



VALIDATION REPORT

“Zhangjiagang Nature Gas Power Generation Project” in China

REPORT NO. 2008-0488

REVISION NO. 01

DET NORSKE VERITAS AS



VALIDATION REPORT

DET NORSKE VERITAS
CERTIFICATION AS

Climate Change Services

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Project Name: Zhangjiagang Nature Gas Power Generation Project
Country: China
Methodology: AM0029
Version: 03
GHG reducing Measure/Technology: Grid connected electricity generation through the use of natural gas
ER estimate: 1 231 243 t CO₂/year
Size
☒ Large Scale
☐ Small Scale
Validation Phases:
☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues
Validation Status
☐ Corrective Actions Requested
☐ Clarifications Requested
☒ Full Approval and submission for registration
☐ Rejected
 In summary, it is DNV's opinion that the "Zhangjiagang Nature Gas Power Generation Project", as described in the PDD of version 05 dated 12 February 2009, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AM0029, version 03. DNV thus requests the registration of the project as a CDM project activity.

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Key words:
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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CCR	Calcium Carbide Residue
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
JPG	Jiangsu Power Grid
ECPG	East China Power Grid
CL	Clarification request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EF	Emission Factor
EIA	Environmental Impact Assessment
EPB	Environmental Protection Bureau
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of Approval
MP	Monitoring Plan
NCV	Net Calorific Value
NDRC	National Development and Reform Commission
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
UNFCCC	United Nations Framework Convention on Climate Change
SCE	Standard coal equivalent



VALIDATION REPORT

TABLE OF CONTENTS

1	EXECUTIVE SUMMARY – VALIDATION OPINION	1
2	INTRODUCTION	2
2.1	Objective	2
2.2	Scope	2
3	METHODOLOGY	3
3.1	Desk Review of the Project Design Documentation	3
3.2	Follow-up Interviews with Project Stakeholders	7
3.3	Resolution of Outstanding Issues	8
3.4	Internal Quality Control	10
3.5	Validation Team	10
4	VALIDATION FINDINGS	11
4.1	Participation Requirements	11
4.2	Project Design	11
4.3	Baseline Determination	12
4.4	Additionality	14
4.5	Monitoring	19
4.6	Estimate of GHG Emissions	20
4.7	Environmental Impacts	22
4.8	Comments by Local Stakeholders	22
4.9	Comments by Parties, Stakeholders and NGOs	22

Appendix A: Validation Protocol

Appendix B: Certificates of Competence



VALIDATION REPORT

1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the “Zhangjiagang Nature Gas 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 United Kingdom of Great Britain and Northern Ireland. Both Parties fulfil the participation criteria and have approved the project and authorized the project participants. The DNA of China has confirmed that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology AM0029 “Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas”, version 03.

By generating electricity using natural gas, the project activity displaces fossil fuel intensive grid electricity, thereby resulting in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It has been 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 1 231 243 t CO₂e per year over the selected 7-year 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 will give opportunity for real measurements of achieved emission reductions. The monitoring methodology AM0029 has been correctly applied. Adequate training and monitoring procedures have been implemented.

In summary, it is DNV’s opinion that the “Zhangjiagang Nature Gas Power Generation Project” in China, as described in the PDD of version 05 dated 12 February 2009, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the simplified baseline and monitoring methodology AM0029, version 03. DNV thus requests the registration of the project as a CDM project activity.



VALIDATION REPORT

2 INTRODUCTION

Arreon Carbon UK Ltd. has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the “Zhangjiagang Nature Gas Power Generation Project” in China. This report summarises the initial 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 AM0029, version 3. The validation team has employed a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of CERs.

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



VALIDATION REPORT

3 METHODOLOGY

The validation consisted of the following three phases:

- I a desk review of the project design documents
- II follow-up interviews with project stakeholders
- III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk Review of the Project Design Documentation

The following table outlines the documentation reviewed during the validation:

- /1/ Beijing Orient Fortune Investment Co., Ltd., Project Design Document for “Zhangjiagang Nature Gas Power Generation Project”, version 01 dated 14 November 2007 and version 05 dated 12 February 2009
- /2/ Letter of approval, DNA of the People Republic of China in January 2008
- /3/ Letters of approval, DNA of United Kingdom of Great Britain and Northern Ireland on 18 January 2008 for Arreon Carbon UK Ltd. and on 9 April 2008 for Credit Suisse International
- /4/ CDM Executive Board: Validation and Verification Manual. [Version](#) 01
- /5/ CDM Executive Board: Approved baseline methodology & Approved monitoring methodology AM0029 Version 03, “Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas” and “Monitoring methodology for grid connected generation plants using non-renewable and less GHG intensive fuel”
- /6/ CDM Executive Board: Tool for the demonstration and assessment of additionality, version 05.
- /7/ Feasibility study report for Zhangjiagang Nature Gas Power Generation Project by Jiangsu Power Design Institute, in October 2001
- /8/ Approval of FSR for Zhangjiagang Nature Gas Power Generation Project by National Development and Reform Commission, 20 October 2003
- /9/ Feasibility study report for Gas Pipeline Work from Suzhou to Zhangjiang for Zhangjiagang Nature Gas Power Generation Project by Changqing Survey and Design Institute, November 2004
- /10/ Approval of FSR for Gas Pipeline Work from Suzhou to Zhangjiang for Zhangjiagang Nature Gas Power Generation Project by Jiangsu Development and Reform Commission, 05 November 2004
- /11/ EIA report by Guodian Environmental Protection Design Institute, May 2002
- /12/ Approval letter on the EIA report by National Environmental Protection Bureau, 24 August 2002
- /13/ State Power Corporation of China. Interim Rules on Economic Assessment of



VALIDATION REPORT

- Electrical Engineering Retrofit Projects. Beijing: China Electric Power Press, 2003
- /14/ 60 copies of questionnaires for the stakeholder comments by project owner.
 - /15/ Training record for Zhangjiagang Nature Gas Power Generation Project
 - /16/ Notice on the basic price adjustment for the natural gas in “western gas to the east” project by National Development and Reform Commission, 18 March 2005
 - /17/ IRR calculation spreadsheet
 - /18/ Construction permission issued on 05 Jan. 2005 by Jiangsu Xingyuan Electric Construction Supervision Co., Ltd.
 - /19/ *Notification on Determining Emission Factor of China’s Grid* issued by China’s DNA on Aug 9th, 2007
<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf>
 - /20/ <http://www.hdrqw.com/news/20060505-31.htm>
 - /21/ Electricity transmission from West to East of China can not meet the requirement of peakload regulation.
http://203.208.37.104/search?q=cache:t13Fovwc5EcJ:www.zjwater.gov.cn/pages/attachment/10/attachment_827.doc+%E5%9F%BA%E8%8D%B7%EF%BC%8C%E7%94%B5%E7%BD%91&hl=zh-CN&ct=clnk&cd=18&gl=cn&st_usg=ALhdy29dKudygO6kODyoXi0kOkAa4PoB1w
 - /22/ Long-term Take or Pay (ToP) contract signed between PetroChina and Zhangjiagang Huaxing Electric Power Co., Ltd on 29 December 2004
 - /23/ CDM Executive Board, Guidance for request for deviation titled “Application of AM0005 and AMS-I.D in China” (<http://cdm.unfccc.int/Projects/Deviations>)
 - /24/ Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories
 - /25/ China Electric Power Yearbooks 2002-2006.
 - /26/ China Energy statistics Yearbooks 2002-2006,
 - /27/ Economic Analysis for Gas Turbine
<http://www.bjx.com.cn/files/wx/ahdl/2001-1/2.htm>
 - /28/ CDM Executive Board, Tool to calculate the emission factor for an electricity system, Version 01
 - /29/ “West to East Gas Pipeline” Line Two project started construction and the gas supply in Jiangsu province
<http://www.gcjxlm.com/ztb/View/35/6437.htm>
 - /30/ Nature gas utility office was built in Jiangsu province
http://news.xinhuanet.com/fortune/2008-10/25/content_10323750.htm
 - /31/ Gas turbine’s application assessment in power industry
<http://www.chinapower.com.cn/article/1025/art1025680.asp>
 - /32/ No oil-fired power plant under construction or planned recently in China.



VALIDATION REPORT

- <http://www.in-en.com/article/news/china/2007/06/19/20070619104058.html>
- /33/ *Calculation on Baseline Emission Factor of China's Grid* issued by China's DNA on Aug 9th, 2007
<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1365.pdf>
- /34/ Economic assessment fascicule of the feasibility study report of Second Phase of Coal Fired Power Generation Project of Zhejiang Changxing Power Generation Co., Ltd completed by Zhejiang Provincial Electric Power Design Institute on April 2003
- /35/ The urgency notification for further standardizing electricity price management and adjusting the electricity tariff of grid-connected power plants issued by Jiangsu Provincial Price Bureau on 23 June 2004, No.219 of Sujiagong [2004].
- /36/ Confirmation on the Input Parameters in the Feasibility Study Report of Zhangjiagang Nature Gas Power Generation Project provided by Jiangsu Power Design Institute on 28 August 2008
- /37/ Construction Contract for Zhangjiagang Nature Gas Power Generation Project signed between Zhangjiagang Huaxing Power Co., Ltd. and First Engineering Company for Jiangsu Power Construction on 09 January 2005
- /38/ The application for constructing the specialized natural gas pipeline of Zhangjiagang gas-steam combined cycle generation project issued by Zhangjiagang Government on 3 March 2004, No. 24 of Zhangzhenfa [2004]
- /39/ The reply regarding constructing the specialized natural gas pipeline of Zhangjiagang gas-steam combined cycle generation project issued by Jiangsu Provincial Development and Planning Committee on 25 March 2004, No. 08 of Suxiqiban [2004]
- /40/ Report on the special pipeline construction for Zhangjiagang gas-steam combined cycle generation project issued by the Development and Planning Committee of Suzhou City on 18 March 2004, No 6 of Sujiji [2004]
- /41/ Application report to Beijing Sanjili Energy Co. Ltd. to apply for the starting of the construction of the proposed project based on the consideration of CDM and the specialized pipeline, issued by Zhangjiagang Huaxing Power Co., Ltd. on 21 December 2004 and the approval letter for the application report by Beijing Sanjili Energy Co. Ltd. on 04 January 2005
- /42/ CDM Development Consultancy Agreement between Zhangjiagang Huaxing Power Co., Ltd. and Beijing Orient Fortune Investment Co., Ltd signed on 11 October 2005
- /43/ CER Purchase Term sheet between Zhangjiagang Huaxing Power Co., Ltd. and Arreon Carbon of 19 April 2007
- /44/ the Analysis Report for National Electric Power Market in 2007
<http://www.hapin.org.cn/html/jiagejiancefenxi/jiagefenxi/20071016/983.html>
- /45/ Energy consumption research in Jiangsu Province
http://www.stats.gov.cn/tjfx/dfxx/t20070816_402426725.htm
- /46/ The urgent notification for adjusting the electricity tariff of thermal power issued by Jiangsu Provincial Price Bureau on April 24th 2005, No.97 of Sujiagong [2005]



