



VALIDATION REPORT

LIAONING ZHANGWU PINGANDI WIND FARM PROJECT IN CHINA

REPORT No. 2011-9174

REVISION No. 02

DET NORSKE VERITAS



VALIDATION REPORT

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Client: Carbon Resource Management S.A.		Client ref.: Mr. Xie Xiaobing	

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Summary:

Project Name: Liaoning Zhangwu Pingandi Wind Farm Project

Country: China

Methodology: ACM0002

Version: 12.1.0

GHG reducing Measure/Technology: Power generation using wind energy

ER estimate: 99 110 tCO₂e per year (average)

Sector Scope: 01

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 project activity "Liaoning Zhangwu Pingandi Wind Farm Project" in China, as described in the PDD, version 2.0 of 18 July 2011, meets all relevant UNFCCC requirements for the CDM and correctly applies the baselines and monitoring methodology ACM0002, version 12.1.0. Hence DNV requests the registration of the projects as a CDM project activity.

Report No.: 2011-9174		Subject Group: Environment	
Report title: Liaoning Zhangwu Pingandi Wind Farm Project in China			
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Work verified by: Agnes Dudek			
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Validation

Clean Development Mechanism

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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CL	Clarification request
CM	Combined Margin
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent
DNA	Designated National Authority
DNV	Det Norske Veritas
DRC	Development and Reform Commission
EIA	Environmental Impact Assessment
ERPA	Emissions Reduction Purchase Agreement
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
LoA	Letter of Approval
MP	Monitoring Plan
NDRC	National Development and Reform Commission
NEPG	Northeast Power Grid
NGO	Non-governmental Organisation
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
PPA	Power Purchase Agreement
RMB	Renminbi, Chinese currency (Yuan)
tCO _{2e}	Tonnes of CO ₂ equivalents
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value-added tax



1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the project activity “Liaoning Zhangwu Pingandi Wind Farm Project” in China. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism 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 Fuxin Juyuan Wind Power Generation Co., Ltd. and Carbon Resource Management S.A.. The DNA from China confirmed that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology ACM0002, version 12.1.0 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”.

Fuxin Juyuan Wind Power Generation Co., Ltd. will displace electricity in the Northeast China Power Grid (NEPG). As a result, the project results in reductions of CO₂ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 99 110 tCO₂e per year over the selected 7 year renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

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

In summary, it is DNV’s opinion that the project activity “Liaoning Zhangwu Pingandi Wind Farm Project” in China, as described in the PDD, version 2.0, dated 18 July 2011, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0002, version 12.1.0. Hence, DNV requests the registration of the project as a CDM project activity.

Beijing and Oslo, 2011-07-27

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2 INTRODUCTION

Carbon Resource Management S.A. has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the “Liaoning Zhangwu Pingandi Wind Farm Project” in China (hereafter called “the project”). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC 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) /1/. 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 ACM0002 (version 12.1.0) /23/. The validation was based on the recommendations in the Validation and Verification Manual /22/.

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



3 METHODOLOGY

The validation consisted of the following three phases:

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

The following sections outline each step in more detail.

3.1 Desk review of the project design documentation

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

3.1.1 Documentation provided by the project participants

- /1/ Carbon Resource Management S.A.: *CDM-PDD for project activity "Liaoning Zhangwu Pingandi Wind Farm Project" in China*, Version 1.1 dated 21 December 2010 and version 2.0 dated 18 July 2011
- /2/ Shanxi Electric Power Survey & Design Institute: *Feasibility Study Report (FSR) of Liaoning Zhangwu Pingandi Wind Farm Project*, dated February 2010
- /3/ Development and Reform Commission of Liaoning Province: *Letter of approval on FSR of Liaoning Zhangwu Pingandi Wind Farm Project*, dated 10 February 2010
- /4/ Environmental Science Institute of Liaoning: *Environmental Impact Assessment (EIA)*, dated January 2010
- /5/ Liaoning Province Environment Protection Department: *Letter of approval on EIA*, dated 11 January 2010
- /6/ Fuxin Juyuan Wind Power Generation Co., Ltd.: *40 copies of Stakeholder consultation questionnaires*, dated June 2010
- /7/ Jilin Longxiang Engineering Construction Supervising Co., Ltd.: *Construction permission of the project*, dated 30 June 2010
- /8/ Fuxin Juyuan Wind Power Generation Co., Ltd. and Jilin Xiehe Power Engineering Co., Ltd.: *Construction & Installation contract of the project*, dated 20 June 2010
- /9/ Fuxin Juyuan Wind Power Generation Co., Ltd. and Xinjiang Goldwind Technology Co., Ltd.: *Wind turbine generator and tower purchase agreement for the project*, dated 18 May 2010
- /10/ Fuxin Juyuan Wind Power Generation Co., Ltd. and Zhongdian Electric Jiangsu Co., Ltd.: *35 kV box-transformers purchase agreement*, dated 24 June 2010
- /11/ Fuxin Juyuan Wind Power Generation Co., Ltd. and Sanbian Technology Co., Ltd.: *220 kV substation purchase agreement*, dated 20 May 2010
- /12/ Fuxin Juyuan Wind Power Generation Co., Ltd.: *CDM project notification form of the project to Chinese National Development and Reform Commission(NDRC)*, dated 10 May 2010
NDRC: *Notification approval*, issued on 17 May 2010
- /13/ Carbon Resource Management S.A.: *CDM prior consideration form of the project*,



- dated 17 May 2010
 UNFCCC secretariat: *Receipt of the notification for prior consideration of the CDM*, dated 17 May 2010
http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html
- /14/ Carbon Resource Management S.A.: *IRR calculation spreadsheet*, version 2.0, dated 1 June 2011
 Carbon Resource Management S.A.: *EF calculation spreadsheet and Emission Reduction spreadsheet for Liaoning Zhangwu Pingandi Wind Farm Project*, dated 18 July 2011
- /15/ Fuxin Juyuan Wind Power Generation Co., Ltd.: *The schedule report for the project*, dated 11 March 2011
- /16/ Fuxin Juyuan Wind Power Generation Co., Ltd.: *Board meeting of deciding to develop the proposed project as a CDM project activity*, 13 March 2010
- /17/ Fuxin Juyuan Wind Power Generation Co., Ltd. and Carbon Resource Management S.A.: *Emission Reduction Purchase Agreement (ERPA) for the project*, dated 10 April 2010
- /18/ Liaoning Province Price Bureau: *Approval on the on-grid tariff of Liaoning Zhangwu Pingandi Wind Farm Project in China (Liao Jia Han [2010]No.154)*, issued on 9 December 2010
- /19/ Jilin Longxiang Engineering Construction Supervising Co., Ltd.: *The construction progress report*, issued on 21 June 2011

3.1.2 Letters of approval

- /20/ National Development and Reform Commission (DNA of China): *Letter of Approval*, dated 12 August 2010
http://cdm.ccchina.gov.cn/website/CDM/pdf/Item_new/Item_new5561.pdf
- /21/ Department of Energy & Climate Change (DNA of United Kingdom of Great Britain and Northern Ireland): *Letter of Approval*, dated 31 March 2011
http://www.decc.gov.uk/assets/decc/what%20we%20do/global%20climate%20change%20and%20energy/tackling%20climate%20change/intl_strategy/mechanisms/clean_dev/1_20100527094605_e_@@_cdmukapprovedprojects.pdf

3.1.3 Methodologies, tools and other guidance by the CDM Executive Board

- /22/ CDM Executive Board: *Validation and Verification Manual*, version 1.2
http://cdm.unfccc.int/Reference/Manuals/accr_man01.pdf
- /23/ CDM Executive Board: *Consolidated baseline methodology for grid-connected electricity generation from renewable sources ACM0002*, version 12.1.0
<http://cdm.unfccc.int/UserManagement/FileStorage/VA17EM2PNDJWBTFY34KGRLZO68S9UQ>
- /24/ CDM Executive Board: *Tool for the demonstration and assessment of additionality*, Version 5.2
<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf>
- /25/ CDM Executive Board: *Tool to calculate the emission factor for an electricity system*,



Version 2.1.0

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.1.0.pdf>

- /26/ CDM Executive Board: *Guidance on the Assessment of Investment Analysis*, version 05, EB62 Annex 5.

http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

- /27/ CDM Executive Board: *Guidance for request for deviation titled "Application of AM0005 and AMS-I.D in China"*, dated 1 December 2005

<http://cdm.unfccc.int/Projects/deviations/87512>

- /28/ CDM Executive Board: *Guidelines for completing the project design document (CDM-PDD) and the proposed new baseline and monitoring methodologies (CDM-NM)*, Version 7

http://cdm.unfccc.int/Reference/Guidclarif/pdd/PDD_guid04.pdf

- /29/ CDM Executive Board: *Guidelines for the reporting and validation of plant load factors*, Version 01

http://cdm.unfccc.int/EB/048/eb48_repan11.pdf

- /30/ CDM Executive Board: *Information note on the highest tariffs applied by the executive board in its decisions on registration of projects in the People's Republic of China*, Version 02, dated 3 June 2011.

http://cdm.unfccc.int/Reference/Notes/reg_note07.pdf

- /31/ CDM Executive Board: *Guidance on the demonstration and assessment of prior consideration of the CDM*, Version 04

http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid04.pdf

3.1.4 Documentation used by DNV to validate / cross-check the information provided by the project participants

- /32/ NDRC: *China DNA's guidance for the determination of grid boundaries and emission factors*, issued on 20 December 2010

<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2552.pdf>

NDRC: OM calculation for China's regional grids, issued on 20 December 2010

<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2550.xls>

NDRC: BM calculation for China's regional grids, issued on 20 December 2010

<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2551.doc>

- /33/ NDRC and China Electricity Council: *The statistics on newly built thermal plants in 2008*, dated 20 December 2010

<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2551.doc>

- /34/ State Power Corporation of China: *Interim rules on economic assessment of electrical engineering retrofit projects*, published in 2003

- /35/ Editorial Committee of China Electric Power Yearbooks: *China Electric Power Yearbooks 2005 – 2009*

- /36/ National Bureau of Statistics and NDRC: *China Energy Statistics Yearbooks 2007, 2008 & 2009*

- /37/ IPCC: *2006 IPCC Guidelines for National Greenhouse Gas Inventories*, Volume 2 Energy, 2006



- /38/ NDRC: *Tariff policy notification for wind projects (Fagaijiage [2009]1906)*, issued on 20 July 2009 and entered into force on 1 August 2009
http://www.ndrc.gov.cn/jgggl/jggs/t20090727_292846.htm
NDRC: *Fagaijiage [2003]424*, issued on 28 May 2003 and entered into force on 10 June 2003
<http://www.chinalawedu.com/news/1200/22016/22034/22529/2006/3/wa00257132360020-0.htm>
NDRC: *Tariff notification for wind power project (Fagaijiage[2008]1876)*, issued on 23 June 2008
http://jgs.ndrc.gov.cn/zcfg/t20080813_230722.htm
NDRC: *Tariff notification for wind power project (Fagaijiage[2007]3303)*, issued on 3 December 2007
<http://www.chinapower.com.cn/article/1133/art1133293.asp>
- /39/ Website of Xinjiang Goldwind Technology Co., Ltd: *Introduction on wind turbine Generator Manufacturer of Xinjiang Goldwind Technology Co., Ltd*, dated March 2011
<http://www.goldwind.cn/web/news.do?action=detail&id=201005171204498000>
<http://www.goldwind.cn/web/news.do?action=detail&id=201005180212028789>
- /40/ China State Council: *Implementation regulations for the law of the People's Republic of China on enterprise income tax (Decree No.512)*, issued on 6 December 2007
http://www.gov.cn/zwgk/2007-12/11/content_830645.htm
- /41/ Chairman of the People's Republic of China: *Income tax law of the Peoples Republic of China for enterprises (Decree No. 63)*, issued on 16 March 2007 and entered into force on 1 January 2008
<http://www.chinaacc.com/new/63/67/88/2007/3/wa060911316191370021122-0.htm>
- /42/ China State Council: *Interim rules on additional tax for city development*", *Guofa [1985] No.19*, 8 February 1985
<http://www.tjtdxy.cn/show.aspx?id=1932&cid=69>
- /43/ China State Council: *Provisional regulations of the People's Republic of China on education surcharge*, 20 August 2005
http://www.law-lib.com/law/law_view1.asp?id=99771
- /44/ China State Council: *The interim statute of people's republic of China on value added tax (State Council Decree No.538)*, issued on 10 November 2008 and entered into force on 1 January 2009
http://www.gov.cn/flfg/2008-11/14/content_1149549.htm
- /45/ Ministry of Finance and the State Administration of Taxation: *Notification on VAT policy of comprehensive utilization of resource and other products (Caishui [2008] No.156)*, issued on 9 December 2008 and entered into force on 1 July 2008
<http://www.chinatax.gov.cn/n8136506/n8136593/n8137537/n8138502/8714515.html>
- /46/ Ministry of Finance and the State Administration of Taxation: *Notification regarding the reform of VAT across the country (Caishui [2008] No.170)*, issued on 19 December 2008 and entered into force on 1 January 2009
<http://www.chinatax.gov.cn/n8136506/n8136563/n8193451/n8193466/n8193602/8884823.html>

