of the crediting period under this model is forecast to be 90.73% of the total available methane from Yuecheng coal mine. Despite average volume of drained methane from the Yuecheng coal mine increasing each year since 2009, the project participant has assumed a static output of drained CMM. This is considered to be conservative, especially when the rate of self-use by the Yuecheng coal mine has been forecast to increase at the rate of national coal production growth of 6.21%.

DNV has verified the historical data provided to be fairly represented in this table and considers the assumptions made to be reasonable and credible.

The assessment of the project's compliance with the applicability criteria of ACM0008 (version 07) /32/ are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

4.4 Project boundary

	Emission Source	Gas	Included or not?	Justification / Explanation
Baseline	Emissions of methane as a result of venting	CH_4	Included	Main emission source.
	Emissions from destruction of methane in the baseline	CO_2	Excluded	There is no methane destruction in the baseline
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Grid electricity generation (electricity provided to the grid)	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Captive power and/or heat, and vehicle fuel use	CO_2	Excluded	No such usage in baseline scenario.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.

Project activity	Emissions of methane as a result of continued venting	CH_4	Excluded	Only the change in CMM emissions release will be taken into account, by monitoring the methane used or destroyed by the project activity.
	On-site fuel consumption due to the project activity, including transport of the gas	CO_2	Included	Additional equipment such as compressors are accounting for this source of emission.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from methane destruction	CO_2	Included	From the combustion of methane in power generation.
	Emissions from NMHC destruction	CO_2	Excluded	In this project, NMHC accounts for less than 1% by volume of extracted coal mine gas.
	Fugitive emissions of unburned methane	CH_4	Included	Small amounts of methane will remain unburned in heat/power generation. Default emission factors are applied as per ACM0008.
	Fugitive methane emissions from on-site equipment	CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.
	Fugitive methane emissions from gas supply pipeline or in relation to use in vehicles	CH_4	Excluded	Excluded for simplification. However taken into account among other potential leakage effects (see leakage section)
	Accidental methane release	CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small.

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by ACM0008 (version 07).

As per ACM0008 version 7, the spatial extent of the boundary for the proposed project includes “all equipment installed and used as part of the project activity for the extraction, compression, and storage of CMM and CBM at the project site, and transport to an off-site user”. As per the diagram in section B.3 of the PDD, the boundary includes the:

- Gas drainage system;

  Existing extraction equipment owned by and 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

- Gas engines; and
- The North China Power Grid.

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. Keeping on purchasing equivalent quantity of electricity from the North China Power Grid;
P2. Construction of a coal-fired captive power plant with equivalent installed capacity (20MW);
P3. CMM power generation, this is the project activity not implemented as a CDM project.

Options for thermal energy production:

T1. Continuation of existing situation - coal and gas fired boilers for thermal energy; and
T2. Waste heat recovery from power plant.

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 can be met due to the following:

Item 136 the "*National coalmine safety regulation (version 2010)*" /40/ 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 Yuecheng coal mine solely through the use of ventilation. Furthermore, Item 145 of the regulations /40/ specifies that an above ground gas drainage station be constructed above ground when the CMM emission rate of a mine exceeds 40m^3/min. According to the FSR /6/ (section 1.2.3, p.6)and the Gas drainage and usage record of Yuecheng Coal Mine /18/, average CMM gas emission rate of Yuecheng Coalmine is 456 m^3/min.

It can be seen that this CMM emission rate far exceeds the threshold of 40m^3/min specified in Item 145 of the regulations /40/. Therefore the project activity requires 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.

Hence options A and B can be eliminated.

The regulation /40/ also states that for reasons of safety, methane concentrations shall not be lower than 30% for CMM utilization. According to the FSR /6/ and the gas drainage records /18/ of the proposed project, the average content of CH_4 in CMM extracted from Yuecheng coal mine is estimated as 35% /6/.

Options for extracted CMM treatment
The treatment of extracted CMM is generally subject to the "Emission Standard of Coal bed Methane/Coal Mine Gas (GB 21522-2008)" /41/ that was promulgated by the Chinese ministry of Environment Protection on 2 April 2008. This provision, effective as of 1 July 2008, states that for existing coal mines direct CMM venting is prohibited from 1 July 2010 in case that methane concentration of coal mine gas is above 30%.

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/ /2/.

- DNV has verified through physical inspection /75/ that the state owned Yuecheng Coal Mine has secured its Business Operation License dated 23 February 2012 /15/, Mining License dated 22 December 2010 (valid through to 2043) /15/ and Environmental Operation Permit dated 30 December 2011 /15/

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 Shanxi Province Environment Protection Bureau is the provincial regulator for performance standards and regulations promulgated by the national Chinese ministry of Environment Protection /58/. The current certificate of compliance from the provincial regulator dated 30 December 2011 /15/, clearly indicates compliance with all applicable standards and regulations the Yuecheng Coal Mine is subject to. This indicates that the compliance with regulation GB 21522-2008 is not required for current environmental compliance purposes.

As per ACM008 version 7, if "based on an examination of current practice in the country or region in which the laws or regulation applies, those applicable legal or regulatory requirement are systematically not enforced and that non-compliance with those requirements is widespread in the country", then it need not be considered in the baseline selection analysis. DNV considers that the standard GB 21522-2008 is systematically unenforced and that there is widespread non-compliance with the standard. This is discussed and analysed in the following paragraphs.

Measures taken by the government to monitor the enforcement

The issued "Emission Standard of Coalbed Methane/Coal Mine Gas", a regulation published on 2 April 2008 and applicable to existing coal mines from 1 January 2010, contains indicative penalties which are not likely to be sufficient to incentivise coal mine owners to comply with the regulation.

Up to date, DNV can confirm that three regulations (Enforcement Regulations for Law on Prevention of Air Pollution of the People's Republic of China /41/; Measures for the Administration of Automatic Monitoring of Pollution Sources /41/ and Measures for the Administration of Environmental Surveillance /41/) have not given its specific guidance for implementation of the standard. This situation was caused by the complexity of the drained coal mine gas, which depends on the several factors: CMM quantities and quality are determined by a complex range of inter-related factors, most notably by the rate of coal extraction, the gas concentrations in the working coal face and in the surrounding seams and well as by the gas drainage techniques employed. This means that the volume and concentration of gas extracted will fluctuate significantly according to factors outside the control of the coal mine owner and power plant operator.

Further, local governments at or above the county level shall be responsible for implementing and monitoring compliance with the regulation. Nevertheless, the infrastructure for the implementation of the standard is not in place as confirmed from both Shanxi Province Environmental Protection Bureau, to date, they have not conducted any inspections of coal mines to check compliance with the Standard /41/; meaning that both entities lack the notification for the following issues: 1) the entity that is supposed to monitor compliance 2) the frequency of checking individual coal mines and gas extraction systems 3) size of penalties or punishments to coal mine owners that continue to vent CMM with a

concentration of ≥30%. The validation team confirms that no details of how the above issues will be handled have yet been published.

Number of mines in the region that abide by the regulation

There are 1053 coal mines in Shanxi Province as detailed by Inner Monglia News Net /41/. Ssuch a large number of the coal mines render providing the number abiding the regulation impracticable, due to the two major reasons: that the methane content of CMM varies and that implementation can vary within the same coal mine from drainage station to drainage station.

Even facing the above mentioned barriers, the recently published data by the State and Provincial governments of Shanxi on the volumes of CMM with a high concentration (No exact definition of 'high concentration' is given but it is commonly understood that this is CMM where the methane content is generally >25-30%) of methane drained and utilised (table 1 below) in the Shanxi province can approximately show that the utilization rate of the CMM drained from coal mines, due to the concerns raised from the safety issues and the funding that was available from varied sources (including CDM), is approximately 20-40% in the period 2006-2011.

Table 1: CMM drainage and usage in Shanxi province /41/

(2006-2010 data from Economics Institute of Shanxi Academy of Social Sciences and 2011 data from Shanxi government Coal Industry Department)

	Unit	2006	2007	2008	2009	2010	2011
Drainage	Billion m^3	1.611	2.080	2.160	2.250	2.513	2.674
Utilization	Billion m^3	0.327	0.558	0.767	0.873	1.01	1.135
% Utilisation	%	20.30	26.83	35.51	38.8	40.2	42.45

When compared with the target set in the twelfth five year plan (2011-2015) /41/ in China:

- The drainage amount of CMM should reach 14 billion cubic meters by 2015
- The utilisation amount of CMM should reach 8.4 billion cubic meters by 2015 (i.e. a utilisation rate of 60%)

It is noted by DNV that the proposed CMM utilization rate of the 12th 5 Year plan remains unchanged despite the introduction of the standard GB 21522-2008. /41/

When compared with the target set in the eleventh five year plan (2006-2010) /41/ in China:

- The drainage amount of CMM should reach 5 billion cubic meters by 2010
- The utilisation amount of CMM should reach 3 billion cubic meters by 2010 (i.e. a utilisation rate of 60%)

The average utilization rate (around 40%) in Shanxi Province lagged far behind the target for the whole country.
It was confirmed that utilisation of CMM with high methane content can be broken down into CMM used for power, for fuel and or other uses, according to the data released by the State and Provincial governments of Shanxi.

Using its sector competence and local knowledge, DNV can confirm that according to the IEA and World Bank /41/ that all CMM fired power projects in Shanxi Province applied for

CDM finance and will likely continue to do so. Thus it can be assumed that all CMM being used for power in Shanxi Province resorted to the CDM.

If share of these power projects are excluded from the total utilisation (This is conservative as other registered CDM projects also use some CMM for fuel (e.g. registered projects 902, 3219) and for other uses, and this volume of CMM is not excluded here), the percentage of utilization excluding power generation is historically less than 17% and for 2011 at 13.65%, as shown below. CMM for power accounted for 68% of the total CMM drained in 2011.

Table 2: Broken down for utilisation of CMM with high methane content in Shanxi province. /41/

(2006-2010 data from Economics Institute of Shanxi Academy of Social Sciences and 2011 data from Shanxi government Coal Industry Department)

	Total drained	Total utilisation	Total utilisation (exc. Power)	% utilisation exc. Power	Power	Fuel	Other
2006	1.611	0.327	0.187	11.61	0.14	0.12	0.067
2007	2.08	0.558	0.358	17.21	0.2	0.27	0.088
2008	2.16	0.767	0.367	16.99	0.4	0.27	0.097
2009	2.25	0.873	0.323	14.36	0.55	0.28	0.043
2010	2.513	1.01	0.36	14.33	0.65	0.3	0.06
2011	2.674	1.135	0.365	13.65	0.77	0.3	0.065

Based on the analysis above in table 1, DNV confirms that it is not plausible that even 50% of high concentration CMM will be utilized or destroyed in the region in the near future, although the standard “Emission Standard of Coalbed Methane/Coal Mine Gas” was taken into effect on 1 January 2010 for existing coal mines. In addition, CDM has contributed substantially to utilization of CMM, contributing for 50-68% of the total CMM drained.

Notably, the common practice analysis for the proposed project, discussed in section 3.6.5 of this report, identified 54 CMM power generation projects within Shanxi Province, of which, 44 are registered as CDM projects or are undergoing validation. The total proposed power generation capacity from the 54 projects in Shanxi Province is 988.9 MW, of which the 44 projects pursuing CDM contribute 951.1 MW, equivalent to 96.18% /72/. As such it may be concluded that the vast majority of CMM utilization for power generation in Shanxi Province is based on CDM support.

ACM0008 version 7 states: *If an alternative does not comply with all applicable legislation and regulations, then show that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread in the country.*

DNV has been able to verify that regulations concerning the utilization of CMM with methane concentrations above 30% are not systematically enforced, and non-compliance with the regulation is widespread in the region.

Reasons why the regulation is not systematically enforced

1) Financial barrier

According to a statement issued in July 2009 /41/, the attitude of the Chinese government is that they "encourage companies to achieve the standard required by the regulation with help from the CDM". Of the CMM fired power projects that have been constructed in Shanxi Province in recent years, all have been financially unattractive and have applied for CDM status to attract additional funding to overcome this barrier (as demonstrated in the common practice section of the PDD for this project).

2) Interview with relevant experts indicates that the regulation is seen as ideal declarative, but unrealistic.

DNV held a telephone interview /74//76//77/ 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

3) Technical barriers preventing the implementation of the standard

In Article 5.2 of the standard, it states that automatic monitoring systems should be installed in new coal mines. However, there is no such provision requiring this for existing coal mines (that are expected though to comply with the standard). Without specific requirements to do this, it is unlikely that existing coal mines will voluntarily go to the expense and complexity of installing this system.

Since the proposed project is an existing coal mine, and the EIA of the project was approved prior to the implementation of the standard, there was no requirement for provision of automatic monitoring equipment to be installed as part of the project.

4) The possibility to change CMM characteristics (low concentration and high concentration, and even VAM) make the verification of compliance to the standard "Emission Standard of Coalbed Methane/Coal Mine Gas" even more uncertain.

The drainage systems under the coal mines will normally take up from the coal seams the CMM, CBM and the rest being VAM. The main concern for the 30% concentration threshold differentiating high concentration and low concentration is for the safe transportation of the CMM drained, due to the explosive limit range of the methane in the air:

The explosive range of methane in air is 5% to 15%, according to a recent study by the IEA "A Budding Asset with the Potential to Bloom", 2009 /41/:

> *"The new policy requiring methane use if CMM concentrations equal or exceed 30% appears to be creating uncertainty for CMM utilisation projects. Based on anecdotal reports gained from the interviews, this policy may result in an increase in CMM dilution to avoid the requirement of flaring/use"*

Many coal mine operators lack the resources to be able to comply with the standard without additional, external resources (such as the CDM). There are fears that some coal mine operators may resort to dilution of extracted CMM to avoid having to comply with the requirement and associated costs of using or flaring CMM with a concentration >30%.

5) The lack of procedures for implementation and measures for prize/penalties impede the compliance of the standard.
As demonstrated by the project participant, the coal mine faces 3 options with regard to the Standard GB 21522-2008, these include:

- Non-compliance (continuing to vent and incurring fine as per SEPA order no. 28, *Measures for the Administration of Automatic Monitoring of Pollution Sources*, 2005),
- Compliance (utilisation of CMM),
- Avoidance (dilution of CMM prior to surface)

DNV has validated the spreadsheet provided by the project participant which calculates the NPV of the three options as follows:

Scenario	**NPV (RMB)**
Continue to vent high concentration CMM and pay the fine (maximum 100,000RMB pa)	- 676,935
Implement a project to utilise/ destroy the CMM thereby avoiding paying the fine.	- 13,914,455
Install equipment to dilute any CMM with a concentration ≥30% to a concentration <30% and continue to vent, thereby avoiding paying the fine.	- 132,008

The analysis demonstrates that under the current regulatory regime, the NPV of dilution compliance is much more attractive than the actual utilization compliance with the standard GB 21522-2008. This provides a strong financial incentive for the coal mine owner to pro-actively avoid the standard GB 21522-2008 by means of CMM dilution prior to the CMM reaching the surface, still resulting in the baseline scenario atmospheric methane emissions.

As a conclusion, DNV can confirm that there are barriers and weaknesses in the standard which prevent its systematic enforcement.

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 /49/, the construction of coal 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.

Options for thermal energy production
No options for extracted CMM treatment are excluded due to legal or regulatory requirements.

Step 3: Formulation of combined baseline scenario alternatives

The technically feasible baseline scenario alternatives which comply with legal and regulatory requirements include:

1. Baseline scenario alternatives for CMM extraction
Scenario C
The combination of A and B, with pre mining CMM/post mining CMM.

2. Baseline scenario alternatives 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.

3. Baseline scenario alternatives for energy production
Power generation:
Scenario P1
Continuation of the current situation, purchasing electricity from the North China Power Grid;
Scenario P3
Use CMM for power production, this is the project activity not implemented as a CDM project.

Thermal energy production:
Scenario T1
Continuation of existing situation- coal and gas fired boilers for thermal energy;
Scenario T2
Waste heat recovery from power plant.

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

Barriers analysis made on baseline alternatives for CMM extraction
Scenario C is the continuation of the current situation and faces no barriers.

Barriers analysis made on baseline alternatives for extracted CMM treatment
Scenario i is the continuation of the current situation 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 /52/ 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 analysis of the coal mine owner implementing the proposed project:

DNV has considered the attractiveness of the proposed project being conducted by the coal mine owner as follows.

If the investment analysis for the proposed project is modified to reduce the CMM price to 0 and the 3 600 MWh of electricity given by the project participant to the coal mine is added to the 100 080 MWh of saleable electricity resulting in a total of 103 680 MWh, the total revenue achievable for the coal mine owner would be 15.37 million RMB/year.

Conversely, the sale of 109.71 million m^3 CMM by the coal mine as is proposed under the project scenario at 0.11 RMB/m^3 plus the receipt of 3 600 MWh of electricity, which at 0.38 RMB/kWh increases the relative price of the CMM to 0.12 RMB/m^3. This then results in gross revenue of 13.17 million RMB.

On a superficial basis, the difference in pre tax profit for the coal mine owner is 2.2 million RMB less income by simply selling the CMM. However, there is no investment required by the coal mine owner to simply sell the CMM, allowing the coal mine owner to instead invest the 129.5 million RMB required to construct the project. The Benchmark IRR for coal mining activities pre tax is stated to be 13% as per the "Economic Evaluation Method and Parameters for Construction Projects (Version 03)" /65/ therefore it is reasonable to assume that the expected return on the 129.5 million RMB invested in coal mining instead of developing the proposed project would result in further annual profit of 13% of 129.5 million RMB which is 16.84 million RMB in addition to the 13.17 million RMB the coal miner stands to gain from selling the CMM to the project proponent resulting in gross profit of 30.01 million RMB/year which is almost double the gross income achievable under the scenario of the coal mine owner implementing the proposed project without CDM.

In addition there is no guarantee that the risk profile for the investment in electricity generation by the coal mine owner would be acceptable. This is best illustrated by the consideration of economic data related to the energy sector in China contained in the State Information Centre Economics Prediction Department, *Power Industry Operation Report*, dated 2008 /66/ and WANG Yong from China International Engineering Consulting Co. Ltd and PAN Weier from State Coalmine Safety Supervision Bureau Control Centre, *Coal Economic Operation in China Report*, dated 2008 /67/, it is clear the profit for the coal industry in 2008 increased more than 120% comparing with 2007, yet in the meantime the

profits of the power industry decreased by 84.1%. In light of these statistics, it is reasonable to state that the coal mine owner does not have real incentive to invest into power generation industry.

It is abundantly clear then that the coal mine owner has far greater incentive to simply sell the CMM to a project developer like the project participant than it does to invest in the proposed project without CDM.

Scenario v: Use of extracted CMM for captive power generation.

As detailed in the FSR /6/ the average demand for electricity from the Yuecheng Coal Mine is 3 600 MWh per year.