VALIDATION REPORT

- /47/ The urgent notification for adjusting the electricity tariff of thermal power issued by Jiangsu Provincial Price Bureau on June 29th 2006, No.223 of Sujiagong [2006]
- /48/ The invoice for electricity sales to JPG issued by Zhangjiagang Huaxing Power Co., Ltd of 24 December 2007
- /49/ The notification for adjusting base factory price of natural gas of “West to East Gas Pipeline” issued by the NDRC on 28 September 2003, No.1323 of Fagaijiage[2003]
- /50/ The notification for adjusting base factory price of natural gas of “West to East Gas Pipeline” issued by the NDRC on 18 March 2005, No.439 of Fagaijiage[2005]
- /51/ The notification for adjusting base factory price of natural gas of “West to East Gas Pipeline” issued by the NDRC on 24 January 2006, No.141 of Fagaijiage[2006]
- /52/ The notification for adjusting base factory price of natural gas of “West to East Gas Pipeline” issued by the NDRC on 8 November 2007, No.301 of Fagaidian[2007]
- /53/ “West to East Gas Pipeline” Line Two project will supply the natural gas in 2010
http://news.xinhuanet.com/fortune/2008-01/18/content_7442708.htm
- /54/ Introduction for Jiangsu LNG project
<http://news2.eastmoney.com/080415,1104,818304.html>
- /55/ 2007 Report for Energy Development of China
http://www.china.com.cn/economic/zhuanti/2007nyfz/2007-05/24/content_8302554.htm
- /56/ News for Sichuan to East Gas Pipeline Project
<http://news.qq.com/a/20070412/001401.htm>
- /57/ Wind development in China
http://co.163.com/forum/content/878_160062_1.htm
- /58/ The minute of the General Manager’s meeting of Beijing Sajili Energy Co., Ltd on 26 December 2004 for the construction of the project based on CDM revenue
- /59/ Proposed LNG projects in China
<http://www.ccgas.net/page/lng.htm>
- /60/ NG projects in Jiangsu Province
<http://www.china5e.com/power/powernews.aspx?newsid=dac24d56-8118-4738-9637-0c58634a3d29&classid=%u7535%u529b>
- /61/ CDM validation projects list in UNFCCC
<http://cdm.unfccc.int/Projects/Validation/index.html>
- /62/ Nuclear power development in China
<http://np.chinapower.com.cn/article/1000/art1000062.asp>
- /63/ Purchase contract of the main equipments for Zhangjiagang Nature Gas Power Generation Project signed between Zhangjiagang Huaxing Electric Power Co., Ltd and GE on 06 March 2003



VALIDATION REPORT

- /64/ Long-term Service Agreement signed on 18 October 2005 between GE and Shanghai Tonghua Turbine Services Co., Ltd
- /65/ Agreement for construction for Zhangjiagang Nature Gas Power Generation Project signed between Zhangjiagang Huaxing Electric Power Co., Ltd and the First Electric Power Construction Company of Jiangsu Province on 09 January 2005.
- /66/ Meeting minutes on PDD development meeting held between Zhangjiagang Huaxing Electric Power Co., Ltd and Beijing Orient Fortune Investment Co., Ltd on 25 May 2006
- /67/ Meeting minutes on the first CER Purchase Termsheet negotiation meeting held between Zhangjiagang Huaxing Electric Power Co., Ltd and Arreon Carbon on 16 August 2006
- /68/ Meeting minutes on the third CER Purchase Termsheet negotiation meeting held between Zhangjiagang Huaxing Electric Power Co., Ltd and Arreon Carbon on 3 December 2006
- /69/ Certificate for acceptance test jointly issued by the construction departments of Jiangsu Provincial Government in January 2007
- /70/ Final accounting of expenditure of the proposed project issued by Jiangsu Tianhua Dapeng Certified Public Accountants Co., Ltd on 30 April 2007
- /71/ Notification regarding the temporary tariff for natural gas fired power plants issued by Jiangsu Provincial Price Bureau on September 21st 2005, No. 270 of Sujiagong [2005]
- /72/ Rules of Dispatch and Management of the Power Grid issued by the State Council of the People's Republic of China in 1993
- /73/ Certificate of Acceptance Test for the project issued by Jiangsu Xingyuan Electric Construction Supervision Co., Ltd. and Jiangsu Power Test Design Institute Co. Ltd. on 12 January 2007

3.2 Follow-up Interviews with Project Stakeholders

DNV carried out a site visit on 07 April 2008 and had interviews with the project proponent and the consultants and discussed the topics listed in below table.

	Date	Name	Organization	Topic
/74/	2008-04-07	Mr. Yu Shaoai Vice General Manager	Zhangjiagang Huaxing Electric Power Co. Ltd.	➤ Project technology ➤ Baseline assumptions ➤ Historical production and quality control /quality assurance ➤ Monitoring and project management plan ➤ Local stakeholder consultation process
		Mr. Yang Zhenyan Managing & Planning Dept. Vice-Director	Zhangjiagang Huaxing Electric Power Co. Ltd.	
		Mr. Zhang	Zhangjiagang	



VALIDATION REPORT

		Xiaoming Managing & Planning Project Director	Huaxing Electric Power Co. Ltd.	➤ Project status
/75/	2008-04-07	Ms. Yan Fei Business Information Manager	Arreon Carbon UK Ltd.	➤ Baseline assumption and calculation ➤ Project additionality
		Mr. Ding Zhaoming Senior Advisor	Beijing Orient Fortune Investment Co., Ltd.	

3.3 Resolution of Outstanding Issues

The objective of this phase of the validation was to resolve any outstanding issues which needed 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 transparent manner criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

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

The validation protocol consists of three tables. The different columns in these tables are described in the figure below. The completed validation protocol for "Zhangjiagang Nature Gas Power Generation Project" is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of CDM criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

- mistakes have been made with a direct influence on project results;
- CDM and/or methodology specific requirements have not been met; or
- There is a risk that the project would not be accepted as a CDM project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

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

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

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

Figure 1 Validation protocol tables



VALIDATION REPORT

3.4 Internal Quality Control

The draft validation report including the initial validation findings underwent a technical review before being submitted to the project participants. The final validation report underwent another technical review before requesting registration of the project activity. The technical review for final validation report was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation Team

Role/Qualification	Last Name	First Name	Country	Type of involvement					
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	Expert input
CDM validator / technical team leader / Methodology expert	Chandrashekhara	Kumaraswamy	India			✓	✓		
GHG auditor	Tang	Zhiang	China	✓	✓	✓			
GHG auditor	Sun	Shuyong	China	✓					
Sector expert	Kakaraparthi	Raman Venkata	India						✓
Technical reviewer (applicant)	Deng	Cuiping	China					✓	
Technical reviewer	Lehmann	Michael	Norway					✓	

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



VALIDATION REPORT

4 VALIDATION FINDINGS

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

The final validation findings relate to the project design as documented and described in the revised and resubmitted project design documentation of version 05 dated 12 February 2009.

4.1 Participation Requirements

The project participants are Zhangjiagang Huaxing Power Co. Ltd. from the host Party China and Arreon Carbon UK Ltd. and Credit Suisse International from the participating Annex I Party the United Kingdom of Great Britain and Northern Ireland. Both Parties fulfil the relevant participation criteria. The DNA of China has issued the Letter of Approval (LoA) /2/ in January 2008 authorizing Zhangjiagang Huaxing Power Co., Ltd. as a project participant and also confirming that the project assists in achieving sustainable development. The DNA of the United Kingdom of Great Britain and Northern Ireland has issued LoAs /3/ on 18 January 2008 for Arreon Carbon UK Ltd. and on 9 April 2008 for Credit Suisse International.

The validation did not reveal any information indicating that the project can be seen as a diversion of official development assistance (ODA) funding towards China.

4.2 Project Design

The project activity envisages the generation of electricity using available natural gas and exporting the electricity to the Jiangsu Power Grid (JPG) which forms a part of the East China Power grid (ECPG). The project has an installed capacity of 780 MW (2 X 390 MW). The total power generation is estimated to be 2730 GWh per year per annum at a plant load factor of 40% /7/ and the annual net electricity supply to the grid is estimated at 2675.4 GWh.

The project involves the technology of 9F-level gas-steam combined cycle, with the equipment supplied by General Electrics (GE) in the US, and consists of gas turbine, heat recovery steam generator, and steam turbine.

It is confirmed from the letter of approval that the proposed project activity fulfils the Chinese domestic regulations and policy of promoting sustainable development. The project is in line with host-country specific CDM requirements and the confirmation thereof by the DNA of China was issued in January 2008.

The project's start date is stated to be 29 December 2004, which is the signature date of Long-term Take or Pay (ToP) contract signed between PetroChina and Zhangjiagang Huaxing Electric Power Co., Ltd. /22/. The project selects a renewable crediting period of seven years, starting 1 June 2009, or the official registration date, whichever is later. The designed operation life of the project is 20 years /7/ and reasonable.

The project's power generation will replace the power generated by the existing power plants and likely capacity additions in the ECPG resulting in an estimated emission reduction of 1 231 243 t CO₂ annually.



VALIDATION REPORT

4.3 Baseline Determination

The project applies the approved baseline methodology AM0029, “Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas” /5/, version 03.

The application of the baseline methodology is justified as it has been demonstrated that:

- The proposed project is the construction and operation of a new natural gas fired power generation plant connected to the Jiangsu Power grid (JPG) and there is no auxiliary fuel involved/7/. Hence, the project meets the requirement that “The project activity is the construction and operation of a new natural gas fired grid-connected electricity generation plant” stated in the methodology.
- The project activity provides electricity to JPG, which is part of the ECPG. The geographic and system boundaries of the ECPG can be clearly defined /19/. Hence, the project meets the requirement that “the geographical/physical boundaries of the baseline grid can be clearly identified and information pertaining to the grid and estimating baseline emissions is publicly available” stated in the methodology.
- Natural gas is sufficiently available in the region. The natural gas supply sources for Jiangsu province from 2009 to 2018 have been demonstrated to be as follows:
 - a) “West to East Gas Pipeline” Line One project. This project has been completed and has the capacity to supply 5.7 billion cubic meters natural gas for Jiangsu province annually /29/.
 - b) “West to East Gas Pipeline” Line Two project. This project is under construction and will have the capacity to provide 1.6 billion cubic meters natural gas to the Jiangsu Province annually/29/ in 2010 /53/.
 - c. Sichuan to East Gas Pipeline Project. This project is under construction and will have the capacity to supply 1.8 billion cubic meters natural gas to the Jiangsu Province annually/29/.by end of 2008 or at the beginning of 2009.
 - d. Jiangsu Rudong LNG Project. The project is under construction. The first phase of the project will have the capacity to provide 4.8 billion cubic meters natural gas to the Jiangsu Province annually/29/ from 2011, and the second phase will have the capacity to supply the natural gas in 2014 and the whole project will provide 13.5 billion cubic meters natural gas to the Jiangsu Province annually /54/.