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- /47/ People website: *The demands for wind turbines and its accessories have exceeded its supply in the whole world in recent years*, dated 11 May 2007
<http://energy.people.com.cn/GB/5720709.html>
- /48/ China Daily website: *The prices of raw materials, man power and industry equipments are raising in recent years in China*, dated September 2007
http://www.chinadaily.com.cn/hqcj/2007-09/03/content_6075777.htm
- /49/ State Congress: *Law of the People's Republic of China on environmental impact assessment*, issued on 28 October 2002
<http://www.people.com.cn/GB/shehui/212/3572/3574/20021029/853043.html>
- /50/ State Economic and Trade Commission: *Technical administrative code of electric energy measuring(DL/T 448-2000)*, approved on 3 November 2000 and entered into force since 1 January 2001
- /51/ The General Office of the State Council: *Notice on strictly prohibiting the installation of fuel-fired generators with the capacity of 135 MW or below, Decree No.2002-6*, dated 15 April 2002
http://www.gov.cn/gongbao/content/2002/content_61480.htm
- /52/ 1) The biomass power generation is hardly to be applied in China due to its high investment cost and immature domestic technology:
NDRC website: *Biomass Generation in China*, dated March 2010.
http://www.sdpc.gov.cn/zjgx/t20071123_174054.htm
2) The solar PV faces the barriers of high cost:
China New Energy Website: *Solar PV industry in China*, dated November 2007.
<http://www.newenergy.org.cn/html/00711/3180816088.html>
- /53/ The geothermal power generation lacks the support of technology and policy:
China New Energy Website: *Geothermal Generation in China*, dated 7 August 2009.
<http://www.newenergy.org.cn/Html/0098/870929050.Html>
- /54/ Water Resource Bureau: *The water resource and agricultural irrigation in Zhangwu County*, dated 10 June 2001
<http://wenku.baidu.com/view/b5c51016866fb84ae45c8db7.html>
- /55/ China NDRC and National Construction Commission: *Economic evaluation methods and parameters for construction project*, Version 03, dated 2006
- /56/ UNFCCC website: *PDD publication for Liaoning Zhangwu Pingandi Wind Farm Project*, published on 26 January 2011.
<http://cdm.unfccc.int/Projects/Validation/DB/XQC2S8DNBUNFWCAQNRC5MDFC1CNJ7W/view.html>
- /57/ The demonstration wind projects in Liaoning Province:
1) Liaoning Xiaochangshan windfarm:
China Grid News Net: *The implementation of wind turbines control system*, dated 22 March 2005
<http://news.sina.com.cn/c/2005-03-22/18106162206.shtml>;
2) Liaoning Dachangshan windfarm:
China Grid News Net: *The implementation of wind turbines control system*, dated 22 March 2005



<http://news.sina.com.cn/c/2005-03-22/18106162206.shtml>;

3) Liaoning Zhangzidao windfarm:

The net of People's Government of Liaoning Province: *Introduction on Liaoning*, dated 31 December 2004

http://www.ln.gov.cn/zjln/lnnj/2004/26/200709/t20070914_130006.html

4) Liaoning Yingkou Xianrendao windfarm:

The net of Government of Yingkou: *Yingkou wind company develops wind projects to help emission reductions*, dated 23 August 2007

<http://www.yingkou.gov.cn/yk/jsp/common/content.jsp?articleId=17765&columnId=488&facolumnId=441>

5) Faku Sijiazi windfarm:

Shenyang Environment Protection Web: *Good wind resource in Faku County*, dated 9 May 2006

<http://www.syepi.com.cn/cykx/default.asp?cmd=show&id=1433>

6) Donggang windfarm:

Chinapower web: *Donggang wind farm was supported as Shuangjia Demonstration Project by State Economic and Trade Commission*

<http://www.chinapower.com.cn/yearbook/article/1995/30901004.html>;

7) Hengshan windfarm:

Shanghai Jiaoda Guotong Green Energy Company: *The utilization and forecast of wind energy in China*, dated 4 April 2002.

Available at the following link

<http://www.xjwind.com/download/%B7%C7%BC%BC%CA%F5%C2%DB%CE%C4/%D6%D0%B9%FA%B7%E7%C4%DC%BF%AA%B7%A2%C0%FB%D3%C3%CF%D6%D7%B4%D3%EB%D5%B9%CD%FB.pdf>

/58/ China Wind Energy Association:

1. *Statistics on China wind farm installed capacity 2007*, dated 24 March 2008

http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=31

2. *Statistics on China wind farm installed capacity 2008*, dated 17 March 2009

http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=36

3. *Statistics on China wind farm installed capacity 2009*, dated 10 June 2010

http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=39

/59/ State Council: *Power system reform*, Guofa[2002] No. 5, dated 10 February 2002

<http://www.energylaw.org.cn/html/news/2008/6/21/2008621151204878.html>

/60/ National Windpower Engineering Technology Research Center web:

The Liaoning Yingkou xianrendao windfarm project splitted up into several phases, dated 20 May 2006

<http://www.nwtc.cn/Article/ShowArticle.asp?ArticleID=1246>

The Donggang windfarm project splitted up into several phases, dated 20 May 2006

<http://www.nwtc.cn/Article/ShowArticle.asp?ArticleID=1241>



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

- 1.Changes related to the CAR and CLs identified in DNV's draft validation report;
- 2.The version of applied methodology ACM0002 was updated to the latest version 12.1.0;
- 3.The starting date of the crediting period was changed from 1 March 2011 to 15 August 2011.
- 4.The *"Tool to calculate the emission factor for an electricity system"* was updated to the latest version 2.1.0
5. The *"Guidance on the Assessment of Investment Analysis"* was updated to the latest version 05.
6. The *"Guidance on the demonstration and assessment of prior consideration of the CDM"* was updated to the latest version 04.
7. The *"Information note on the highest tariffs applied by the executive board in its decisions on registration of projects in the People's Republic of China"* was updated to the latest version 02.

After reviewing the revised PDD (version 2.0 dated 18 July 2011), DNV issued this final validation report and opinion.

3.2 Follow-up interviews with project stakeholders

On 17 March 2011, Mr. Jiang Zhi and Mr. Li Cheng from DNV performed an interview in DNV Beijing office with the representatives of Fuxin Juyuan Wind Power Generation Co., Ltd. and Carbon Resource Management S.A. to resolve issues identified during the document review.

During the desk review, the relevant documents including the PDD /1/, the FSR /2/ and the EIA /4/ were provided and assessed. The information about this project was able to be confirmed from these documents. The project is a newly built wind farm power project without the utilization of existing facilities. Through the documents provided by the project participant, which include the PDD, the FSR, the EIA, the contracts and other relevant background documents /1-/18/, DNV could confirm the project design, construction, operation and monitoring plan and all baseline scenario information.

According to the EIA /4/ and FSR /2/, no migration was involved in this project. Moreover, the construction of the project commenced on 30 June 2010 as per the construction permission /7/. Up to the validation commencement on 17 March 2011, the proposed project has not started to generate electricity yet /15/. Furthermore, according to the latest construction progress report issued by the supervising company on 21 June 2011 /19/ at the time of the technical review on the project, the construction of the projects has still not completed. Thus, no further issues could be assessed through on site visit. Therefore, DNV can justify that a physical site visit for this project was not necessary during the validation process.

The main topics of the interviews are summarised in table below.

Date	Name	Organization	Topic
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/61/	2011-3-17	Mr. Du Shuyao General manager assistant	Fuxin Juyuan Wind Power Generation Co., Ltd. (Project owner)	➤	Project background information.
				➤	Project technology, operation, maintenance and monitoring capability.
/62/	2011-3-17	Ms. Li Xia Project manager	Carbon Resource Management S.A. (Consultant company and the CER buyer)	➤	Project monitoring and management plan.
				➤	Project approval status (incl. EIA, FSR and CDM project)
				➤	Stakeholder consultation process
				➤	Applicability of selected methodology.
				➤	Baseline determination.
				➤	Project additionality.
				➤	Emission reductions calculation.
				➤	Monitoring plan

3.3 Resolution of outstanding issues

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

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

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "Liaoning Zhangwu Pingandi Wind Farm Project" in China is enclosed in Appendix A to this report.

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

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

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



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



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

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

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

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

Figure 1 Validation protocol tables



3.4 Internal quality control

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

3.5 Validation team

<i>Role</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>						
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 1.2 competence	Financial expertise
Team leader (Validator) from April 2011 onwards	Lin	Wu	China	✓		✓	✓		✓	
Assessor under training	Li	Cheng	China	✓	✓	✓				
Validator (Team leader) prior to April 2011	Jiang	Zhi	China	✓	✓	✓			✓	
Financial expert prior to April 2011	Zhao	Qifeng	China	✓		✓				✓
Financial expert from April 2011 onwards	Huang	Wenhu	China	✓		✓				✓
Technical reviewer	Dudek	Agnes	Norway					✓	✓	

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



4 VALIDATION FINDINGS

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

The final validation findings relate to the project design as documented and described in the PDD, version 2.0 dated 18 July 2011 /1/.

4.1 Participation requirements

The project participants are Fuxin Juyuan Wind Power Generation Co., Ltd. and Carbon Resource Management S.A.. The host Party (China) and the Annex I Party (United Kingdom of Great Britain and Northern Ireland) meet all relevant participation requirements.

A letter of approval (LoA) /20/ was issued by DNA of China on 12 August 2010, authorizing Fuxin Juyuan Wind Power Generation Co., Ltd. of China as the project participant and confirming that the project assists in achieving Chinese sustainable development. The DNA of United Kingdom of Great Britain and Northern Ireland issued the LoA /21/ on 31 March 2011 and authorized Carbon Resource Management S.A. as project participant.

The letters of approval were received from the project participants. DNV has checked the links from DNAs of China /20/ and United Kingdom of Great Britain and Northern Ireland /21/, DNV confirmed the authenticity and validity of LoAs, which are in compliance with the paragraph 45-48 of the VVM /22/.

4.2 Project design

The Liaoning Zhangwu Pingandi Wind Farm Project is located in Houxinjiu Town, Zhangwu County, Fuxin City, Liaoning Province, P. R. China. The central coordinate of the wind farm is longitude 122°43' east and latitude 42°38' north /2/, and the coordinates of each wind turbine are listed in the PDD, which both have been verified by DNV.

The project involves the installation and operation of 33 wind turbines with each unit 1.5 MW, thus constituting a total generation capacity of 49.5 MW /2/. The electricity delivered to the Northeast Power Grid (NEPG) is expected to be 98 100 MWh at a load factor of 22.6% /2/.

The wind turbine-generators (type GW82/1500) for the proposed project are manufactured in China by Xinjiang Goldwind Technology Co., Ltd. /9/ using the domestic advanced wind power technology /39/. The technology is deemed to reflect current good practice in China /39/.

Being a renewable electricity project, the project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions from electricity generation by fossil fuel power plants, which are connected to the grid. Each of the 33 turbines is connected with one 35 kV box transformer on site and these 33 box transformers are connected via a bus bar of transmission lines with 220 kV Zhangdong substation which is connected to the grid.

The project's system boundaries are clearly defined as the NEPG, which is in line with the delineation of the grid boundaries regulated by DNA of China /32/.



The starting date is defined as 18 May 2010, which is the date of turbine generator and tower purchase agreement /9/. The construction permission for the project was issued on 30 June 2010 /7/ and the construction agreement for the project was signed on 20 June 2010 /9/. The relevant evidences have been verified by DNV /7/ /8/ /9/ /10/ /11/. Therefore, it is DNV's opinion that this date correctly represents the earliest date of financial commitment.

The expected operational lifetime of the project activity is 20 years as per the FSR /2/, which is deemed to be realistic by DNV. A renewable crediting period of 7 years has been chosen for the project, starting from 15 August 2011 or the date of registration, whichever is later. The emission reductions are estimated to be 99 110 tCO₂e/year and 693 770 tCO₂e over the renewable 7-year crediting period.

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

4.3 Application of selected baseline and monitoring methodology

The project correctly applies the approved baseline methodology ACM0002 (version 12.1.0), titled "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*" /23/.

The applicability of this methodology is justified since:

- The project is a greenfield wind power project with the installation capacity of 49.5 MW, which has been confirmed from the FSR /2/;
- The project does not involve switching from fossil fuels to renewable energy sources at the site of the project activity, as confirmed by the FSR /2/;
- The electricity from the project activity is proposed to be supplied to the NEPG, and information on the characteristics of the NEPG can be clearly identified /32/.

The assessment of the project's compliance with the applicability criteria of ACM0002 (version 12.1.0) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

4.4 Project boundary

The spatial extent of the project boundary is clearly defined as the proposed project and all power plants connected physically to the NEPG including Heilongjiang, Jilin and Liaoning provincial grids, to which the project is connected. This is in line with the delineation of grid boundaries as provided by the DNA of China /32/. The defined project boundary is in line with ACM0002 (version 12.1.0).

Emission sources and gases included in the project boundary are:

	GHGs involved	Description
Baseline emissions	CO ₂	Emissions equivalent to the same quantity of electricity generated by the project activity, which would have been otherwise generated in the fossil fuel intense grid as reflected by the grid



		<p>emission factor.</p> <p>The baseline emission factor for the project is determined <i>ex-ante</i> as a combined margin, consisting of the operating margin (OM) and build margin (BM) of the NEPG.</p>
Project emissions	N/A	Project emissions are regarded as zero as the project is a renewable energy (wind source) project.
Leakage	N/A	There are no leakages that need to be considered in applying this methodology.

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by ACM0002 (version 12.1.0).

4.5 Baseline identification

Since the project can be demonstrated additional, cf. Section 4.6, the baseline scenario for the project activity is defined directly by the methodology ACM0002 (version 12.1.0) /23/ as the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”. The weighting is set to be 75% and 25% for OM and BM emission factors, respectively /32/.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumptions and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario was correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sector policies and circumstances are considered and listed in the PDD.

4.6 Additionality

The additionality of the project has been demonstrated by applying the “Tool for the demonstration and assessment of additionality” version 5.2 /24/ approved by the CDM-EB.



4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status

Project start date:

The starting date of the project activity is defined as 18 May 2010, which is the date of the wind turbine generators and towers purchase contract /9/. This is considered the earliest financial commitment for the project activity. The evidences for determine the starting date of the project activity have been assessed and verified by DNV as follows:

- Wind turbine generators and towers purchase contract has been signed between Fuxin Juyuan Wind Power Generation Co., Ltd. and Xinjiang Goldwind Technology Co., Ltd on 18 May 2010 /9/.
- 220 kV substation purchase agreement has been signed between Fuxin Juyuan Wind Power Generation Co., Ltd. and Sanbian Technology Co. Ltd. on 20 May 2010 /11/.
- 35 kV box-transformers purchase agreement has been signed between Fuxin Juyuan Wind Power Generation Co., Ltd. and Zhongdian Electric Jiangsu Co., Ltd. on 24 June 2010 /10/.
- Construction Permission of the project has been issued by Jilin Longxiang Engineering Construction Supervising Co., Ltd. on 30 June 2010 /7/.

It is DNV's opinion that 18 May 2010 correctly represents the earliest financial commitment to the project activity.