The project participant has demonstrated the financial unattractiveness of the baseline alternative scenario v, namely the use of CMM by the coal mine for captive power generation in the spreadsheet titled "*Yuecheng project scenario v fin analysis.xls*" /12/.

DNV has validated the power purchase price paid by the Yuecheng Coal Mine through the inspection and verification of the January 2012 electricity purchase invoice detailing the consumer as the Yuecheng Coal Mine owner and the tariff rate as 0.45 RMB/kWh including VAT. DNV verified this to be in line with the Electricity sale price notification published by Shanxi Government on 20 November 2009, which nominates an industrial user tariff of 0.4521 RMB/kWh including VAT. As such DNV can confirm that the electricity tariff used by the project participant in the financial analysis spreadsheet titled "*Yuecheng project scenario v fin analysis.xls*" /12/ of 0.45 RMB/kWh including VAT is both accurate, reasonable and stable given the Electricity sale price notification published by Shanxi Government was published in 2009.

DNV has validated the financial analysis "*Yuecheng project scenario v fin analysis.xls*" /12/ and notes the following alterations and justifications that constitute a deviation from the already validated financial analysis for the proposed project:

- Power purchases not required to be made from the grid are considered revenue. In this case, the 3 600 MWh at 0.45 RMB/kWh resulting in a comparative income (money saved) of 1 402 200 RMB/year.
- Total static investment based upon generation capacity required, which is equivalent to 0.7 MW. This represents 3.5% of the 20 MW planned under the proposed project, as such the cost associated with total static investment (129.5 million RMB for the proposed project) has been reduced to 4.53 million RMB.
    - This rationale has also been applied to the following parameters:
        - Circulating fund
        - Auxiliary Power Self Consumption
        - Annual Power Generation
        - Gas Consumption
        - Engine oil consumption
        - Water consumption
- The salary rate of 2 500 RMB/month was sourced from a salary payment receipt

supplied by the coal mine /11/.

DNV can confirm that the IRR of scenario v is 11.73% before tax which is below the benchmark for a coal mining company (13%) /65/. As a result it may be seen that the construction of the proposed project for self use is not financially attractive to the coal mine owner. Therefore scenario v is excluded.

Scenario vi: Use for additional heat generation

The coal mine currently owns and operates both coal and gas fired boilers for the generation of heat at the coal mine. The coal mine also has access to both coal and CMM to power this heat demand at no cost to the coal mine. Due to the access to both coal and CMM energy sources for heat generation at no cost to the coal mine owner, the investment in new gas fired boilers or the retrofitting of existing coal boilers to use gas (CMM) fuel can provide no financial benefit to the coal mine owner because no savings can be made.

As there is no financial incentive for the coal mine owner to make an investment in gas fired boilers for additional heat generation, scenario vi is eliminated.

Scenario vii: Feed into pipeline (used by vehicles or used for power or heat generation)

The project participant has demonstrated the financial unattractiveness of the baseline alternative scenario vii, namely the feeding of CMM into a pipeline for use in vehicular or power/heat generation in the spreadsheet titled "*Yuecheng project scenario vii fin analysis.xls*" /12/. Due to the prohibitive cost of conducting a full FSR for the transport of CMM to the nearest market, Yangcheng, approximately 35 km from the proposed project site, the costing for the hypothetical gas pipeline project have been sourced from the costs incurred during the recent installation of pipeline infrastructure associated with the delivery of CMM to the proposed project site by the Yuecheng Coal Mine owner /11/. This pipeline extends approximately 2.4 km, so the costing of the 2.4 km pipeline has been extrapolated out to the 35 km distance. DNV considers this to be a reasonable and accurate assumption based upon recent costs for a similar purpose.

DNV has validated the financial analysis spreadsheet, which is based upon the financial analysis model for the proposed project. The costs associated with the financial analysis not analogous to the proposed projects have been validated as follows:

- Total static investment. Instead of costing for the proposed project's construction, the financial analysis considers the cost of the following components:
    - Purchase of CMM transport pipeline of 35km with associated fixtures and components.
    - Installation and construction of the pipeline
        - The cost of the equipment and construction for 2.4 km pipeline recently constructed by the Yuecheng Coal Mine was 50.5 million RMB /11/, therefore the 35 km pipeline may reasonably be assumed to cost:

50.5million RMB / 2.4 km * 35 km = 736.5 million RMB

- Purification and processing plant to bring the concentration of the CMM up to the required concentration of at least 95% /46/. The project participant obtained a quote for the purchase and installation of methane purification plant capable of processing 80 million m^3 of CMM pure CMM as would be required for the proposed project /11/. The quoted cost for the plant is 40 million RMB /11/.
- The repair costs associated with the hypothetical pipeline project have been assumed to be 1% per year. This is conservative in comparison to registered project activities 3219, 5227, 3661, 3542 which incorporate repair costs in the O&M expenditure ranging from 2-5% of total static investment.
- CMM extracted (35% concentration) available for sale is assumed to be the total volume extracted, 239.67 million m^3 minus the 10% used by the coal mine and local residents leaves 0.9 * 239.67 = 215.703 million m^3. This is equivalent to approximately 75.5 million m^3 of pure methane, thus explaining the need for 80 m^3 pure methane purification capacity.
- The number of staff assumed to be required to operate and maintain the pipeline is assumed to be the same as for the 2.4 km pipeline already constructed. DNV considers this conservative given the increased length of a 35km pipeline and the requirement for staff to operate the purification plant.
- The expected operational lifetime of the pipeline project has assumed to be 25 years to allow for the maximum opportunity for the pipeline to return a favourable IRR.
- The sale price of the CMM (purified) has been assumed by the project participant to be 0.1575 RMB/m^3 as per the recommended pricing detailed by the Jincheng Government in 2008 /68/.
- The financial analysis also assumes a full VAT refund available to the Yuecheng Coal Mine for the sale of the CMM to market.

DNV can confirm that the IRR of scenario vii is -2.87% before tax and -0.81% after tax, which is below the benchmark for coal mining (13%) and the benchmark for CMM extraction (12%) /65/. As a result it may be seen that the feeding of the extracted CMM into a pipeline for sale is not financially attractive to the coal mine owner. Therefore scenario vii is excluded.

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 2.21%, which is below the industry benchmark for electricity generation of 8%.

As discussed in Scenario iv, above, the coal mine owner has no incentive to operate the proposed project for captive power as the sale of CMM with no investment (129.5 million RMB to develop the proposed project) provides almost double (30.01 million RMB/year) the achievable income of selling electricity (or indeed self-using the electricity, which would correspond to 15.37 million RMB/year of savings). As the financial incentive to sell CMM and continue to invest in the coal mining industry so dramatically outweighs the benefits of conducting the project themselves for either sale of electricity (scenario iv) or self use of the generated electricity (scenario v).

However, in China, even captive power plants must be connected to a power grid /54/. Therefore, on-site power generation from CMM as an alternative scenario (option v in PDD) is actually partly of option iv, and therefore, option v is not considered.

Hence, despite the option of the use of extracted CMM for self use being less attractive to the coal mine owner than the project scenario, by using its local and sectoral knowledge, DNV confirmed that scenario v can be regarded equivalent to scenario iv, so as to be no reasonable alternative scenario and then it has been excluded.

The coal mine owner may instead generate income from the sale of the CMM to a third party for the purposes of electricity generation as part of the proposed CDM project without facing the technical barriers or investment risk associated with internally developing the project and stand to gain substantially greater income as a result.

Scenario vi is use for additional heat generation. It was verified during the site visit /74/ that seasonal heat demand for buildings at the mine site is currently met by coal and gas fired boilers. Since the price of gas fired boilers are generally 2~3 times that of coal fire boilers with a similar capacity /53/, extra investment in the new gas equipment prevent this scenario from being a feasible baseline alternative.

As detailed in the PDD /2/ there is no plan as a part of the proposed project to supply heat recovered from the proposed project to either the coal mine or the local residential area. As per regulation issued by the China NDRC and Construction Ministry on 17 January 2007: "Item 9: The pre-requisite for building up cogeneration project is central heating in the regions without central heating" /39/ Industrial operations with cogeneration plant operating are required to provide heat to local residents where no centrally operated central heating system exists.

The proposed project does not involve waste heat recovery; in addition, the heating needs of the local population are already being met by the provision of CMM for heating from Yuecheng Coal Mine /2/ /18/.

While the mine supplies some CMM to meet the thermal demand of the coal mine and local villages, it can be seen by both historical usage and the forecast usage in section 3.3 of this report that this demand is minor and could not realistically be affected by the CMM demand from the proposed project.

Scenario vii is the feed of CMM into pipelines for vehicular use, heat or power generation. The concentration of CMM extracted from the Yuecheng coalmine is at approximately 35% concentration /6/. As per the publication from Qinghua University available /46/ *"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; /47/. Therefore the extracted CMM from the Yuecheng coalmine would require purification.

Existing methods of the methane purification process (e.g. pressure swing adsorption /43/, membrane separation /43/ and low temperature separation /43/) 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.

To further explore the viability of the potential for pipeline transport of CMM, 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 two 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 -163,190,000 RMB /2/. 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 guidelines set out by the Shenyang Aode Gas Co Ltd, the minimum concentration of gas for domestic (combustion for heating) applications should be 41% methane content /48/, higher than the concentration of the CMM from the Yuecheng Coal Mine at 35% /6/.

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 purchasing electricity from the North China Power Grid, which is the continuation of the current situation 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.

Scenario T1 Continuation of existing situation- coal and gas-fired boilers for thermal energy;
There is no barrier for this option.

Scenario T2 Waste heat recovery from power plant;
Heat exchangers to capture the waste heat from gas engines which could be used for thermal energy production. As discussed in section B.5 of the PDD, building a CMM power generation plant without the revenue from CERs faces investment barriers. So, there is no waste heat to recover, scenario T2 will be eliminated.

After Step 4 “Elimination of baseline scenario alternatives that face prohibitive barriers”, only Scenario I, Scenario P1 and Scenario T1 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 2.21%, 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 practice, 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 /34/ 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 29 April 2011, which corresponds to the signing of the major equipment contract /9/ and the commencement of validation (date of publication of the PDD for stakeholder consultation) was on 20 April 2011.

DNV notes that while the gas purchase agreement was signed on 17 December 2009, the proposed project could not be legally implemented (as per the Shanxi Province Project Design and Approval Management Regulation) /6/ until the proposed project’s FSR /6/ was approved by the local authority /7/. The gas purchase agreement does not commit the project participant to financial expenditure as it could have been cancelled if the FSR had not been approved or if the proposed project did not go ahead. The gas purchase agreement was legally conditional upon the FSR approval and as a result would not constitute actual or confirmed implementation, expenditure or construction of the proposed project.

The project participant informed the host party DNA (the NDRC) of the project activity and of their intention to seek CDM status on the 15 March 2011. The NDRC confirmed this notification on the 28 March 2011 /14/. The project participant informed the UNFCCC of their intention to seek CDM status on the 16 March 2010. The UNFCCC confirmed this notification on the 17 March 2010 /14/. 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

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 of flaring does involve an investment, however as the flaring of CMM, as an alternative to the project activity, generates no income stream, it cannot be considered a similar activity suitable for an investment comparison..

BENCHMARK SELECTION

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

1) The benchmark published in the "Economic Evaluation Method and Parameters for Construction Projects (Version 03)" /65/ 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 grid connected 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.

INPUT PARAMETERS

The input parameters used in the financial analysis are taken from the FSR /6/ developed by Changzhi Branch of Dahua Engineering Management Group in June 2010 and approved by

Shanxi Province Development and Reform Commission on 31 December 2010 /7/. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognised source.

The financial input parameters used in the financial analysis of spreadsheet /12/ and PDD version 6 dated 18 December 2012 /2/ were verified by the validation team to be same and adhered to the approved /7/ FSR /6/, 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 /6/ was finalised by Changzhi Branch of Dahua Engineering Management Group in June 2010 and about ten months before the decision to proceed with the project activity (i.e. the project activity start date as the signing of the equipment purchase contract) which was on 29 April 2011. Given this relative short period of time between 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 /31/ 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 other CMM projects utilizing reciprocating engines to generate power with and without WHR registered projects in Shanxi Province exporting at least part of the electricity generated by the project to the NCPG .

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,	No	5	29 100	0.66	4.46	0.0007	20.3%*	4.24	0.27	<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. %
	P.R.China										
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%
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**	**20**	**100 080**	**0.66**	**6.475**	**0.0013**	**13.67%***	**2.21**	**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 investment and total static investment

The total investment includes capital expenditures (gas engines, ancillary equipment purchase, construction and professional services related but not floating capital) of 129.5 million RMB which was verified by the validation team and through the FSR /6/. The total static investment was verified by DNV to include main equipment purchases, ancillary equipment and construction/installation/related professional costs associated totalling 129.5 million RMB. This figure was updated by the project participant to exclude any investment in WHR equipment or plant (5.7 million RMB as per FSR /6/) as WHR is outside the scope and boundary of the project.

It is noted by DNV that the project participant has not accounted any cost for the CMM gas drainage system components that would be provided by the coal mine in the absence of the proposed project as detailed in section B.3 of the PDD /2/ and section 3.4 of the validation report above.

For the proposed project, the investment (total) per MW is 6.475 million RMB/MW which is reasonable to the validation team when compared with the other similar projects without WHR as per Table 1 above, whose unit cost per MW in the range of 3-8.4 million RMB/MW in Shanxi province for projects without WHR installed. DNV verified the FSR and confirmed that the investment estimations are in compliance with governmental economic regulations /38/ by Changzhi Branch of Dahua Engineering Management Group /6/.

DNV has validated the forecast cost for total static investment of 129.5 million RMB through comparison with purchase receipts and invoices /9/ as follows:

Equipment purchase cost Table (actual cost incurred by the project participant is already over 93% of the forecast cost):

Item	**Cost (RMB)**
30T anti-leakage water treatment equipment	2,543,000
35KV step-up substation project design	540,000
35KV step-up substation telecommunication automation project construction	169,294
35KV step-up substation(Power cable etc)	37,500
35KV step-up substation automation system	3,643,000
Yuechneg 35KV power transformer project	22,288,736

Ancillary equipments for power plant	8,752,078
Cable	173,840
Civil engineering construction	6,071,500
Construction and installation of Yuecheng Power Plant	21,100,000
Fireproof equipment installation for Yuecheng Power Plant	386,000
20 sets of 1000GF9-WK generator	42,400,000
Geological survey and infrastructure construction	2,960,500
Grid connection supervision	10,000
Street Lighting	53,600
Lightning protection tower	282,000
Optical cable construction	104,700
Optical transmitter and receiver etc	2,833,200
Power transformer, high strength cable, switch cabinet etc.	6,000,000
Routers and installation	63,800
Scheduling data network	330,000
Water pump	228,000
Wind and dust-proof barrier wall construction	600,000
XM130DRP+1 electrical cabinets	55000
TOTAL	**121,625,748**

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 over 93% of the forecast cost.

The following purchase contracts were stated to have been entered into by the project participant but no documentary evidence was available for validation:-

- Gas pipe contracting
- Power plant design contract
- Bidding agency contract.

The value of these contracts has not been considered in the above summary due to the lack of documentary evidence.

It is expected that the purchase/works contracts yet to be signed by the project participant for:

- Construction of office facilities
- Construction of power distribution room
- Purchase of office equipment
- Purchase of non-CDM related meters for power plant and substation
- Power plant testing and commissioning

- Power purchase agreement

Will exceed the 7.9 million RMB difference between currently contracted goods and services and forecast costs.

DNV can confirm that after validating each of the contracts listed above /9/ and considering the status of the proposed project, which is still under construction, the forecast total static investment is both reasonable and justified.

CMM price

DNV has verified the Jincheng Runhong New Energy Power Co., Ltd and Yuecheng Coal Mine: *Cooperation agreement on the development of Jincheng Runhong New Energy Power Co., Ltd* /22/ detailing the agreed CMM purchase price of 0.11 RMB/m^3. The purchase price of 0.11 RMB/m^3 was further confirmed during the site visit through interviews with Mr Chaopeng Li, deputy general manager of Yuecheng coal mine /74//75/ and Mr Yan Xiangjin of Jincheng Runhong New Energy Power Co Ltd, one of the project owners /73//74/. As per the gas purchase agreement, the project participant is to provide 3 600 MWh of electricity generated from the proposed project to the Yuecheng Coal Mine per year. With a tariff of 0.38 RMB/kWh (with VAT), this represents a forgone income from electricity sales of 1.368 million RMB per year (VAT excluded), when this is added to the total cost of CMM purchases (12.068 million RMB/year) and divided by the volume of gas purchased 109.710 million m^3 at 35% concentration) the effective cost of CMM paid by the project participant rises to 0.1225 RMB/m^3.

The concentration of CMM extracted from the Yuecheng Coal Mine has been confirmed to be approximately 35% through verification of the Jincheng City Gas Testing centre: *CMM component analysis report J091223.12*, dated 23 December 2009 /21/.

The project participant Jincheng Runhong New Energy Power Co Ltd, has been verified by DNV to be separate entity to the Yuecheng 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 /23/.

It was verified that the Yuecheng Coal Mine is wholly owned by Shanxi JINCHENG Smokeless Coal Industry Group Ltd via the Qinshui Economy and Commerce Bureau of Qinshui Government /24/. In addition it is listed in the Jincheng City Council website that Shanxi JINCHENG Smokeless Coal Industry Group Ltd is a state owned corporation /25/. 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 Yuecheng coal mine and the project participant, the CMM price of 0.11 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 0.10 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* /68/ 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 /46/ /47/ 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/m3 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 CMM price detailed in the gas purchase agreement of 0.11 RMB/m^3 (0.1225 RMB/m^3 with electricity provision cost) is considered to be conservative. This 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	Yuecheng coalmine power generation project (the proposed project)	n/a	35	0.11	n/a	0.11 (0.1225 when *electricity exported to Yuecheng* is considered)**
4098	Shanxi Herui Coal Mine Methane Power Generation Project	25/5/2011	36.1	n/a	0.286	0.1
4534	Shanxi Wangpo Low Concentration Coal Mine Methane Utilization Project	10/3/2011	6 - 22	n/a	0.15	0.0525
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).
** The allocation of 3 600 MWh electricity from the project participant to the coal mine owner, which is part of the gas purchase agreement /4/ has been accounted for above for purposes of financial comparison.
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 0.05 – 0.14 RMB/m^3 with the price used in the proposed project being towards the center of this range.

In this context DNV considers the cost associated with CMM gas in the proposed project of 0.11 RMB/m^3 (or a relative cost of 0.1225 RMB/m^3 including consideration of electricity provided to Yuecheng coal mine) to be reasonable and credible.