The natural gas demand in Jiangsu Province in 2008 is estimated at 6.40 billion cubic meters annually /29/. The annual consumption of natural gas of the project is only 0.576 billion cubic meters /7/. Hence, natural gas is sufficiently available in the region (Jiangsu province). The assumptions and the figures stated in the PDD have been checked against the references provided.

Moreover, a number of new natural gas fired power generation projects (similar or of larger capacity than the project) /59/ have been proposed and are under approval by the NDRC. This confirms that “natural gas is sufficiently available in the region or country, e.g. future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity.” stated in the methodology.

In conclusion, DNV is of the opinion that the baseline methodology is applicable for the project activity.

VALIDATION REPORT

1. Identify plausible baseline scenarios.

The following alternatives are identified and DNV considers the list of realistic and credible alternatives to be complete:

- The proposed project activity not implemented as a CDM project. This is a plausible and eligible baseline scenario, i.e. natural gas power generation using combined cycle gas turbine (CCGT) without considering CDM.
- Power generation using natural gas, but applying other technologies than the proposed project activity. This scenario has been demonstrated to be not a plausible baseline alternative as a simple cycle gas turbine has a rated capacity of 100-300 MW and relatively lower thermal efficiency of only 38 % ~ 39.5 % while the CCGT has capacities greater than 300 MW and the efficiency greater than 55% /31/. Hence, a simple cycle gas turbine is not a plausible baseline scenario for the project proponent.
- Power generation technologies using energy sources other than natural gas
 - Hydro power generation
 - Wind power generation
 - Nuclear power generation
 - Oil-fired power generation
 - Coal-fired power generation

Hydropower is not a plausible scenario, as Jiangsu province does not have any natural hydro power potential /45/. Jiangsu province has pumped storage hydro power stations, which cannot create the original electricity to supply the JPG. Wind or nuclear power is not plausible scenario as they cannot deliver outputs and services for peak load like the project plant /57/ /62/. Oil-fired power generation is not plausible because there are no oil-fired power plants that have recently been constructed or are under construction or are being planned within ECPG as verified from the document under reference /32/.

To construct a 600 MW sub-critical coal-fired power generation plant with the best technology commercially available in China is the plausible baseline scenario. The fact that the sub critical coal fired power generation is the best technology commercially available was verified from the official website of the Chinese DNA /33/.

- Import of electricity from connected grids, including the possibility of new interconnections, is not a feasible option in China as it cannot deliver output and services comparable to the project activity with full-year peak regulation capacity /21/.

Hence, the following alternatives are realistic and credible baseline alternatives:

- the proposed project activity not implemented as a CDM project
- 600 MW sub-critical coal-fired power plant.

2. Identify the economically most attractive baseline scenario alternative.

The economically most attractive baseline scenario alternative among the two alternatives as stated above has been identified using the levelized cost of power generation as the financial indicator. As per AM0029 version 03, “these alternatives need not consist solely of power plants of the same capacity, load factor and operational characteristics (i.e. several smaller plants, or the share of a larger plant may be a reasonable alternative to the project activity),



VALIDATION REPORT

however they should deliver similar services (e.g. peak vs. baseload power)". The two alternatives can supply similar level of service, i.e. operating for peaking purposes. In order to provide peaking service, the power generation units (e.g. CCGT units or coal-fired sub-critical units) have to start up frequently. In fact the start-up of CCGT units is much quicker than that of sub-critical units, and hence CCGT units operate with operational hours lower than that of coal-fired sub-critical units. Moreover, according to the methodology, "the share of a larger plant may be a reasonable alternative to the project activity". The total annual power to grid of the 2*600MW coal-fired power plant is 6217.2GWh. The total annual power to grid of the project activity is 2675.4GWh, which is about 43% share of 2*600MW coal-fired power plants. According to the definition of levelized cost of electricity production (LCEG), the LCEG of 43% share of 2*600MW coal-fired power plant is the same as the LCEG for the whole 2*600MW coal-fired power plant, and this will thus not affect the comparison of LCEG between two baseline scenario alternatives.

It has been demonstrated that the levelized cost of power generation in a similar capacity coal based sub critical power plant is 0.199 RMB/kWh, as against a levelized cost of generation of 0.292 RMB/kWh for a natural gas based power plant. DNV has verified that the data set used for calculating the levelized cost for a sub critical coal based power plant has been sourced from the data from the *economic assessment fascicule of the feasibility study report of Second Phase of Coal Fired Power Generation Project of Zhejiang Changxing Power Generation Co., Ltd /34/*, and that for the natural gas based power plant from the feasibility study report of the project activity and the specialised gas line /7 & /8/. The price of standard coal assumed in the FSR for the 600MW subcritical coal-fired power plant is 363 Yuan/tonne. However, in 2005 in which year the proposed project started, the actual price of raw coal for power generation in the Jiangsu Province was 504 Yuan/tonne of standard coal. Hence, this higher value of coal price was selected for the economic comparison.

The sensitivity analysis on the levelized cost applying a +/- 20% variation of the parameters of total investment, operating hours, fuel price, operation and maintenance cost and the discount rate also demonstrate that the levelized cost of NG power generation does not reach the levelized cost of generation using coal.

The assumptions and the calculations provided for the legalized cost have been verified and found to be correct.

Hence, the construction of a 600 MW sub-critical coal-fired power plant is identified as the baseline scenario.

The project's system boundaries are defined as the project site and the system boundary for the electricity grid includes all power plants connected physically to the ECPG, including Shanghai, Jiangsu, Zhejiang, Anhui and Fujian grid /19/. There are no significant transmission constraints between the power plants of the ECPG grid. The selected sources and gases are justified for the project activity.

The application of the baseline methodology is transparent and conservative.

4.4 Additionality

The additionality of the project, as required by AM0029 version 03, is demonstrated by applying the "Tool for demonstration and assessment of additionality" version 5 /6/.



VALIDATION REPORT

4.4.1 CDM consideration and continued action to secure CDM status

DNV has assessed and verified the evidence and timeline for the starting date of the project activity as follows:

On 06 March 2003, the Purchase Contract for the main equipments for the Zhangjiagang Nature Gas Power Generation Project was signed between Zhangjiagang Huaxing Electric Power Co., Ltd and GE /63/. However, the contract only became effective after signing the Long-term Service Agreement /64/. The Long-term Service Agreement was signed on 18 October 2005 between GE and Shanghai Tonghua Turbine Services Co., Ltd on behalf of four natural gas fired power plants (including Zhangjiagang Huaxing Electric Power Co.) /64/. Hence, the purchase contract of the main equipments of the proposed project was effective on 18 October 2005.

On 29 December 2004, Long-term Take or Pay (ToP) contract was signed between PetroChina and Zhangjiagang Huaxing Electric Power Co., Ltd. /22/

On 05 January 2005, Construction Permit was issued by Jiangsu Xingyuan Electric Construction Supervision Co., Ltd. /18/. On 09 January 2005, the agreement for construction of the Zhangjiagang Nature Gas Power Generation Project was signed between Zhangjiagang Huaxing Electric Power Co., Ltd and the First Electric Power Construction Company of Jiangsu Province /65/.

Hence, the signature date of Long-term Take or Pay (ToP) contract signed between PetroChina and Zhangjiagang Huaxing Electric Power Co., Ltd. /22/ can be considered the date when a commitment to significant expenditures was made and this is thus the starting date of the project activity.

The CDM consideration of the project activity is demonstrated by the following milestones.

- a) The feasibility study report (FSR) of the proposed project prepared by Jiangsu Power Design Institute, in October 2001 was approved by the NDRC on 20 October 2003. In the FSR, the total static investment of the proposed project is stated to be 2449.54 million Yuan /7/. In order to assure the stability for the natural gas supply, the construction of the special natural gas pipeline of the proposed project was to be invested by PetroChina.
- b) In early 2003, the responsibility of the specialized pipeline project (investment, construction and operation of the natural gas pipeline network in Jiangsu Province) was shifted from PetroChina to Jiangsu Provincial Natural Gas Investment and Development Co., Ltd., which didn't agree to invest for the construction of the special pipeline for the proposed project /38/, leaving the project proponent Zhangjiagang Huaxing Power Co., Ltd. with the options of either constructing the special pipeline themselves or abandon the project. .
- c) In November 2004, the feasibility study report for Gas Pipeline Work from Suzhou to Zhangjiang for Zhangjiagang Nature Gas Power Generation Project was developed by Changqing Survey and Design Institute and approved by Jiangsu Development and Reform Commission /9/ /10/. The investment for the pipeline project as per the FSR is estimated at 413.75 million Yuan /9/, raising the total cost of the project to 2863.29 million Yuan. The IRR for the total investment without consideration of CDM is 5.02% and not financially attractive.



VALIDATION REPORT

- d) Under serious consideration of CDM, project proponent, Zhangjiagang Huaxing Power Co., Ltd. decided to carry out the proposed project by investing in the specialized pipeline by itself. The consideration of the CDM was verified from the following documents trial.
- I. Application submitted by the project proponent to its parent company Beijing Sajili Energy Co., Ltd. to apply for the starting the construction of the proposed project (power project and the specialized pipeline) on 21 December 2004 /41/. The application mentions that due to the addition of gas pipeline investment, the IRR of the proposed project is below the benchmark and the project is economically unattractive, but that additional CDM revenue will improve the economic feasibility of the project and overcome the barrier due to the construction of the gas pipeline /41/.
 - II. CDM consideration for the project by the parent company Beijing Sajili Energy Co., Ltd. as evidenced from the minute of the General Manager's meeting of Beijing Sajili Energy Co., Ltd on 26 December 2004 for the construction of the project based on CDM revenue /58/. The meeting minute mentions that the application submitted by the project proponent was accepted and that the proposed project with CDM could start construction /58/.
 - III. Approval letter from the parent company Beijing Sajili Energy Co., Ltd. on 04 January 2005 /41/.
- e) On 29 December 2004, Long-term Take or Pay (ToP) contract was signed between PetroChina and Zhangjiagang Huaxing Electric Power Co., Ltd. /22/ and the project activity started.

All the documents referenced above have been verified by DNV, and demonstrate that incentives from the CDM were seriously considered in the decision to proceed with the project activity.