Prior consideration of CDM:

Since the starting date of 18 May 2010 is after 2 August 2008 and prior to the start of validation, in line with the latest the CDM EB guidance /31/, the prior consideration of CDM for the project activity was demonstrated as follows:

- A commencement notification letter for Liaoning Zhangwu Pingandi Wind Farm Project was sent by Fuxin Juyuan Wind Power Generation Co., Ltd. to the Chinese DNA on 10 May 2010 /12/;
- Carbon Resource Management S.A. submitted to the UNFCCC secretariat the prior consideration of the CDM form on 17 May 2010. This was confirmed by UNFCCC secretariat through its website on 17 May 2010 /13/.

Notifications were thus submitted within 6 months of the project activity start date, thereby it is justified that the CDM was seriously considered in the decision to proceed with the project activity in accordance

Continuous actions to secure CDM status:

After the project starting date, the validation started on 26 January 2011 by publishing the PDD on the UNFCCC website. Since no gap of more than two years between the starting date and the start of validation were identified, sufficient efforts to secure CDM status were confirmed.

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



4.6.2 Identification of alternatives to the project activity

The alternative baseline scenarios for the project activity have been suitably identified as:

Alternative 1: the proposed project activity undertaken without being registered as a CDM project activity.

Alternative 2: construction of a fossil fuel-fired power plant with equivalent annual electricity generation.

Alternative 3: A power plant using other source of renewable energy with the comparable capacity or electricity generation, such as PV, biomass and hydro, etc.

Alternative 4: equivalent electricity service provided by the NEPG.

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

Alternative 2: This scenario is not consistent with the regulation “*Notice on strictly prohibiting the installation of thermal power generation units with the capacity of 135 MW or below*” /51/. Considering the same annual power output, the alternative baseline scenario for the project should be a fossil fuel-fired power plant with installed capacity 17.78 MW (the average generating hours for fossil fuel power plants are 5 516 hours in Liaoning province /35/). However, thermal power plants with a capacity less than 135 MW are prohibited to be built in areas covered by large grids such as provincial grids. Hence, alternative 2 can not be considered as a realistic and credible alternative.

Alternative 3: Due to the high cost and domestic technical developing status, biomass and solar PV generation are difficult be operated because of the high cost /52/; geothermal generation is also in need of support from national policy and hard to be put into practice /53/; As the proposed project located in the water resource-lacking area /54/, it is not appropriate to develop hydropower project there. Therefore, other sources of renewable energy are not feasible. The alternative 3 can be eliminated.

Based on above discussion, alternative 2 and 3 are not realistic and credible alternatives and thus can be excluded. It has been adequately demonstrated that alternative 1 and 4 are the alternatives consistent with current laws and regulations as potential alternatives and thus will be discussed at the next stage.

4.6.3 Investment analysis

Choice of approach

As the proposed project generates financial and economic benefits other than CDM related income through the sales of electricity and the alternative to the project does not involve and investment, a benchmark analysis was justified for conducting the investment analysis.

Benchmark selection

According to the “*Interim rules on economic assessment of electrical engineering retrofit projects*” /34/, in China a project-IRR of 8% (post tax) of a project is regarded as a benchmark for investing in wind farm projects. The benchmark of 8% (post tax) is therefore appropriate for this project. DNV was also able to confirm that the selected benchmark is suitable and reasonable for the proposed project as shown below:

- a. The benchmark was determined by the national administration of this industry in China /34/, and represents a government/official approved benchmark;

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- b. The benchmark is for project-IRR and after tax and the investment analysis for this project is also for project and after tax;
- c. The “*Interim rules on economic assessment of electrical engineering retrofit projects*” /33/ is referred to the risk premiums of large scale wind farm power projects;
- d. The “*Interim rules on economic assessment of electrical engineering retrofits projects*” /33/ is still valid now.

Input parameters

A FSR in China is required to be developed by a qualified third party, like Shanxi Electric Power Survey & Design Institute, accredited for this task directly by the Chinese government. An approval letter of the FSR is issued by the Chinese government only after it passes the public assessment of the sector experts designated by the government. It is in DNV’s opinion that the FSR can be regarded as an accurate and trustworthy source of information coming from a recognized entity once it has the approval letter from the government.

The input parameters used in the financial analysis of this project activity are all taken from the FSR developed by Shanxi Electric Power Survey & Design Institute in February 2010 and approved by Development and Reform Commission of Liaoning Province on 10 February 2010 /3/. Thus, it can be considered as information provided by an independent and recognized source.

DNV compared the input parameters for the financial analysis included in the PDD /1/ and IRR calculation spreadsheet /14/ with the parameters stated in the FSR /2/ and was able to confirm that the values applied are consistent with the value stated in the FSR /2/.

The FSR was finalized in February 2010 and was approved on 10 February 2010 by Development and Reform Commission of Liaoning Province, more than 3 months prior to the decision to the decision to proceed with the project activity (i.e. the start date of the project), was on 18 May 2010. Given this relatively short period of time between approval of FSR and the decision to proceed with the project activity, it is unlikely in the context of the project that the input value would have materially changed and it is thus reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project.

Furthermore, the input parameters used in the financial analysis were compared with the data reported for all registered CDM wind power projects developed in the same area Liaoning Province (refer to Table 1 below), by comparing the investment costs per kW, other cost, percentage of annual O&M costs relative to total static investment, as shown in the following table:



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Table 1: Comparison of investment cost per kW, other costs, percentage of annual O&M costs relative to total investment and electricity tariff of all registered wind power projects in Liaoning province

Project name	UNFCCC Ref. No.	Installed capacity (MW)	Investment cost per kW (RMB/kW)	Other cost (RMB/kW)	Percentage of O&M costs relative to total investment cost (%)	Depreciation Period (years)	Residual value rate (%)
Liaoning Kangping 24.65MW Wind Farm Project	537	24.7	9 267	-	-	-	-
Liaoning Zhangwu 24.65MW Wind Farm Project	539	24.7	9 221	-	-	-	-
Liaoning Changtu Wind Farm Project	883	49.5	8 457	19	2.9	-	-
Liaoning Huanren Niumaodashan Wind Power Project	1501	24.7	9 146	60	4.0	12	4.0
Liaoning Xingcheng Haibin Wind Farm Project	1446	49.5	8 912	36	2.3	15	2.5
Liaoning Changtu Quantou Wind Power Project	3806	49.3	8 449	40	3.2	15	3.0
Liaoning Faku 1st phase Wind Power Project	2223	49.5	9 589	10	2.1	13	4.0
Liaoning Faku Baijiagou Wind Power Project	2123	49.5	8 923	38	2.4	15	5.0
Liaoning Faku Heping Wind Power Project	1924	49.3	8 733	45	2.5	15	4.0
Liaoning Faku Wanghaisi East Wind Power Project	1965	22.1	8 812	50	4.4	12 (equipment)/ 20 (building)	10.0
Liaoning Changtu Shihu Wind Power	2817	49.3	8 306	30	3.2	15	10.0



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Project							
Shenyang Faku Wanghaisi Wind Power Project	2854	20.4	8 381	37	2.6	15	10.0
Liaoning Kangping Furaoshan Wind Power Project	2864	49.5	8 375	50	2.9	15	10.0
Liaoning Fuxin Gaoshanzi 100.5MW Wind Power Project	3344	100.5	9 952	14	2.4	15	5.0
Liaoning Changtu Taiyangshan Phase One 49.5MW Wind Farm Project	3031	49.5	10 283	25	2.1	12	4.0
Huaneng Liaoning Fuxin Phase II Wind Farm Project	2918	300	10 338	17	2.2	13	5.0
Liaoning Province Zhangwu Mazongshan Wind Farm Project	3112	49.5	10 744	40	2.7	17	5.0
Liaoning Faku Ciensi Wind Power Project	3470	49.3	9 503	45	2.8	15	5.0
Diaobingshan New-built 49.5 MW Wind Power Station Porject	2149	49.5	8 650	-	2.9	15	0
Dalian Tuoshan Wafangdian Wind Farm Project	2827	49.5	10 426	45	3.1	17	10.5
Liaoning Xingcheng Liutaizi Wind Farm Project	3443	49.5	9 116	21	-	15	5.0
Huaneng Fuxin Phase II Wind Farm Project	3867	100.5	10 179	13	2.3	15	4.0



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Guodian Linghai Qingsong Wind Farm Project	3894	48	10 623	-	2.1	15	5.0
Liaoning Qujiagou Wind Farm Project	3862	49.5	9 343	40	3.0	14	5.0
Liaoning Linghai Shengli Wind Farm Project	3934	49.5	9 810	21	1.8	15	5.0
Liaoning Changtu Manjing Wind Power Project	4059	49.5	10 183	30	3.0	15	5.0
Huadian Tieling Zhenxibao Wind Farm Project	4415	48	10 331	17	2.3	15	5.0
Dalian Tuchengzi Wind Power Project	4067	30	8 150	18	3.0	15	5.0
The proposed project	-	49.5	9 899	40	2.4	15	5.0

1) Investment Cost

The investment costs used in the financial analysis were compared with the data reported for registered CDM wind power projects in the same region Liaoning Province. As shown in Table 1, the investment cost per kW for the proposed project (9 899 RMB/kW) is within the range of the investment per kW (8 150 RMB/kW to 10 744 RMB/kW). Therefore, the investment cost per MW is deemed to be reasonable for the project.

In addition, the investment costs were cross-checked against the costs at the time of the financial commitment. DNV has verified the signed contracts for the costs of purchasing turbine generators and towers /9/, main transformer /11/, box-transformers /10/ and their construction & installation /8/, and confirmed that the total amounts resulting from these contracts is 461.6 million RMB. DNV confirmed that the costs of these items in the FSR contribute about 94.2% of the total static investment of the project as stated in the FSR /2/. It was found that the actual costs stated in the contracts for these items are 8.3% higher than the estimated corresponding amounts of 426.2 million RMB in the FSR /2/. Therefore, the total static investment in the FSR is deemed to be reasonable and appropriate by DNV.

2) O&M costs

The O&M costs for wind power projects mainly consists of maintenance costs, salary and welfare for the employees, insurance of the fixed assets, material cost and other costs. For the wind power projects, the O&M cost may vary by site location, conditions for transportation, applied technology, number of turbines and regional inflation. As shown in



Table 1 above, the percentage of O&M costs relative to total static investment costs for the proposed project (2.4%) /14/ is within the range of the registered CDM wind power projects (1.8% to 4.4%) located in the same region. Hence, in DNV's opinion, the O&M costs considered for the proposed project are reasonable.

Other costs

Other cost refers to additional production expenses, administrative expenses and operating expenses, except depreciation, maintenance, insurance, material, salary and welfare, which was considered as the financing assessment and source for preparing the FSR and found to be consistent with the *Economic evaluation methods and parameters for construction project* /52/.

Moreover, the "other costs" of the proposed project was compared with the registered CDM wind power projects in Liaoning province. DNV has checked and found that the "other costs" (40 RMB/kW) of the proposed project used in the investment analysis is within the range of the registered CDM wind power projects in Liaoning Province (10~60 RMB/kW).

In addition, even when the "other cost" is assumed to be zero, the project IRR is 6.77% and is still below the benchmark of 8%. Thus, the "other costs" of 40 RMB/kW used in the project is reasonable.

3) Annual power generation

According to the FSR /2/, it is expected that the project will supply electricity 98 100 MWh per year, at a plant load factor of 22.6%. Annex 11 of CDM EB's 48th meeting report /29/ gives a guideline for validation of plant load factor for renewable energy. One option is to use plant load factor provided to the government while applying the project activity for implementation approval. The FSR has this purpose and hence according to current CDM regulations, by checking that the values are in line with the FSR should be considered sufficient for validation of plant load factor. This was the case for this project.

According to the FSR /2/, the annual electricity output was determined based on the meteorological data from 1978 to 2007 of the wind resource in the local area and one year onsite wind resources measurement (1 January 2007 to 31 December 2007) /2/. The professional WAsP software was used to select the rich wind source area, and then using software WindFarmer to optimize the location of each turbine for maximize power generation. The revised data was put in the professional WAsP software to calculate the annual theoretical power generation from which the annual effective power generation was obtained through discount by considering factors such as air density, trailing stream, wind turbine efficiency etc. DNV was able to confirm that the assumed annual grid connected output from the FSR is appropriate and acceptable.

4) Tariff

The electricity tariff of 0.61 RMB/kWh (incl. VAT) applied for the proposed project was derived from the approved FSR /2/, which is consistent with the tariff guideline "Notice on the on-grid tariff management policy for wind power generation from NDRC of China", Fagajjage [2009]1906 /38/, dated 20 July 2009. It is stated in the tariff management document Fagajjage [2009]1906 /38/ that there are four wind resource regions in China base on the analysis of wind energy resources and standard for engineering constructions. The tariff for wind power projects located in Liaoning Province is 0.61 RMB (incl. VAT) for the



proposed project activity. DNV has verified the notifications for wind power electricity tariff issued by NDRC in recent years /38/, and can confirm that there is no other tariff guidance for the Liaoning province. Thus, DNV can confirm that the tariff applied in the proposed project is the latest value available when the investment decision was made and also the highest value, and thus it is reasonable.

In China, the electricity power system was implemented by the state council in 2002 which led to a diversification in the ownership of power generation and the tariff reform /59/. After the reform, power companies and grid companies were separated to be more market oriented, as a result, power projects prior to 2002 enjoyed higher electricity price than projects after 2002.

By checking *China Wind Power Statistic in 2007 2008 and 2009* /58/ and UNFCCC website, it was found that there were a total of 36 wind power projects in Liaoning Province after 2002 till now (refer to Table 2 below). Except for 7 projects which were demonstration projects and tariff of which are not publicly available /57/, the tariff of the remaining 29 projects were ranging from 0.45 RMB/kWh to 0.61 RMB/kWh (incl. VAT) as shown in the table below. This further substantiate that the expected tariff used in the FSR of the proposed project 0.61 RMB/kWh (incl. VAT) /38/ is reasonable.