The basis for a CMM price has been further analysed and validated as follows:

The Yuecheng Coal Mine owner has provided DNV with a record of infrastructure and costs associated with the delivery of CMM from its existing gas drainage assets to the proposed project. This includes:

- 2.4 km of gas drainage pipeline, installation of gas dehydration units, pressure regulator units and CMM gas drainage fixtures from the Yuecheng Coal Mine gas drainage station to the geographical boundary of the proposed project site resulting in a cost of 20.5 million RMB /11/.
- Construction costs associated with the installation of the gas carriage pipeline and associated equipment resulting in costs of 30 million RMB /11/.
- The on-going management and maintenance obligations associated with the pipeline and the associated equipment resulting in a cost to the Yuecheng Coal Mine of 2.4 million RMB/year /11/.

To adequately consider the applicability and reasonableness of the applied CMM cost of 0.11 RMB/m^3 charged by the coal mine DNV has validated the IRR of the CMM sales by the Yuecheng Coal Mine. The financial calculations contained in the spreadsheet "*Yuecheng CMM sale financial analysis.xls*" /11/ was validated by DNV and the costs claimed were verified against the invoices provided by the Yuecheng Coal Mine /11/ and found to be correct.

DNV can confirm that the IRR of the sale of CMM to the proposed project based upon the stated costs above and the sale price of 0.11 RMb/m^3 results in a pre tax IRR of 12.07% which is in line with the benchmark for coal mining operations at 13% before tax /65/ and in line with the benchmark for CMM sales at 12% before tax /65/.

As such DNV can confirm that the nominated CMM price of 0.11 RMB/m^3 is reasonably represents the cost of supplying CMM, based upon costs incurred by the Yuecheng Coal Mine

and a return on investment in line with the nominated industry benchmarks for both mining and CMM sales.

Supply of 3 600 MWh of electricity to the Yuecheng Coal Mine:
DNV has detailed the impact of the delivery of the 3 600 MWh electricity to the Yuecheng Coal Mine. This supply of electricity was negotiated as a part of the gas purchase agreement /4/ between the project participant and the Yuecheng Coal Mine.
The supply, according to the electricity tariff of 0.38 RMB/kWh including VAT constitutes a fixed value of 1.368 million RMB per year in addition to the revenue from CMM sales equivalent to 12.068 million RMB/year /2/ /12/. As a result, the supplied electricity (3 600 MWh/year) the represents forgone income for the project participant (lost sales to the NCPG) of 1.368 million RMB/year.

DNV has demonstrated the impact of the financial value of the 3 600 MWh upon the CMM price to be equivalent to an increase in the CMM price from 0.11 RMB/m^3 to 0.1225 RMB/m^3.

The provision of 3 600 MWh/year electricity to the Yuecheng Coal Mine costs the project participant 1.368 million per year. Due to the negotiation of this as part of the gas purchase agreement DNV has deemed it appropriate to consider this cost in terms of the CMM price. DNV demonstrated that accounting for the supplied electricity in this way, that the effective cost of the CMM to the project participant is 0.1225 RMB/m^3 and that the effect of such a price rise is negligible on both the investment analysis and sensitivity analysis.

Furthermore, DNV has demonstrated in Table 2 of the FVR that the CMM price including the supply of 3 600 MWh/year is in line with other registered projects and the Jincheng City Government Coal Mine Methane sale price guidelines /68/, which when linearly adjusted for concentration at 35% details a cost of 0.23 RMB/m^3.

Electricity tariff

The electricity tariff for the project of 0.38 (incl. VAT) RMB/kWh is sourced from the FSR /6/. As the project was in construction at the time of validation (March 2012), a grid connection approval had been secured by the project participant /27/, however a grid connection agreement with the local electricity utility has not yet been finalised as the local utility ShanXi province Jincheng City Power Group requires the project be commissioned prior to providing a formal grid connection agreement. The project participant estimates that the project will be commissioned in late 2012. 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 /50/, which indicates an electricity tariff price rise for coal gas generation to 0.38 RMB/kWh.

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 /63/. The

project PDD /63/, 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 /64/ 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 /6/, the project has an installed capacity of 20 MW. The annual gross generation in FSR /6/ is estimated to be 115 200 MWh net generation in FSR /6/ is estimated to be 100 080 MWh (after the supply of 3 600 MWh to Yuecheng coal mine). The project annual operating hours is 7 200 hours, hence, the project load factor is 0.66. 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 16 MW, considering the installed capacity as of 20 MW. The effective operating capacity of 80% /6/ for a 1000GF9-WK gas engine was determined by the validation team to be reasonable after verification of the manufacturer Issued guidelines /26/. The designed power generation of the proposed project is 115.2 GWh (20 engines x 800 kW x 7 200 h), corresponding to 7 200 hours each year as per the manufacturers guidelines for constant operation /26/.

The auxiliary power consumption is 10% as per the FSR 6/. The estimated level of self use was validated by DNV through review of the component usage analysis and calculation provided by the FSR author Changzhi Branch of Dahua Engineering Management Group /6/.

As per the document *Statement of Yuecheng 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)	132	7	924
Well pump (water extraction well)	55	2	110
Booster pump (water extraction well)	30	3	90
Booster pump (water supply station)	30	3	90
Scavenging pump (water supply station)	5.5	1	5.5
High pressure pump (water supply station)	37	1	37
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
Air conditioner (control room)	4.75	2	9.5
Axial fan (water pump room and power distribution room)	2	7	14
Generator starter (Generator sets)	10	5	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			1614

CMM pre-treatment in the proposed project involves the use of a pressure regulating valve gate to increase the pressure to 8-12 kpa, gas/water separator and 2 in line dust filters as per the FSR author Changzhi Branch, Dahua Engineering Management (Group) Co Ltd statement dated 20 July 2012 /6/. The gas pre-treatment process does involve electric or fossil fuel powered filtration devices /6/ as such gas pre treatment is not considered in evaluation of auxiliary power demand.

As detailed in Table 2, the total forecast auxiliary power consumption for the proposed project is then:

1 614 kW * 7 200 hours = 11 620 800 kWh
= 11 620.8 MWh

Total generated electricity is:

1MW * 20 generators * 7 200 hours * 80% efficiency = 115 200 MWh

Percentage self-use (auxiliary use) is:

11 620.8 MWh / 115 200 MWh * 100 = 10.08752%

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:

(1 614 kW – 66 kW (fire suppression) – 50 kW (generator starter) -20kW (half of the lighting)) * 7 200 hours = 1 478 kW * 7 200 hours
= 10 641 600 kWh
= 10 642 MWh

Resulting in a self-use of:

10 642 MWh / 115 200 MWh * 100 = 9.24%

Some self-use of the fire suppression equipment and generator startup 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.

The portion directed to the Yuecheng Coal Mine is 3600 MWh/yr. The portion delivered to Yuecheng Coal Mine is done so solely out of arrangements under the gas purchase agreement /4/ between the project participant and the Yuecheng Coal Mine. DNV's opinion is that this projection of annual power generation is realistic and reasonable.

Annual O&M cost
The annual O&M cost for the proposed project is 17.7 million RMB.

Operating Cost	**17.7million RMB**
Raw Material	12.068 million RMB
Fuel Expense	0.4549 million RMB
Salary and Welfare	0.4925 million RMB
Repair Fee	3.885 million RMB
Other operational fees	0.8 million RMB

Of this, CMM purchases (Raw material) account for approximately 12.068 million RMB per year /6/ /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 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 37 500 litres would result in a cost of 450 000 RMB/year. The water use is expected to total 2 428 tonnes per year at a cost of 2 RMB/t as per the FSR /6/ resulting in a cost of 4 856 RMB/year, representing 0.03% of the annual O&M costs. The volume of water consumed by the project in the financial analysis was halved due to the removal of all activities and costs associated with WHR in the project financial analysis and PDD. This does not imply that other water will not be used by the project but that for the purposes of the financial analysis, the consideration of water use cost is limited to 2 428 tonnes per year. This is a conservative assumption.

This was validated by DNV through consideration of assumptions and information provided in the FSR /6/ and the equipment purchase contract /9/. As per these documents, the generator usage of engine oil per kWh is 1.0 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 /45/.

(115 200 000 kWh generated x 0.001 kg lube oil per kWh) / 0.85 kg/l oil density
= 135 529 litres engine oil consumed per year.

As such, the assumed consumption of 37 500 litres lube oil per year is very conservative.

The salary and welfare component of the O&M expenses of 0.4925 million RMB/year is composed of an assumed 30 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) /44/. 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 number of staff proposed to be employed on the project has been broken down in the FSR /6/ as follows:

- 1 supervisor,
- 26 technicians and
- 3 Accountant/bookkeepers/management personnel will be employed.

The 30 full time employees would be rostered according to 3 shifts allowing for continuous 24 hour operation. Comparison to other ACM0008 projects in Shanxi Province has been made in Table 3 below by assessing the projects in Table 1 above that disclose staffing numbers related to the project activity:

Table 4: Registered projects in Shanxi Province exporting at least part of the electricity generated by the project to the NCPG that disclose employee numbers.

Project Number	Project Name	Installed Capacity (MW)	Staff Number	Staff per MW
3219	SDIC Xiyang Baiyangling CMM to power generation project	16	26	1.625
5227	Jilin Hunchun Coal Mine Methane (CMM) Power Generation Project	4	15	3.75
3661	Shaanxi Tongchuan Huachen 7MW CMM Power Generation Project	7	20	2.86
4534	Shanxi Wangpo Low Concentration Coal Mine Methane Utilization Project	7	36	5.14
4098	Shanxi Herui Coal Mine Methane Power	45	73	1.62

	Generation Project			
2929	SDIC Xiyang Huangyanhui CMM to Power Generation Project	10	22	2.2
3195	Shaqu Coal mine CMM to power generation Phase 2 Project	62	65	1.05
1900	Duerping Coal Mine Methane Utilization Project	12	12	1
1928	Jincheng Fengrun CMM Utilisation from Nine Mines in Jincheng City Shanxi Province China	24	72	3
3876	Duanwang CMM Power Generation Project	4	30	7.5
3016	Yangquan Nanmei (Group) Co., Ltd. Coalmine Methane Utilization Project	10	60	6
	Proposed Project	20	30	1.5

As per the comparison of projects in table 4 above, the range of employees per MW of generation capacity ranges from 1 to 7.5 with a mean of 3.3 for all projects and from 3 to 5.14 employees per MW for projects 4534 and 1928 that do not include WHR. The proposed project's staffing of 1.5 employees per MW of generation capacity is below the range of similar registered projects in Shanxi Province that do not conduct WHR. As such, the forecast staffing cost may be seen to be conservative.

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 3.885 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 represent 0.8 million RMB/year of the O&M costs and per MWh of generation represents 7.99 RMB/MWh. This is conservative in comparison to 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 as this information was not available for projects without WHR.

The relative share of the O&M per total investment of the proposed project is 13.67%, of which the total cost of CMM per year is 68%. 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 5.63 million RMB/year which represents 4.35% of total static investment. When compared to other registered CMM projects in Shanxi Province without WHR installed in Table 1, this is conservative compared to the range of 12.4 – 24% of O&M cost per total static investment.

VAT refunds and Tax exemptions

DNV has elected to respond to both parts i) and ii) of this question in a single response for simplicity and brevity due to the interrelatedness of the two components.
As required by VVM version 1.2 paragraph 111, DNV has evaluated the project participants consideration of tax exemptions and/or VAT refund policies. DNV can confirm the following analysis of policies potentially applicable to the proposed project:

1. **Urban construction and maintenance tax /39/ exemption /39/. This tax exemption is available in the following cases:**

- Where transfer tax is paid on imported goods.
- *The proposed project does not involve the direct import of goods. As such this tax exemption does not apply to the proposed project.*
- The Three Gorges Hydro Power Station.
- *The proposed project is not related to the Three Gorges Hydro Power Station. As such this tax exemption does not apply to the proposed project.*
- Joint ventures initiated prior to 1 December 2010 or Foreign owned corporations.
- *The proposed project is wholly owned and operated by the project participant Jincheng Runhong New Energy Power Co Ltd /23/ which is domiciled in Shanxi province, China. As such this tax exemption does not apply to the proposed project.*

In conclusion, DNV can confirm that the proposed project does not qualify for the Urban construction and maintenance tax exemption.

2. **Education surcharge levy /39/ exemption /39/. This tax exemption is available in the following cases:**

- Where the importing of good occurs.
- *The proposed project does not involve the direct import of goods. As such this tax exemption does not apply to the proposed project.*
- Where refunds of VAT, Consumption tax or income tax are provided.
- *The proposed project income does not account for or rely upon the refund of VAT, consumption tax for income /12/ and the project participant is not eligible for income payments (such income tax is levied upon individuals) as a corporate entity. As such this tax exemption does not apply to the proposed project.*
- Internal logistic service in government departments carried out before 31 December 2003.
- *The project participant is a private entity and not related to any government department /23/. As such this tax exemption does not apply to the proposed project.*
- New companies in product wholesale or retail operation where over 30% staffs are hired were unemployed and all signed up on greater than 1 year employment contracts with confirmation from the Provincial Labour and Social Security Department. Such businesses qualify for 3 years of Education Surcharge exemption.
- *The project participant does not operate in wholesale or retail product industries, but rather in energy generation. As such this tax exemption does not apply to the proposed project.*
- Self employed professionals qualify for a 3 year exemption from the date of business licence issuance.
- *The project participant is an incorporated business with numerous employees /2/. As such this tax exemption does not apply to the proposed project.*

- Companies set up by retired military people or the company enrolled retired military people with more than 30% of the total staff.
- *The project participant was not incorporated by retired military personnel and does not have a staff constituting 30% military veterans /23/. As such this tax exemption does not apply to the proposed project.*
- Financial organisations de registered by the Chinese Central Bank.
- *The project participant is not a financial institution. As such this tax exemption does not apply to the proposed project.*
- Brokerage fees and security investments between 1 January 2006 and 31 December 2008.
- *The project participant was not incorporate in by 31 December 2008. As such this tax exemption does not apply to the proposed project.*

In conclusion, DNV can confirm that the proposed project does not qualify for the Education Surcharge tax exemption.

3. VAT preferential policies /39/. This tax exemption is available to the following project types:

- Agricultural projects.
- *The proposed project is an energy generation project and as such, does not qualify for this exemption.*
- Culture, education and sports projects.
- *The proposed project is an energy generation project and as such, does not qualify for this exemption.*
- Social welfare and Hygiene projects
- *The proposed project is an energy generation project and as such, does not qualify for this exemption.*
- Technology development and renovation projects.
- *The proposed project is an energy generation project and as such, does not qualify for this exemption.*
- Infrastructure and environmental protection projects.
- *The proposed project is an energy generation project and as such, does not qualify for this exemption.*
- Finance projects.
- *The proposed project is an energy generation project and as such, does not qualify for this exemption.*
- Recycling and renewable energy projects.
- *The proposed project is an energy generation project utilising a fossil fuel source and as such, does not qualify for this exemption.*
- Other incidences including Public security or justice departments, Donation from foreign governments, Auction goods, Duty Free goods, Confiscated items, spare parts or repair (railway and aircraft) and imported devices or equipment for scientific research.
- *The proposed project is an energy generation project utilising a fossil fuel source and as such, does not qualify for this exemption.*
- VAT Concession Sector which includes Agricultural products, DVD, CD and other video or audio products, Electronic publications and Dimethyl ether.

- *The proposed project is an energy generation project utilising a fossil fuel source and as such, does not require or qualify for this exemption.*

In conclusion, DNV can confirm that the proposed project does not qualify for the VAT Preferential Policies tax exemption.
DNV can confirm that the proposed project does not qualify for any of the available VAT refund or tax exemption policies available in China at the time of validation.

Other financial calculations and assumptions

- The period of financial assessment (project IRR) is 11 years, reflecting the period of expected technical lifetime of the main equipment /26/ as per the manufacturers guidelines and the and is in line with the Economic Evaluation Code and Parameter for Construction Projects published by the NDRC /38/.
- The working capital of 10.48 million 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 /6/.
- Taxes, tax exemptions and VAT refunds were considered by the project participant, however due to the nature of the project activity, no ion or refund were applicable according to the Provisional Regulations of the People's Republic of China on Value Added Tax (No. 538) /39/.
- The assumption that CMM is provided free to local residents (3.64% of total CMM drained from Yuecheng Coal Mine) does not directly impact the financial interests of the project participant who has been demonstrated to be a separate entity to the coal mine owner,

The financial calculations and assumptions have been assessed and are considered appropriate 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.

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 and before tax is 2.21%; this confirms that the project without CDM benefits is not financially attractive /12/ compared to the benchmark. With CER revenues, before tax the project IRR increases to 36.12%, this is above the benchmark of 8%.

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 5 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	-22.12%	-42.65%	-29.05%	16.05%	16.05%
Benchmark	8%				

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

Static total investment:
Static total investment savings of 22.12% are not considered to be realistic. The cost associated with the static total investment can be considered to be reasonable and at the mid range of investments per output capacity and investment per net power supply in comparison to other registered CMM projects in Shanxi Province without WHR installed as per Table 1 above.

CMM price:
The CMM price negotiated as per the FSR /6/ of 0.11 RMB/m^3 is in line with the prices quoted by Jincheng City Government: Coal Mine Methane sale price guidelines, dated 28 October 2008 /68/ and at the lowest end of the spectrum of CMM prices listed in Table 2 above. As such it would be unreasonable to suggest a discount of 42.65% is achievable. When the delivery of 3 600 MWh electricity to the Yuecheng Coal Mine is considered as part of the CMM price (as per the CMM gas purchase agreement /4/) the effective cost of the CMM increases 11.4% to 0.1225 RMB/m^3. As such the reduction of the CMM price required to cause the benchmark to be crossed is increased to 54.05% which is an even more unlikely scenario.

Operational Costs:
While the CMM cost has been considered in the overall operational cost by the project participant the remaining costs associated such as repair costs, management costs, salary, and welfare contributions are unlikely to decrease during the project lifetime due to the upwards pressure on these factors by inflation which has increased from around 0% in 2000 to around 4% in 2012 /62/, as such a 29.05% reduction in O&M costs is unrealistic.

Electricity tariff:
DNV was able to confirm that the tariff of the proposed project will be regulated by the Price Bureau 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 and the tariff will not be changed frequently indicated by the notice of electricity tariff supervision in order to control inflation /51/ and this price has not changed since then according to regulations. In addition, any increase in electricity tariffs is likely to put further upwards pressure on inflation rates which have increased from around 0% in 2000 to around 4% in 2012 /62/. Upwards pressure on inflation would subsequently increase O&M costs, eroding relative increases to the IRR resulting from increases to the electricity tariff.