Real actions to secure CDM status were evidence through:

- a) On 05 January 2005, Construction Permit was issued by Jiangsu Xingyuan Electric Construction Supervision Co., Ltd. /18/.
- b) On 09 January 2005, the agreement for construction of the Zhangjiagang Nature Gas Power Generation Project was signed between Zhangjiagang Huaxing Electric Power Co., Ltd and the First Electric Power Construction Company of Jiangsu Province /65/.
- c) On 11 October 2005, Zhangjiagang Huaxing Power Co., Ltd. signed the CDM Consultancy Agreement with Beijing Orient Fortune Investment Co., Ltd /42/.
- d) On 25 May 2006 Zhangjiagang Huaxing Electric Power Co., Ltd held a meeting with Beijing Orient Fortune Investment Co., Ltd for PDD development /66/.
- e) On 16 August 2006 the first CER purchase term sheet negotiation meeting was held between Zhangjiagang Huaxing Electric Power Co., Ltd and Arreon Carbon/67/
- f) On 3 December 2006 the third CER purchase term sheet negotiation meeting was held between Zhangjiagang Huaxing Electric Power Co., Ltd and Arreon Carbon/68/
- g) On 12 January 2007, the Certificate of Acceptance Test for the project was issued by Jiangsu Xingyuan Electric Construction Supervision Co., Ltd. and Jiangsu Power Test Design Institute Co. Ltd./73/.



VALIDATION REPORT

- h) On 19 April 2007, Zhangjiagang Huaxing Power Co., Ltd. signed the CER purchase agreement with Arreon Carbon /43/.
- i) On 30 April 2007, final accounting of expenditure of the proposed project was issued by Jiangsu Tianhua Dapeng Certified Public Accountants Co., Ltd./70/
- j) Validation started in November 2007.

4.4.2 Step 1 - Benchmark investment analysis

Sub-steps 1. Apply benchmark analysis

In line with the approved baseline methodology AM0029 /5/, the benchmark analysis (Option III) was chosen to assess the financial viability of the project activity. The benchmark IRR for total investment after tax has been selected at 8%. This benchmark is derived from the *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects* /13/ issued by State Power Corporation of China in 2003. This benchmark is a government benchmark and applicable for electrical engineering projects such as the project in question that are connected to the state power grid (including thermal power, wind power, large scale hydropower, etc.). Hence, the selected benchmark for proposed project is applicable. The project IRR without CER revenues has been demonstrated to be 5.02 %, (lower than the benchmark) and hence not a financially viable option.

Sub-steps 2 - Calculation and comparison of financial indicators

The input parameters used in the financial analysis calculation have been sourced from the feasibility study report (FSR) developed by Jiangsu Power Design Institute in October 2001 /7/ and approved by the National Development and Reform Commission on 20 October 2003/8/. The investment for the gas pipeline has been sourced from the feasibility report prepared by Changqing Survey and Design Institute in November 2004 /9/ and approved by Jiangsu Development and Reform Commission on 05 November 2004. As the feasibility study reports have been prepared by independent agencies and approved by regulatory authorities, the input parameters used in the financial analysis can thus be considered information provided by an independent and recognized source.

The FSR of the project activity was approved on 11 October 2003, thus 15 months prior to the decision to proceed with the project activity (the starting date of the project). However, a confirmation was provided by Jiangsu Power Design Institute on 28 August 2008, stating that the input parameters used to develop the FSR had not materially changed between the finalization of the FSR and the investment decision /36/.

DNV also confirms that the input parameters used in the financial analysis are consistent with those stated in the FSR. Furthermore, the input parameters used in the financial analyses were compared with the data reported for other similar proposed CDM projects in Jiangsu province like Jiangsu Qishuyan Natural Gas Based Power Generation Project, Jiangsu Wangting Natural Gas Based Power Generation Project and Nanjing Grid Connected Natural Gas Combined Cycle Power Plant Project, and found to be reasonable.

Moreover, DNV also compared the input parameters for the investment analysis with the actual total investment, power tariff and natural gas price at the time of commissioning of the project on 12 January 2007 /69/. The actual total statistics investment is 2926.91 Million Yuan as evidenced by final accounting of expenditure of the proposed project issued by Jiangsu Tianhua Dapeng Certified Public Accountants Co., Ltd on 30 April 2007 /70/. The actual power tariff at the time of commissioning is 0.48 Yuan/kWh (including tax) as



VALIDATION REPORT

evidenced by the notification regarding the temporary tariff for natural gas fired power plants issued by Jiangsu Provincial Price Bureau on 21 September 2005, No. 270 of Sujiagong [2005] /71/. The actual natural gas price at the time of commissioning is 1.18 Yuan/m³ as evidenced by the notification for adjusting base factory price of natural gas of “West to East Gas Pipeline” issued by the NDRC on 24 January 2006, No.141 of Fagaijiage[2006] /51/. These values confirm the reasonableness of the values which were assumed in the FSR and which were the basis for the investment decision. In addition, even with the actual total investment, power tariff and natural gas price at the time of commissioning, the IRR is 7.25% and thus still lower than the benchmark.

The IRR calculations were provided in a spreadsheet. The calculations were verified and found to be correct by DNV. The assumptions used in the calculations were deemed to be correct by DNV.

Sub-steps 3 - Sensitivity Analysis

The sensitivity analysis for the input parameters of a) total investment, b) gas price, c) annual O&M expenditure, d) annual operation hours and e) electricity tariff fluctuation confirm that the project activity is financially unviable. As per the sensitivity analysis, the project IRR touches the benchmark if a) the electricity tariff increases by about 11.85% b) gas price decreases by 21.1%, c) operation hours increase more than 31.9% (increase to 4616.5 hours per year d) total investment decreases more than about 24.5%, and e) O&M costs decreased more than 82.4%,.

It has been demonstrated that for natural gas combined cycle power plant in Jiangsu province, the basic electricity tariff has increased by only 5.4% from 2004 to 2007 /35//46//47//48/. The tariff in China is also regulated strictly by the government and it is generally related with the increase on price of fuels. So it is unlikely that the electricity tariff will increase by 11.85% in the crediting period. It is also unlikely for the gas price to decrease by 21% as the gas prices have been increasing continuously from 2004 to 2007 /49//52/. It is also demonstrated by the “*Analysis Report for National Electric Power Market in 2007*” that the average annual operation hours is declining in China, especially in Jiangsu Province. Moreover, According to the Rules of Dispatch and Management of the Power Grid /72/ issued by the State Council in 1993, which is still valid and applied, the power grid management administrative authorities are responsible for the planning and regulating of the electric power generation and distribution in the country or the region. The annual operation hours are limited by the planned value and controlled by the power grid management administrative authorities. The power plants can not change it without approval. Hence it is unlikely that the annual operation hours will increase more than 31.9%. The main part of total investment is the main equipments being imported from USA /7/. The main equipments purchase agreement has been contracted and the final price is affected mainly by the exchange rate for US Dollar and RMB. From 2005 to 2007, the exchange rate for US Dollar and RMB rose 10.8%, so it is not likely that the total investment decreases more than about 24.5% in the crediting period. The O&M expenditures are fixed in the contracts and hence unlikely that they would come down. Based on the above analysis, DNV is of the opinion that the project activity is not financially viable.

4.4.3 Step 2 - Common practice analysis

In China, electricity price and regulations are usually similar for power projects in the same province, so Jiangsu Province is selected as the geographical scope for the common practice



VALIDATION REPORT

analysis of the project. It has been demonstrated that the project activity is not a common practice in Jiangsu province, even though there are three similar projects, i.e. the Jiangsu Qishuyan Natural Gas Based Power Generation Project, the Jiangsu Wangting Natural Gas Based Power Generation Project and the Nanjing Grid Connected Natural Gas Combined Cycle Power Plant Project /60/. However, all the projects are in the process of applying as CDM projects /61/. Therefore, the project activity cannot be considered to represent common practice.

4.4.3.1 Step 3 - Impact of CDM registration:

It is demonstrated that the CER revenues improve the financial performance of the project and increase the IRR.

Hence in DNV's opinion, it is sufficiently demonstrated that the project is not a likely baseline scenario and that the emission reductions are hence additional.

4.5 Monitoring

The proposed project applies the approved monitoring methodology, AM0029 "*Monitoring methodology for grid connected generation plants using non-renewable and less GHG intensive fuel*", version 03. The selected monitoring methodology is applicable for the project. The monitoring plan is in accordance with the monitoring methodology. The monitoring plan will give opportunity for real measurements of achieved emission reductions.

4.5.1 Parameters determined ex-ante

To identify the lowest emission factor among the three as the baseline emission factor, the build margin emission factor (BM) of 0.8672 tCO₂/MWh, the combined margin emission factor (CM) of 0.90465 tCO₂/MWh and the emission factor of the technology (and fuel) identified as the most likely baseline scenario of 0.9508tCO₂/MWh were determined *ex-ante* based on the most recent information available at the time the PDD was submitted for validation (Refer to section 4.6).

4.5.2 Parameters monitored ex-post

The following are the main data and parameters to be monitored in accordance with AM0029:

- 1) *BM*, Build margin emission factor.
Calculated *ex-post* as per "Tool to calculate the emission factor for an electricity system"
- 2) *FC_y*, - Quantity of natural gas consumed in project activity on an annual basis.
The natural gas flow will be monitored daily both by the supplier and the project owner. The metering records will be maintained electronically and cross checked with the natural gas supplier's bills.
- 3) *NCV_y*, Net Calorific Value of natural gas in project activity
The value is sourced from the report of supplier and the details are based on the relevant terms in the Purchase Agreement and will be collected fortnightly.
- 4) *OXID_{NG}* Oxidation factor of natural gas in project activity
IPCC default value
- 5) *EF_{CO2,y}*, Emission factor per unit of energy for natural gas
EF_{CO2} of natural gas will use supplier-provided data or local data or country-specific values, in this order of preference. The data will be recorded annually.



VALIDATION REPORT

6) *EG_y*, Electricity supplied to the grid by the project.

The electricity supplied to the grid by the project will be measured continuously and recorded monthly. This data will be cross checked against the sales receipt. The metering equipments are with an accuracy of 0.2s. The electricity meters shall be calibrated once a year.

4.5.3 Management system and quality assurance

The project's monitoring plan includes:

- Operation and Management Organization,
- Monitoring and Reporting Procedure,
- Monitoring and Measuring Instruments,
- Calibration, testing, zero checking and maintenance for measuring instruments,
- Staff Training
- Quality Control and Quality Assurance
- Data Management and improvement
- Monitoring Report

Detailed procedures have been elaborated. These will be maintained and implemented to enable subsequent verification of emission reductions.

4.6 Estimate of GHG Emissions

The GHG emission reduction calculations are in accordance with the formulae given in the baseline and monitoring methodology AM0029 version 03.

1) Baseline emissions

In line with the methodology, the emission factor of the first crediting period is determined as the least of the following 3 options:

- Option 1: The build margin, calculated according to “Tool to calculate the emission factor for an electricity system”; and
- Option 2: The combined margin, calculated according to “Tool to calculate the emission factor for an electricity system”, using a 50/50 OM/BM weight.
- Option 3: The emission factor of the coal based sub critical power plant which has been identified as the baseline scenario.

Calculation of the BM emission factor

Because plant specific fuel consumption and electricity generation data is not publicly available in China, the EB guidance on the request for deviation titled “Application of AM0005 and AMS-I.D in China” /23/ the build margin is calculated with the following parameters:

- The capacity addition from the years 2004 to 2005 is chosen and represents 21.55% of total installed capacity /25/.
- The weight of installed capacity additions for thermal power plant is accounted for 92.53% of total installed capacity additions /25/.