Table 2 Wind Power Project in Liaoning Province after 2002

No	Project name	Commissioning Date	Installed Capacity (MW)	Tariff Incl.VAT (RMB/kWh)	Tariff source	Tariff Approval Time	Note
Non CDM projects in Liaoning Province							
1	Liaoning Xiaochangshan windfarmC	December 2002	3.6	-	-	-	Demonstration
2	Liaoning Dachangshan windfarm	December 2003	3.6	-	-	-	Demonstration
3	Liaoning Zhangzidao windfarm	July 2002	3.0	-	-	-	Demonstration
4	Liaoning Yingkou xianrendao windfarm	July 1999-June 2006	32.66	-	-	-	Demonstration
5	Faku Sijiazi windfarm	July 2002	9.6	-	-	-	Demonstration
6	Donggang windfarm	November 1994 –April 2002	22.45	-	-	-	Demonstration
7	Hengshan windfarm	July 1993 – May 2002	7.4	-	-	-	Demonstration
CDM projects in Liaoning Province							
8	Liaoning Kangping 24.65MW Wind Farm Project	The first part capacity commissioned in June 2003, the second	24.65	0.55 for the first part capacity (10.2MW), and 0.61 for the second part capacity (14.45MW)	Fagaijiage [2003]424 Fagaijiage [2007]3303	28 May 2003	Registered in EB: 0537



		part capacity commissioned in February 2006					
9	Liaoning Zhangwu windfarm	The first part capacity commissioned in October 2003, the second part capacity commissioned in February 2006	24.65	0.55 for the first part capacity (10.2MW), and 0.61 for the second part capacity (14.45MW)	Fagaijiage [2003]424 Fagaijiage [2007]3303	28 May 2003	Registered in EB: 0539
10	Liaoning Changtu wind Farm Project	December 2006	49.5	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB: 0883
11	Liaoning Huanren Niumaodashan Wind Power Project	15 May 2006	24.65	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB: 1501
12	Liaoning Xingcheng Haibin Wind Farm Project	24 November 2006	49.5	0.51	Local DRC	27 September 2007	Registered in EB:1446
13	Liaoning Changtu Quantou Wind Power Project	1 October 2010	49.3	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB:3906
14	Liaoning Faku 1st phase Wind Power Project	15 March 2008	49.5	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB:2223
15	Liaoning Faku Baijiagou Wind Power Project	17 August 2008	49.5	0.61	Fagaijiage [2008]1876	23 June 2008	Registered in EB:2123
16	Liaoning Faku Heping Wind Power Project	3 April 2008	49.3	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB:1924
17	Liaoning Faku Wanghaisi East Wind Power Project	29 July 2007	22.1	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB: 1965
18	Liaoning Changtu Shihu Wind Power Project	18 February 2008	49.3	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB: 2817
19	Shenyang Faku Wanghaisi Wind Power Project	6 November 2006	20.4	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB: 2854
20	Liaoning Kangping Furaoshan Wind	28 May 2007	49.5	0.61	Liaoning Price Bureau,	12 July 2006	Registered in EB:2864



VALIDATION REPORT

	Power Project				No.2006-181		
21	Liaoning Changtu Taiyangshan Phase One 49.5MW Wind Farm Project	18 November 2008	49.5	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB: 3031
22	Huaneng Liaoning Fuxin Phase II Wind Farm Project	30 June 2008	300	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB: 2918
23	Liaoning Province Zhangwu Mazongshan Wind Farm Project	28 September 2009	49.5	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB: 3112
24	Liaoning Fuxin Gaoshanzi 100.5MW Wind Power Project	1 January 2008	100.5	0.61	Fagaijiage [2008]1876	23/07/2008	Registered in EB: 3344
25	Liaoning Faku Ciensi Wind Power Project	17 August 2009	49.3	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB:3470
26	Liaoning Xingcheng Liutaizi Wind Farm Project	28 September 2007	49.5	0.51	Local DRC	23 September 2006	Registered in EB:3443
27	Liaoning Linghai Shengli Wind Farm Project	10 January 2008	49.5	0.51	Linghai Development and Reform Commission	18 October 2007	Registered in EB: 3934
28	Liaoning Changtu Manjing Wind Power Project	28 October 2008	49.5	0.61	Fagaijiage [2007]3303	3 December 2007	Registered in EB: 4059
29	Liaoning Qujiagou Wind Farm Project	20 July 2008	49.5	0.61	FaGaiJiaGe [2009]1906	20 July 2009	Registered in EB: 3862
30	Liaoning Linghai Nanxiaoliu Wind Farm Project	20 January 2007	49.5	0.51	Reply on Tariff from Linghai Development and Reform Commission1 876	23 August 2006	Applying for CDM project
31	Liaoning Chaoyang Lishugou Wind Power Project	4 January 2011	49.5	0.61	FaGaiJiaGe [2009]1906	20 July 2009	Applying for CDM project
32	Liaoning Faku Yemaotai Wind Power Project	27 November 2010	49.5	0.61	FaGaiJiaGe [2009]1906	20 July 2009	Applying for CDM project
33	Liaoning Kangping Fangjia Wind Power Project	19 February 2011	49.5	0.61	FaGaiJiaGe [2009]1906	20 July 2009	Applying for CDM project
34	Liaoning Kangping Zhangqiang Wind Power Project	4 May 2009	49.5	0.6203 before accumulat-	Fagaijiage[2007]1260	9 June 2007	Applying for CDM project



				ive operation 30 000 hours, 0.4500 after accumulat- ive operation 30 000 hours			
35	Liaoning Julonghu Wind Farm Project	29 June 2009	49.5	0.61	FaGaiJiaGe [2009]1906	20 July 2009	Applying for CDM project
36	Liaoning Xidayingzi Wind Farm Project	29 June 2009	49.5	0.61	FaGaiJiaGe [2009]1906	20 July 2009	Applying for CDM project

From the tariff list for the wind power projects in Liaoning Province, the tariff of these projects is ranging from 0.45 RMB/kWh to 0.61 RMB/kWh (incl. VAT), which were evidenced by the tariff approval letters /38/. The applied tariff 0.61 RMB/kWh (incl. VAT) for all years of operation is the most common and highest tariff for the region.

Furthermore, CDM Executive Board issued the “*Information note on the highest tariff applied by the EB in its decision on registration of projects in the People’s Republic of China*” in EB 61 Para 78, which states that the highest tariff for wind power project in Liaoning Province is 0.61 RMB/kWh (incl. VAT) /30/. Therefore, the electricity tariff applied in the proposed project 0.61 RMB/kWh (incl. VAT) as the highest tariff after 2002 in Liaoning Province will be reasonable.

5) Taxes

The taxes and depreciation rate applied in the project financial assessment are shown in the following table:

Table 3 Tax rates involved in the project

Value added tax (VAT)	17%
Revenue tax	25%
Rate of residual value	5%
Depreciation period (years)	15
Education tax(of VAT)	3%
City Build tax (of VAT)	5%

(a) VAT for equipment

17% VAT is paid as usual for purchased goods. According to the “Interim statute of people's republic of China on value added tax (State Council Decree No.538)” /44/, the equipment VAT can be credited over the operation period against the tariff VAT until the VAT from the equipment VAT is fully recovered. For the proposed project, this happens in the 8th year (7th year of the operation period).



(b) VAT on tariff

The VAT rate on the tariff of 17% applied to the financial analysis is substantiated by the following arguments.

On 10 November 2008, the “*Interim statute of People’s Republic of China on value added tax (State Council Decree No. 538)*”/44/ was issued and entered into force on 1 January 2009. In this statute, the VAT occurred on the sales of electricity was stipulated to be 17%.

On 9 December 2008, the “*Notice of the Ministry of Finance and the State Administration of Taxation about policies regarding the value added tax on comprehensive utilization of resources and other products (No.156 [2008])*” /45/ was issued. As stipulated in this notice, VAT refund half upon levy shall be applicable for selling the electricity generation from wind power etc. The regulation entered into force on 1 January 2009.

(c) Income tax

The income tax rate (25%) is derived from the FSR /2/, which is in line with “*Income tax law of the Peoples Republic of China for enterprises*” (Decree No. 63) /41/, issued on 16 March 2007 and came into force on 1 January 2008. Thus the income tax used in the FSR and the financial analysis for this project activity is reasonable. The tax benefits from loan interest are included in accordance to Annex 5 of EB 62. /26/.

(d) Depreciation and residual value Rate.

The depreciation rate per year of 6.33% and the residual rate of 5% are derived from the FSR /2/ and the depreciation period is 15 years. The residual value is recovered at the last year of operation period in the project IRR calculation spreadsheet /14/. According to the *Implementation regulations for the law of the People’s Republic of China on enterprise income tax (Decree No.512)* /40/ issued on 6 December 2007, the minimum number of years for computing depreciation of fixed assets is 10 years for the manufacturing and business operations, therefore, the depreciation period of 15 years for the proposed project is in line with the law of the People’s Republic of China on enterprise income tax /40/. Compared with the depreciation period and the residual value of CDM registered projects as shown in the Table 1, the depreciation period (15 years) and the rate of residual value (5%) adopted by the proposed project is considered to be reasonable.

(e) Educational tax and city building tax

The educational tax rate of 3% (of VAT) is consistent with the “*Provisional regulations of the People’s Republic of China on education surcharge*” from the State Council /43/; the city building tax rate of 5% of VAT is in line with the “*Interim rules on additional tax for city development*” *Guofa [1985] No.19*, 8 February 1985 /42/.

Therefore, DNV confirms that all the tax rates used in the financial analysis of the proposed project are in line with the relevant regulations of the tax rates.

In conclusion, based on our local and sectoral expertise, and data base of publicly available information, DNV was able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situations of the project.

Calculation and conclusion

The project-IRR calculations were provided in a spreadsheet /14/. The calculation were verified and found to be correct by DNV. A period of 20 years was used for the IRR



calculation according to the FSR /2/. The assumptions used in the calculations were deemed to be correct by DNV. The project IRR (post-tax) without CDM revenue is 6.26%, which confirms that the project in the absence of CDM benefits and compared to the benchmark of 8% is not financially attractive. With CER revenue, the project IRR (post-tax) increased to 9.23%, which is above the benchmark of 8% /14/.

Sensitivity analysis

A sensitivity analysis was carried out for parameters contributing more than 20% to revenues or costs in order to check the robustness of the financial analysis. Reasonable variations of the total investment, annual operational and maintenance costs, electricity output and on-grid tariff were checked by calculating the variations necessary to reach the benchmark and then discussing the likelihood for that to happen. None of the parameters in the sensitivity analysis are considered to have any significant positive correlation. The variation necessary for each parameter to reach the benchmark is indicated in the following table:

Table 4- Variation of the parameter to make the IRR reach the benchmark

Total static investment	Annual electricity output	Electricity tariff	O&M cost
-12.0%	12.6%	12.6%	-59.5%

1) Total static investment

DNV was able to confirm that a 12.0% decrease in total static investment costs is unlikely to happen, as 94.2% of the total static investment of the projects goes towards purchase of turbines, towers, transformers and construction & installation related services according to the FSR /2/. At the time of validation, the main equipments and construction contracts have been signed, which was listed in the Table 5 below. Prices of wind turbines and raw materials have been increasing as the demand for wind turbines and its accessories have exceeded its supply worldwide in recent years /47/ and the cost of labour force are increasing rapidly in China in recent years /48/. Moreover, according to the already signed contracts /8/ /9/ /10/ /11/, the actual total expense on equipments and construction is 461.6 million RMB, which is 8.3% higher than the estimated value in the FSR (426.2 million RMB) /2/. Therefore, the comparison demonstrates that the estimated total static investment in the PDD is conservative and reasonable. The static total investment is not likely to decrease by 12.0%.

Table 5 Comparison of the investment cost between the actual investment cost and the estimated value in the FSR

	The actual investment cost (million RMB)	The estimation in FSR (million RMB)
Wind turbines and tower	383.8	343.4
Box transformer	8.4	8.0
Main transformer	5.1	4.0
Construction & Installation	64.3	70.9



2) Electricity tariff

If the tariff increases by 12.6%, the project IRR will reach the benchmark. However, according to the tariff guideline in China from CDM Executive Board /30/, the highest tariff in the region where the project located is 0.61 RMB/kWh (incl. VAT). Furthermore, the tariff used in the proposed project is 0.61 RMB/kWh (incl. VAT) which is derived from the latest NDRC notification Fagaijiage [2009] No.1906 dated 20 July 2009 /38/. In addition, the policy regarding tariff is strictly controlled by the government and normally the tariff is kept at a stable level. Therefore, it is unlikely that the tariff increases by 12.60% to reach the benchmark.

3) Annual electricity output

If the annual electricity output increases by 12.6%, the project-IRR reaches the benchmark. However, the annual output depends on the wind speed of the project site at the specific wind turbine. As per the FSR /2/, the annual electricity output is estimated based on the data from meteorological data of the wind resources in the local area of 30 years (1978~2007) and onsite wind resources measurements (from 1 January 2007 ~ 31 December 2007) /2/, which was used through the professional software WAsP to determine the richest wind source area, then using another software WindFarmer to optimize the location of each turbine in order to maximize power generation /2/. Therefore, the electricity output is unlikely to increase by 12.6%

4) O&M cost

By decreasing the annual O&M cost by 59.5%, the project IRR reaches the benchmark. According to the FSR /2/, the detailed included maintenance fee, material fee, and annual salaries for the employees, insurance premium of fixed assets and other cost. Since in the recent years, the price of the raw material and salaries of the employees and tax rates are gradually increasing in China /48/ and the maintenance costs for spare parts and accessorial equipments of wind turbines are also rising due to the wind turbines demand exceeding supply in China /47/, it is highly unlikely that the annual O&M cost will decrease for the proposed project.

The sensitive analysis above shows that very unrealistic favorable circumstances would be needed for the project-IRR to reach the benchmark. In conclusion, the investment analysis and sensitivity assessment have shown that the project activity is not financially attractive.

4.6.4 Common practice analysis

In China, most policies are promulgated in provincial level by combining the national policy with the region's condition. Hence, it is reasonable that Liaoning Province is selected as the geographical scope for the common practice analysis.

For the purpose of the common practice analysis, it is reasonable to define projects with similar capacity as all wind projects in the Liaoning province with larger installed capacity than 15 MW according to definition from EB, and small projects are not comparable in size to the 49.5 MW installed by the proposed project activity.