As tested by DNV using the project financial model /12/, a tariff increase of 16.05% from the first year holding through the crediting period or an annual increase of 2.97% would be required for the benchmark of 8% to be crossed, however the possibility of a 2.97% 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 2.97% annual rise in electricity tariff was modelled by DNV along with a corresponding rise in O&M costs of 1%. This increase of O&M costs 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 /62/.

The result of this scenario is an IRR of 7.29%, which is below the benchmark of 8%. If the rate of both electricity tariff and O&M cost increase together at the historical average annual inflation rate from 1994 to 2010 of 4.25% /62/ the project IRR will be 7.17%, which is also below the benchmark of 8%.

Considering the statements from the Price Bureau of Shanxi Province /51/ coupled with the inflationary effects of potential tariff rate rises in an existing national economic environment of increasing inflation /62/, an increase in the tariff rate of 16.05% relative to inflation (which would increase the IRR of the project towards the benchmark) is unlikely and unrealistic.

Annual power supply:
Due to the technical specifications and related limitations of the generator sets 1000GF9-WK, as per the Generator Operational Guidelines /26/, which recommend an annual operational time of 7 200 hours, it is not possible to increase output by either operational time or physical output by 16.05% in any realistic sense. An increase in operational time by 16.05% would result in annual operational hours of 8 355 per year. This would exceed the manufacturers specification of 7 200 operational hours per year /26/ and leave only 405 hours per year of service and maintenance time for the generators. This exceeds the manufacturer's guidelines for operation and as a result is considered an unrealistic operation of the generation equipment.

The manufacturer has stated that the maximum continuous operational output level of the 1000GF9-WK generator units is 93.6% of the nameplate capacity /26/. The ER calculations use a continuous operational output level of 80% of the nameplate maximum, which is stipulated as the recommended continuous operational output level by the manufacturer capable of being delivered for 7 200 hours per year /26/ resulting in an annual generation of 115 200 MWh /1/ so an increase in output of 16.05% would be required to cross the benchmark with an annual generation of 133 690 MWh equivalent to a continuous operational

output level of 92.84% of the nameplate capacity, less than one percent under the maximum attainable output.

However, the maximum continuous operational output of 93.6% of the nameplate capacity is only possible for annual operation of 7 000 hours per year as per the statement from Shandong Jichai Green power Equipment Co Ltd on 23 July 2012 /26/ and would only result in generation of 131 040 MWh so the generators are not physically capable of a output increase of 16.05% corresponding to a continuous operational output level of 92.84% of the nameplate capacity to produce 133 690 MWh per year.

The manufacturers guidelines /26/ discuss the relevance of the recommended operational output and operational hours of the generators to be a balance between output and required maintenance. Operation at a output above 80% of the nameplate 1MW output requires a more intensive maintenance regime which would subsequently reduce the annual hours available for continuous operation.

The altitude of the project site of approximately 1 400 m (average elevation of Qinshui County /59/ will also result in a derating of the generator performance. According to the Cummins Power derating tool /59/ for lean running natural gas generators of similar output, an altitude of 1 000 m above sea level will result in total power available after derating of 92% of rated power and an altitude of 1 500 m above sea level will result in total power available after derating of 86% of rated power. The project participant has not considered the effects of altitude derating in its emissions reduction calculations or financial analysis.

The consideration of altitude derating on generator performance would further reduce the expected PLF based on manufacturers guidelines, which are based on standard temperature and pressure /26/ and result in electricity generation and subsequent emissions reductions being revised down.

Considering modest derating for altitude at 1 400 m of 5%, the rated maximum output of 93.6% and continuous operation at 80% for the 1000GF9-WK generator would be reduced to a maximum output of 88.3% and continuous operational efficiency of 75%. This subsequently results in a PLF of 0.616 at the reduced continuous operational efficiency and a PLF of 0.726 for the maximum output adjusted for altitude. As a result, achieving the PLF of 0.77 required to cross the benchmark is not possible in the manufacturers specification of 7 200 hours annual operation for continuous use.
The analysis above shows that 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 chosen to demonstrate additionality through investment analysis.

4.6.5 COMMON PRACTICE ANALYSIS

It is reasonable in DNV's opinion that the similarity of the proposed project is defined: 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 domestic or foreign sourced equipment) and a ±50% capacity range (i.e. between 10 MW and 30 MW).

The project participant has used numerous sources in identifying other similar projects for the common practice analysis. These sources include:

1. Shanxi NDRC, Shanxi Provincial government website. Register of all approved electricity generating projects with approval to export electricity to the power grid. http://www.sxdrc.gov.cn/xxlm/lxsp/ /72/

2. Clean Development Mechanism in China government website listing all projects with approved LoA. http://cdm.ccchina.gov.cn

3. UNFCCC website (Registered CMM power generation project or CMM power generation project in the UNFCCC validation process)

4. Methane Markets database. CMM projects listed for Shanxi Province China. http://www2.ergweb.com/cmm/index.aspx /72/

Of the sources listed above, the Shanxi NDRC, Shanxi Provincial government website /72/ 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.

The project participant identified 22 projects potentially meeting the common practice criteria, of which all 22 were pursuing CDM status. These projects include:

	Project Name	Installation capacity	Applied for CDM
1	Shaqu 14MW CMM Power Generation Project in Shanxi Province (Phase I)	14 MW	Yes (3190)
2	Shanxi Yaoyuan Coal Mine Methance Developing Co., Ltd, Coal Mine Methance (Coal Mine Gas) Unilization (Nanyu) Project	10MW	Yes Webhosted (UNFCCC)
3	Coal Mine Methane (CMM) and Ventilation Air Methane (VAM) Comprehensive Utilization Project of Taiyuan, Shanxi Province	10MW	Yes Webhosted (UNFCCC)
4	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)
5	This project is part of the registered project Yangquan Coal Mine Methane (CMM) Utilization for Power Generation	25MW	Yes (0892)

	Project, Shanxi Province, China (0892)		
6	Xingyu Coal Mine CMM to Power Generation Project	10 MW	Yes Webhosted (UNFCCC)
7	Wujia coalmine power generation project	10MW	Yes Webhosted (UNFCCC)
8	SDIC Xiyang Huangyanhui CMM to Power Generation Project	16MW	Yes (3219)
9	Jincheng Chengzhuang 18MW coal mine methane power generation project	18MW	Yes (3179)
10	Jincheng Fengrun CMM Utilisation from Nine Mines in Jincheng City Shanxi Province China	24 MW	Yes (1928)
11	SDIC Xiyang Huangyanhui CMM to Power Generation Project	10 MW	Yes (2929)
12	Shanxi Coal Transport Market Co., Ltd. Yangquan Branch CMM Utilization Project	30MW	Yes (1319)
13	Shanxi Yangcheng Coal Mine Methane Utilization Project	16.5 MW	Yes (1250)
14	Shanxi Datuhe Coal Mine Methane Utilization Project	17 MW	Yes (1801)
15	Shanxi Liulin Coal Mine Methane Utilization Project	12 MW	Yes (1230)
16	Shanxi Qinshui Yongchanglong CMM power generation project	18 MW	Yes Webhosted (UNFCCC)
17	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)
18	Shanxi Xiyang Fenghui Coal Industry Co. Ltd. Mahui Coal Mine Utilization for Power Generation Project	10 MW	Yes Webhosted (UNFCCC)
19	Duerping Coal Mine Methane Utilization Project	12 MW	Yes (1929)
20	Shanxi Fenxi Coal Mine Methane Utilization Project The approved LoA shows the annual ER volume is 800,674 tones of CO2 per year. As the installed capacity is not visible, a +/-50% range has been calculated on the proposed project's emissions reductions. The upper 50% boundary of this is 836,128.5 tCO_2 per year. Therefore, this project is included in the common practice analysis.	NA	Yes Webhosted (UNFCCC)
21	Huineng Coal Industry 12MW CMM Power Project	12 MW	Yes Webhosted (UNFCCC)
22	Gaojiazhuang Coal Mine CMM Power Project	17.4 MW	Yes Webhosted (UNFCCC)
23	Xiyang Fengyuan Anping CMM Power Project http://www.sxdrc.gov.cn/xxlm/xny/zhdt/201206/t20120612_64893.htm	12MW	No

As stated in the PDD, project 23 in the table above is within the comparable capacity range of the proposed project and has not registered for CDM but can be ruled out as a similar project due to the Xiyang Fengyuan Anping CMM Power Project (12MW) being development

approved by local government during the month of June 2012 /72/ and as a result is not yet in operation.

Therefore, as stated in the PDD, based on the analysis of the 23 projects above within the comparable capacity range:

- 12 projects were registered as CDM projects
- 10 projects are in the CDM application process
- 1 project is ruled out as it is not yet in operation

DNV searched the databases of the Shanxi NDRC project register /72/, the Methane Markets website /72/ and the UNFCCC CDM website to identify projects fitting the common practice analysis criteria and was unable to identify any additional projects beyond those identified by the project participant.

All projects can be excluded based on the paragraph (44) of the Tool for the demonstration and assessment of additionality version 6.0 /34/ and it is determined that there are no similar projects to the proposed project. Therefore, Sub step 4a and 4b of the tool /34/ have been satisfied and proposed project is not common practice in Shanxi Province.

According to the common practice analysis, CMM power generation from out puts of 10 MW to 30 MW utilizing CMM within Shanxi province are not common practice, 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 07) 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:

- Electricity consumption for ancillary equipment;
- CMM undestroyed in the project activity;
- The relative proportion of NMHC compared to CH4;
- The monitoring of electricity sent to Yuecheng Coal Mine.

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;

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.

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.
$EF_{Coal,Adv,y}$	Electricity supply efficiency of the best commercially available technology for coal-fired power generation in China.	39.08	%	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	%	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	%	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
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
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 in the above table 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 2.2.1 /33/.

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 3.8. The parameters are listed in below table and found acceptable by DNV.

Data and Parameters	***Unit***	***Value***	***Source of data used***
Density of methane	kg/m^3	0.67	2006 IPCC Guidelines for National Greenhouse Gas Inventories, ACM0008 version 7
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	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}	Methane sent to power generators	t	Temperature and pressure will, through a flow meter, be recorded and the volume adjusted to NTP
PC_{CH4}	Concentration 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	Ammeter 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	$tCO_2/tNMHC$	To be obtained through annual analysis of the fractional composition of captured gas. If NMHC concentration is less than 1%, its emissions can be ignored.

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 monitoring plan includes responsibilities and authorities for management, procedures for monitoring and reporting, QA/QC procedures are clearly stated.

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 and national standards 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

The emission reductions (ER_y) by the project activity during the crediting period are the difference between baseline emissions (BE_y), project emissions (PE_y) (leakage (LE_y) is considered to = 0 and is discussed below):

1) Baseline emissions: baseline emissions (BE_y in tCO_2) are the total of the baseline emissions from destruction of methane in the baseline scenario in year y ($BE_{MD,y}$) (tCO_2e) plus the baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity ($BE_{MR,y}$) (tCO_2e) and the baseline emissions from the net production of power, heat or supply to gas grid replaced by the project activity in year y ($BE_{Use,y}$) (tCO2e)
2) Project emissions: project emissions (PE_y in tCO_2) are the total of project emissions from energy use to capture and use methane (PE_{ME}) (tCO2e) plus project emissions from methane destroyed (PE_{MD}) (tCO_2e) and project emissions from un-combusted methane (PE_{UM}) (tCO_2e).

The grid emission factor is determined ex-ante as a combined margin, consisting of combination of the operating margin (OM) and build margin (BM). The data used in the EF calculation is in accordance with data in the China Electric Power Yearbook from 2007 to 2009 (published annually) /69/ and the China Energy Statistical Yearbook from 2007 to 2009 (published annually) /69/.

The assessment of the grid emission factor of the NCPG is as follows:

Operating Margin: Simple OM was chosen and this is justified since the low cost /must run resources constitute less than 50% of total grid generation 0.8% in 2004, 0.7% in 2005, 0.8% in 2006, 0.9% in 2007 and 1.3% in 2008) /69/.

Aggregated generation and fuel consumption data are used due to the fact that more disaggregated data are not available in the NCPG, the total electricity delivered to the NCPG has been used which are obtained from the China Electric Power Yearbook from 2007 to 2009 (published annually) /69/. Country specific data for net calorific value of each type of fossil fuel are obtained from the China Energy Statistical Yearbook from 2007 to 2009 /69/ and the emission factors of each type of fossil fuel from IPCC 2006 /70/ are deemed reasonable. The OM is calculated to be 0.9914 tCO2/MWh. The sources and calculation have been verified by DNV /2/.

Build Margin: Build margin was determined *ex-ante*. Due to data availability, option (b), the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) has been used in conjunction with option 1, calculation of the build margin ex-ante based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation.
With reference to the *Notification on Determining Baseline Emission Factor of China's Grid in 2009* /71/, the Build Margin emission factor ($EF_{BM,y}$) of the NCPG is 0.7495t CO_2e/MWh. The BM is calculated as 0.7495t CO_2e/MWh, which was verified from the data for BM calculation /2/.

It has been calculated as 50:50 as the weights of the operating margin and the build margin.

$EF_{CM,grid,y} = 0.5 \times EF_{OM,grid,y} + 0.5 \times EF_{BM,grid,y}$
$= 0.5 \times 0.9914 + 0.5 \times 0.7495 = 0.87045\ tCO_2e/MWh$

The resulting combined margin emission factor 0.87045 tCO_2e/MWh is fixed ex-ante for the 10 years fixed crediting period.

Estimates 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 ERy by the project activity during a given year y is the difference between the baseline emissions (BEy), project emissions (PEy) and leakage (LEy), as follows:

$ER_y = BE_y - PE_y - Le_y$
$ER_y = 630\ 515 - 73\ 096 - 0$
ER_y =557 419tCO_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 /6/. As a result the forecast average annual emission reduction during the first 12 months is reduced from 557 419 tCO_2e/year to 445 935 tCO_2e/year. The first year operation at 80% and subsequent 9 years at 100% averaged over the 10 year crediting period the annual emissions reductions are then 546 271 tCO_2e.

Baseline emissions BE_y:

$BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y}$
$BE_y = 0 + 540\ 267 + 90\ 248$
BE_y = 630 515 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 $BE_{MR,y}$

$BE_{MR,y} = GWP_{CH4} \times MM_{ELEC}$
$BE_{MR,y} = 21 \times 25\ 727$
$BE_{MR,y} = 540\ 267\ tCO_2e$

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 $BE_{Use,y}$

$BE_{Use,y} = GEN_y \times EF_{ELEC} + HEAT_y \times EF_{HEAT} = GEN_y \times EF_{ELEC}$
$BE_{Use,y} = GEN_y \times EF_{ELEC}$
$BE_{Use,y} = 103\ 680 \times 0.87045$
$BE_{Use,y} = 90\ 248\ tCO_2e/year$

Where
$BE_{Use,y}$: total baseline emissions from the 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) before 3 600 MWh is supplied to Yuecheng coal mine);
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

$PE_y = PE_{ME} + PE_{MD} + PE_{UM}$
$PE_y = 0 + 70\ 395 + 2\ 701$
***PE_y* = 73 096 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.

$PE_{ME} = CONS_{ELEC,PJ} \times CEF_{ELEC}$
$PE_{ME} = (10\% \times 0\ MWh) \times 0.87045 tCO_2e/tCH_4$
$PE_{ME} = 0\ tCO_2e/year$

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）.

The proposed project, as part of the CMM gas purchase agreement /4/, is to supply 3 600 MWh per year to the Yuecheng coal mine at no tariff charge for the life of the proposed project.

The 3 600 MWh sent to the Yuecheng Coal Mine each year is included in the emissions reductions claimed by the project, as evidenced by GEN_y being 103 680 MWh/year as opposed to the financial analysis calculations detailing 100 080 MWh/year being exported to the NCPG for sale. The financial implications of this have been considered in section 3.6.3 Investment Analysis under the heading CMM price.

Project emission from CMM/CBM destroyed PE_{MD}

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

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

$PE_{MD} = MM_{ELEC} \times Eff_{ELEC} \times CEF_{CH4}$
$PE_{MD} = 25\ 598\ tCH_4/year \times 99.5\% \times 2.75\ tCO_2e/tCH_4$

PE_{MD} = 70 395 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 (2.75tCO_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 (%).

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

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})

$PE_{UM} = GWP_{CH4} x\ [MM_{ELEC} x(1-Eff_{ELEC})]$

PE_{UM}=21 tCO_2e/tCH_4 *x* 25 727 tCH_4/year *x* (1-99.5%)

PE_{UM}= 2 701 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 the following 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:

- The proposed project aims to utilize 45 % of the available CMM from the Yuecheng Coal Mine, of the remaining 55%, historical averages from 2009 to 2011 indicate, 4.88% is self-used by the coal mine, 3.67% is provided to local residents at no cost /18/ and 19.48% (based on average usage of 0% in 2009, 30.3% in 2010 and 18.4% in 2011 /18/) was historically provided to Shanxi Jin Coal Group Qinxiu Coal industrial Co. Ltd. as a part of a temporary assistance program /4/ /75/ (refer to section 3.3 of this report for detail)leaving a buffer of 26.97% /18/. The population growth rate for Jincheng city as per the 2011 local census published in the Shanxi Newspaper Taihang Daily /55/ is approximately 0.53% per year averaged over the last ten years. Following this trend the expected increase of CMM demand by local residents based on current levels may be forecast to grow at 0.53% per year (20 385 m^3 CMM) resulting in a potential increase in demand for local CMM of 0.25% over the ten year crediting period, which is well within the 26.97% of surplus CMM available from Yuecheng Coal Mine under the project scenario;
- 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, $\mathbf{LE_{o,y} = 0}$.

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 /6/. As a result this has affected the forecast emissions reductions from 1 December 2012 to 30 November 2013 as per the table below.

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	4,873	42,034	0	37,161
2013	59,695	514,922	0	455,226
2014	73,096	630,515	0	557,419
2015	73,096	630,515	0	557,419
2016	73,096	630,515	0	557,419
2017	73,096	630,515	0	557,419
2018	73,096	630,515	0	557,419
2019	73,096	630,515	0	557,419
2020	73,096	630,515	0	557,419
2021	73,096	630,515	0	557,419
1/1/2022 -	67,005	577,972	0	510,967

30/11/2022				
Total (tCO_2e)	**716,341**	**6,179,048**	**0**	**5,462,707**

Uncertainty
The major uncertainty related to the project's emission reductions is the amount of CMM captured in the future. The mine is in early the development stages in an area known to be rich in gassy coal. Based on the FSR /6/ and confirmed by the Gas drainage and usage record of Yuecheng Coal Mine /18/, CMM utlised by the project is expected to comprise approximately 45% of the total estimated CMM extracted from the Yuecheng Coal Mine.

Relative emissions are not likely to vary significantly at the Yuecheng 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 546 271 tCO2e/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.

