
Validation Report

Kyushu Electric Power Co., Inc.

Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China


Project No. JQA-C0116

(1812000137)

Date: 18 August 2011



JAPAN QUALITY ASSURANCE ORGANIZATION

Validation Report	Project Title: "Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China"
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Approved by:  Tadayuki Yano	Client: Kyushu Electric Power Co., Inc.

Summary:

This is the Validation Report for the project activity "Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China", proposed by Shaanxi Huadian Pucheng Power Generation Co., Ltd. (People's Republic of China) and Kyushu Electric Power Co., Inc. (Japan).

This project activity aims at reducing GHGs emissions by replacing the rotors and rotating blades of high-, medium- and low-pressure turbines so as to increase the efficiency rate of the turbines and to reduce the coal consumption.

The approved baseline and monitoring methodologies, AM0062 / Version 1.1 "Energy efficiency improvements of a power plant through retrofitting turbines" is applied.

Japan Quality Assurance Organization (JQA) as a DOE conducted the validation on the basis of UNFCCC, Kyoto Protocol and the relevant decisions of COP/MOP and CDM-EB under the contract with Kyushu Electric Power Co., Inc.

After the implementation of the project activity, the average amount of emission reductions of 270,205 t-CO₂e/year is to be achieved.

JQA confirms that the project activity meets all relevant criteria. With the Certification Committee deliberation, JQA determines the project activity is valid as a CDM project activity.

Validation Team:	Technical Reviewer:
Team Leader: Dr. Ikuo Tamori	Mr. Shigenari Yamamoto
Member: Mr. Jun Takata Dr. Tadashi Yoshida	Certification Committee: Leader: Mr. Itaru Watanabe Member: Dr. Hiroshi Kuribayashi (Ext) Dr. Takahisa Yokoyama (Ext)

Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM-EB	CDM Executive Board
CER	Certified Emission Reduction
CL	Clarification Request
CM	Combined Margin
CNY	Chinese Yuan
COP/MOP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	CDM Executive Board
EF	Emission Factor
EIA	Environmental Impact Assessment
ERPA	Emission Reduction Purchase Agreement
FSR	Feasibility Study Report
GHG	Greenhouse Gas
HFC	Hydro Fluoro Carbon
IRR	Internal Rate of Return
ISO	International Organization for Standardization
JQA	Japan Quality Assurance Organization
LFG	Landfill Gas
LoA	Letter of Approval
NCV	Net Calorific Value
NDRC	National Development and Reform Commission
MRI	Mitsubishi Research Institute, Inc.
NGO	Non-governmental Organization
NWPG	North-West Power Grid
ODA	Official Development Assistance
OM	Operating Margin
O&M	Operation and Maintenance
PDD	Project Design Document
PP	Project Participant
QA/QC	Quality Assurance and Quality Control
RMB	People's Bank of China
SD	Sustainable Development
SEPB	Shaanxi Environmental Protection Bureau
SDRC	Shaanxi Development and Reform Committee
SV	Site visit
UNFCCC	United Nations Framework Convention on Climate Change
UO	Under Observation
VAT	Value Added Tax
VVM	CDM Validation Verification Manual

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1 INTRODUCTION

Japan Quality Assurance Organization (hereinafter referred to as JQA) has performed the validation on “Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China”, which Shaanxi Huadian Pucheng Power Generation Co., Ltd. (People's Republic of China) (hereinafter Project company) and Kyushu Electric Power Co., Inc. (Japan) plan to develop in Sunzhen, Pucheng County, Weinan City, Shaanxi Province, People's Republic of China. This report summarizes the findings obtained through the validation process and the validation opinion.

1.1 Objective

The objective of the validation is to review whether the project activity is in conformance with the requirements defined by the UNFCCC, the Kyoto Protocol, CDM Modalities and Procedures and related decisions by COP/MOP and EB. One of the most important points to be confirmed is the achievement of GHG emission reductions in line with the Sustainable Development (SD) policy of People's Republic of China.