Furthermore, only projects developed after 2002 are chosen for the common practice analysis, since 2002 is a threshold for economic reform in electricity sector /59/ in China which is



considered to be reasonable. Although the total installed capacity of Liaoning Yinkou xianrendao windfarm project and Donggang windfarm project are larger than 15 MW, however, both of the projects are splitted up into several phases, and the newly capacity addition of the two projects after 2002 were both smaller than 15 MW /60/. In addition, Liaoning Yingkou windfarm project is a demonstration project which was developed with national debt funds /57/. The national debt funds are used to purchase domestic wind turbines which can make demonstration on local wind turbine usage /57/. Such financial support from the government of China is not applicable to the project activity and wind power projects in Liaoning Province as listed in Table 2. Thus the Liaoning Yingkou Xianrendao windfarm project was excluded from the common practice analysis and was not considered as a similar project to the project activity. Donggang windfarm was supported as Shuanjia Demonstration Project by the State Economic and Trade Commission and received financial support from government of China /57/. Such financial support from the government of China is not applicable to the project activity and wind projects in Liaoning Province.

According to the definitions described above, apart from the projects have been registered or are applying as CDM, there are no similar projects as the proposed project in Table 2 in Liaoning province.

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

4.7 Monitoring

The project applies the approved consolidated baseline and monitoring methodology ACM0002 version 12.1.0 “*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*” /23/.

The monitoring plan is in accordance with the monitoring methodology ACM0002 version 12.1.0. The monitoring plan will give opportunity for real measurements of achieved emission reductions.

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

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

4.7.1 Parameters determined ex-ante

The combined margin emission factor is determined ex-ante based on the most recent information available at the time the PDD was submitted for validation on 26 January 2011. Detailed calculation of the combined margin emission factor is described in the following section 4.7. The parameters are listed in the below table:

Data and Parameters	Unit	Ex-ante value	Source of data used
Operating margin of NEPG (OM)	tCO ₂ /MWh	1.1109	China Electric Power Yearbooks 2005~2009 /35/ China Energy Statistical Yearbooks 2007~2009 /36/
Build margin of NEPG (BM)	tCO ₂ /MWh	0.7086	



Emission factor of NEPG (CM)	tCO ₂ /MWh	1.0103	2006 IPCC Guidelines for National Greenhouse Gas Inventories /37/
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4.7.2 Parameters monitored ex-post

The parameters monitored *ex-post* is $EG_{\text{facility},y}$ (quantity of net electricity generation supplied by the proposed project in year y). The $EG_{\text{export},y}$ (the quantity of annual electricity exported to the grid by the proposed project in year y) and the $EG_{\text{import},y}$ (the quantity of annual electricity imported from the grid by the proposed project in year y) will be measured through the main and the backup meters installed at the on-site substation. Then $EG_{\text{facility},y}$ will be calculated as $EG_{\text{export},y}$ minus $EG_{\text{import},y}$. The meters are bidirectional and their accuracy is not lower than 0.5%. The meters will be calibrated by a qualified third party according to the national regulations. The on-grid electricity will be monitored continuously and recorded on a monthly basis. This data will be cross-checked against the sale receipt from the grid. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. Fuxin Juyuan Wind Power Generation Co., Ltd. will be responsible for the overall monitoring and reporting and will keep all the data and material.

4.7.3 Management system and quality assurance

The following are included in the monitoring plan of the PDD:

- Responsibility
- Training
- Data and parameters to be monitored
- Installation of electricity meters
- Calibration
- Quality control
- Reporting
- Data management system

The detailed contents have been elaborated in the PDD /1/. These will be maintained and implemented to enable subsequent verification of emission reductions.

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

4.8 Algorithms and/or formulae used to determine emission reduction

The emission reductions (ER_y) by the project activity during the crediting period are the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

- 1) Baseline emissions: baseline emissions (BE_y in tCO₂) are the product of the grid emission factor ($EF_{\text{grid},CM,y}$ in tCO₂/MWh) times the electricity supplied by the project activity to the grid ($EG_{PJ,y}$ in MWh).



2) Project emissions: There are no emissions from the project which is a renewable wind energy project.

3) Leakage: No leakage has to be considered for the proposed project activity

The PDD was published on 26 January 2011 /56/, and the calculation of the grid emission factor has been conducted by using the latest data which was available at the commencement of validation. The data used in the EF calculation is in accordance with data in the China Electric Power Yearbook from 2005 to 2009 (published annually) /35/ and the China Energy Statistical Yearbook from 2007 to 2009 (published annually) /36/ which was confirmed by DNV.

The grid emission factor of the NEPG is determined *ex-ante* for the first 7 years crediting period according to the “Tool to calculate the emission factor for an electric system”, version 2.1.0 /25/, based on the most recent data available at the start of validation. It has been calculated as the weighted average ($w_{OM}=0.75$; $w_{BM}=0.25$) of the operating margin and the build margin emission factors.

Operating Margin: Simple OM was chosen and this is justified since the low cost/must run resources constitute less than 50% of total grid generation (6.46% in 2004, 8.28% in 2005, 5.25% in 2006, 5.24% in 2007 and 5.65% in 2008) /35/.

Aggregated generation and fuel consumption data are used due to the fact that more disaggregated data are not available in the NEPG, the total electricity delivered to the NEPG has been used which are obtained from the China Electric Power Yearbook from 2005 to 2009 (published annually) /35/. Country specific data for net calorific value of each type of fossil fuel are obtained from the China Energy Statistical Yearbook from 2007 to 2009 /36/ and the IPCC default values /37/ for the emission factors of each type of fossil fuel are deemed reasonable.

The OM is calculated to be 1.1109 tCO₂/MWh. The sources and calculation have been verified by DNV.

Build Margin: Build margin was determined *ex-ante*. Because plant specific fuel consumption and electricity generation data are not publicly available in China, the guidance requested by DNV from the CDM Executive Board for a deviation of the baseline methodology of AM0005 has been applied for calculation of the build margin (BM) emission factor for this project /27/.

- Use of capacity additions from the years 2006 to 2008 is chosen and reaches 30.21% of the total installed capacity /35/.
- Use of weights estimated using installed capacity in place of annual electricity generation. Thermal power plant accounts for 88.73% of the total installed capacity addition in this period. Since specific data for each technology is not available, the fraction of fuels (coal 98.61%; natural gas 1.18%; oil 0.21%) was estimated from the CO₂ intensity for the fuels used in the NEPG /36/.
- Efficiencies of 39.08% for coal power plants and 51.46% for oil or gas power plants are defined as the best technology commercially available in China by the DNA of China /32/.



The BM is calculated as 0.7086 tCO₂/MWh, which was verified by the emission factor calculation spreadsheet /14/.

The resulting combined margin emission factor 1.0103 tCO₂e/MWh is fixed *ex-ante* for the first crediting period. The annual electricity delivered to the NEPG is expected to be 981 00 MWh /2/.

Based on the calculations and results presented in the sections above, the implemtation of the project activity will result in an average *ex-ante* estimation of emission reduction conservatively calculated to be 99 110 tCO₂e per year for the selected crediting period.

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

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

4.9 Environmental impacts

An Environmental Impact Assessment (EIA) /4/ has been conducted by Environmental Science Institute of Liaoning in January 2010 according to “*Law of the People’s Republic of China on environmental impact assessment*” /49/. The potential environmental impacts have been sufficiently identified, such as wastewater, solid waste, ecosystem and noise. No significant environmental impacts are expected from the project activity /4/ /5/. The Liaoning Province Environment Protection Department approved the project activity on 11 January 2010 /5/. These documents have been verified by DNV.

4.10 Comments by local stakeholders

In June 2010, a survey was conducted by the project owner through distributing the questionnaires to the local stakeholders and collecting their responses. The surveyed local stakeholders mainly live near the project site and were selected from different genders, education levels and occupations with proper proportion. In the survey, 40 questionnaires were distributed to local stakeholders and were returned giving a 100% response rate /6/. DNV has checked all the questionnaires received /6/ and confirmed that the survey shows that local stakeholders are supportive to the project.

DNV considers the local stakeholder consultation to be carried out adequately.



4.11 Comments by Parties, stakeholders and NGOs

The PDD of version 1.1 dated 21 December 2010 /1/ was made publicly available on UNFCCC CDM website /56/ and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 26 January 2011 to 24 February 2011.

No comments were received in this period.

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APPENDIX A

CDM VALIDATION PROTOCOL

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

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

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		
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
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. 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	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity					
A.1 Title of the project activity (VVM para 55-57)					
A.1.1 Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	<input type="checkbox"/> Clearly identifiable title of the project activity <input checked="" type="checkbox"/> Version number of the PDD is included <input checked="" type="checkbox"/> Date of the PDD is included. The title of the project in the GSP PDD is 'Liaoning Zhuangwu Pingandi Wind Farm Project', but the correct title should be 'Liaoning Zhangwu Pingandi Wind Farm Project' as per the FSR.	CL1	OK
A.1.2 Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/ /28/	DR	<input checked="" type="checkbox"/> Yes <i>If no, list where the PDD is not in accordance:</i>		OK
A.2 Description of the project activity (VVM para 58-64 and VVM para 135 and 136 (a) & (c) for small-scale project activities, as applicable)					
A.2.1 How was the design of the project assessed?	/1/ /2/ /4/ /7/ /15/ /61/	DR I	<i>What type is the project?</i> <input type="checkbox"/> Project in existing facility or utilizing existing equipment(s) <input type="checkbox"/> Project is either a large scale project or a small scale project with emission reductions exceeding 15 000 tCO ₂ e per year. In this case, a site visit must be performed. <input type="checkbox"/> Project is a bundled small scale project, with each project in the bundle with		OK