It is noted by DNV that the emissions reductions associated with the 3 600 MWh per year of electricity sent to the Yuecheng Coal Mine were deemed to be additional after verification of electricity purchase invoices supplied by the yuecheng Coal Mine in the pre project period /11/. As such, DNV can confirm that the baseline source of energy supplied to the Yuecheng Coal Mine was from the NCPG, which is dominated by fossil fuel sources. As such DNV can confirm the emission reductions associated with the supply of the 3 600 MWh are additional to what would have occurred during the baseline scenario.

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 July 2010 /5/.

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 2010 /3/ /4/. The project participant sent employees to distribute questionnaires to local residents and staff from the coal mine.

Participants surveyed 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 verified the stakeholder consultation surveys during the site visit /16/.

DNV considers the local stakeholder consultation carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 01 dated 25 March 2011, 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 20 April 2011 to 19 May 2011 (http://cdm.unfccc.int/Projects/Validation/DB/7Q0ZS8VZVD75W3JZG9VZTS77UYRKTW/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		
• 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	~~CAR 1~~ OK
• The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	~~CAR 1~~ OK
• 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	~~CAR 1~~ OK
• The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	~~CAR 1~~ OK
• 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
• Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
• The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
• The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	~~CAR 1~~ OK
• 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		
• 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	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	~~CAR 5~~ ~~CAR 4~~

Requirement	Reference	Conclusion
anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.		~~CL 3~~ ~~CL 4~~ ~~CL 5~~ ~~CL 6~~ ~~CL 7~~ ~~CL 8~~ ~~CL 9~~ ~~CL 10~~ ~~CL 11~~ ~~CL 12~~ OK
About forecast emission reductions and environmental impacts		
• The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	~~CL 13~~ ~~CL 14~~ OK
For large-scale projects only		
• 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	~~CL 18~~ OK
About stakeholder involvement		
• 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	~~CL 19~~ OK
• 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

Requirement	Reference	Conclusion
Other		
• The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
• 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	~~CAR 2~~ ~~CL 3~~ OK
• 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
• 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	~~CAR 3~~ ~~CL 15~~ ~~CL 16~~ OK

Table 2 Requirements checklist

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity						
A.1	**Title of the project activity (VVM para 55-57)**					
A.1.1	Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ Date of the PDD is included.		OK
A.1.2	Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	☒ Yes *If no, list where the PDD is not in accordance:*		OK
A.2	**Description of the project activity (VVM para 58-64) and VVM para 135 and 136 (a) & (c) for small-scale project activities, as applicable)**					
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		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				analysis. ☐ The project is an individual small scale project activity with emission reductions not exceeding 15 000 tCO_2e per year. In this case, DOE may not conduct a physical site visit as appropriate. ☐ Greenfield project *How was the design of the project assessed?* ☒ Physical site inspection ☒ Reviewing available designs and feasibility studies *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 description of the project activity contained in the PDD generally covers the main elements of the project. The project participant is requested to clearly state the differences between the project activity and the pre project scenario. In particular, detail information of the consumers of hot water/heating/cooling/gas in the baseline and project activity, and use of electricity generation from existing CMM fired power plant and source	~~CL 1~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				of hot water/heating/cooling to the consumers in the baseline.		
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 1000kW power generation units in or near the Yuecheng 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/	DR	Yes. The applied technology reflects 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/	DR	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	The LoA from both the host country China and the Annex 1 Party the United Kingdom have not been received. The project participant is requested to provide these.	~~CAR 1~~	OK
				China (host) / The United Kingdom / 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/ /29/ /30/	DR			
				China (host) / The United Kingdom / Country Y	~~CAR 1~~ (LoAs not	OK
	a) LoA confirms that Party has ratified the Kyoto Protocol			☐ Yes ☒ No / ☐ Yes ☒ No / ☐ Yes ☐ No		

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
b) LoA confirms that participation is voluntary c) The LoA confirms that the project contributes to the sustainable development of the host country? d) The LoA refers to the precise project activity title in the PDD e) The LoA is unconditional with respect to (a) to (d) above f) The LoA is issued by the respective Party's DNA g) The LoA was received directly by the DNA or the 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			☐ Yes ☒ No ☐ Yes ☒ No ☐ Yes ☐ No ☐ Yes ☐ No NA NA ☐ Yes ☒ No ☐ Yes ☒ No ☐ Yes ☐ No ☐ Yes ☒ No ☐ Yes ☒ No ☐ Yes ☐ No ☐ Yes ☒ No ☐ Yes ☒ No ☐ Yes ☐ No ☐ DNA ☐ PP ☐ DNA ☐ PP ☐ DNA ☐ PP	provide d)	
A.3.3 Have all private/public project participants been authorized by an involved Party?	/1/	DR	The LoA from both the host country China and the Annex 1 Party the United Kingdom have not been received.	~~CAR 1~~	OK
A.4 Technical description of the project activity (VVM para 58-64)					
A.4.1 Is the project's location clearly defined?	/1/	DR	The projects location is clearly defined within Qinshui County, Jincheng City of Shanxi Province, however the projects location in relation to the Yuecheng 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 evidence of public funding was identified during the desk review or site visit. The project participant is requested to provide copies of funding agreements or evidence of funding sources.	~~CL 1~~	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) and VVM para 136 (b) for small-scale project activities, as applicable)					
B.1.1 Does the project apply an approved methodology and the correct and valid version thereof?	/1/ /32/ /33/	DR	The project applies the approved consolidated 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"* The project participant is requested to update the usage and reference for the Tool to calculate the emission factor for an electricity system" (Version 02.1) as per EB 60 Report Annex 8.	~~CL 2~~	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	/1/	DR I	The project utilises 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 method of gas extraction is to be clarified in	~~CL 2~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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.			the PDD.		
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/	DR I	For the Project: - The baseline is the total or partial or total atmospheric release of the methane from the Yuecheng 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. The project participant is requested to demonstrate through evidence that CBM is not utilised as per the PDD.	~~CL 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	/1/ /6/ /38/ /74// 75/	DR I	The Yuecheng 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. This was confirmed through visual inspection of the working coal mine infrastructure during the site visit, interviews with the Yuecheng coal mine		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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 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.			Deputy General Manager Mr. Chaopeng Li and review of FSR.		
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//9/	DR I	Methane demand to be fixed at the rated maximum capacity of the 20MW generator capacity. The project participant is requested to include this part of the methodology applicability in section B.2 of the PDD. The project participant is requested to demonstrate how the necessary to data for ex ante projections of methane demand as described in sections Baseline Emissions and Leakage is available for validation.	~~CL 2~~ ~~CAR 5~~	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 CO2 or any other fluid/gas to enhance CBM drainage before mining takes place.	/1/ /6/	DR I	The project is being conducted simultaneously to the coal mining activity; The project participant is requested to include the location of gas wells in the PDD.	~~CL 2~~	OK
B.2.6 Is the selected baseline one of the baseline(s) described in the	/1/	DR	The selected baseline of venting pre-mining		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	methodology and this hence confirms the applicability of the methodology?	/32/		CMM/post mining CMM; purchasing power from the North China Power Grid is one of the baselines described in the methodology ACM0008 version 7.		
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//32/	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 China Power Grid. This is in compliance with the spatial boundary requirements detailed in the methodology ACM0008 version 7.		OK
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/	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. - CO2 related to the combustion of CMM during electricity production, the production of grid electricity and emissions from non methane hydrocarbon destruction. - The project participant is requested to clarify and update Table B.3-1 in the PDD.	~~CL 2~~	OK
B.3.3	Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission	/1/ /32/	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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
reductions of the project?					
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/	DR	1a. Baseline scenario alternatives for CMM extraction Scenario C The combination of A and B, with pre mining CMM/post mining CMM. The project participant is requested to substantiate the claim that the coal mine methane extracted from the mining activity will be >30%. 1b. Baseline scenario alternatives for extracted CMM treatment i Venting ii Using/destroying ventilation air methane rather than venting it; iii Flaring of CMM; iv Use for additional grid power generation;	~~CL 3~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			v Use for additional captive power generation; vi Use for additional heat generation; vii Feed into gas pipeline (to be used as fuel for vehicles or heat/power generation); viii The combination of scenarios I to vii with the relative shares of gas treated under each option specified. 1c. Baseline scenario alternatives for energy production Scenario P1, the continuation of the current situation, purchasing electricity from the North China Power Grid; P2. Construction of a coal-fired captive power plant with equivalent installed capacity (20MW); 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	1. Options for CMM extraction It is required that methane concentrations in the coal mine be below 1% to avoid the risk of explosion by the .“National coalmine safety regulation 1(version 2010).”-chapter 2, section 2, item 136. Solely adopting pre mining or post	~~CL 3~~ ~~CAR 2~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			mining CMM extraction could not meet the coal mine safety requirement. So Option A and B do not comply with the legal requirement and will be eliminated. Option C will be the only option that is technically feasible and in compliance with national legal or regulatory requirements. 2. Options for extracted CMM treatment For CMM utilization, Chinese regulation requires that CMM used should have a minimum methane concentration of 30 % (National Coalmine Safety Regulation (2005) item 148.1). This was also emphasized in the Coalmine Methane Treatment and Utilization Macro Plan published by National Development and Reform Committee (NDRC) in June 2005. The Emission Standard of CBM/CMM (on trial) (GB 21522-2008) for extracted CMM utilization was issued by Ministry of Environmental Protection in April 2008 and valid from 1 July 2008. The standard is applicable for high concentration of the extracted CMM i.e. no less than 30%. Local governments at or above the county level shall be responsible for implementing and monitoring compliance with the regulation. It stipulates that: (i) For gassy coal mines (coal mines that have to be equipped with CMM drainage system), which started operation after 1 July 2008, the extracted CMM has to be utilized and should not be vented. (ii) For gassy coal mines which started operation		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			before 1 July 2008, the extracted CMM can be vented until 31 December 2009. The extracted CMM has to be utilized after 1 January 2010. The standard is not considered in the baseline analysis for the project for the following reasons: (i) The standard was published on 02 April 2008. As agreed by the UNFCCC Executive Board (EB22 annex 3 and EB53 annex 32), such national policies to reduce GHG emissions shall not be considered for baseline determination, if they were implemented after 11th November 2001. As confirmed by the above official document, the national regulation to utilize CMM has been implemented in April 2008 and came into effect in July 2008. Hence, it can be confirmed that the regulation referred to in this request is not to be considered for determination of the baseline scenario. (ii) No further guidance or legislation has been published by the Chinese government to date giving details about how the standard will be enforced or what penalties will be given to mines that do not comply with the standard. Furthermore, it seems that no additional resources have so far been allocated to the provincial level governments to monitor compliance with the legislation. (iii) Equally, no additional funding has been given to coal mine operators to help them comply with the Standard. (iv) Further, although the regulation published in 2008 in China required CMM utilization where gas concentration was >30%, according to a		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			statement issued in July 2009 2, the attitude of the Chinese government is that they "encourage companies to achieve the standard required by the regulation with help from the CDM. This is because the real IRR of most CMM projects (except for a few demonstration projects) is almost negative. Thus it is considered that all of the options in step 1b are comply with regulatory requirements as a baseline scenario. Therefore options i, iii, iv, v, vii and viii are all technically feasible and in compliance with legal and regulatory requirements. The project participant is requested to substantiate the claim through documentary evidence and justification, that the coal mine methane extracted from the mining activity will be >30%. The project participant is requested to further substantiate and demonstrate how this regulation is not effective or enforced in China. 3. Options for Energy production According to Chinese laws, it is strictly prohibited to build fuel-fired captive power plants with the capacity of 135MW and below1. Therefore option P2 does not comply with the legal and regulatory requirements and will be eliminated. The project participant is requested to consider heat usage in addition to electricity production as per the methodology.		