VALIDATION REPORT

- The standard coal consumption of 343.33gSCE/kWh is used to determine the BM emission factor, which is deemed conservative. The coal consumption efficiency of 343.33 g SCE/kWh is defined as the best technology commercially available in China by the DNA of China /19/.
- The local net calorie value of each kind of fuel, the local carbon content of each kind of fuel and the IPCC 2006 default value of carbon oxidization factor are used to calculate the BM. /24/
- The BM is calculated as 0.8672 tCO₂/MWh

Calculation of the OM emission factor and CM emission factor

The simple OM emission factor calculation method is selected because low cost must run projects constitute less than 50% of the total grid generation and data is not available for applying the dispatch data analysis.

The aggregated generation and fuel consumption data are used as more disaggregated data are not available in the ECPG. Country specific data for the net calorific value (NCV_i) of each type of fossil fuel, which can be obtained from the China Energy Statistical Yearbook /26/, the IPCC 2006 default values /24/ for the oxidation factor of each type of fossil fuel and the total electricity delivered to the ECPG selected are deemed reasonable. Vintage data for the years 2003, 2004 and 2005 are used for the OM emission factor calculation, which were the most recent data available at the time of submission of the PDD for validation. The electricity generation data are sourced from China Electric Power Yearbooks 2002-2006 /25/. The OM is calculated to be 0.9421 t CO₂/MWh as a generation-weighted average for the three years,

The weights ω_{OM} and ω_{BM} are selected as 0.5 and 0.5, respectively, as stipulated by AM0029. The combined margin is determined ex-ante at 0.90465 t CO₂/MWh. However, the BM emission factor will be updated ex-post.

For the calculation of the identified fuel emission factor

$$EF_{BL,CO_2,Option3} = \frac{COEF_{BL}}{\eta_{BL}} \times 3.6GJ / MWh = 0.0946/35.82\% \times 3.6 = 0.9508 \text{ tCO}_2/\text{MWh}.$$

$\eta_{BL} = 35.82\%$, which is sourced from *Notification on Determining Baseline Emission Factor of China's Grid* issued by China's DNA on 9 August 2007 /19/.

The lowest emission factor among the three options is the BM emission factor (0.8672 tCO₂/MWh), which is selected to be the baseline emission factor. Therefore, baseline emissions are calculated as $BE_y = EG_y * EF_{BL, CO_2, y} = 2675400 \text{ MWh} * 0.8672 \text{ t CO}_2/\text{MWh} = 2320107 \text{ tCO}_2/\text{year}$.

2) Project emissions

$$COEF_y = NCV_y \times EF_{CO_2,y} \times OXID_{NG} = 33.695 \times 56.1 \times 1 \div 1000 = 1.89 \text{ tCO}_2/\text{km}^3$$

$$PE_y = \sum FC_y \times COEF_y = 576030 \times 1.89 = 1088863 \text{ tCO}_2\text{e}$$

FC_y Quantity of natural gas combusted in the proposed project plant in year 'y',



VALIDATION REPORT

COEF_y The CO₂ emission coefficient for natural gas (tCO₂/m³) in year 'y'.

3) Leakage

Fugitive upstream CH₄ emissions associated are calculated to be smaller than fugitive CH₄ emissions from the use of fossil fuels in the grid in the absence of the project activity.

$$LE_y = [FC_y \times NCV_y \times EF_{NG,upstream,CH_4} - EG_y \times EF_{BL,upstream,CH_4}] \times GWP_{CH_4}$$

$$= (576030 \times 33.695 \times 296 \times 10^{-6} - 2675400 \times 0.005764) \times 21 = -203174 \text{ tCO}_2\text{e}$$

DNV verified that leakage calculation is in line with the methodology. Leakage from the project activity is calculated to be negative, and in line with the methodology thus considered zero.

4) Emission reductions

$$ER_y = BE_y - PE_y - LE_y = 2\,320\,107 \text{ tCO}_2/\text{year} - 1\,088\,863 \text{ tCO}_2/\text{year} - 0 = 1\,231\,243 \text{ tCO}_2/\text{year}.$$

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

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

4.7 Environmental Impacts

The environmental impact assessment (EIA) of the project has been conducted in line with the Chinese laws and regulations. The potential environmental impacts have been sufficiently identified, such as noise and vibration, air, waste water, discard solid in construction and operation phase. No significant environmental impacts are expected from the project activity. The National Environmental Protection Bureau approved the project on 24 August 2002 /12/.

4.8 Comments by Local Stakeholders

A survey of local residents was carried out to invite comments from local stakeholders during the Environmental Impact Analysis period including government employee, company employee, teacher, hospital employee, worker, farmer, student and retiree. Totally 60 questionnaires for stakeholders returned out of 60 with 100% response rate. No negative comments have been received. The survey questionnaire and the responses were evidenced to DNV during the site visit.

The questionnaire survey indicates that the project received support from local people and opinions from survey has been considered seriously by the project operator.

4.9 Comments by Parties, Stakeholders and NGOs

The PDD of 14 November 2007 was made publicly available on DNV's climate change website¹ and Parties, stakeholders and NGOs were through the CDM website invited to

¹ http://www.dnv.com/focus/climate_change/projects/projectdetails.asp?ProjectId=1605



VALIDATION REPORT

provide comments during a 30 days period from 24 November 2007 to 23 December 2007.
No comment was received during this period.

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirement for Clean Development Mechanism (CDM) Project Activities

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

Requirement	Reference	Conclusion
Protocol Article 5 and 7.		
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	CAR-2 CL-6 CL-7 CL-12 OK
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK

Requirement	Reference	Conclusion
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK
19. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements Checklist

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity <i>The project design is assessed.</i>						
A.1. Project Boundaries <i>Project Boundaries are the limits and borders defining the GHG emission reduction project.</i>						
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?		/1/	DR I	Please provide the information source for the project's spatial boundaries (geographical) defined in PDD	CL1	OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?		/1/	DR I	The project's system boundaries are defined as the project site and all power plants connected physically to the baseline grid, i.e., the East China Power Grid (ECPG), including Shanghai, Jiangsu, Zhejiang, Anhui and Fujian grid /19/. There are no significant transmission constraints between the power plants of the ECPG grid, nor with the proposed project. The selected sources and gases are justified for the project activity.		OK
A.2. Participation Requirements <i>Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.</i>						
A.2.1. Which Parties and project participants are participating in the project?		/1/	DR	Zhangjiagang Huaxing Power Co., Ltd. is the project participant from the host Party China. Arreon Carbon UK Ltd., UK and Credit		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
				Suisse International, UK are the project participants from Annex I Party UK.		
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party?	/1/ /2/ /3/	DR		The letters of approval from the DNA of China and United Kingdom of Great Britain and Northern Ireland. have not been obtained.	CAR-1	OK
- Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority		DR		China ratified the Kyoto Protocol on 30 August, 2002. United Kingdom of Great Britain and Northern Ireland ratified the Kyoto Protocol on 31 May 2002. The letters of approval from the DNA of China and United Kingdom of Great Britain and Northern Ireland are required to ensure that both Parties participate in the CDM on a voluntary basis. DNA of China is National Development and Reform Commission. DNA of United Kingdom of Great Britain and Northern Ireland is the Department for Environment, Food and Rural Affairs	CAR-1	OK
A.2.3. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	/1/	DR I		The validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards China.		OK
A.3. Technology to be employed <i>Validation of project technology focuses on the project engineering, choice of technology and competence/</i>						

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
<i>maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.</i>					
A.3.1. Does the project design engineering reflect current good practices?	/1/ /7/	DR I	Yes. The project design engineering reflects current good practices in China.		OK
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	/1/ /7/	DR	The detailed information about the manufacturer need to be stated and it needs to be clarified whether the installed capacity is 780MW or 760MW	CL-2	OK
A.3.3. Does the project make provisions for meeting training and maintenance needs?	/1/ /12/	DR I	Yes. The training has been provided by project owner and manufacturer.		OK
A.4. Contribution to Sustainable Development <i>The project's contribution to sustainable development is assessed.</i>					
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	/1/ /2/	DR	The LoA issued by DNA of China is pending now.	CAR-1	OK
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	/1/ /9/ /10/	DR	Yes. The project will also mitigate local environmental pollution caused by coal-fired power plants, improve the electric supply quality of the grid, enhance the application of gas-fired combined cycle power generation technology and provide the employment opportunities for the local residents.		OK
B. Project Baseline <i>The validation of the project baseline establishes whether the</i>					

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
<i>selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
B.1. Baseline Methodology <i>It is assessed whether the project applies an appropriate baseline methodology.</i>					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	/1/	DR	Yes. AM0029 (version 03) is chosen for the project.		OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/1/ /19/	DR	Yes. The baseline methodology is applicable for the project because the project complies with all the applicability criteria of the AM0029 version 03 as: • The project activity is the construction and operation of a new natural gas fired grid-connected electricity generation plant. • The geographical/ physical boundaries of the baseline grid, East China Power Grid can be clearly identified and information pertaining to the grid and estimating baseline emissions is publicly available. • Natural gas is sufficiently available in the region. The future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity. Detailed evidence that natural gas is sufficiently available in the region needs to be provided	CL3	OK
B.2. Baseline Scenario Determination					

[illegible]

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
			lower thermal efficiency of only 38% ~ 39.5 % while the CCGT has capacities greater than 300 MW and the efficiency greater than 55% /31/. Hence, a simple cycle gas turbine is not a plausible baseline scenario for the project proponent. Scenario 4 is not the plausible baseline scenario because the electricity from connected grids, including the possibility of new interconnections can not provide peak regulation to ECPG as the project The evidence for scenario 4 in baseline alternatives needs to be provided. For scenario 3 in baseline alternatives, only the alternative of coal-fired power generation is the plausible baseline scenario. But, the spreadsheet and data sources for calculating levelized cost of electricity production in \$/kWh should be provided and the evidences that the coal-fired power generation technology based on best technology commercially available in China is sub-critical which includes 300MW and 600MW needs to be provided. The evidence that		

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				the project is to provide the full-year peak regulation services to JPG needs to be provided.		
B.2.3. Has the baseline scenario been determined according to the methodology?	/1/ /5/	DR		This can be concluded after CL 5 is clarified.	CL-5	OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/ /5/	DR		This can be concluded after CL 5 is clarified.	CL-5	OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /5/	DR		This can be concluded after CL 5 is clarified.	CL-5	OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /5/	DR		This can be concluded after CL 5 is clarified.	CL-5	OK
B.2.7. Have the major risks to the baseline been identified?	/1/	DR		There are no significant risks to the baseline		OK
B.3. Additionality Determination <i>The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.</i>						
B.3.1. Is the project additionality assessed according to the methodology?	/1/	DR		The latest version 05 of the "Tool for the	CAR-2	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
	/6/		<i>demonstration and assessment of additionality</i>” approved by the CDM EB should be used. Step 1: Benchmark Investment Analysis In China an IRR of 8 % for total investment of a project is regarded as benchmark for investments in power projects. The project IRR without CER revenues is 4.35 % which shows that the project is not financially attractive in absence of CDM benefits. Step 2: Common practice analysis There are three other natural gas-fired power plants previously or simultaneously in Jiangsu Province. All of them are under development as CDM projects. Step 3: Impact of CDM Registration CDM registration for the project activity can improve total investment IRR of the project, promote the popularization of the gas-fired combined cycle power technology, and reduce GHG emission in the future. The whole process of calculation of IRR including necessary parameters, assumptions and their data sources need to be provided. In sensitivity analysis, please clarify the reasons for the selections of the key factors and the	CL6	