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

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>emission reductions not exceeding 15,000 tCO₂e per year. In such case the number of physical site visits may be based on sampling, if the sampling size is appropriately justified through statistical analysis.</p> <p><input type="checkbox"/> The project is an individual small scale project activity with emission reductions not exceeding 15 000 tCO₂e per year. In this case, DOE may not conduct a physical site visit as appropriate.</p> <p><input checked="" type="checkbox"/> Greenfield project</p> <p><i>How was the design of the project assessed?</i></p> <p><input type="checkbox"/> Physical site inspection</p> <p><input checked="" type="checkbox"/> Reviewing available designs and feasibility studies</p> <p><i>If a physical site inspection is not undertaken, justify why no site visit was undertaken:</i></p> <p>During the desk review, the relevant documents including the PDD, the FSR and the EIA were provided and assessed. The information about this project was able to be confirmed from these documents. The project is a newly-built wind farm power project without involving the utilization of existing facilities; through the documents provided by project participant, including the PDD, the FSR, the EIA, the wind turbine purchase contract and other relevant background documents, DNV could confirm the project design, construction, operation and monitoring plan and all baseline scenario</p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			information. In addition, according to the EIA, no migration was involved in this project. Moreover, the construction of the project began on 30 June 2010 as per the construction permit. Up to the date of interview on 17 March 2011, the project has not commenced generating electricity. Thus, during the validation date of 17 March 2011, no further issues could be assessed through an on site visit. Therefore, DNV can justify that a physical site visit for this project was not necessary during the validation process.		
A.2.2 If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/ /7/ /15/ /61/	DR I	The project is a Greenfield project and began construction on 30 June 2010 as per the construction permission. When the validation was commenced on 17 March 2011, all of 33 turbines were installed but the installation of substation was not completed as per the schedule report for the proposed project; also the expected starting date of power generation for the proposed project is within May 2011.		OK
A.2.3 If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO ₂ e per year), justify the sampling through a statistical analysis:	/1/ /2/	DR I	It is not applicable as the project activity is not bundled small scale projects.		OK
A.2.4 Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/	DR	Yes, the description of the proposed project activity has been addressed sufficiently and clearly in the PDD. The project involves the installation and operation of 33 wind turbines with each unit 1.5 MW, thus constituting a total generation capacity of 49.5 MW. The electricity delivered to the NEPG is expected to be 98 100 MWh/year with		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			the load factor of 22.6%.		
A.2.5 Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/ /2/ /3/	DR I	No, the proposed project is a greenfield wind power project.		OK
A.2.6 Does the project design engineering reflect current good practices?	/1/ /2/ /9/ /39/	DR I	Yes. The project design engineering reflects current good practices. The wind turbines (type GW82/1500) for the proposed project are manufactured in China by Xinjiang Goldwind Technology Co., Ltd., using domestic advanced wind power technology. The technology is deemed to reflect current good practice in China. According to FSR, the plant load factor for the proposed project is 22.6% determined by Shanxi Electric Power Survey & Design Institute, which was contracted by the project owner to develop FSR.		OK
A.2.7 Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/ /2/ /9/ /39/	DR I	Yes. The turbine generators for the proposed project are manufactured in China by Xinjiang Goldwind Technology Co., Ltd using advanced domestic windpower technology The technology applied by this project will result in better performance than any commonly used technologies in China. The project did not involve any transfer of technology from any Annex-I Party.		OK
A.3 Participation requirements (VVM para 51-54, 125-127)					
A.3.1 Do all participating Parties fulfil the participation requirements as follows:	/1/	DR			OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
a) Party has ratified the Kyoto Protocol			China (host) United Kingdom of Great Britain and Northern Ireland Country Y		
b) Party has designated a Designated National Authority			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No		
c) The assigned amount has been determined			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No		
A.3.2 Do the letters of approval meet the following requirements?	/1/ /20/	DR	The LoA from United Kingdom of Great Britain and Northern Ireland has not been received yet.	CAR-1	OK
a) LoA confirms that Party has ratified the Kyoto Protocol			China (host) United Kingdom of Great Britain and Northern Ireland Country Y		
b) LoA confirms that participation is voluntary			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No		
c) The LoA confirms that the project contributes to the sustainable development of the host country?			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No NA NA		
d) The LoA refers to the precise project activity title in the PDD			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No		
e) The LoA is unconditional with respect to (a) to (d) above			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No		
f) The LoA is issued by the respective Party's DNA			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No		
g) The LoA was received directly by the DNA or the PP			<input type="checkbox"/> DNA <input checked="" type="checkbox"/> PP <input type="checkbox"/> DNA <input type="checkbox"/> PP <input type="checkbox"/> DNA <input type="checkbox"/> PP		
h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic			By checking the link from DNA of China, DNV could verify the authenticity and validity of LoA from China.		
A.3.3 Have all private/public project participants been authorized by an involved Party?	/1/	DR	The LoA from United Kingdom of Great Britain and Northern Ireland has not been received yet.	CAR-1	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.4 Technical description of the project activity (VVM para 58-64)					
A.4.1 Is the project's location clearly defined?	/1/ /2/	DR	The Liaoning Zhangwu Pingandi Wind Farm Project is located in in Houxingiu Town, Zhangwu County, Fuxin City, Liaoning Province, P. R. China. The central coordinate of the wind farm is longitude 122°43' east and latitude 42°38' north, which are consistent with those indicated in the FSR of this project.		OK
A.5 Public funding of the project activity					
A.5.1 In case public funding from Parties included in Annex I is used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/1/	DR I	The project will not receive any public funding from parties in Annex I. The validation did not reveal any information to indicate that the project can be seen as a diversion of official development assistance (ODA) funding towards the China.		OK
B Application of a baseline and monitoring methodology					
B.1 Methodology applied (VVM para 65-76 and VVM para 136 (b) for small-scale project activities, as applicable)					
B.1.1 Does the project apply an approved methodology and the correct and valid version thereof?	/1/ /23/	DR	Yes. The project correctly applies the approved methodology, ACM0002, " <i>Consolidated baseline methodology for grid-connected electricity generation from renewable sources</i> ", version 12.1.0.		OK
B.1.2 If applicable, has any specific guidance provided by the CDM EB in respect to the applied methodology been considered?	/1/	DR	It is not applicable as no specific guidance was provided by the CDM EB for ACM0002.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.2 Applicability of methodology (and tools) (VVM para 65-76) <i>Insert a row for each applicability criteria of the applied methodology (and tools)</i>					
<p>B.2.1 How was it validated that project complies with the following applicability criterion 1?</p> <p><i>This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).</i></p>	/1/ /2/	DR I	<p>Yes. The applicability criterion of this methodology is justified since:</p> <ul style="list-style-type: none"> • The project is a Greenfield wind power plant with installation capacity of 49.5 MW, which has been confirmed from the FSR. • The electricity from the project activity is supplied to the NEPG, and information on the characteristics of the NEPG can be clearly identified. 		OK
<p>B.2.2 How was it validated that project complies with the following applicability criterion 2?</p> <p><i>The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;</i></p>	/1/ /2/	DR I	<p>Yes. The applicability criterion of this methodology is justified since:</p> <ul style="list-style-type: none"> • The project activity is the installation of a wind power plant with installation capacity of 49.5 MW, which has been confirmed from FSR. 		OK
<p>B.2.3 How was it validated that project complies with the following applicability criterion 3?</p> <p><i>The methodology is not applicable to the following: Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;</i></p>	/1/ /2/	DR I	<p>Yes. The applicability criterion of this methodology is justified since:</p> <ul style="list-style-type: none"> • The project does not involve switching from fossil fuels to renewable energy sources at the site of the project activity, as confirmed by the FSR. 		OK
<p>B.2.4 Is the selected baseline one of the baseline(s) described in the methodology and this hence confirms the applicability of the methodology?</p>	/1/ /23/	DR	<p>Yes. The selected baseline is one of baselines described in the ACM0002 version 12.1.0, which confirms the applicability of the methodology.</p>		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.3 Project boundary (VVM para 78-80)					
B.3.1 What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?	/1/	DR	Yes. The project's system boundaries have been clearly defined and in accordance with the methodology ACM0002 version 12.1.0. The project will deliver the electricity to the NEPG. (NEPG is composed of Liaoning, Heilongjiang and Jilin provincial grids). The project power plant and the NEPG are defined as the project's system boundary.		OK
B.3.2 Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/ /2/ /23/	DR	The identified boundary of the project covers all possible GHG sources as follows: <ul style="list-style-type: none"> • The baseline emission includes CO₂ emission from the NEPG electricity generation. • Project emission is regarded as zero as the project is a renewable energy (wind source) project. • No leakage emissions are considered as per the methodology ACM0002 version 12.1.0. 		OK
B.3.3 Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/1/ /23/	DR	No other emission sources contributing more than 1% and not mentioned by the methodology have been found.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4 Baseline scenario determination (VVM para 81-88, 105-107) <i>Ensure that the evaluation of all alternatives provided in the PDD and required by the methodology and also possible alternatives/offshoots of alternatives are discussed. Check that all alternatives required to be considered by the methodology are included in the final PDD. If baseline alternatives required to be considered by the methodology are considered not applicable, please assess the justification for this.</i>					
B.4.1 Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/ /22/ /23/	DR	<p>The identified baseline scenario is accordance with ACM0002 of version 12.1.0 as follows:</p> <ul style="list-style-type: none"> Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”. <p>The alternative baseline scenarios for the project activity have been suitably identified as:</p> <ol style="list-style-type: none"> The proposed project activity undertaken without being registered as a CDM project activity; A fossil fuel-fired power plant with the same annual electricity output as the proposed project; A power plant using other source of renewable energy with the same annual electricity output as the proposed project; Provision of an equivalent amount of annual 		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			power output by the NEPG. DNV considered that the list of baseline scenarios is complete.		
B.4.2 How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/ /51/ /52/ /53/ /54/	DR	<p>The alternative b) is not compliant with China's regulation "Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135 MW or below". The amount of annual electricity generation from capacity 49.5 MW wind farm is less than from the thermal power plant with the same capacity. In other words, the thermal power plant capacity with equivalent power generation must be less than 49.5 MW which is much less than 135 MW. Therefore, this alternative can be excluded.</p> <p>Alternative c) is in compliance with legal and regulatory requirements. However, due to the technology development status and the high cost for power generation, solar PV, geothermal and biomass face difficulties and barriers. As a consequence, they are hardly put into commercial production in China without the support of policies and financing. The project region belongs to water resources shortage area in Liaoning Province, so no economically exploitable water resources exist in project site. Thus, Alternative c) using other sources of renewable energy are not feasible and excluded.</p> <p>Therefore, the alternatives a) and d) are the plausible alternative scenarios which are consistent with the current laws and regulations and thus will be discussed at the next steps.</p> <p>In the following section of investment analysis,</p>		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			alternative a) is less attractive with low IRR and is not realistic without CDM financing and thus excluded.		
B.4.3 What is the baseline scenario?	/1/	DR	The baseline scenario is as follows: <ul style="list-style-type: none"> Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”. 		OK
B.4.4 Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/ /23/	DR	Yes. The determination of the baseline scenario is in accordance with the guidance in the methodology ACM0002 version 12.1.0.		OK
B.4.5 Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	This is not applicable as no conservative assumptions were used in the determination of baseline scenario		OK
B.4.6 Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Yes. The baseline scenario sufficiently takes into account relevant national and/or sectoral policies, macro-economic trends and political aspirations.		OK
B.4.7 Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Yes. The baseline scenario determination is compatible with the available data and all literature and sources are clearly referenced.		OK
B.4.8 Is the baseline determination adequately documented in the PDD? <ul style="list-style-type: none"> All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. All documentation is relevant as well as correctly quoted and interpreted. 	/1/ /2/ /4/	DR	Yes. the baseline determination has been adequately documented in the PDD: <ul style="list-style-type: none"> All assumptions and data including their references and sources used by the project participants are listed in the PDD and properly referenced. All documentation used is relevant and correctly quoted and interpreted. Assumptions and data are justified 		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<ul style="list-style-type: none"> Assumptions and data can be deemed reasonable Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity 			<p>appropriately and can be considered reasonable.</p> <ul style="list-style-type: none"> Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. The methodology has been correctly applied to identify the most reasonable baseline scenario. 		
B.5 Additionality determination (VVM para 94-121 and VVM para 137 for small-scale project activities, as applicable)					
B.5.1 What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/ /24/	DR	The “Tool for demonstration and assessment of additionality” version 5.2 is used to demonstrate the additionality of the project, which is in line with the approved methodology ACM0002 version 12.1.0.		OK
B.5.2 Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/	DR	Yes. The regulatory requirements have been correctly taken into account in the baseline scenario determination, the investment analysis and common practice analysis.		OK
B.5.3 Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	Yes. The sufficient evidences have been provided to support the relevance of the arguments made.		OK
B.5.4 What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/	DR	Investment analysis.		OK
Prior consideration of CDM (VVM para 98-103)					
B.5.5 What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/ /7/ /8/ /9/ /12/ /13/	DR I	<p>DNV has assessed and verified the evidence and timeline for the starting date of the project activity as follows:</p> <p>On 18 May 2010, the wind turbine generator purchase agreement was signed between Fuxin Juyuan Wind Power Generation Co., Ltd. and Xinjiang Goldwind Technology Co., Ltd.</p>		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	/31/		<p>On 20 June 2010, the construction agreement for the project was signed between Fuxin Juyuan Wind Power Generation Co., Ltd. and Jilin Xiehe Power Engineering Co., Ltd.</p> <p>On 30 June 2010, the construction Permit for the project was issued by ilin Longxiang Engineering Construction Supervising Co., Ltd.</p> <p>The starting date of the project activity is 18 May 2010, the signature date of turbine purchase agreement. It is DNV's opinion that this date correctly represents the earliest commitment to the financial expenditure of the project.</p> <p>The evidence for prior consideration of CDM are as follows:</p> <p>The project's starting date of 18 May 2010 is after 2 August 2008 and prior to the date of PDD publication 26 January 2011.</p> <p>On 10 May 2010, the project participant of Fuxin Juyuan Wind Power Generation Co., Ltd. submitted a CDM notification form for this project to China NDRC regarding the commencement of the project and its intention to seek CDM status. This notification was approved by NDRC on 17 May 2010. DNV has checked the notification and its approval and is able to confirm that the notification had been provided to NDRC and was made within six months of the project's starting date.</p> <p>On 17 May 2010, the project participant of Carbon Resource Management S.A. submitted a CDM notification form for this project to</p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			UNFCCC secretariat regarding the commencement of the project and its intention to seek CDM status. The UNFCCC website shows that the notification of prior consideration of the CDM for this project was received on 17 May 2010. DNV has checked the UNFCCC website link for this notification and is able to confirm that the notification had been received by UNFCCC secretariat and was made within six months of the project starting date.		
B.5.6 If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/ /8/ /12/ /13/	DR	Yes. Both DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status.		OK
Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)					
B.5.7 What initiatives were taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/1/ /7/ /8/ /9/	DR I	Not applicable as the project's starting date of 18 May 2010 is after 2 August 2008.		OK
B.5.8 When did the construction of the project activity start?	/1/	DR	Not applicable		OK
B.5.9 When was the project commissioned?	/1/	DR I	Not applicable		OK
B.5.10 Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	Not applicable		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
Investment analysis (VVM para 108-114) <i>The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.</i>					
B.5.11 Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/	DR	The proposed project generates financial and economic benefits through the sales of electricity other than CDM related income, which has been correctly described in the PDD.		OK
B.5.12 Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	The baseline scenario does not involve an investment, which has been correctly described in the PDD.		OK
B.5.13 Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/	DR	The benchmark analysis (option III) is justified for conducting the investment analysis.		OK
B.5.14 Is the benchmark/discount rate the latest available at the time of decision?	/1/ /34/	DR	According to the “ <i>Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects</i> ” issued by State Power Corporation of China, a project-IRR of 8% (post tax) for total investment is regarded as a benchmark for investing in renewable energy generation projects in China, which is the latest available at the time of decision. DNV was able to confirm this benchmark is suitable and reasonable.		OK
B.5.15 What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/	DR	The financial indicator is project-IRR, which is on project basis and after tax. The project-IRR is in correspondence with the benchmark. However, the Project IRR (after tax) with CER revenue in the calculation spreadsheet is inconsistent with that stated in the PDD of GSP	CL-2	OK
B.5.16 Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have	/1/ /14/	DR	Those underlying assumptions are appropriate. No waste was considered for this project.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
zero value?					
B.5.17 Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/ /14/	DR	Yes. The depreciation has been taken into account in the income tax calculation. The depreciation period of 15 years is in accordance with normal accounting practice in China.		OK
B.5.18 Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/ /2/ /14/ /40/	DR	<p>The 21 years of investment analysis including one year of construction time and 20 years of operation time have been used by the project, which is deemed to be realistic.</p> <p>The salvage value with the rate of 5% has been taken into account and recovered in the last year of operation time, which is in line with Chinese rule.</p> <p>The working capital of 1.49 million RMB has been returned in the last year of operation time in the IRR spreadsheet.</p>		OK
B.5.19 When a feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?	/1/ /2/ /3/ /14/	DR I CC	<p>DNV compared the input parameters for the financial analysis included in the PDD with the parameters stated in the FSR prepared by Shanxi Electric Power Survey & Design Institute in February 2010, and was able to confirm that the values applied are consistent with the values stated in the FSR.</p> <p>The FSR was approved on 10 February 2010 and thus only three months prior to the decision to proceed with the project activity (i.e. the start date of the project) which was on 18 May 2010. Given this relatively short period of time between the approval of FSR and the decision to proceed with the project activity it is unlikely in the context of the project that the input values would have materially changed.</p>		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Therefore, it is reasonable to assume that the FSR has been the basis of the decision to proceed with the investment in the project.		
B.5.20 How was the amount of output (e.g. sales of electricity) assessed? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /2/ /3/ /14/	DR I CC	<input checked="" type="checkbox"/> The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval <input type="checkbox"/> The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) <input type="checkbox"/> Other approach. <i>Provide details on how the load factor was validated::</i> According to the FSR, the net electricity supplied by the project to grid is 98 100 MWh at load factor of 22.6%, which was calculated on the basis of 30 years of meteorological data from 1978 to 2007 and one year on-site wind resources measurement from 1 January 2007 to 31 December 2007 provided by local meteorological station. The data was processed in professional software to calculate the annual theoretical power generation, from which the annual effective power generation was obtained through discount by considering factors such as air density, trailing stream, wind turbine efficiency, and power loss etc. Annex 11 to the CDM EB's 48 th meeting report gives a guideline for validation of plant load factor for renewable energy. One option is to use		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			plant load factor provided to the government while applying the project activity for implementation approval. The FSR has this purpose and hence according to current CDM regulation, the checking that the value is in line with the FSR should be considered sufficient for validation of plant load factor. This estimated electricity generation used in the PDD is for this project in line with the FSR.		
B.5.21 How was the output price (e.g. electricity price) assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /2/ /3/ /14/ /18/ /38/ /30/	DR I CC	<input checked="" type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants <i>Provide details on how the output price was validated:</i> The tariff of 0.61 RMB/kWh (incl. VAT) used in the financial analysis of PDD is taken from the FSR. The tariff assumed in the FSR referred to the latest tariff notification issued by NDRC on 20 July 2009 (Fagaijiage [2009] No. 1906). DNV confirm that the tariff available and valid at the time of decision, 18 May 2010. On 9 December 2010, the tariff of the project was approved as 0.61 RMB/kWh incl. VAT by Liaoning Province Price Bureau. As per the <i>Information note on the highest tariffs applied by the executive board in its decisions on registration of projects in the People's Republic of China</i> , issued by CDM Executive Board in June 2011 at EB 61, the highest tariff of wind power project in Liaoning province is 0.61		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			RMB/kWh including VAT. The tariff of this proposed project is also 0.61 RMB/kWh (incl. VAT) and the same as the highest tariff published by CDM Executive Board, which demonstrates the project' tariff is conservative.		
B.5.22 How were the investment costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /2/ /3/ /8/ /9/ /10/ /11/ /14/	DR I CC	<input checked="" type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input checked="" type="checkbox"/> Review of feasibility reports, public announcements, contracts and annual financial reports related to the project and the project participants <i>Provide details on how the investment costs were validated:</i> The static investment used in the financial analysis of PDD is taken from the FSR with the value of 490.01 million RMB, which is available and valid at the time of decision. The investment costs per MW of 9 899 RMB/kW for the project was compared with the data reported for other similar proposed CDM projects developed in Liaoning Province and found to be within the range of 8 150 RMB/kW to 10 744 RMB/kW of other similar projects. Moreover, the investment costs were further cross-checked against the actual investment data in the main contracts. As per the FSR, the sum of expenses on turbo-turbines, towers, box-transformers, 220 kV substation and construction was budgeted to 88.4% of the static total investment. The actual expenditure on these items, according to the wind turbo-generators and towers purchase agreement, box-transformers		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			purchase agreement, 220 kV substation purchase agreement and contraction agreement, is 6.6% higher than the estimated value in the FSR. Therefore, the static total investment is deemed to be reasonable and appropriate in Liaoning province by DNV.		
B.5.23 How were the O&M costs assessed? Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /2/ /3/ /14/	DR I CC	<input checked="" type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants <i>Provide details on how the O&M costs were validated:</i> The O&M costs used in the financial analysis of the PDD is taken from the FSR with the value of 11.65 million RMB/year, which was available and valid at the time of investment decision. The percentage of O&M costs relative to investment costs was compared with the data reported for other similar proposed CDM projects developed in Liaoning Province. The O&M/investment of 2.4% for this project is within the range of 1.8%-4.4% for other similar projects. It shows that O&M costs are in a reasonable range.		OK
B.5.24 Describe the assessment of the other input parameters. Were the data available and valid at the time of decision? Remember to include all the data sources used and list all the projects that have been used for cross-checking in accordance with VVM paragraph 95.	/1/ /2/ /3/ /14/ /40/ /41/	DR I CC	<input checked="" type="checkbox"/> Cross-check against third-party or publicly available sources (e.g. invoices or price indices) <input checked="" type="checkbox"/> Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants <i>Provide details on how other input parameters were validated:</i>		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	/42/ /43/ /44/ /45/ /46/ /55/		<p>Comparing the “other cost” of the proposed project with other similar proposed CDM projects developed in Liaoning Province, DNV has found that the other cost 40 RMB/kW of the proposed project is within the range of 14-60 RMB/kW for other similar projects. Even if other cost is 0, project IRR is 6.77% lower than the benchmark of 8%.</p> <p>The rate of income tax in IRR spreadsheet is 25%, which is in line with Income Tax Law of the Peoples Republic of China for Enterprises issued by Chairman of the Peoples Republic of China on 16 March 2007.</p> <p>The depreciation has been taken into account in the income tax calculation. The depreciation period of 15 years is in accordance with normal accounting practice in China. The residual value is recovered at the end year of the operational time in IRR calculation. The residual rate of 5% is in line with the Implementation Regulations for the Law of the People’s Republic of China on Enterprise Income Tax ([2007] No.512), issued by China State Council on 6 December 2007. Thus, the depreciation rate of 6.33% is correct $[(100\%-5\%)/15]$.</p> <p>For the city development tax rate of 5% and education tax rate of 3%, DNV was able to confirm that these two values are in accordance with national regulations in China. According to the “Interim rules on additional tax for city development”, the tax rate for city development</p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>will be determined as per taxpayer's location: 7% for urban areas, 5% for county and town, and 1% for others. Due to project owner's location in Houxinqu Town, Zhangwu County, Fuxin City, Liaoning Province, P. R. China, the tax rate for city development of 5% was selected. In terms of the "national rules on education surcharge", the "tax rate for education" of 3% shall be applied for companies in China, which was followed by the proposed project as indicated in the IRR spreadsheet.</p> <p>According to the current law in China, The Interim Statute of People's Republic of China on Value Added Tax, the VAT rate is defined as 17% for wind power industry. In order to encourage the development of wind power in China, the Ministry of Finance and State Administration of Taxation issued a notification on VAT policy on 9 December 2008 (Cai Shui [2008] No.156) to stipulate that the output VAT should be imposed with the rate of 17% and 8.5% of output VAT should be refunded. In the IRR spreadsheet of the project, the VAT rate of 17% was applied and half of output VAT was recovered as cash inflow, which was verified consistent with Chinese law and VAT policy by DNV.</p> <p>In order to encourage the economic development in China, the Ministry of Finance and State Administration of Taxation implemented the reform of VAT system on 19 December 2008 (Cai Shui [2008] No.170) and stipulated that</p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>from 1 January 2009 the input VAT of equipment investment should be deducted from the output VAT for the general taxpayer and thus the leviable VAT is the output VAT minus the input VAT of equipment investment. DNV has verified the IRR spreadsheet of the project and can confirm this new policy was correctly reflected in the IRR spreadsheet.</p> <p>As per the accounting principles, the leviable VAT belongs to the circulating tax which is transferred to the government and thus is not related to the profit. In the IRR spreadsheet of the project, the input VAT of equipment investment, 52.61 million RMB was included in static investment in the one year of construction period as cash outflow and meanwhile was recovered as cash inflow during 7 years of operation period. Thus, the input VAT of equipment investment was not deemed as profit in the IRR spreadsheet, which is consistent with the accounting principles and reasonable.</p> <p>According to the guidance of EB51 Annex 58, the interest payable should be taken into account in the income tax calculation in cases where the benchmark applied in the investment analysis is post tax. As for the proposed project, the IRR benchmark of 8% is post tax and the interest tax payable has been verified to be included in the calculation of the income tax.</p>		
B.5.25 Was the financial calculation spreadsheet verified and found to be correct?	/1/ /14/	DR	<p>The financial calculation spreadsheet was verified and found to be correct.</p> <p>The IRR with CDM revenue in the final</p>	CL 2	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			calculation spreadsheet is not consistent with that in the PDD of GSP		
B.5.26 Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/ /2/ /14/ /47/ /48/	DR	<p>A sensitivity analysis has been carried out for parameters contributing more than 20% to revenues or costs to check the robustness of the financial analysis. Reasonable variations of static total investment, annual O&M cost, net electricity supply to grid and electricity tariff were checked by calculating the variation necessary to reach the benchmark and then discussing the likelihood for that to happen. None of the parameters in the sensitivity analysis are considered to have any significant effect.</p> <ul style="list-style-type: none"> • For a 12.0% decrease in static total investment, the benchmark will be reached. However, the demands for wind turbines and its accessories have exceeded its supply in China in recent years which resulted in the price rising of wind equipment. Thus, the static investment is highly unlikely to decrease that much. The above information was confirmed by DNV. • With a 59.5% decrease in O&M cost, the benchmark will be reached. However, the prices of raw materials, man power and industry equipments are rising in recent years in China. Thus, a significant reduction in O&M cost is particularly unlikely and this possibility can be ruled out. • With a 12.6% increase in electricity output, the benchmark will be reached. However, the electricity output of this project was calculated 	CL-3	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>by a third party, an independent qualified design institute with higher grade (Grade A) based on long term wind speed measurement data (from 1978 to 2007) provided by local meteorological station and on the characteristics of turbines. Hence, a 12.6% increase in electricity output is deemed highly unreasonable.</p> <ul style="list-style-type: none"> To reach the 8% benchmark, power tariff must increase by 12.6% (i.e. 0.687 RMB/kWh including VAT), which is not likely to happen. The tariff used in the PDD is 0.61 RMB/kWh (incl. VAT) which is derived from the “Notice on Policy for the Tariff of Wind Power Projects in China” issued by NDRC of China on 20 July 2009. As discussed in the section B.5.21 above, the tariff implemented in the PDD is reasonable and the tariff of wind power projects in Liaoning province should be approved as 0.61 RMB/kWh (incl. VAT) after 1 August 2009. <p>The variation of investment cost and O&M cost making the benchmark be reached in the final calculation spreadsheet is not consistent with that has been stated in the PDD of GSP.</p>		
B.5.27 Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	It is discussed in B.5.26	CL 3	OK
B.5.28 Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/	DR	It is discussed in B.5.26	CL 3	OK
Barrier analysis (VVM para 115-118)					
B.5.29 Are the barriers identified complimentary to a	/1/	DR	Not applicable		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.					
B.5.30How were the <u>investment barriers</u> assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	Not applicable		OK
B.5.31How does CDM alleviate the investment barriers?	/1/	DR	Not applicable		OK
B.5.32Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable		OK
B.5.33How were the <u>technological barriers</u> assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR	Not applicable		OK
B.5.34How does CDM alleviate the technological barriers?	/1/	DR	Not applicable		OK
B.5.35Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable		OK
B.5.36How were the <u>barriers due to prevailing practise</u> assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR	Not applicable		OK
B.5.37How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	Not applicable		OK
B.5.38Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable		OK
B.5.39How were the <u>other barriers</u> assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	Not applicable		OK
B.5.40How does CDM alleviate the other barriers?	/1/	DR	Not applicable		OK