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4.3	What is the baseline scenario?	/1/	DR	The selected baseline in the PDD is venting pre-mining CMM/post mining CMM and purchasing power from the North China Power Grid. The project participant is requested to clarify the baseline usage of CMM to include the partial use by local residents. Pending resolution of CL 3 and CAR 2.	~~CL 3~~ ~~CAR 2~~	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 3, refer to B.4.3.	~~CL 3~~	OK
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Pending resolution of CL 3 and CAR 2.	~~CL 3~~	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	The baseline scenario has taken into account all relevant national and sectoral policies, including the National Coalmine Safety Regulation, Coalmine Methane Treatment and Utilization Macro Plan. The macro-economic trends and political aspirations are also taken into account. Pending resolution of CL 3 and CAR 2.	~~CL 3~~	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 CAR 2 and CL 3.	~~CAR 2~~ ~~CL 3~~	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	/1/	DR	Clarification is requested to demonstrate that VAM technology is still experimental and utilising VAM is cost prohibitive.	~~CL 4~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
• Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity					
B.5 Additionality determination (VVM para 94-121) and VVM para 137 for small-scale project activities, as applicable)					
B.5.1 What approach/tool does the project use to assess additionality? Is this in line with the methodology	/1//32/ /34/	DR	The methodology ACM0008 specifies the use of the "Tools for the demonstration and assessment of additionality"(version 05.2). 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 I	Pending the resolution of CL 3 refer to B.4.1.	~~CL 3~~	OK
B.5.3 Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR I	Pending the justification of the coal mine methane concentration estimate. Refer to CL 3 and B.4.3.	~~CL 3~~	OK
B.5.4 What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	The project additionality is based solely on investment analysis.		OK
Prior consideration of CDM (VVM para 98-103)					
B.5.5 What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1//8/ /14/	DR I	The project participant notified the DNA of China of it's prior consideration of CDM on the 15 March 2011. This was confirmed by the Chinese DNA on 28 March 2011.		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				The project participant notified the UNFCCC about it prior consideration of CDM on 17 March 2011. This was confirmed by the UNFCCC on 17 March 2011.		
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/	DR I	The starting date of the project activity is 19 April 2011, which is after 2 August 2008 and before the global stakeholder consultation, which started on 20 April 2011.		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/	DR	Not applicable		OK
B.5.8	When did the construction of the project activity start?	/1/	DR	Not applicable		OK
B.5.9	When was the project commissioned?	/1/	DR	Not applicable		OK
B.5.10	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	Not applicable		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 I	The project activity generates revenue from the sales of electricity to the North China Power Grid. The project activity may also generate revenue from the saving resulting from the use of waste heat. The project participant is requested to clarify the extent of waste heat and gas use related to the project site and activities.	~~CL 5~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.12	Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR I	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. However as the flaring of CMM, as an alternative to the project activity, generates no income stream, it cannot be considered a similar activity suitable for an investment comparison. The project participant has included the cost of WHR plant and expenses in the financial analysis. The project participant is requested to justify the inclusion of WHR activities inside the project boundary.	~~CAR 4~~	OK
B.5.13	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR I	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 I	The benchmark rate of 8% for electricity generation 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 with some additional waste heat recovery.	~~CL 6~~	OK
B.5.15	What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/	DR I	The financial indicator used is the Internal Rate of Return based on total investment before income tax.		OK
B.5.16	Are the underlying assumptions appropriate, e.g. what is	/1//6/	DR	The project participant is requested to break	~~CL 6~~	OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	considered as waste in the baseline is considered to have zero value?		I	down the Raw Material cost in the PDD to the relevant units. The project participant is requested to clarify the usage of waste gas in the baseline including any price associated. The project participant is requested to justify the price of CMM in the project scenario of 0.11 RMB/m3 while there is no assigned cost in the baseline. The project participant has considered government subsidies available at the time of publication of the FSR. The project participant is requested to further clarify and demonstrate that : The project owner is not an "enterprises specialized in CMM extraction" but a power generation company and thus this subsidy cannot be applied to this project. The project participant is requested to include the revenue from waste heat recovery in the project scenario.		
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//12/	DR I	The income tax calculation takes depreciation into account. Depreciation has been considered in the IRR spreadsheet under Total costs and manufacturing expenses which feed into the calculation of taxable income. Depreciation in the IRR calculation spreadsheet is approximately 9.5% of total static investment. The project participant is requested to demonstrate in the PDD that this is normal accounting practice in China.	~~CL 7~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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//12/ /13/	DR I	The time period for the investment analysis is 11 years including 1 year for construction and the subsequent year for commissioning running at 80% output. Salvage value has been taken into consideration in year 11. Working capital is returned in year 11. In the project IRR calculation spreadsheet, the load factor for the first operation year was considered as 80% of normal years in operation which needs to be justified. However, the 80% load factor of the first year in operation was not considered in ER calculation sheet. The inconsistency needs to be substantiated and/or justified.	~~CL 7~~	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//6/ /8/	DR I	The emissions reductions quoted in the FSR state an annual amount of 540,000 tonnes, whereas the PDD states an annual emissions reduction of 554 285 tonnes. The project participant is requested to clarify this difference. The other figures quoted for the financial analysis in the PDD match those provided in the FSR.	~~CL 8~~	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/ /6/	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) ☐ Other approach.	~~CL 9~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				Provide details on how the load factor was validated:: The project participant is requested to substantiate and provide translation of the calculation of the plant load factor used in the FSR for validation.		
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 project participant is requested to substantiate the suitability of the output price of electricity (tariff) used in the project, providing translated copies of relevant documents as required. The project participant is requested to clarify whether there are any internal efficiencies or savings related to the generation of heat or hot water.	~~CL 9~~	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/ /6/ /9/ /10/ /11/ /12/	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 project participant is requested to include a	~~CL 9~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				clear summary of how the investment costs are accounted for in the IRR spreadsheet and the PDD as a part of the total investment so that these may be validated against the FSR and the investment contracts. The project participant is requested to clarify any preferential policies on capture and utilization of high concentration CMM such as reducing or waiving taxes and charges, preferential price polices, pre-tax appropriation of safety cost, refund VAT, etc. If such policies or incentives exist, the project participant shall provide detail information how these preferential policies have been considered in the investment analysis.		
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/ /6/	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:* The project participant is requested to provide a breakdown of O&M costs in the PDD and demonstrate how the costs are justified including how any figures referenced from the FSR were substantiated.	~~CL 9~~	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/	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*	~~CL 9~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				were validated: The project participant is requested to justify the validity and suitability of the input parameters for the financial analysis in the PDD.		
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/ /12/	DR	The project participant is requested to clarify the total of the O&M costs. The total of the individual O&M costs listed in the PDD equates to 18.8983 million CNY, however the total listed in the PDD and used in the IRR spreadsheet is 18.53 million Yuan. The project participant is requested to include live calculations with equations for the sensitivity analysis in the IRR spreadsheet.	~~CL 10~~	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	Key parameters contributing to more than 20% of the revenue and costs of the proposed project have been considered in the sensitivity analysis including total static investment, electricity tariff, annual operating cost and annual power supply.		OK
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	The sensitivity analysis has been conducted to + and – 10% in table B.5-4, however appears to have been further extended in the following discussion in the PDD. The project participant is requested to extend the sensitivity analysis to demonstrate the extended analysis in the justification following table B.5-4.	~~CL 11~~	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 key parameters have been varied to reach the benchmark, however they have not been included in table B.5-4. Refer to CL 11 and B.5.27.	~~CL 11~~	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	/1/	DR	Barrier analysis not opted for by the Project Participant for additionality assessment and		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.			demonstration.		
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	Not applicable		OK
B.5.31	How does CDM alleviate the investment barriers?	/1/	DR	Not applicable		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	Not applicable		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	Not applicable		OK
B.5.34	How does CDM alleviate the technological barriers?	/1/	DR	Not applicable		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	Not applicable		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	Not applicable		OK
B.5.37	How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	Not applicable		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	Not applicable		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	Not applicable		OK
B.5.40	How does CDM alleviate the other barriers?	/1/	DR	Not applicable		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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	Not applicable		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 for the common practice analysis has been selected as Shanxi Province. The project feeds electricity into the North China Power Grid. The project participant is requested to justify why the geographical area covered by the North China Power Grid is not selected.	~~CL 12~~	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 and capacity of the technology for the common practice analysis is not clearly explained in the PDD. The project participant is requested to clarify whether the scope and capacity of the common practice analysis is to include all CMM projects.	~~CL 12~~	OK
B.5.44	What is the data source(s) used for the common practice analysis?	/1/	DR	The data sources used for the common practice analysis are: • The Methane to Markets CMM projects database (available at http://www2.ergweb.com/cmm/index.aspx). • The UNFCCC website showing details of registered CDM projects and CDM projects under development (available at http://cdm.unfccc.int/index.html) The project participant is requested to clarify if all relevant CMM projects have been omitted from the common practice analysis.	~~CL 12~~	OK
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/	DR	The PDD states that none of the identified projects in the common practice analysis were non-CDM projects.	~~CL 12~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Refer to CL 12 and B.5.43.		
B.5.46 How were possible essential distinctions between the project activity and similar activities assessed?	/1/	DR	The scope and capacity of the technology for the common practice analysis is not clearly explained in the PDD. The project participant is requested to clarify whether the scope and capacity of the common practice analysis is to include all CMM projects.	~~CL 12~~	OK
B.5.47 What is the conclusion of the common practice analysis?	/1/	DR	The conclusion of the common practice analysis in the PDD is: "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" Refer to CL 12 and B.5.41, B.5.43 and B.5.44.	~~CL 12~~	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 additional.		OK
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/ /32/	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.		OK
B.6.2 How was Global warming potential of methane verified?	/1/	DR	The global warming potential for methane used in the PDD is 21 tCO_2e/tCH_4 as per the		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	/32/		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.		
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.	~~CL 13~~	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 2007-2009 has been included in Annex 3 of the PDD as an exert from the China Electric Power Yearbook 2007 - 2009.		OK
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 as an exert from the China Electric Power Yearbook 2007 - 2009.		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 as an exert from the China Electric Power Yearbook 2007 - 2009.		OK
B.6.7 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 provided in the PDD is incomplete and does not contain a year. The project participant is requested to clarify this.	~~CL 13~~	OK
B.6.8 How was the amount of fuel i (in a mass or volume unit) consumed by relevant provincial sub-grid j in year y.	/1/	DR	The amount of fuel i (in a mass or volume unit) consumed by relevant provincial sub-grid j in	~~CL 13~~	OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	verified?			year y has been included in Annex 3 of the PDD. The reference provided in the PDD is incomplete and does not contain a year. The project participant is requested to clarify this.		
B.6.9	How was the carbon emission factor per unit of energy of the fuel i verified?	/1/	DR	The carbon emission factor per unit of energy of the fuel i has been referenced from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2Energy, Table 1.3 and 1.4, page 1.21-1.24, chapter 1 and has been included in Annex 3 of the PDD.		OK
B.6.10	How was the efficiency of methane destruction / oxidation in power plant verified?	/1/ /32/	DR	The Efficiency of methane destruction / oxidation in power plant has been referenced from the methodology ACM0008 version 7 as 99.5%.		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/	DR	The project participant is requested to clarify: - Where the equation labelled as (3) in the PDD is sourced from. - The parameter $MM_{ELE,yC}$ in the PDD which appears to represent C$MM_{ELE,yC}$ in the related equation.	~~CL 14~~	OK
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 this is considered to be conservative.		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/ /32/	DR	Project emissions were calculated in accordance with ACM0008, taking into account emissions due to: - Project emissions from energy use to		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				capture and use methane, - Project emissions from methane destroyed, and - Project emissions from un-combusted 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.		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/ /32/	DR	Leakage has been assumed to be 0. This is in accordance with the methodology ACM0008 and is conservative.		OK
B.6.18	Have conservative assumptions been used when calculating the leakage emissions?	/1/	DR	Refer to B.6.17.		OK
B.6.19	Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	Refer to B.6.17		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	/1/ /13/	DR	The figure used for CEF_{NMHC} in the ER calculation sheet is 2.75, however the figure quoted in the PDD for the carbon emissions factor for combusted non methane hydrocarbons is 0. The project participant is requested to clarify this. The project participant is requested to clarify how the figure used for MM_{ELEC} in the PDD, 9004.8tCH_4 relates to the volume given for MM_{ELEC} in the ER calculation spreadsheet of 38.3985Mm3. The figure used in the PDD for the PC_{CH4}	~~CL 14~~ ~~CAR 4~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	submitted for registration.			percentage of pure methane in drained gas is 35%, however the ER calculation spreadsheet uses the figure 0.55 or 55%. The project participant is requested to clarify this. 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.7	**Monitoring plan (VVM para 122-124)**					
	Data and parameters monitored					
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/	DR	The monitoring plan Section 2 in the PDD makes reference to use of an auditor who is not involved in the daily operation of the landfill. The project participant is requested to clarify this. The diagram used to depict the location and identification of the monitoring system includes a circular unit labelled "S". This unit is not identified in the key noted under the diagram. The project participant is requested to clarify this. The means of monitoring described in the monitoring plan comply with the requirements of the methodology.	~~CL 15~~	OK
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/	DR	The project participant is requested to edit $GEN_{PJ\ to\ Grid,\ y}$ to description Electricity generated instead of Electricity exported to NCPG. The project participant is also requested to edit this description in the PDD in section B.7.2. The project participant is requested to demonstrate how electricity sent to the Yuecheng	~~CAR 3~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				coal mine is monitored. The project participant is requested to clarify how the parameter PC_{NMHC} is to be monitored through the crediting period.		
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	Measured parameters include: • Volume of methane sent to the generators, and • Percentage of pure methane sent to the generators. • Temperature, • Pressure. These parameters are measured as follows: The concentration meters and flow meter need to be installed at the inlet of the generators. The flow meter measures the CMM entering the generators continuously. The concentration meters are adopted daily to measure the concentration of methane (in mass) in extracted gas (%, on wet basis). The concentration meters are adopted annually to measure the concentration of NMHC (in mass) in extracted gas (%, on wet basis). The personnel of the proposed project should record and collect the readings of the two instruments. Spot readings of other values (methane content, temperature and pressure) will also be recorded periodically and at the times when flow meter readings are taken. These instruments should be calibrated according to the manufacturers' instructions and relevant national/sectoral standards.	~~CL 15~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			• Electricity supplied to the North China Power Grid by the proposed project activity. The electricity supplied to the NCPG by the proposed project is to be measured as follows: The electric energy meter will be equipped according the requirements of the Technical Administrative Code of Electric Energy Metering (DL/T448-2000). The project will install meters at the outlet end of the power station. Main meter M1 (with a back-up meter M2) will be used to measure the electricity that the Project supplies to the North China Power Grid and the net electricity supplied to North China Power Grid. The accuracy of meters will rely on requirements of national/ industry standard. The project owner is responsible for the installation of meters, and the North China Power Grid takes charge of checking and supervision. The meters should be examined and undergo regular calibration according to relevant standards and regulations of the power industry so as to ensure the accuracy. If any meter requires repair due to the inaccurate readings beyond the error range or the breakdown of the meters, the project owner and the grid corporation should jointly commission a qualified metering verification institution to make tests while the		

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				two parties should keep records on calibration and maintenance. The settlement of electricity between the project owner and the gird company is based on monthly reading of the main meter. Once the accuracy of main meter fails beyond the accepted range, data from the back-up meter will be used. The measurement equipment has been generally described in the monitoring plan; however the specific unit details have not been described. The project participant is requested to elaborate on the actual units to be installed.		
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/	DR	Measurement accuracy has not been described for any parameter. The project participant is requested to provide the measurement accuracy for each of the measured parameters: • Volume of methane sent to power generators(MM_{ELEC}); • Percentage of pure methane (wet basis) in drained gas (by volume)(PC_{CH4}); • Electricity supplied to North China Power Grid by the proposed project in year y (GENPJ to Grid, y); • NMHC concentration in coal mine methane (PC_{NMHC}) to be monitored once a year. In addition the project participant is also requested to provide a measurement accuracy for the temperature and pressure measurements	~~CL 16~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				taken.		
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 requirements for maintenance and calibration of measurement equipment has not been provided for each parameter or unit of measurement equipment, however the monitoring plan states that: Maintenance and calibration on all monitoring meters will be in compliance with relevant national/sectoral standards. An archive should be established for each meter. The content of the archive should include the location of the meter, serial number, calibration information (when last calibrated, when next due for calibration) and the name of the operator who has performed the calibration. Calibration certificates will be retained for all meters until two years after the end of the crediting period. The project participant is requested to to provide maintenance and calibration requirements for each piece of measurement equipment.	~~CL 16~~	OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/ /32/	DR	According to the monitoring plan: • Volume of methane sent to power generators(MM_{ELEC}) is to be monitored continuously, which is in line with the methodology ACM0008; • Percentage of pure methane (wet basis) in drained gas (by volume)(PC_{CH4}) is to be monitored continuously; The methodology stated that the PC_{CH4} is to be monitored hourly or daily. The project participant	~~CL 16~~	OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				is requested to nominate a frequency. • Electricity supplied to North China Power Grid by the proposed project in year y (GEN_{PJ} to Grid, y) is to be monitored continuously, which is in line with the methodology ACM0008; • NMHC concentration in coal mine methane (PC_{NMHC}) to be monitored once a year, which is in line with the methodology ACM0008.		
B.7.7	Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	• Volume of methane sent to power generators (MM_{ELEC}). The recording frequency for MM_{ELEC} is not clearly nominated in Table B.7.1 or in the monitoring plan. The project participant is requested to nominate an adequate recording frequency; • Percentage of pure methane (wet basis) in drained gas (by volume)(PC_{CH4}) The recording frequency for PC_{CH4} is not clearly nominated in Table B.7.1 or in the monitoring plan. The project participant is requested to nominate an adequate recording frequency; • Electricity supplied to North China Power Grid by the proposed project in year y (GEN_{PJ} to Grid, y). The readings of electricity meter will be continuously measured and monthly recorded; • NMHC concentration in coal mine methane (PC_{NMHC}) to be monitored once	~~CL 16~~	OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				a year. The PDD states that analysis is to be conducted annually. The project participant is requested to clarify in the PDD whether this refers to both measurement and recording.		
	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	Pending resolution of CL 15 and CL 16.	~~CL 15~~ ~~CL 16~~	OK
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)?			Day to day records handling procedures have not specifically been provided in the PDD. The project participant is requested to provide procedures for what records are to be kept, the storage location and method of those records and how to process performance documentation.	~~CL16~~	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	Refer to CL 15 and B.7.1. Data management procedures and quality assurance procedures including data storage, cross checking and internal auditing have been described in the monitoring plan.	~~CL 15~~	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 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.		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		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				plant. The environmental impacts will be monitored by local environmental authority.		
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
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/ /9/ /11/ /22/ /73/ /74/	DR I CC	The starting date of the project activity has been determined by the project participant to be the signing of the equipment purchase contract. The date provided in the PDD is the 19 April 2011, however the equipment purchase contract verified during the site visit was signed on the 29 April 2011. The project participant is requested to clarify this in the PDD. The construction contract was verified during the site visit to have been signed on the 8 May 2011. The project participant is requested to include this milestone in the PDD. The project participant is requested to include the date of agreement with the Yuecheng coal mine in the PDD. Construction is detailed to have started on the 30 May 2011. This was confirmed through site visit interviews with the project owner Mr Yan Xiangjin and visual inspection of the site including inspection of the early stages of construction on the 25 May 2011.	~~CL 17~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/	DR	The project participant is requested to substantiate the expected operational lifetime of the main equipment in the PDD.	~~CL 17~~	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 2012. The length of the crediting period is considered reasonable in conjunction with the expected lifetime of the main equipment of the project pending resolution of CL 17.	~~CL 17~~	OK
D Environmental Impacts (VVM para 131-133) and VVM para 136 (d) for small-scale project activities, as applicable)						
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/ /4/ /5/	DR	An EIA has been conducted for the project and approved by Environmental Protection Bureau of Jincheng city on 20 July 2010.		OK
D.1.2	Does the project comply with environmental legislation in the host country?	/1/ /3/ /4/ /73/ /75/ /76/	DR I	The EIA concludes that. “The proposed project is in compliance with the national policies of industrial development, energy resource and environmental protection”. The EIA was verified during the site visit and the compliance of the project with environmental legislation was confirmed through interviews with the local DRC representative Mr. Qingsheng Li.		OK
D.1.3	Will the project create any adverse environmental effects?	/1/ /3/ /4/	DR	The management of potential environmental impacts acknowledged in the EIA were validated though inspection of the EIA and interviews with the project participant and the local DRC representative including the ability of the project participant to meet the requirements of “Limits		OK

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

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				and measurement methods for exhaust pollutants from compression ignition and gas fuelled positive ignition engines of vehicles (GB17691-2005).		
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/	DR	With regards to noise, the project participant is requested to clarify how noise control measures like absorption and isolation as well as vibration absorption will be taken during operation period. The project participant is requested to clarify where trees will be planted in the PDD to reduce noise.	~~CL 18~~	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?	/1/		Transboundary environmental impacts of noise and emissions to air have been considered in the PDD. Environmental impacts across the project boundary are likely to be limited as the only export from the site boundary is electricity to the North China Power Grid. Refer to CL 18 and D.1.5.	~~CL 18~~	OK
E Stakeholder Comments (VVM para 128-130)						
E.1.1	Have relevant stakeholders been consulted?	/1/ /16/	DR	Local residents were invited to comment on the project through a questionnaire. Further clarification in the PDD is requested to regarding how the distribution of questionnaires was conducted.	~~CL 19~~	OK
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	The project participant is requested to clarify in the PDD, why other means of communication were not selected for the invitation of comments from stakeholders.	~~CL 19~~	OK

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

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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	Yes. The stakeholder consultation process is in accordance with Chinese EIA regulations.		OK
E.1.4	Is a summary of the stakeholder comments received provided?	/1/ /16/	DR I	Yes. The summary of the stakeholder comments received is described in the PDD. The original stakeholder questionnaires were verified during the site visit. The representation of stakeholder comments in the PDD is reflected by the original questionnaires.		OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/ /16/	DR	All stakeholder responses were positive and in support of the project.		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 LoA from both the host country China and the Annex 1 Party the United Kingdom have not been received. The project participant is requested to provide these.	A.2.4 A.3.1	LoA's have been submitted for host country approval.	The project participant has supplied the LoAs from both the DNA of The People's Republic of China and the United Kingdom of great Britain. The CAR is closed.
CAR 2 In consideration of options for energy production in the baseline, the project participant is requested to consider heat usage in addition to electricity production as per the methodology ACM0008.	B.4.2	The option of thermal energy production has been added to the revised PDD (version 02) in section B.4 page 12.	The PDD has been updated to include the consideration of thermal energy in the options for energy production in line with the Methodology ACM0008 version 7. The CAR is closed.
CAR 3 The project participant is requested to correct $GEN_{PJ\ to\ Grid,\ y}$ to description Electricity generated instead of Electricity exported to NCPG. The project participant is also requested to edit this description in the PDD in section B.7.2 The project participant is requested to demonstrate how electricity sent to the Yuecheng coal mine is monitored. The project participant is requested to clarify how the parameter PC_{NMHC} is to be monitored through the crediting period.	B.7.2	$GEN_{PJ\ to\ Grid,\ y}$ is revised to GENy according to ACM0008 Version 07. In the revised PDD (version 02, B7.1 page 47 and B7.2 page 48) GENy is a parameter to be monitored in Table 7.1. The readings of the electricity meter will be continuously measured and recorded monthly.	The project participant has updated the PDD to reflect the parameter $GEN_{PJ\ to\ Grid,\ y}$ as GEN_y as per the methodology ACM0008 version 7. The CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CAR 4 The project participant has included the cost of WHR plant and expenses in the financial analysis. The project participant is requested to justify the inclusion of WHR activities inside the project boundary. 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.5.12 B.6.20	The proposed project supplies the waste heat from CMM power generation to nearby residents free of charge as an act of goodwill. This has been revised to be outside of the project boundary for the following reasons: • The investment required to construct the WHR facility has not been included in the financial analysis • No income will be generated by the project participant from supplying the waste heat • The emissions reductions from the displacement of the electric or gas heating used otherwise are not included in this projects CDM consideration and no CER's will be generated. Therefore, the supply of waste heat to nearby residences will be excluded from the project boundary. To ensure the financial analysis of the project remains conservative, the following costs have been removed. • Static investment is reduced by 5.7 million RMB (Section 1.3.2 of the FSR) due to the removal of the WHR boilers and equipment • It is conservatively assumed that	The project participant has removed the costs associated with waste heat recovery from the financial analysis and the including: - 5.7 million RMB investment from the Total Static Investment. - 4 852 RMB associated water expense. - 171 000 RMB associated repair costs. 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.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		50% of the water consumed by the project is specifically for the WHR facility. As a result, the cost of water has been reduced by 4,856 RMB • The Repair Fee of the project is calculated as 3% of the static investment. Therefore, due to the revision of the static investment figure, the annual repair cost has also been reduced by 171,000 RMB. The removal of these costs from the IRR calculation resulted in a project IRR of 1.40%. Considering the 8% benchmark of the power generation activity, this change does not effect the additionally of the project and adheres to the principles of conservatism. The PDD has been update to reflect this change in Sections B.3 (Project Boundary) and B.5 (Financial Analysis).	
CAR 5 The project participant is requested to demonstrate how the necessary to data for ex ante projections of methane demand as described in sections Baseline Emissions and Leakage is available for validation.	B.2.4	To demonstrate the prior and projected methane demand drainage records have been supplied by the Shanxi Jin Coal Group Qinxiu Coal industrial Co. Ltd., owner of the Yuecheng Coalmine. These records show the prior usage of CMM drained from Yuecheng Coalmine in the years 2009, 2010 and 2011.	The project participant provided historical records for CMM drainage use as monitored by the state owned corporation Shanxi Jin Coal Group Qinxiu Coal industrial Co. Ltd. The project participant used this data along with local population growth rate and national coal production growth rate statistics to forecast the thermal