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
			fluctuation scope. In the common practice analysis, please provide the reference for the data source.		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	/1/ /7/ /13/	DR	Same as above	CL6	OK
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	/1/ /6/	DR	Same as above	CL6	OK
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	/1/	DR	The starting date of the project needs to be defined with the evidence, such as the first investment for the project. It needs to be mentioned in PDD and the evidence needs to be provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity.	CL12 CL7	OK
B.4. Calculation of GHG Emission Reductions – Project emissions <i>It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /7/	DR	Yes. It is in compliance with AM0029 and documented in a complete and transparent manner.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
B.4.2. Have conservative assumptions been used when calculating the project emissions?	/1/ /5/	DR	Yes.		
B.4.3. Are uncertainties in the project emission estimates properly addressed?	/1/	DR	Yes.		OK
B.5. Calculation of GHG Emission Reductions – Baseline emissions <i>It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /5/	DR	The spreadsheet for the calculation of the baseline emissions needs to be provided and all of data source need to be updated according the latest documents available at the time of PDD publicly on the website.	CL8	OK
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	/1/ /5/	DR	Same as above	CL8	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	According to the methodology, the uncertainty has addressed by use the lowest EF_{CO_2} from $EF_{BL,BM}$, $EF_{BL,CM}$, $EF_{BL,CO_2,option3}$, The spreadsheet for the calculation of the baseline emissions needs to be provided and all of data source need to be updated according the latest documents available at	CL8	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
			the time of PDD publicly on the website.		
B.6. Calculation of GHG Emission Reductions – Leakage <i>It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
B.6.1. Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/5/	DR	The spreadsheet for the calculation of leakage needs to be provided	CL9	OK
B.6.2. Have conservative assumptions been used when calculating the leakage emissions?	/1/ /7/	DR	Same as above	CL9	OK
B.6.3. Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	Same as above	CL9	OK
B.7. Emission Reductions <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i>					
B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	/1/ /7/	DR	Yes, the emission reductions are real, measurable, and give long-term benefits related to the mitigation of climate change compared to the baseline scenario. The actual amount will be confirmed in the final validation report.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
B.8. Monitoring Methodology <i>It is assessed whether the project applies an appropriate monitoring methodology.</i>					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/ /12/	DR	Yes. The project applies the approved monitoring methodology AM0029 version 03 “Grid Connected Electricity Generation Plants using Non-Renewable and Less GHG Intensive Fuel” and is explained in a complete and transparent manner.		OK
B.8.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/ /12/	DR	Yes. As mentioned in PDD, the relevant data will be kept for 2 years following the end of the crediting period.		OK
B.9. Monitoring of Project Emissions <i>It is established whether the monitoring plan provides for reliable and complete project emission data over time.</i>					
B.9.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the project boundary during the crediting period?	/1/ /7/	DR	Yes. FC _{f,y} will be metered daily using the flow meter within the project boundary and will be cross-verified with the natural gas supplier’s bills. NCV _{f,y} will be obtained fortnightly according to the report from supplier and the details are based on the relevant terms in the Purchase Agreement. OXID _f and EF _{CO2,f,y} will use the IPCC 2006 value.		OK
B.9.2. Are the choices of project GHG indicators reasonable and conservative?	/1/	DR	Yes, the choices of project GHG indicators are in line with the approved monitoring		OK

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	/16/		methodology AM0029 version 03.		
B.9.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	/1/ /16/ /18/	DR	Yes, FC _{f,y} will be metered daily using the flow meter within the project boundary and will be cross-verified with the natural gas supplier's bills. NCV _{f,y} will be obtained fortnightly according to the report from supplier and the details are based on the relevant terms in the Purchase Agreement.		OK
B.9.4. Is the measurement equipment described and deemed appropriate?	/1/ /16/	DR	Yes, the measurement equipment described and deemed is appropriate.		OK
B.9.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/ /7/	DR	Yes. The measurement accuracy is 0.2% addressed in PDD. The procedures are in place on how to deal with erroneous measurements.		OK
B.9.6. Is the measurement <i>interval</i> identified and deemed appropriate?	/1/	DR	Yes, the measurement will be taken continuously by the flow meter and the data will be recorded daily.		OK
B.9.7. Is the <i>registration, monitoring, measurement and reporting</i> procedure defined?	/1/ /7/	DR	Yes.		OK
B.9.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/ /7/	DR	The calibration interval for fuel flow meter needs to be provided.	CL10	OK

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B.9.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/ /7/	DR	Yes.		OK
B.10. Monitoring of Baseline Emissions <i>It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.</i>					
B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	/1/ /5/	DR	The electricity supplied to the grid will be measured continuously and recorded monthly. This data will be cross checked against the sales receipt. The metering equipments are with an accuracy of 0.2s. The electricity meters shall be calibrated once a year. In section B.6.1 of the PDD, parameters related to the calculation of operating margin emission factor (OM) and build margin emission factor (BM) are listed. According to AM0029, option 1 (BM) are selected and will be estimated <i>ex-post</i> .		OK
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	/1/ /5/	DR	The data source of $F_{i,j,y}$ and $COEF_{i,j}$ need to be updated according the latest documents available before the time of PDD publicly on the website.	CL-11	OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	/1/ /5/	DR	The data source of $F_{i,j,y}$ and $COEF_{i,j}$ need to be updated according the latest documents available before the time of PDD publicly on	CL-11	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
			the website.		
B.10.4. Is the measurement <i>equipment</i> described and deemed appropriate?	/1/ /12/	DR	Yes, the measurement equipment described and deemed is appropriate.		OK
B.10.5. Is the measurement <i>accuracy</i> addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR	Yes, the measurement accuracy is is 0.2S level addressed in PDD. The procedures are in place on how to deal with erroneous measurements.		OK
B.10.6. Is the measurement <i>interval</i> for baseline data identified and deemed appropriate?	/1/ /7/	DR	Yes, The readings of electricity meters will be continuously measured and monthly recorded.		OK
B.10.7. Is the registration, <i>monitoring, measurement</i> and <i>reporting</i> procedure defined?	/1/ /7/	DR	Yes		OK
B.10.8. Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?	/1/ /7/ /12/	DR	Yes, the electricity meters will be calibrated at least once a year. The measurement instruments and procedure adopted will be as per the industry practice.		OK
B.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/	DR	Yes		OK
B.11. Monitoring of Leakage <i>It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.</i>					
B.11.1. Does the monitoring plan provide for the	/1/	DR	Leakage from the project activity is assumed		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
collection and archiving of all relevant data necessary for determining leakage?				to be zero as the total net leakage effects are negative when calculating these in accordance with the methodology.		
B.11.2. Are the choices of project leakage indicators reasonable and conservative?		/1/	DR	Yes.		OK
B.11.3. Is the measurement method clearly stated for each leakage value to be monitored and deemed appropriate?		/1/	DR	Yes.		OK
B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts <i>It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>						
B.1.3. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?		/1/ /12/	DR I	DNA of China does not require collection and archiving of data related to environmental, social and economic impacts. The environmental impacts will be monitored by local environmental authority.		OK
1) Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?		/1/ /12/	DR I	The indicators of environmental impacts will be stipulated by local environmental authority.		OK
B.1.4. Are the sustainable development indicators in line with stated national priorities in the Host Country?		/1/ /12/	DR I	This will be verified through the letter of approval from the DNA of China, which is yet to be obtained.	CAR-4	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview	Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
B.13. Project Management Planning <i>It is checked that project implementation is properly prepared for and that critical arrangements are addressed.</i>					
B.13.1. Is the authority and responsibility of overall project management clearly described?	/1/	DR I	Yes. The authority and responsibility of the project management has been identified in the PDD.		OK
B.2.8. Are procedures identified for training of monitoring personnel?	/1/	DR I	Procedures for monitoring personnel training are identified.		OK
B.2.9. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR I	Yes, procedures are identified for emergency preparedness for cases where emergencies can cause unintended emissions		OK
B.13.2. Are procedures identified for review of reported results/data?	/1/	DR I	Yes.		OK
B.13.3. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR I	Yes.		OK
C. Duration of the Project/ Crediting Period <i>It is assessed whether the temporary boundaries of the project are clearly defined.</i>					
C.1.1. Are the project's starting date and operational lifetime clearly defined and evidenced?	/1/	DR	The starting date of the project needs to be defined with the evidence, such as the first investment for the project.	CL-12	OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
				The operational lifetime is clearly defined and evidence.		
C.1.2. Is the start of the crediting period clearly defined and reasonable?	/1/	DR		A renewable crediting period of 7 years starts from 1 January 2008, which is not reasonable.	CL-13	OK
D. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>						
D.1.1. Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /12/	DR I		Yes. The impacts are properly described.		OK
D.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved?	/1/ /12/	DR I		Yes. The EIA has been approved by National Environmental Protection Bureau on 24 August 2002.		OK
D.1.3. Will the project create any adverse environmental effects?	/1/ /12/	DR I		There are no significant adverse environmental effects for the project according to the EIA.		OK
D.1.4. Are transboundary environmental impacts considered in the analysis?	/1/ /12/	DR I		There are no transboundary environmental impacts foreseen for the project.		OK
D.1.5. Have identified environmental impacts been addressed in the project design?	/1/ /12/	DR I		Yes, the impacts are properly described, such as noise and vibration, air, waste water, discard solid in construction and operation phase.		OK
D.1.6. Does the project comply with environmental legislation in the host country?	/1/	DR		Yes.		OK