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B.5.41 Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	Not applicable		OK
Common practice analysis (VVM para 119-121)					
B.5.42 What is the geographical scope of the common practice analysis? Is this justified?	/1/ /58/	DR	In China, most policies are promulgated in provincial level by combining the national policy with the region's condition. In addition, the quality of wind resources in Liaoning province makes this region different from other regions in the aspect of electricity output, eventually in the aspect of economic feasibility. Hence, it is reasonable that Liaoning province is selected as scope for common practice analysis.		OK
B.5.43 What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/ /59/	DR	The wind power projects with the capacity of more than 15 MW in Liaoning province without revenues from CDM are selected in the common practice analysis. DNV considers it is appropriate. Furthermore, only those non-CDM projects developed after 2002 are chosen for the common practice analysis, since 2002 is a threshold for economic reform in electricity sector.		OK
B.5.44 What is the data source(s) used for the common practice analysis?	/1/ /35/ /58/	DR	The data sources are from <i>the Statistics of domestic wind farm installation capacity in 2007, Statistics of domestic wind farm installation capacity in 2008, and Statistics of domestic wind farm installation capacity in 2009</i> finished by Shi Pengfei.		OK
B.5.45 How many similar non-CDM-projects exist in the region within the scope?	/1/ /58/	DR	There is no similar non-CDM project in Liaoning Province.		OK
B.5.46 How were possible essential distinctions between the	/1/	DR	It is not applicable as there no similar non-CDM		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
project activity and similar activities assessed?			projects in Liaoning Province.		
B.5.47 What is the conclusion of the common practice analysis?	/1/	DR	There is no similar non-CDM project in Liaoning Province.		OK
Conclusion					
B.5.48 What is the conclusion with regard to the additionality of the project activity?	/1/	DR	It is clearly demonstrated that the project is not a likely baseline scenario and the emission reductions are additional to what would have happened in absence of the project activity.		OK
B.6 Calculations of GHG emission reductions					
Data and parameters that are available at validation and that are not monitored (VVM para 199-203)					
B.6.1 How was the baseline emission factor verified?	/1/ /25/ /35/ /36/	DR	DNV verified that baseline emission factor are calculated <i>ex-ante</i> as 1.0103 tCO ₂ e/MWh according to the “Tool to calculate the emission factor for an electricity system”, version 2.1.0. This value has also been cross-checked with that published by NDRC and it is found that they are consistent.		OK
Baseline emissions (VVM para 89-93)					
B.6.2 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /25/ /27/ /32/ /33/ /35/ /36/ /37/	DR	Yes. Baseline emissions are calculated as the net electricity generated from the project multiplied by the NEPG emission factor. The grid emission factor is calculated in line with “Tool to calculate the emission factor for an electricity system” version 2.1.0 as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM). Calculation of OM: The simple OM method is		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>selected because low cost/must run resources constitute less than 50% of the total grid generation in recent years.</p> <p>The aggregated generation and fuel consumption data are used due to the fact that more disaggregated data for power plants are not available in the NEPG. Country specific data for net calorific value of each type of fossil fuel, which was obtained from the China Energy Statistical Yearbook from 2007 to 2009, the emission factor of each type of fossil fuel which was taken from the IPCC 2006 default values, and the total electricity delivered to the NEPG which were obtained from the China Electric Power Yearbook from 2007 to 2009, are selected and are deemed reasonable.</p> <p>Vintage data for the data years 2006, 2007 and 2008 from China Energy Statistics Yearbooks 2007-2009 and China Electric Power Yearbooks 2007-2009 are used for operating margin calculation, which are the most recent available at the time of PDD webhosting (26 January 2011).</p> <p>The OM is calculated to be 1.1109 tCO₂/MWh as a generation-weighted average for the three years. The sources and calculation have been verified by DNV.</p> <p><u>Calculation of BM:</u> Because plant specific fuel consumption and electricity generation data are not publicly available in China, the guidance requested by DNV from the CDM Executive Board for a deviation of the baseline</p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>methodology of AM0005 has been applied for calculation of the build margin (BM) emission factor of this project:</p> <ul style="list-style-type: none"> - Use of capacity additions from the years 2006 to 2008 is chosen and reaches 30.21% of the total installed capacity. <p>Use of weights estimated using installed capacity in place of annual electricity generation. Thermal power plant accounts for 88.73% of the total installed capacity additions in this period. Since specific data for each technology is not available, the fraction of fuels (coal 98.61%; natural gas 1.18%; oil 0.21%) was estimated from the CO₂ intensity for the fuels used in NEPG.</p> <ul style="list-style-type: none"> - Use of the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption. This is 39.08% for coal power plants and 51.46% for oil power plants and gas power plants. <p>BM is calculated as 0.7086 tCO₂e/MWh. The resulting combined margin emission factor of 1.0103 tCO₂e/MWh is fixed <i>ex-ante</i> for the first crediting period. The annual electricity delivered to the NEPG is expected 98 100 MWh, so the annual baseline emission of the project is 99 110 tCO₂e/year.</p>		
B.6.3 Have conservative assumptions been used when calculating the baseline emissions?	/1/	DR	This has been discussed in B.6.2		OK
B.6.4 Are uncertainties in the baseline emission estimates	/1/	DR	No significant uncertainties need be addressed for		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
properly addressed?			this project.		
Project emissions (VVM para 89-93)					
B.6.5 Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /23/	DR	Yes. Project emission is regarded as zero as the project is a renewable energy (wind source) project.		OK
B.6.6 Have conservative assumptions been used when calculating the project emissions?	/1/ /23/	DR	Not applicable		OK
B.6.7 Are uncertainties in the project emission estimates properly addressed?	/1/ /23/	DR	Not applicable		OK
Leakage (VVM para 89-93)					
B.6.8 Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /23/	DR	Yes. Leakage is neglected as per ACM0002 version 12.1.0.		OK
B.6.9 Have conservative assumptions been used when calculating the leakage emissions?	/1/ /23/	DR	Not applicable		OK
B.6.10 Are uncertainties in the leakage emission estimates properly addressed?	/1/ /23/	DR	Not applicable		OK
Emission Reductions (VVM para 89-93)					
B.6.11 Algorithms and/or formulae used to determine emission reductions: <ul style="list-style-type: none"> All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced All documentation is correctly quoted and interpreted. All values used can be deemed reasonable in the context of the project activity The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the 	/1/ /23/ /25/ /35/ /36/	DR	The algorithms and/or formulae have been correctly used to determine emission reductions: <ul style="list-style-type: none"> All assumptions and data including their references and sources used by the project participants are listed in the PDD. The data are properly referenced All documentation used by the project participants is correctly quoted and interpreted. All values used in the PDD are considered reasonable. 		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
data provided in the PDD and supporting files to be submitted for registration.			<ul style="list-style-type: none"> The methodology has been correctly applied to calculate the emission reduction. The emission reductions can be replicated by using the data provided in the PDD. 		
B.7 Monitoring plan (VVM para 122-124)					
Data and parameters monitored					
B.7.1 Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/ /23/	DR	Yes. The means of monitoring described in the plan complies with the requirements of the methodology.		OK
B.7.2 Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/ /23/	DR	Yes. In monitoring plan, the quantity of net electricity generation supplied by the project plant to the grid ($EG_{\text{facility},y}$), which is the difference of exports to the grid and imports from the grid, will be monitored.		OK
B.7.3 In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	The electricity exported to and imported from the grid will be continuously measured by one bidirectional main meter and one bidirectional back-up meter. The main meter will be installed in the 220 kV Zhangdong substation and the backup meter was also installed in the same place.		OK
B.7.4 In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/ /50/	DR	The accuracy of main meter and back-up meter is 0.5 or better, which is deemed appropriate as per technical administrative code of electric energy metering (DL/T 448-2000).		OK
B.7.5 In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/	DR	The main meter and back-up meter will be annually calibrated by a qualified third party, which is deemed appropriate.		OK
B.7.6 Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	Yes. The electricity exported to and imported from the grid will be continuously measured		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			through main meter and back-up meter, which is deemed adequate.		
B.7.7 Is the recording frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	The electricity exported to and imported from the grid will be recorded monthly, which is deemed adequate.		OK
Ability of project participants to implement monitoring plan					
B.7.8 How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/	DR I	The monitoring organization, responsibilities, monitoring procedures, QA/QC procedures and data management have been presented in the monitoring plan and were checked during follow-up interviews. The monitoring arrangement is considered appropriate and feasible within the project design.		OK
B.7.9 Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	/1/	DR I	Yes. The procedures for day-to-day records handling have been identified in the PDD.		OK
B.7.10 Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR I	Yes. The detailed procedures related to data management, quality assurance and quality control have been elaborated in the PDD. These will be maintained and implemented to enable subsequent verification of emission reductions.		OK
B.7.11 Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR I	It is mentioned in the PDD that all monitored data will be kept for two years after the end of the crediting period for this project activity.		OK
Monitoring of sustainable development indicators/ environmental impacts					
B.7.12 Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	/1/	DR	The legislations in China do not require collection and archiving of data related to sustainable development indicators. The		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			environmental impacts will be monitored by local environmental authority		
B.7.13 Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	Neither ACM0002 version 12.1.0 nor the Chinese DNA requires collection and archiving of relevant data concerning environmental, social and economic impacts. So, Monitoring Plan does not provide for this.		OK
B.7.14 Are the sustainable development indicators in line with stated national priorities in the host country?	/1/	DR	This will be on local authority decision.		OK
C Duration of the project activity / crediting period					
C.1.1 Start date of project activity (VVM para 99-100, 104)					
C.1.2 How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/ /7/ /8/ /9/	DR	<p>DNV has assessed and verified the evidence and timeline for the starting date of the project activity as follows:</p> <ul style="list-style-type: none"> • On 18 May 2010, the wind turbine generator purchase agreement was signed between Fuxin Juyuan Wind Power Generation Co., Ltd. and Xinjiang Goldwind Technology Co., Ltd. • On 20 June 2010, the construction agreement for the project was signed between Fuxin Juyuan Wind Power Generation Co., Ltd. and Jilin Xiehe Power Engineering Co., Ltd. • On 30 June 2010, the construction Permit for the project was issued by ilin Longxiang Engineering Construction Supervising Co., Ltd. <p>The starting date of the project activity is 18 May 2010, the signature date of turbine purchase</p>		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			agreement. It is DNV's opinion that this date correctly represents the earliest commitment to the financial expenditure of the project.		
C.1.3 Is the stated expected operational lifetime of the project activity reasonable?	/1/ /2/	DR	The project's operational lifetime indicated in the PDD is 20 years, which was cross-checked and evidenced by the FSR.		OK
C.1.4 Is the start date, the type (renewable/fixed) and the length of the crediting period clearly defined and reasonable?	/1/	DR	The project developer has chosen a renewable crediting period of 7 years with the starting date of the crediting period being 1 March 2011 or the registration date, whichever is later. The starting date of the crediting period 1 March 2011 needs to be updated according the actual validation schedule.	CL4	OK
D Environmental Impacts (VVM para 131-133 and VVM para 136 (d) for small-scale project activities, as applicable)					
D.1.1 Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?	/1/ /4/ /5/ /49/	DR	The Law of the People's Republic of China on Environmental Impact Assessment was issued on 28 October 2002 and requires the EIA for construction project. The EIA for this project activity was approved by Liaoning Province Environment Protection Department on 11 January 2010. The approval does not contain any indicator to be monitored.		OK
D.1.2 Does the project comply with environmental legislation in the host country?	/1/ /4/ /5/	DR	Yes. The project complies with Chinese environmental legislation as the EIA was approved by local authority.		OK
D.1.3 Will the project create any adverse environmental effects?	/1/ /4/ /5/	DR	No. The project will not create any significant adverse environmental effects as per EIA report and its approval.		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
D.1.4 Have identified environmental impacts been addressed in the project design?	/1/ /4/ /5/	DR	Yes. The identified environmental impacts have been addressed in the project design.		OK
D.1.5 Has an analysis of the environmental impacts of the project activity been sufficiently described?	/1/ /4/ /5/	DR	Yes. The analysis of environmental impacts during construction and operational period are elaborated in the PDD, mainly about waste water, solid waste, ecosystem and noise.		OK
D.1.6 Are transboundary environmental impacts considered in the analysis?	/1/ /4/ /5/	DR	No transboundary environmental impacts are identified for the project according to EIA and its approval.		OK
E Stakeholder Comments (VVM para 128-130)					
E.1.1 Have relevant stakeholders been consulted?	/1/ /6/	DR	Yes. In June 2010, a survey was made by the project owner among the local stakeholders through distributing the questionnaires to the local stakeholders and collecting their responses. The investigated local stakeholders mainly live near the project site and were selected from different genders, education levels and occupations with proper proportion. In the survey, 40 questionnaires were distributed to local stakeholders and 40 questionnaires were returned giving a 100% response rate. DNV has checked all the questionnaires received. The survey shows that 100% of the investigated people are supportive to the project construction and no negative comments are received.		OK
E.1.2 Have appropriate media been used to invite comments by local stakeholders?	/1/ /6/	DR	Yes. The distribution of questionnaires had been used to invite the comments from the local stakeholders.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
E.1.3 If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/ /6/ /49/	DR	Yes. The stakeholder consultation process is in accordance with Chinese EIA law.		OK
E.1.4 Is a summary of the stakeholder comments received provided?	/1/	DR	Yes. A 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/	DR	The survey shows that 100% of the investigated people are supportive to the project construction and no negative comments are received.		OK