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		An explanation of CMM drainage is given under Option iv. of Step 1b in Section B.4 of the PDD.	demand for extracted CMM through the crediting period. The forecast provided demonstrates an excess of CMM throughout the crediting period based on reasonable and conservative assumptions detailed in section 3.3 of this report. The CAR is closed.
CL 1 The project participant is requested to clearly state the differences between the project activity and the pre project scenario. In particular, detail information of the consumers of hot water/heating/cooling/gas in the baseline and project activity, and use of electricity generation from existing CMM fired power plant and source of hot water/heating/cooling to the consumers in the baseline. The project participant is requested to clearly state the differences between the project activity and the pre project scenario. In particular, detail information of the consumers of hot water/heating/cooling/gas in the baseline and project activity, and use of electricity generation from existing CMM fired power plant and source of hot water/heating/cooling/gas to the consumers in the baseline. The projects location is clearly defined within	A.2.4 A.4.1 A.5.1	1. In the project activity PP will install 20 sets of 1000KWgenerators with a total capacity of 20MW. Waste heat recovery from the power plant is considered a backup to the current heat supply. The waste heat will not replace the baseline thermal energy generation. In the baseline scenario for the proposed project, extracted coalmine gas is released directly into the atmosphere. The CMM used in the baseline is outside the project boundary and these users will continue to receive the same volume of CMM. Legally binding CMM supply agreements between the PP and the mine owner quantify the exact amounts to be used in the proposed project. The PDD (Version 02) has been updated under A.2. (p.2) to provide this information and Figure B.3-1 demonstrates this diagrammatically.	The project participant has updated the description of the project activity to include the existing users of heat and gas and the proposed project scenario. As confirmed by the Yuecheng coal mine gas usage reports /18/ the pre project scenario approximately 4.88% of extracted CMM was consumed by the mine itself and 3.64% by local residents. The gas drainage report also details the usage of an additional 19.48% by the Jincheng Group for incidental maintenance usage. The proposed project is set to utilize an additional 45% of the extracted CMM resulting in a proposed total utilization of extracted CMM of 73.8% The project participant has clarified the location of the proposed project to be approximately 800-900 meters from the drainage well. This was confirmed during the site visit.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
Qinshui County, Jincheng City of Shanxi Province, however the projects location in relation to the Yuecheng Coal Mine is unclear in the PDD. The project participant is requested to include the location of gas wells in the PDD. The project participant is requested to provide copies of funding agreements or evidence of funding sources		Please refer to the document: "Yuecheng coalmine Present gas usage and Project gas usage explanation" for further information. 2. The project site is located in the Yuecheng coalmine range. A revised figure depicting the location of the gas wells in relation to the Yuecheng Coal Mine and the location of the project activity has been included in the PDD (Version02 Figure A.4-2) 3. The PP financed the project internally and as the project is still under construction, not all equipment has been purchased. Accordingly, the contract of the equipment purchased and construction contract so far have been provided. Please refer to the document "Equipment purchase contract. *pdf*" and "Construction contract.*pdf*"	The project participant provided equipment purchase contracts indicating the use of internal funding for the proposed project. During the site visit it was confirmed with the project owner Mr. Yan Xiangjin /73//74/ that the project is being constructed from internal funding. No loan associated costs have been considered in the financial analysis of the proposed project /12/. The CL is closed.
CL 2 The project participant is requested to update the usage and reference for the Tool to calculate the emission factor for an electricity system" (Version 02.2.1) as per EB 60 Report Annex 8. The method of gas extraction is to be clarified in the PDD. The project participant is requested to demonstrate through evidence that CBM is not utilised as per	B.1.1 B.2.1 B.2.2 B.2.4 B.3.2	1. The version of the Tool has been updated, in table B.1 of the PDD, with the latest version (version 02.2.1). This tool was updated at EB 61 in annex 12 of the EB report. 2. The method of gas extraction includes utilising underground boreholes and gas drainage galleries that will capture CMM from post mining operation activities. Table B.2-1has been revised in the PDD (Version 02)	The project participant has updated the Project documentation to reflect the use of the most recent versions of the Tool to calculate the emission factor for an electricity system (version 2.2.1) and the Tool for the demonstration and assessment of additionality (version 5.2). The method of gas extraction in the project activity has been updated in the PDD to state that gas drainage galleries that will capture CMM from post mining operation

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
the PDD Under the proposed project methane demand is fixed at the rated maximum capacity of the 20MW generator capacity. The project participant is requested to clarify this part of the methodology applicability in section B.2 of the PDD. The project participant is requested to clarify and update Table B.3-1 in the PDD.		3. Currently there is no CBM extraction adopted at the Yuecheng 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 generation. The Yuecheng 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. 4. Table B.3-1 has been updated in the PDD (Version02). 5. The sentence "Methane demand is fixed at the rated maximum capacity of the 20MW generator capacity." was amended to the paragraph between Table B.2-2 and B 2-3.	activities. The project participant has updated section B.2 of the PDD to address the applicability of the methodology related to the ability of the project participant to calculate ex ante emission reductions. The project participant has updated the table B.3-1 to reflect the methodology. The CL is closed.
CL 3 The project participant is requested to further substantiate and demonstrate how the Emission Standard of CBM/CMM (on trial) (GB 21522-2008) for extracted CMM utilization was issued by Ministry of Environmental Protection in April 2008 and valid from 1 July 2008 is not effective or enforced in China.	B.4.3	1. Please refer to the revised "2. Options for extracted CMM treatment in the PDD(version 02, 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	The project participant has clarified and elaborated in the PDD that despite the existence of the Emission Standard of CBM/CMM (on trial) (GB 21522-2008) for extracted CMM utilization which was issued by Ministry of Environmental Protection in April 2008 and valid from 1 July 2008, the regulation is not enforced

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
The project participant is requested to substantiate the claim through documentary evidence and justification, that the coal mine methane extracted from the mining activity will be >30%. The project participant is requested to clarify the baseline usage of CMM to include the partial use by local residents.		be in accordance with the relevant standards and the related safety technology measures need to be considered." 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 Coalbed 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 05), 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	and not applicable to the baseline of the project. The project participant has provided verified documentary evidence of drained CMM analysis which indicates the concentration of the CMM from the Yuecheng coal mine was approximately 34.4% at the time of testing. 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 project participant has provided the document titled "CMM component analysis report" issued by Jincheng City Gas Testing center on 23 Dec 2009 /21/. The provides a methane concentration result of 34.4394% in line with the estimate used in the PDD.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		from further consideration. Extensive research on the current practice with regard to the Emission Standard proved that neither widespread implementation nor any 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 “CMM component analysis report” issued by Jincheng City Gas Testing center on 23 Dec 2009. Report number is J091223.12, the report was made according to the GB/T13610-2003 standard. On the 2nd page of the report, the content of CH4 is 34.4394%. The “Yuecheng gas drainage and usage record in 2010” has been added as a footnote in A.2. and B.4. 3. Every year the average amount of extracted CMM from Yuecheng Coal Mine is about 83.88 million m3 (pure CH4). The present usage accounts for approximately 40% of the extracted CH4, this usage includes providing gas	As per the resolution of CL 1, the Yuecheng coal mine gas usage report /18/ details the pre project scenario approximately 9.15% of extracted CMM was consumed by the mine itself and by local residents. The gas usage reports /18/ the pre project scenario approximately 4.88% of extracted CMM was consumed by the mine itself and 3.64% by local residents. The gas drainage report also details the usage of an additional 19.48% by the Jincheng Group for incidental maintenance usage. The proposed project is set to utilize an additional 45% of the extracted CMM resulting in a proposed total utilization of extracted CMM of 73.8% The project participant has updated the PDD in section A.2 and B4 accordingly. Further analysis of historical CMM usage has been provided by the project participant with analysis provided in section B.2 of version 4 of the PDD The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		to nearby residents, as fuel for gas boilers used to generate back up heat in the Yuecheng Coal Mine and providing gas to associated mines within the Jincheng Coal Group. The majority of extracted coalmine gas is vented directly into the atmosphere. The amount of gas extracted from the Yuecheng Coal Mine is sufficient to supply both the project and present use. Waste heat from the power generation process is to be recovered and utilized for domestic purposes and Yuecheng Coal Mine. The waste heat is a backup source to the existing heat supply within the Yuecheng Coal Mine and does not displace thermal energy onsite. CERs will not be claimed for waste heat recovery. Please also refer to the detail information of the gas usage in the document: "Yuecheng coalmine Present gas usage and Project gas usage explanation". The present usage information table was amended to "Step 1b: Options for extracted CMM treatment" under B.4. (p.13) in the PDD version 2	
CL 4 Clarification is requested to demonstrate that VAM technology is still experimental and utilising VAM is cost prohibitive.	B.4.8	Revised in Step 1b under B.4 in the PDD (Version 02) Although projects utilizing VAM have been registered under CDM, the technology is still considered as immature. Current	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.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		projects registered under CDM have been undertaken as pilot or demonstration projects. So far no experience in continuous operation at Chinese coal mines could be collected. Existing projects in China – solely conducted under the CDM – are still at demonstration stage. In addition considerable investment would not be covered by any income from operation except from CDM revenue. At present, the investors of the proposed project will face the risk of unstable operation or insufficient financial return."	The CL is closed.
CL 5 The project activity may also generate revenue from the saving resulting from the use of waste heat. The project participant is requested to clarify the extent of waste heat and gas use related to the project site and activities.	B.5.11	The waste heat in the proposed project comes from the generators when they are in operation. According to the statement on page 3 of FSR ("9. Social benefit") the estimated waste heat could provide heat for 1,100 homes in the winter. This is an estimate; the waste heat supply is used as a backup resource to the existing heat supply but not a replacement based on the 3 reasons: • Power generation is the key business in the proposed project; WHR is not within the business scope of PP who will not manage the WHR as a daily business. • The generators in the proposed project are not in constant operation, as they require maintenance, the FSR (page 11-12 on FSR) estimates operational uptime at 300 days a year. When the generators are	The project participant has update the PDD to include the provision of waste heat to local residents, accounting for a potential 1,100 households according to the FSR /6/. The project participant has stated the provision of waste heat to these customers will be at no cost and result in no revenue for the project. This has since been removed and all consideration of WHR costs in the financial analysis have been removed The project participant has highlighted to proposed annual operation of the project activity to be approximately 300 days per year. As a result the primary heat source for the project will be unavailable for the remaining 65 days per year. The consideration of waste heat recovery as a part of the financial analysis has been removed. WHR activities are considered to

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		not in operation, there is no waste heat generated, therefore the WHR in the proposed project cannot replace the existing heating system as it does not provide guaranteed heat as required by the coal mine operations. • CMM venting facilities also need maintenance or repair sometimes, which will cause generators to cease operation. When the generators not working, there is no waste heat, therefore the WHR in the proposed project cannot be a replacement to the existing system. The above 3 reasons explain why the WHR from the project is not used as a primary source of heating but is used as a support mechanism to the existing heating system at the Yuecheng Coal Mine. Additionally, waste heat from the project is provided to the mine and local residents when the existing heating system does not work properly or requires maintenance. On the occasions that this occurs, the PP will provide the waste heat for free and will not claim any CERs. Therefore, there is NO revenue from waste heat for the PP.	be outside the project boundary. The CL is closed.
CL 6 The benchmark rate of 8% for the electricity generation is in reference to the Economic Evaluation Method and Parameters for Construction Projects/Version 03", China Plan	B.5.14 B.5.16	1. The coalmine does not belong to the PP and the PP does not sell gas but only engages in electricity generation. The benchmark of coal mining is 13% (before tax); for gas drainage on the land	The project participant has clarified the selection of the benchmark and demonstrated why the benchmark for electricity generation (8%) is the appropriate benchmark for the project

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
Press, 2006. /38/ 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 with some additional heat generation. The project participant is requested to break down the Raw Material cost in the PDD to the relevant units. The project participant is requested to clarify the usage of waste gas in the baseline including any price associated. The project participant is requested to justify the price of CMM in the project scenario of 0.11 RMB/m3 while there is no assigned cost in the baseline. The project participant is requested to include the revenue from waste heat recovery in the project scenario		the rate is 12% (before tax) and for electricity generation the benchmark rate is the lowest at 8% (before tax). The majority of electricity supplied to the NCPG (North China Power Grid) is generated from fossil fuel. According to the report "*Economic Evaluation Method and Parameters for Construction Projects/Version 03, China Plan Press, 2006"* the benchmark rate for fossil fuel electricity generation industry is 8% (before tax). The benchmark rate for this project is chosen as the benchmark of the fossil fuel electricity generation industry. 2. The raw material cost is only the gas cost. For electricity generation from methane the only raw material is the gas (CMM). 3. Waste gas in currently used internally in the baseline is scenario by Yuecheng coal or associated mines within the Jincheng Coal Group. Therefore, there is not any price associated with its baseline usage. Please refer to the detailed usage information to the document: "Yuecheng coalmine Present gas usage and Project gas usage". A summary of this document is given in the PDD (Version 2) in "Step 1b: Options for extracted CMM treatment" under B.4 (p.12-13).	activity. The selected benchmark is also the lowest of all the potential benchmarks available which are in some way related to the project such as coal mining (13%) and gas drainage (12%). The project participant has clarified the raw material cost to include only the cost of the coal mine methane purchased. The project participant has recognized the calorific and potential financial value of the CMM in the baseline scenario and provided the Yuecheng coal mine gas usage report /18/ which is further clarified in Step 1b of the baseline determination. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		The price of 0.11 RMB/m^3 in the project scenario is the result of discussions between the 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 corresponding to it's calorific value. 4. Heat supply is not within the business scope of the PP, and the heat will be supplied for free. So the waste heat does not generate revenue for PP.	
CL 7 Depreciation in the IRR calculation spreadsheet is approximately 9.5% of total static investment. The project participant is requested to demonstrate in the PDD that this is normal accounting practice in China. In the project IRR calculation spreadsheet, the load factor for the first operation year was considered as 80% of normal years in operation which needs to be justified. However, the 80% load factor of the first year in operation does not appear to have been considered in ER calculation sheet. The inconsistency needs to be substantiated and/or justified.	B.5.17 B.5.18	1. The depreciation rate applied in the project is 5%, which is in accordance with the normal accounting practice in China. While the latest "China Enterprise Income Tax Regulation" (effective from 6/14/2007) does not specify a residual rate, the previous version of the "China Enterprise Income Tax Regulation" (effective 1994-2007) indicated under Point 2, Section III, Item 31, if the residue rate is not more than 5%, the company can make the decision by themselves. Following this guidance, the majority of Chinese enterprise and CDM projects still use 5% as the residual rate. Please review the IRR calculation spreadsheet. According to the item (1) depreciation	The project participant has clarified the residual rate of 5%. This is in line with the reference to the FSR /6/. The project participant has clarified the load factor for the first year of operation at 80% as being due to the trial and construction phases of the project and has updated the ER spreadsheet and IRR spreadsheet to reflect this. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		under Item 4: manufacture cost under 7.7.1 on page 51 of FSR: residual rate is 5% of static total investment and period is 10 years: Depreciation = Total static investment *(1-5%)/10 = 129.5039 million Yuan * (1-5%)/10 = 12.3029 million Yuan (same figure on IRR spreadsheet) 2. An 80% load factor is applied to the first year, as the project is in the construction phase during this time. This is described in the FSR. See section 7.2.2 (p.49) of the FSR for further details (this is translated below): "7.2.2 calculation period" The construction period of the project is 16 months. During the trial operation period, the load factor is 80% of the designed capacity, and depreciation life of main equipment is 10 years. In the first year of the project activity (2012), equipment is run at 80% the efficiency of normal operation during the commissioning period. Therefore, more un-combusted methane will be released into the atmosphere than under normal operating conditions so the emission reduction of the first year is estimated to be 83% of a	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		normal year. 3. "2. Project emissions（PEy）" under B.6.3 has been revised in the PDD (version 02) and revised in the ER calculation sheet to amend the inconsistency.	
CL 8 The emissions reductions quoted in the FSR state an annual amount of 540,000 tonnes, whereas the PDD states an annual emissions reduction of 554 285 tonnes. The project participant is requested to clarify this difference.	B.5.19	The writer of FSR did not calculate the ER based on the CDM methodology and relevant tools. The ER on PDD was calculated based on the CDM methodology and relevant tools. Therefore there is a difference between the two figures. The figure provided in the FSR is best defined as an estimate, whereas the ER calculation found in the PDD is in accordance with the methodology. The ER calculation and PDD calculation have been revised to ensure consistency between documents.	The project participant has clarified the difference between emissions reductions estimates in the FSR and the PDD/ER calculation spreadsheet. The CL is closed.
CL 9 The project participant is requested to substantiate and provide translation of the calculation of the plant load factor used in the FSR for validation. The project participant is requested to substantiate the suitability of the output price of electricity (tariff) used in the project, providing translated copies of relevant documents as required.	B.5.20 B.5.21 B.5.22 B.5.23 B.5.24	1. Plant load factor is 65.75%(=112,200MWh/175,200MWh) PLF amended to Table A.4-1 (p.7) in PDD version 2 2. Because the project is currently under construction, electricity is not yet being exported to the NCGP. As such, the feed in tariff has not yet been negotiated with the	The project participant has demonstrated and included the calculation of plant load factor. This has been updated in Table A. 4-1 of the PDD. 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