CHECKLIST QUESTION * MoV = Means of Verification, DR= Document Review, I= Interview		Ref.	MoV *	COMMENTS	Draft Concl.	Final Concl.
		/12/	I			
E. Stakeholder Comments <i>The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i>						
E.1.1. Have relevant stakeholders been consulted?		/1/ /12/	DR I	Yes. All the relevant stakeholders are consulted including government employee, company employee, teacher, hospital employee, worker, farmer, student and retiree.		OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?		/1/ /12/	DR I	Yes. Local stakeholders have been invited to comment on the project through distribution of questionnaires. Total 60 questionnaires for were distributed among the relevant stakeholders. The relevant documents were verified by DNV.		OK
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?		/1/ /12/	DR I	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/ /12/	DR I	Yes. The summary of the stakeholder comments received is described in the PDD.		OK
E.1.5. Has due account been taken of any stakeholder comments received?		/1/ /12/	DR I	The questionnaire survey shows that the project received support from local people and opinions from survey has been considered seriously by the project operator.		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR 1 The LoAs issued by DNA of China and United Kingdom of Great Britain and Northern Ireland need to be provided.	A.2.2 A.4.1 B.1.4	The LoAs issued by the DNA of China and United Kingdom of Great Britain and Northern Ireland have submitted to DNV for validation.	OK The DNA of China has issued the Letter of Approval (LoA) /2/ in January 2008 authorizing Zhangjiagang Huaxing Power Co., Ltd. as a project participant. The DNA of the United Kingdom of Great Britain and Northern Ireland has also issued the LoAs /3/ on 18 January 2008 for Arreon Carbon UK Ltd. and on 9 April 2008 for Credit Suisse International. The CAR is closed.
CAR 2 The latest version 05 of the “<i>Tool for the demonstration and assessment of additionality</i>” approved by the CDM EB should be used	B.3.1	The PDD has been revised as per the latest version 05 of the “<i>Tool for the demonstration and assessment of additionality</i>”.	OK The CAR is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 1 Please provide the information source for the project's geographical coordinates defined in PDD	A.1.1	The information sourced from page 13 of the EIA report of the proposed project.	OK It is verified by DNV that the geographical coordinates is at longitude 120°39'E and latitude 31°53'N, which is stated in page 13 of the EIA /11/. The CL is closed.
CL 2 The detailed information about the manufacturer need to be stated and it needs to be clarified whether the installed capacity is 780MW or 760MW	A.3.2	The manufacturer is General Electric Company based in Schenectady, NY,USA, the detailed information about the manufacturer please refer to: http://www.ge.com/ The total installation capacity of the proposed project is 2*390MW, it is stated in page 3 of the economic assessment of the FSR of the proposed project (Serial number: F1274KU - EB - 01, index number: 32 - F1274KU - EB), which can be crosschecked by the approval issued by the NDRC on October 20th 2003.	OK The manufacturer is General Electric Company and the total installation capacity of the proposed project is 2*390MW , which is verified by FSR and the approval of FSR /9//10/ The CL is closed.
CL 3 Detailed evidence that natural gas is sufficiently available in the region needs to be provided	B.1.2	The description has been revised in B.2 of PDD and the relevant evidences have been provided to DNV.	OK DNV has verified that the total natural gas supply capacity will be higher than the total natural gas demand in the

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			Jiangsu Province in the future according to below analysis. The natural gas supply sources for Jiangsu province from 2009 to 2018 are as follows: a. “West to East Gas Pipeline” Line One project “West to East Gas Pipeline” Line One project has been completed and can supply 5.7 billion cubic meters natural gas for Jiangsu province annually /29/. b. “West to East Gas Pipeline” Line Two project “West to East Gas Pipeline” Line Two project is under construction now and will supply the natural gas in 2010 /53/, which will provide 1.6 billion cubic meters natural gas to the Jiangsu Province annually/29/. c. Sichuan to East Gas Pipeline Project Sichuan to East Gas Pipeline Project is under construction now and will supply the natural gas by end of 2008 or at the beginning of 2009, which will provide 1.8 billion cubic meters natural gas to the Jiangsu Province annually/29/. d. Jiangsu Rudong LNG Project

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			Jiangsu Rudong LNG Project is under construction now. The first phase of the project will supply the natural gas in 2011, which will provide 4.8 billion cubic meters natural gas to the Jiangsu Province annually/29/. The second phase of the project will supply the natural gas in 2014 and the whole project will provide 13.5 billion cubic meters natural gas to the Jiangsu Province annually /54/. The natural gas demand in Jiangsu Province in 2008 is estimated at 6.40 billion cubic meters annually /57/. The annual consumption of natural gas of the project is only 0.576 billion cubic meters /7/. Hence, natural gas is sufficiently available in the region (Jiangsu province). The assumptions and the figures stated in the PDD have been checked against the references provided. Moreover, a number of new natural gas fired power generation projects (similar or of larger capacity than the project) /59 have been proposed and are under approval by the NDRC. This confirms that “natural gas is sufficiently available

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			in the region or country, e.g. future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity.” stated in the methodology. Relevant references have been check by DNV. The CL is closed.
CL 4 The evidence for scenario 4 in baseline alternatives needs to be provided.	B.2.2	The grid connected to the baseline grid (ECPG) is the Central China Power Grid (CCPG), and ECPG imports the electricity from CCPG in recent years. Due to the electricity transferred between grids generally provides base load other than peak load /21/, so the electricity imported from CCPG can not provide peak regulation to ECPG.	OK DNV has verified that the import of electricity from other connected grids generally provides base load other than peak load in China/21/. The CL is closed.
CL 5 For scenario 3 in baseline alternatives, the spreadsheet and data sources for calculating levelized cost of electricity production in \$/kWh should be provided and the evidences that the coal-fired power generation technology based on best technology commercially available in China is sub-critical which includes 300MW and 600MW	B.2.2 B.2.3 B.2.4 B.2.5 B.2.6	The spreadsheet and data sources for calculating levelized cost of electricity production have submitted to DOE for validation. According to page 3 of the BM Calculation of the Regional Grids of China in 2007 issued by the DNA of China on August 9th 2007, the coal fired power generation technology	OK The spreadsheet and data sources for calculating levelized cost of electricity production have been verified by DNV. DVN has verified that the coal fired power generation technology based on best technology commercially available in China is 600MW sub-critical /33/ and 300MW sub-critical is not permitted in

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
needs to be provided. The evidence that the project is to provide the full-year peak regulation services to JPG needs to be provided.		based on best technology commercially available in China is 600MW sub-critical./33/ In addition, 300MW sub-critical is not permitted in China since March 5th 2007, so this alternative should be excluded from the plausible baseline scenarios. “The full-year peak regulation services to JPG” is cited from section 2.3.2 in page 20 of the general guide report of the FSR of the proposed project (Serial number: F1274K - A01, index number: 32 - F1274K - A01). This general guide report has submitted to DOE for validation.	China since March 5th 2007 (http://www.p5w.net/news/cjxw/200703/t810531.htm) In FSR, it mentions that the project is to provide the full-year peak regulation services to JPG /7/ The CL is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 6 The whole process of calculation of IRR including necessary parameters, assumptions and their data sources need to be provided. In sensitivity analysis, please clarify the reasons for the selections of the key factors and the fluctuation scope. In the common practice analysis, please provide the reference for the data source.	B.3.1 B.3.2 B.3.3	The spreadsheet and data sources for calculating IRR of total investment of the proposed project have submitted to DOE for validation. In sensitivity analysis, the analysis process has been revised in the latest version of PDD. In the common practice analysis, the reference for the data source has been revised in the latest version of PDD.	OK The spreadsheet and data sources for calculating IRR and the sensitivity analysis have been verified by DNV. The reference for the data source of the common practice analysis has been verified by DNV. The CL is closed.
CL 7 It needs to be mentioned in PDD and the evidence needs to be provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity.	B.3.4	The description has been revised in B.5 of PDD and the relevant evidences have been provided to DNV.	OK DNV has verified that the CDM consideration of the project activity is demonstrated by the following milestones. a) The feasibility study report (FSR) of the proposed project prepared by Jiangsu Power Design Institute, in October 2001 was approved by the NDRC on 20 October 2003. In the FSR, the total static investment of the proposed project is stated to be 2449.54 million Yuan /7/. In order to assure the stability for the natural gas supply, the construction of the special natural gas pipeline of the proposed project was to be invested

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			by PetroChina. b) In early 2003, the responsibility of the specialized pipeline project (investment, construction and operation of the natural gas pipeline network in Jiangsu Province) was shifted from PetroChina to Jiangsu Provincial Natural Gas Investment and Development Co., Ltd., which didn't agree to invest for the construction of the special pipeline for the proposed project /38/, leaving the project proponent Zhangjiagang Huaxing Power Co., Ltd. with the options of either constructing the special pipeline themselves or abandon the project. . c) In November 2004, the feasibility study report for Gas Pipeline Work from Suzhou to Zhangjiang for Zhangjiagang Nature Gas Power Generation Project was developed by Changqing Survey and Design Institute and approved by Jiangsu Development and Reform Commission /9/ /10/. The investment for the pipeline project as per the FSR is estimated at 413.75 million

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			Yuan /9/, raising the total cost of the project to 2863.29 million Yuan. The IRR for the total investment without consideration of CDM is 5.02% and not financially attractive. d) Under serious consideration of CDM, project proponent, Zhangjiagang Huaxing Power Co., Ltd. decided to carry out the proposed project by investing in the specialized pipeline by itself. The consideration of the CDM was verified from the following documents trial. I. Application submitted by the project proponent to its parent company Beijing Sajili Energy Co., Ltd. to apply for the starting the construction of the proposed project (power project and the specialized pipeline) on 21 December 2004 /41/.In the application report, it mentions that due to the addition of gas pipeline investment, the IRR of the proposed project is below the benchmark and the project was economically unattractive. Additional CDM revenue can

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			improve the economic feasibility of the project and overcome the barrier due to the construction of the gas pipeline. The application report has been verified by DNV/41/. II. CDM consideration for the project by the parent company Beijing Sajili Energy Co., Ltd. as evidenced from the minute of the General Manager's meeting of Beijing Sajili Energy Co., Ltd on 26 December 2004 for the construction of the project based on CDM revenue /58/ It mentions in the meeting minute that the application report submitted by the project proponent was agreed and the proposed project with CDM will start up accordingly. The minute of the General Manager's meeting has been verified by DNV/58/. III. Approval letter from the parent company Beijing Sajili Energy Co., Ltd. on 04 January 2005 /41/. e) On 29 December 2004, Long-term

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			Take or Pay (ToP) contract was signed between PetroChina and Zhangjiagang Huaxing Electric Power Co., Ltd. /22/ and the project activity started. All the documents referenced above have been verified by DNV, and demonstrate that incentives from the CDM were seriously considered in the decision to proceed with the project activity. Real actions to secure CDM status were evidence through: a) On 05 January 2005, Construction Permit was issued by Jiangsu Xingyuan Electric Construction Supervision Co., Ltd. /18/. b) On 09 January 2005, the agreement for construction of the Zhangjiagang Nature Gas Power Generation Project was signed between Zhangjiagang Huaxing Electric Power Co., Ltd and the First Electric Power Construction Company of Jiangsu Province /65/. c) On 11 October 2005, Zhangjiagang Huaxing Power Co., Ltd. signed