Table 3 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>CAR 1:</p> <p>The LoA from United Kingdom of Great Britain and Northern Ireland has not been received yet.</p>	<p>A.3.2</p> <p>A.3.3</p>	The LoA of UK is provided to DOE.	<p>OK.</p> <p>The LoA from DNA of United Kingdom of Great Britain and Northern Ireland has been provided. DNV can confirm the authenticity of the LoA by verifying the website of the DNA of UK and the email for applying and sending LoA between the DNA of UK and CER buyer “Carbon Resource Management S.A.”.</p> <p>CAR is closed.</p>
<p>CL 1:</p> <p>The title of the project in the GSP PDD of version 1.1 dated 21 December 2010 is ‘<i>Liaoning Zhuangwu Pingandi Wind Farm Project</i>’, but the correct title should be ‘<i>Liaoning Zhangwu Pingandi Wind Farm Project</i>’ as per FSR.</p>	A.1.1	This is a typo. The name in updated PDD is corrected.	<p>OK.</p> <p>The wrong title of the project has been corrected accordingly.</p> <p>CL is closed.</p>
<p>CL 2:</p> <p>The IRR with CDM revenue in the final calculation spreadsheet is not consistent with that stated in the PDD of GSP.</p>	<p>B.5.15</p> <p>B.5.25</p>	The IRR with CDM revenue in PDD is a typo. The updated PDD is corrected.	<p>OK.</p> <p>The IRR with CDM revenue in the PDD has been corrected accordingly.</p> <p>CL is closed.</p>
<p>CL 3:</p> <p>The variation of investment cost and O&M cost making the benchmark be reached in the final calculation spreadsheet is not consistent with that has been stated in the PDD of GSP</p>	<p>B.5.26</p> <p>B.5.27</p> <p>B.5.28</p>	The values in GSP PDD are typos. They are corrected in according to IRR calculation.	<p>OK.</p> <p>The wrong values in the PDD of GSP have been corrected in the updated PDD according to IRR calculation.</p> <p>CL is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 4: The starting date of the crediting period 1 March 2011 needs to be updated according the actual validation schedule.	C.1.4	According to current validation schedule, it is assumed the starting date of crediting period is 15 August 2011.	OK According to current validation schedule, the starting date of crediting period has been updated to be 15 August 2011 accordingly, which is reasonable. CL is closed.

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
No FAR was issued.	N/A	N/A

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Mr. Lin Wu

Mr. Lin Wu holds a Master Degree in Chemical Engineering & Process, a Bachelor Degree in Chemical Engineering & Process and a Bachelor Degree in Computer Science & Technology, having an overall experience of around seven years. Prior to joining DNV, he has around four years experience in chemical industry covering design of chemical process and system, piping design, commissioning and project management on site. His experience also covers the fields of desulfurization of flue gas in power plant industry. He has experience of around 3 years in validation and verification of CDM/JI projects and other 3rd party validation/verification services.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in “Energy Generation from Renewable Energy Sources” and “Chemical Processes Industries”.

Mr. Jiang Zhi, Tim

Mr. Jiang Zhi, Tim holds a Master Degree in Chemical Engineering, Having an overall experience of around twelve years. Prior to joining DNV having ten years experience in chemical processes industry and environmental protection industry covering chemical separation, compound synthesis and wastewater treatment.

He has experience of around two years in validation and verification of numerous CDM projects.

His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in “Energy Generation from Renewable Energy Sources”.

Mr. Huang Wenhui

Mr. Huang Wen Hu, John holds a Master Degree in Business Administration (MBA). Having an overall experience of around 12 years. Prior to joining DNV, having around 10 years experience in several renowned multinational companies like Kodak, Meggitt, APC etc as a quality engineer, management system specialist, quality team leader, quality manager & management representative and his experience also cover the fields of environmental management. He has also been actively involved in establishing, implementation and audit of management systems such as ISO9001, TS16949, ISO140001 and OHSAS18001 standards in manufacturing industries for more than 8 years. In addition, he has gained knowledge in the field of cost accounting, strategic investment analysis & decision, financial risk and sensitivity analysis, and associated financial knowledge through his MBA course, The financial knowledge gained was also applied for the quality cost analysis while he was working in manufacturing industry as quality management role

He has experience of around 2 years in validation and verification of numerous CDM projects.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in “Energy Generation from Renewable Energy Sources”

Mr. Zhao Qifeng

Mr. Zhao Qifeng holds a Bachelor Degree in Economic Management and holds a Master Degree in Environmental Engineering with focus on the environmental-economic analysis and environmental asset valuation. Having an overall experience of around ten years. Prior to joining DNV having around four years experience in the electric power capital markets consulting industry covering power plant asset valuation, power plants EBITDA forecast, electric power market price forecasting due to multiply factors changes (e.g. pollutant control regulatory policies, supply/demand of the energy market, and electricity transmission network, etc.) and power plant performance modeling under varying environmental regimes.

Mr. Li Cheng

Mr. Licheng, Cliff holds a Bachelor Degree in Chemical Engineering. Having a overall experience of around six years. Prior to joinning DNV, having three years experience in oil drilling industry covering field technical service and three years in chemical production industry covering field management of product line.

His qualification, industial experience demonstrate his sufficient sector competence in "Chemical Process Industries/Oil and Gas Industries"

Agnes Dudek

Agnes Dudek holds a PhD Degree in applied physics. Having an overall experience of around 10 years. Prior to joining DNV having 7 years experience in scientific research covering satellite remote sensing, mesoscale weather forecast modelling and air pollution dispersion modelling and monitoring.

She has experience of more than 3 years in validation and verification of numerous CDM projects.

Her qualification, research experience and experience in CDM demonstrate her sufficient sectoral competence in energy generation from renewable energy sources.