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
The project participant is requested to provide a clear summary of how the investment costs are accounted for in the IRR spreadsheet and the PDD as a part of the total investment so that these may be validated against the FSR and the investment contracts. The project participant is requested to clarify any preferential policies on capture and utilization of high concentration CMM such as reducing or waiving taxes and charges, preferential price polices, pre-tax appropriation of safety cost, refund VAT, etc. If such policies or incentives exist, the project participant shall provide detail information how these preferential policies have been considered in the investment analysis. The project participant is requested to provide a breakdown of O&M costs in the PDD and demonstrate how the costs are justified including how any figures referenced from the FSR were substantiated. The project participant is requested to justify the validity and suitability of the input parameters for the financial analysis in the PDD.		grid company. However, the Shanxi Price Bureau document (that is provided for validation) demonstrates that the electricity tariff from CMM power generation is 0.38RMB/kWh (including tax). The following web site is the source of the document. http://www.sxprice.gov.cn/sy/tzgg/20091209/084629.html In the Item 2: Regulating the feed-in tariff of electricity generated by new energy: he feed-in tariff of electricity generated by coal mine methane in the Shanxi province is 0.38RMB/kWh." 3. This has been revised. A clear summary of how the investment costs are accounted for in the IRR spread sheet, and the PDD, as part of the total investment has been provided in a new excel spread sheet called "basic information" that has been added to the revised IRR spreadsheet. 4. There are no such preferential policies on capture and utilization of the high concentration CMM. 6. The O&M costs have been broken down in the PDD version 2 in the Table B.5-2. The following references are provided to	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 project participant has clarified the project investment costs in IRR calculation spreadsheet dated 27 June 2011. The project participant has clarified the allocation of O&M costs in Table B.5-2 of the PDD and referenced the sources of cost associated. These have been further updated in table B.5-2 of version 4 of the PDD The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		assist in validating the break down of the O&M costs (the PDD (version 02) has also been amended to reflect these references): A. Raw material (the cost for gas): 12.07 million RMB Yuan (based on the figure in item 1 under 7.7.1 on page 50-51 in the FSR): "Unit price of gas is 0.11 Yuan/M^3 with annual consumption of 109.71 million m^3, annual gas cost is: 12.07 million Yuan." B. Fuel expense: 0.4549 million Yuan C. Based on the figure in item 2: fuel expense under 7.7.1 on page 51 in the FSR) D. Salary & Welfare cost: 0.4925 million Yuan (based on the figure in item (3): Salary and welfare under 7.7.1 on page 51 in the FSR) E. Repair fee: 3% of total investment (based on item (2) repair fee under item (4): manufacture fee under 7.7.1 on page 51 in the FSR: the repair fee is estimated as 3% of total investment each year: 3%* 129.5 million Yuan (total static investment) = 3.8851 million Yuan). F. Other operation fee: 0.8 million Yuan (based on the figure under item (3) other operation fee under item (4) manufacture cost under	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		7.7.1 on page 51 in the FSR). G. Other management fee: 0.65 million Yuan (based on the figure under item (2): other management fee under 7.7.2: management fee: "other management fee including CDM consulting fee and training fee is estimated as 0.65 million Yuan per year.") 7. The input parameters for the financial analysis in the PDD (version 02) were extracted from the FSR as indicated above.	
CL 10 The project participant is requested to clarify the total of the O&M costs. The total of the individual O&M costs listed in the PDD equates to 18.8983 million Yuan, however the total listed in the PDD and used in the IRR spreadsheet is 18.53 million Yuan. The project participant is requested to include live calculations with equations for the sensitivity analysis in the IRR spreadsheet.	B.5.25	1. Table B.5-2 in the PDD (version 02) was revised and now corresponds to the figure (18.35 million Yuan) in the IRR spreadsheet. 2. Equations for the sensitivity analysis calculation have been included in the IRR spreadsheet.	The project participant has updated the PDD and IRR spreadsheet to be consistent and updated the IRR spreadsheet to include in cell calculations. The CL is closed.
CL 11 The sensitivity analysis has been conducted to + and – 10% in table B.5-4 and has been further extended in the following discussion in the PDD. The project participant is requested to extend the sensitivity analysis to demonstrate the extended analysis in the justification following table B.5-4.	B.5.27	The ±10% range for the sensitivity analysis is valid and suitable according to guidelines on the assessment of investment analysis (EB51, Annex 58) The critical point analysis has been included in the PDD (underneath Table	The project participant has further clarified the sensitivity analysis and elaborated on the changes required in the factors subject to the analysis to cross the benchmark. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		B.5-4, version 02))	
CL 12 The geographical scope for the common practice analysis has been selected as Shanxi Province. The project feeds electricity into the North China Power Grid. The project participant is requested to justify why the geographical area covered by the North China Power Grid is not selected. The scope and capacity of the technology for the common practice analysis is not clearly explained in the PDD. The project participant is requested to clarify whether the scope and capacity of the common practice analysis is to include all CMM projects. The project participant is requested to clarify if all relevant CMM projects have been omitted from the common practice analysis.	B.5.42 B.5.43	1. NCPG encompasses 6 provinces, cities and autonomous regions; Shandong, Beijing, Tianjin, Hebei, Shanxi and Inner Mongolia. This area is a large geographical region with a population of 230 million residents. A number of key economic factors vary from province to province including: tariff rates on products, the costs of materials, the cost of electricity and other utilities such as water, the cost of labor and services and the types of loans that can be obtained. Further, Shanxi is the province with the largest coalmine reserves in China, containing 30% of the total reserves in the country (Information from "China Coal Resource": http://www.chinacoal.org.cn/mtzy/254/390.aspx). For these reasons Shanxi province was selected as the suitable spatial area to conduct the common practice analysis. 2. The table under sub-step 4a in PDD (version 02) has been revised to include additional CDM projects. A more thorough analysis of the technology, scope and capacity of these projects has been provided in the PDD in sub-step 4a. The common	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, labor and services between provinces of China. The project participant has clarified the technological scope of the common practice analysis to include the capture and use of CMM for the generation of electricity. The project participant has defined the output scope for the common practice analysis to be + or – 50% of the proposed projects output, resulting in a scope range of 10 MW to 30MW. The project participant has updated the common practice analysis to include all relevant CMM projects based on the selected sources. DNV has reviewed the common practice analysis sources: 1. Shanxi NDRC, Shanxi Provincial government website. Register of approved electricity generating projects with approval to export electricity to the power grid. http://www.sxdrc.gov.cn/xxlm/lxsp/

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		practice analysis identified all CMM projects in the Shanxi Province 3. Common practice analysis was made based on all CMM projects in Shanxi province as listed in "Sub-step 4a. Analyze other activities similar to the proposed project activity" under B.5. Only 21 CMM projects were identified in the Shanxi province. Given the limited number of projects it was determined that the common practice analysis should include all CMM projects and not limit the common practice analysis by scope or capacity.	2. Clean Development Mechanism in China government website listing all projects with approved LoA. http://cdm.ccchina.gov.cn 3. UNFCCC website (Registered CMM power generation project) 4. Methane Markets database. CMM projects listed for Shanxi Province China. http://www2.ergweb.com/cmm/index.aspx No further projects were identified. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 13 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. The Net calorific value of fuel *i* has been included in Annex 3 of the PDD. The reference provided in the PDD is incomplete and does not contain a year. The project participant is requested to clarify this.	B.6.3 B.6.8	1. As requested, "Combusted non methane hydrocarbons" has been moved to the table B7.1 on the PDD (version 02) 2. The Net calorific value of fuel *i* has been included in the PDD in Table B.7-1. And the value of each fuel is from *China Energy Statistical Yearbook 2009* p.507-508. This is the latest version of this publication as the 2010 version will not be published until the end of 2011.	The project participant has moved the carbon emission factor for combusted non methane hydrocarbons from section B.6.2 data and parameters available at validation to section B.7.1 data and parameters monitored. The reference for the net calorific value of fuel *i* has been updated in table B.6.2 of the PDD. The CL is closed.
CL 14 The project participant is requested to clarify: - Where the equation labeled as (3) in the PDD is sourced from. - The parameter $MM_{ELE,yC}$ in the PDD which appears to represent C$MM_{ELE,yC}$ in the related equation. The figure used for CEF_{NMHC} in the ER calculation sheet is 2.75, however the figure quoted in the PDD for the carbon emissions factor for combusted non methane hydrocarbons is 0.	B.6.11 B.6.20	1.1 The equation was revised under B.6. in the PDD (version 02) and labeled as (6) on p.26 1.2 $MM_{ELE,yC}$ has been removed from equation (7) in the revised PDD (version 02) under B.6 (p.26). 2. This was an input error. The value of CEF_{NMHC} should be 0. The value of non-methane hydrocarbons combusted in the project is 0. The ER calculation sheet has	The project participant has revised the equations in the PDD as per the methodology ACM0008 version 7. The project participant has updated the ER spreadsheet to reflect the CEF_{NMHC} value of 0. The methane measured sent to generators has been updated in the PDD to reflect the ER calculation spreadsheet.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
The project participant is requested to clarify this. The project participant is requested to clarify how the figure used for MM_{ELEC} in the PDD, 9004.8tCH_4 relates to the volume given for MM_{ELEC} in the ER calculation spreadsheet of 38.3985Mm3. The figure used in the PDD for the PC_{CH4} percentage of pure methane in drained gas is 35%, however the ER calculation spreadsheet uses the figure 0.55 or 55%. The project participant is requested to clarify this.		been revised to show this. 3. The total volume of methane is 109,710,000 m^3 and the Methane density is 35% (by volume) so the pure methane content calculation is: [109,710,000*35% =38.3985 million m^3] 4. This was an input error. The value of the PC_{CH4} percentage of pure methane in drained gas is 35%. ER calculation sheet has also been revised.	The project participant has updated the ER spreadsheet to reflect the value for PC_{CH4} as 0.35. The CL is closed.
CL 15 The monitoring plan Section 2 in the PDD makes reference to use of an auditor who is not involved in the daily operation of the landfill. The project participant is requested to clarify this. The diagram used to depict the location and identification of the monitoring system includes a circular unit labeled “S”. This unit is not identified in the key noted under the diagram. The project participant is requested to clarify this. The measurement equipment has been generally described in the monitoring plan; however the specific unit details have not been described. The project participant is requested to elaborate on the actual units to be installed.	B.7.1 B.7.3	1. This was an input error the word should have been “power plant”. This has been revised in “2. Management structure for the implementation of monitoring plan” under B.7.2. in the PDD (version 02). 2. The note was hidden by the textbox, please see the revised figure B.7-2 in the PDD. (Version 02) on p.49. The note is S: (represents) Periodical sampling of NHMC concentration 3. All the means of monitoring described in the monitoring plan comply with the methodology. 4. Because the project is still under construction the relevant monitoring equipment has not yet been purchased,	The project participant has clarified the use of an auditor in section 2; Management structure for implementation of the monitoring plan. The project participant has adjusted the table B.7-2 in the PDD to include the note entry for periodical sampling of NMHC concentration. The project participant has clarified the standards to which measured parameters of temperature and pressure will be tested as the project is still under construction and the measurement equipment has not yet been acquired. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		however, all monitoring equipment that will be used at the project site will comply with all current industry standards and requirements. The current industry standards (as at 30/01/2012) are the following: The accuracy of the Pressure Transmitter would be ±0.075% (Industry standard: JB/T 10726-2007) The accuracy of Temperature Transmitter would be 0.2 (Industry standard: JB/T 10202-2000) Concentration (in mass) of methane (wet basis) in drained gas according to GB/T 13610-2003 PC_{NMHC} will be monitored by an external qualified laboratory (to meet the current industry standard (as at 30/01/2012 is JB/T 10202-2000)) The compliance of installed equipment with national standards will be assessed during the verification process prior to the issuance of CERs.	
CL 16 Measurement accuracy has not been described for any parameter. The project participant is requested to provide the	B.7.4 B.7.5 B.7.6 B.7.7	1.The below was amended to B.7.2 (p.49) on PDD: "**4. Measurement of Accuracy** The proposed project is still under	The project participant has updated the Monitoring plan to require that all monitoring meters must meet the relevant industry standards for measurement

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
measurement accuracy for each of the measured parameters. In addition the project participant is also requested to provide a measurement accuracy for the temperature and pressure measurements taken. The project participant is requested to provide maintenance and calibration requirements for each piece of measurement equipment. The methodology stated that the PC_{CH4} is to be monitored hourly or daily. The project participant is requested to nominate a frequency. Volume of methane sent to power generators (MM_{ELEC}). The recording frequency for MM_{ELEC} is not clearly nominated in Table B.7.1 or in the monitoring plan. The project participant is requested to nominate an adequate recording frequency; Percentage of pure methane (wet basis) in drained gas (by volume)(PC_{CH4}) The recording frequency for PC_{CH4} is not clearly nominated in Table B.7.1 or in the monitoring plan. The project participant is requested to nominate an adequate recording frequency; NMHC concentration in coal mine methane (PC_{NMHC}) to be monitored once a year. The PDD states that analysis is to be conducted annually.	B.7.8	construction; therefore the measurement equipment for the project has not yet been acquired. However, all the monitoring meters to be purchased by the project participant MUST meet the relevant industry standards for measurement of accuracy. The parameters to be monitored include: $MM_{ELEC:}$ Continuous monitoring and monthly recording $PC_{CH4:}$ Daily monitoring and monthly recording $PC_{NMHC:}$ Annually monitoring and recording $GEN_{,y}$: Continuously measured and monthly recorded. $CON_{ELEC,y}$: Continuously measured and monthly recorded $GEN_{PJ\ to\ Yuecheng,y}$: Electricity consumed by Yuecheng Coal Mine Continuous monitoring and monthly recording. $CEF_{NMHC:}$ To be obtained through annual analysis of the fractional composition of captured gas The monitoring and recording frequencies of all measured parameters have been in B.7.1 of the PDD (version 02) PC_{NMHC} (annual measurement and data recorded annually) have been included in Table B7.1 in the PDD (version 02).	accuracy. The project participant has clarified the standards to which measured parameters of temperature and pressure will be tested as the project is still under construction and the measurement equipment has not yet been acquired. The project participant has updated the monitoring plan to include that: "Maintenance and calibration on all monitoring meters will be in compliance with relevant national/sectoral standards." The project participant has updated the description for the parameter PC_{CH4} to nominate daily monitoring and monthly recording. The project participant has updated the description for the parameter MM_{ELEC} to nominate continuous monitoring and monthly recording. The project participant has updated the description for the parameter PC_{NMHC} to nominate annual monitoring and annual recording. The project participant has elaborated the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
The project participant is requested to clarify in the PDD whether this refers to both measurement and recording. Day to day records handling procedures have not specifically been provided in the PDD. The project participant is requested to provide procedures for what records are to be kept, the storage location and method of those records and how to process performance documentation.		All the procedures have been included in the PDD (version 02) under B.7.2 Description of the monitoring plan: For details on records handling, please refer to point 5 under B7.2 Archiving of data: Electronic documents will be saved on disk for backup and written documents will be safely kept in storage. All information related to monitoring such as meeting minutes, data documents, maintenance records, failure reports, paper documents as well as computer records, should be kept in an orderly way at a designated location. This data will be stored until 2 years after the end of the crediting period or the last issuance of CER's, whichever occurs later. Reporting Procedures: • Internal reporting - The CDM monitoring team is responsible for reporting defects and corrective action to the CDM Manager. The CDM Manager will then provide senior management with monthly progress, annual audit and monitoring reports. • External reporting - The CDM Director will circulate an annual audit, monitoring	description of day to day records management and handling to include all information related to monitoring such as meeting minutes, data documents, maintenance records, failure reports, paper documents as well as computer records, should be kept in an orderly way at a designated location. This data will be stored until 2 years after the end of the crediting period or the last issuance of CER's, whichever occurs later. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		performance through quarterly progress reports to the developer and buyers as required. The CDM Director will finish the monitoring report two weeks before periodic verification. The report will be in English and signed by the top management before being submitted to the DOE."	
CL 17 The starting date of the project activity has been determined by the project participant to be the signing of the equipment purchase contract. The date provided in the PDD is the 19 April 2011, however the equipment purchase contract verified during the site visit was signed on the 29 April 2011. The project participant is requested to clarify this in the PDD. The construction contract was verified during the site visit to have been signed on the 8 May 2011. The project participant is requested to include this milestone in the PDD. The project participant is requested to include the date of agreement with the Yuecheng coal mine in the PDD. The project participant is requested to substantiate the expected operational lifetime of the main equipment in the PDD.	C.1.2 C.1.3 C.1.4	1. This was an input error. The starting date of the project is 29 April 2011. Table B.5-1 in the PDD (version 02) has been revised accordingly. 2. The milestone 'construction contract signed' has been included in the Table B.5-1 on PDD (version 02) 3. The date the gas purchaser's agreement was signed with Yuecheng coal mine has been included in Table B.5-1 in the PDD (version 02). The date was 17/14/2009. 4. The expected operational lifetime of the main equipment is greater than 10 years. The operational lifetime has been included in Table A.4-1 in PDD (version 02).	The project participant has updated the date for the signing of the equipment purchase contract to reflect the equipment purchase contract verified during the site visit. The project participant has included the signing of the construction contract in table B.5-1 of the PDD. The project participant has included the signing of the gas purchase agreement in table B.5-1 of the PDD. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 18 With regards to noise, the project participant is requested to clarify how noise control measures like absorption and isolation as well as vibration absorption will be taken during operation period. The project participant is requested to clarify where trees will be planted in the PDD to reduce noise.	D.1.4	1. The generators used in the project are individually enclosed units; each generator resides in a cargotainer. The inside of the cargotainer wall is covered with acoustic material, this material is for the purpose of sound 'absorption and isolation'. 2. Trees will be planted around the power plant.	The project participant has clarified the actions taken to reduce the impacts of noise from the project activity on the local area. The CL is closed.
CL 19 Local residents were invited to comment on the project through a questionnaire. Further clarification in the PDD is requested to regarding how the distribution of questionnaires was conducted. The project participant is requested to clarify in the PDD, why other means of communication were not selected for the invitation of comments from stakeholders.	E.1.1 E.1.2	1. The PP sent the questionnaires to the nearest villages Zhaozhuang Village and Xiaozhuang Village. The village council provided notice to the village residents by broadcasting over the Council radio broadcasting station to ask some villagers join the survey of the proposed project voluntarily. 2. The project site is located in a remote rural area and geographical barriers largely prevent the project from having a direct impact on a broad stakeholder group. Furthermore the geographical isolation influenced the ability to communicate the project to a broader group of indirect stakeholders. As modern means of communication (telephones, email) are not available in the surveyed area, the best way to access stakeholder opinions is for: "The PO to send the questionnaires to the nearest villages Zhaozhuang Village and Xiaozhuang Village, and have the village communities notify villagers to join the	The project participant has clarified the distribution of questionnaires and the notification of local residents. The CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		survey of the proposed project voluntarily." A representative group of direct stakeholders from nearby villages were contacted through the use of the questionnaire to scope stakeholder comments on the project and the government was conferred with throughout the CDM development. The stakeholder consultation and liaisons with the government during the CDM process, (in particular the NDRC) with regards to the suitability of the project is considered to be a fair and reasonable stakeholder consultation process by the project participant. See revisions made to E.2 in the PDD (version 02)	

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
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

Mr 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.

Xiaojun Johnsen Zhang: holds a Master Degree in Metallurgical Physical Chemistry and obtained his MBA in project management. 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, 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".

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, Mark holds a Bachelor Degree in Science. Having an overall experience of over 6 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.

He has experience in the validation of CDM projects in Asia. His qualification, industrial experience and experience in CDM sufficiently demonstrate his sectoral competence in the area of energy generation from renewable sources.

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.

Sector Expert

Mr. Zhu Chao, holds a Master Degree in Environment Engineering, and a Bachelor Degree in Mineral Processing Engineering. Having an overall experience of around 20 years in coal and coalbed methane industry covering energy policy, energy market, energy technology and information consulting.

He has experience of around 5 years in validation and verification of CDM projects and other 3rd party validation/verification services.

His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in “CMM Recovery and Use”.

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.