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			the CDM Consultancy Agreement with Beijing Orient Fortune Investment Co., Ltd /42/. d) On 25 May 2006 Zhangjiagang Huaxing Electric Power Co., Ltd held a meeting with Beijing Orient Fortune Investment Co., Ltd for PDD development /66/. e) On 16 August 2006 the first CER purchase term sheet negotiation meeting was held between Zhangjiagang Huaxing Electric Power Co., Ltd and Arreon Carbon/67/ f) On 3 December 2006 the third CER purchase term sheet negotiation meeting was held between Zhangjiagang Huaxing Electric Power Co., Ltd and Arreon Carbon/68/ g) On 12 January 2007, the Certificate of Acceptance Test for the project was issued by Jiangsu Xingyuan Electric Construction Supervision Co., Ltd. and Jiangsu Power Test Design Institute Co. Ltd./73/. h) On 19 April 2007, Zhangjiagang

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			Huaxing Power Co., Ltd. signed the CER purchase agreement with Arreon Carbon /43/. i) On 30 April 2007, final accounting of expenditure of the proposed project was issued by Jiangsu Tianhua Dapeng Certified Public Accountants Co., Ltd./70/ j) Validation started in November 2007. The evidences were provided and verified by DNV. The CL is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CL 8 The spreadsheet for the calculation of the baseline emissions needs to be provided and all of data source need to be updated according the latest documents available at the time of PDD publicly on the website.	B.5.1 B.5.2 B.5.3	The calculation spreadsheet for the baseline emissions has submitted to DNV for validation and all of data sources have been updated. The data for calculation of the baseline emissions are sourced from <i>China Energy Statistics Yearbook</i>, <i>China Electric Power Yearbook</i> and IPCC. The time of PDD publicly on the website is November 24th 2007, so before this time, the latest available versions of the above-mentioned documents are <i>China Energy Statistics Yearbook 2006</i> which published on March 28th 2007, <i>China Electric Power Yearbook 2006</i> which published in December 2006 and <i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>.	OK The spreadsheet for the calculation of the baseline emissions has been verified by DNV and all of data source is according to the latest documents available at the time of PDD publicly on the website in latest PDD. The CL is closed.
CL 9 The spreadsheet for the calculation of leakage needs to be provided	B.6.1 B.6.2 B.6.3	The spreadsheet for the calculation of leakage has submitted to DNV for validation.	OK The spreadsheet for the calculation of leakage has been verified by DNV The CL is closed.
CL 10 The calibration interval for fuel flow meter needs to be provided.	B.9.8	The calibration interval for fuel flow meter is one year.	OK The CL is closed
CL 11 The data source of $F_{i,j,y}$ and $COEF_{i,j}$ need to be updated according the latest documents available before the time of PDD publicly on	B.10.2 B.10.3	The time of the PDD of the proposed project publicly on the website is November 24th 2007, so the data sources of $F_{i,j,y}$ and $COEF_{i,j}$ are <i>China Energy</i>	OK DNV could verify that the data source of $F_{i,j,y}$ and $COEF_{i,j}$ is according to the latest documents available before the

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
the website.		<i>Statistics Yearbook 2006 and 2006 IPCC Guidelines for National Greenhouse Gas Inventories</i> , and been updated in the latest PDD.	time of PDD publicly on the website in latest PDD. The CL is closed
CL 12 The starting date of the project needs to be defined with the evidence, such as the first investment for the project.	C.1.1	The project's start date is stated to be 29 December 2004, which is the signature date of Long-term Take or Pay (ToP) contract signed between PetroChina and Zhangjiagang Huaxing Electric Power Co., Ltd. /22/	OK DNV has assessed and verified the evidence and timeline for the starting date of the project activity as follows: On 06 March 2003, the Purchase Contract for the main equipments for the Zhangjiagang Nature Gas Power Generation Project was signed between Zhangjiagang Huaxing Electric Power Co., Ltd and GE /63/. However, the contract only became effective after signing the Long-term Service Agreement /63/. The Long-term Service Agreement was signed on 18 October 2005 between GE and Shanghai Tonghua Turbine Services Co., Ltd on behalf of four natural gas fired power plants (including Zhangjiagang Huaxing Electric Power Co.) /64/. Hence, the purchase contract of the main equipments of the proposed project was effective on 18 October 2005. On 29 December 2004, Long-term Take or Pay (ToP) contract was signed

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
			between PetroChina and Zhangjiagang Huaxing Electric Power Co., Ltd. /22/ On 05 January 2005, Construction Permit was issued by Jiangsu Xingyuan Electric Construction Supervision Co., Ltd. /18/. On 09 January 2005, the agreement for construction of the Zhangjiagang Nature Gas Power Generation Project was signed between Zhangjiagang Huaxing Electric Power Co., Ltd and the First Electric Power Construction Company of Jiangsu Province /65/. Hence, the signature date of Long-term Take or Pay (ToP) contract signed between PetroChina and Zhangjiagang Huaxing Electric Power Co., Ltd. /22/ can be considered the date when a commitment to significant expenditures was made and this is thus the starting date of the project activity. The CL is closed
CL 13 A renewable crediting period of 7 years starts from 1 January 2008, which is not reasonable.	C.1.2	The starting data of the first crediting period has changed to be 1 June 2009, or the official registration date, whichever is later. in the latest PDD.	OK The CL is closed

APPENDIX B

CERTIFICATES OF COMPETENCE



CERTIFICATE OF COMPETENCE

Kumaraswamy Chandrashekara

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	yes				
Technical Area	CDM Validator	CDM Verifier	Sector Expert	Methodology Expert	Technical Reviewer
Landfill gas	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Hydro power	Jan 2009	Jan 2009			
Renewables Wind power	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Other renewable	Jan 2009	Jan 2009			
Biomass	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Grid connection of isolated system	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Cement	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Waste-heat / waste-gas recovery	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
Efficiency of thermal power plants	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Coal mine methane	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Fuel switch	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Manure management	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Waste / wastewater treatment	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Energy efficiency	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
N ₂ O	Jan 2009	Jan 2009		Jan 2009	Jan 2009
HFCs	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
Flare reduction	Jan 2009	Jan 2009		Jan 2009	Jan 2009
PFCs	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Charcoal	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
CO ₂ recovery	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
Transport	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Non-renewable biomass	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Biofuel	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Pipeline leakage reduction	Jan 2009	Jan 2009		Jan 2009	Jan 2009
SF ₆	Jan 2009	Jan 2009		Jan 2009	Jan 2009

Høvik, 9 January 2009

Michael Lehmann

Michael Lehmann

Technical Director, Climate Change Services



CERTIFICATE OF COMPETENCE

Raman Venkata Kakaraparthi

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJi-i1)

GHG Auditor:	Yes				
Technical Area	CDM Validator	CDM Verifier	Sector Expert	Methodology Expert	Technical Reviewer
Landfill gas	Jan 2009				
Renewables	Jan 2009				
Hydro power	Jan 2009				
Wind power	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Other renewable					
Biomass	Jan 2009				
Grid connection of isolated system					
Cement					
Waste-heat / waste-gas recovery	Jan 2009	Jan 2009	Jan 2009		
Efficiency of thermal power plants			Jan 2009		
Coal mine methane					
Fuel switch			Jan 2009		
Manure management					
Waste / wastewater treatment	Jan 2009				
Energy efficiency	Jan 2009	Jan 2009	Jan 2009		
N ₂ O					
HFCs	Jan 2009	Jan 2009			
Flare reduction					
PFCs					
Charcoal					
CO ₂ recovery			Jan 2009		
Transport					
Non-renewable biomass					
Biofuel					
Pipeline leakage reduction					
SF ₆					

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CERTIFICATE OF COMPETENCE

zhi Ang (Walter) Tang

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJi-i1)

GHG Auditor:	Yes
Technical Area	CDM Validator CDM Verifier Sector Expert Methodology Expert Technical Reviewer
Landfill gas	
Hydro power	Jan 2009
Renewables Wind power	Jan 2009
Other renewable	
Biomass	
Grid connection of isolated system	
Cement	
Waste-heat / waste-gas recovery	
Efficiency of thermal power plants	
Coal mine methane	
Fuel switch	
Manure management	
Waste / wastewater treatment	
Energy efficiency	
N ₂ O	
HFCs	
Flare reduction	
PFCs	
Charcoal	
CO ₂ recovery	
Transport	
Non-renewable biomass	
Biofuel	
Pipeline leakage reduction	
SF ₆	

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CERTIFICATE OF COMPETENCE

Sun Shu Yong

Qualification in accordance with DNV's Qualification scheme for CDM/JI (ICP-9-8-i1-
CDMJi-i1

<i>GHG Auditor:</i>	Yes		
<i>CDM Validator:</i>	Yes	<i>JI Validator:</i>	--
<i>CDM Verifier:</i>	--	<i>JI Verifier:</i>	--
<i>Industry Sector Expert for Sectoral Scope(s):</i>	--		

Høvik, 6 November 2006

Einar Telnes
Director, International Climate Change Services

Michael Lehmann
Technical Director



CERTIFICATE OF COMPETENCE

Cuiping Deng

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJi-i1)

GHG Auditor:	Yes				
Technical Area	CDM Validator	CDM Verifier	Sector Expert	Methodology Expert	Technical Reviewer
Landfill gas					
Renewables	Hydro power	Jan 2009	Jan 2009		
	Wind power	Jan 2009	Jan 2009	Jan 2009	Jan 2009
	Other renewable				
Biomass					
Grid connection of isolated system					
Cement					
Waste-heat / waste-gas recovery					
Efficiency of thermal power plants					
Coal mine methane					
Fuel switch					
Manure management					
Waste / wastewater treatment					
Energy efficiency					
N ₂ O		Jan 2009			
HFCs					
Flare reduction					
PFCs					
Charcoal					
CO ₂ recovery					
Transport					
Non-renewable biomass					
Biofuel					
Pipeline leakage reduction					
SF ₆					

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CERTIFICATE OF COMPETENCE

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Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJ1-i1)

GHG Auditor:	Yes				
Technical Area	CDM Validator	CDM Verifier	Sector Expert	Methodology Expert	Technical Reviewer
Landfill gas	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Hydro power	Jan 2009	Jan 2009	Jan 2009		
Renewables Wind power	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Other renewable	Jan 2009	Jan 2009			
Biomass	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Grid connection of isolated system	Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
Cement	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Waste-heat / waste-gas recovery	Jan 2009	Jan 2009		Jan 2009	Jan 2009
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Fuel switch	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Manure management	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Waste / wastewater treatment	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Energy efficiency	Jan 2009	Jan 2009		Jan 2009	Jan 2009
N ₂ O	Jan 2009	Jan 2009		Jan 2009	Jan 2009
HFCs	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Flare reduction	Jan 2009	Jan 2009		Jan 2009	Jan 2009
PFCs	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Charcoal	Jan 2009	Jan 2009		Jan 2009	Jan 2009
CO ₂ recovery	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Transport	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Non-renewable biomass	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Biofuel	Jan 2009	Jan 2009		Jan 2009	Jan 2009
Pipeline leakage reduction	Jan 2009	Jan 2009		Jan 2009	Jan 2009
SF ₆	Jan 2009	Jan 2009		Jan 2009	Jan 2009

Høvik, 9 January 2009

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