1.2 Scope

The documentation of this validation process is set as follows:

- UNFCCC
- Kyoto Protocol
- Relevant decisions of COP/MOP and CDM-EB
- Project Design Document (PDD) (Version 01.1, as of 29/04/2009) - PDD (Version 02.8, as of 15/08/2011)
- AM0062 “Energy efficiency improvements of a power plant through retrofitting turbines” (Version 1.1) (Sectoral Scope: 1)
- Combined tool to identify the baseline scenario and demonstrate additionality (Version 02.2)
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 02)
- Tool to calculate the emission factor for an electricity system (Version 02)
- Glossary of CDM terms (Version 05)
- CDM Validation and Verification Manual (VVM) (Version 01.2)
- Guidelines for Completing the Project Design Document (CDM-PDD) and the Proposed New Baseline and Monitoring Methodologies (CDM-NM) (Version 07)
- Guidelines on the Assessment of Investment Analysis (Version 03.1)
- Guidelines on the demonstration and assessment of prior consideration of the CDM (Version 03)

The location of the validation is the project site of Pucheng Power Plant, and the organization is Shaanxi Huadian Pucheng Power Generation Co., Ltd.

1.3 GHG Project Description

Project Participants : Shaanxi Huadian Pucheng Power Generation Co., Ltd. /
People's Republic of China and
Kyushu Electric Power Co., Inc. / Japan

Non-Annex I Party : People's Republic of China (30 August 2002: Kyoto Protocol
ratified)

Annex I Party : Japan (04 June 2002: Kyoto Protocol ratified)

Project Site : Sunzhen, Pucheng County, Weinan City, Shaanxi Province,
People's Republic of China

Starting date of the project activity : 02/04/2007

Expected operational lifetime of the project activity : 19 years and 5 months

Starting date of the fixed crediting period : 01/07/2011 or date of registration,
whichever the later

Length of the fixed crediting period : 10 years and 0 month

Technology : Replacement of the rotors and rotating blades of high-, medium- and
low-pressure turbines to optimize the design of steam flow paths

The total estimate of anticipated reductions in tons of CO₂ : 2,702,050 tCO₂e

The overall capacity of coal-fired power plants in China is 631GW (in 2009) and its average power generation efficiency is 34.6%, which is considerably lower than 41.1% in Japan. The medium scale power plants with 200-400 MW class, which account for 38.7% of the total capacity of coal-fired power plants, have a relatively lower thermal efficiency. Therefore, the improvement of thermal efficiency by retrofitting of steam turbine contributes significantly to the emission reductions of CO₂ released from coal-fired power plants.

This project activity aims to reduce CO₂ emissions by retrofitting 2 x 330 MW steam turbines used in a coal-fired power plant. The technology to be employed in this project activity is to replace the rotors and rotating blades of high-, medium- and low-pressure turbines, whose performances and designs greatly affect turbine efficiencies, while it utilizes the existing base and outer casing without modification. The project activity increases the efficiencies of turbines by approximately 10% compared to the baseline situation.

The fixed crediting period of the project activity is 10 years from 01/07/2011 to 30/06/2021.

The ex-ante annual average emission reductions of the proposed project are estimated to be 270,205 tCO₂e for the crediting period and the aggregate emission reductions during the fixed crediting period, 10 years is estimated to be 2,702,050 tCO₂e.

1.4 Validation Team

The validation team was assigned on 16/04/2009 based on the JQA CDM Quality Manual (Eighth Edition).

Team Leader: Ikuo Tamori JQA Certified CDM Lead Assessor
(Certified sectoral scope: 1)

Member: Jun Takata JQA Certified CDM Assessor
(Certified sectoral scopes: 7, 13)

Tadashi Yoshida JQA Certified CDM Assessor
(Certified sectoral scopes: 1, 4, 5, 11, 12)

Technical reviewer: Shigenari Yamamoto JQA Certified CDM Lead Assessor
(Certified sectoral scope: 1, 2, 3, 4, 8, 9, 10, 11, 13)

JQA conducted an essential revision of the JQA CDM Quality Manual, taking into account the requirements, especially in newly defined Technical Area of the accreditation standard (Version 02). And then, the Technical Areas for the team members granted by the new criteria of JQA CDM Quality Manual (Version 13, 01/03/2011) are shown in Table 1.

Table 1 Validation team members and Technical Reviewer

Name	JQA or External	Qualification ¹⁾	Task ²⁾	Technical Area
Ikuo Tamori	JQA	LA	TL	1.1, 1.2
Jun Takata	JQA	A	TM	7.1, 13.1
Tadashi Yoshida	JQA	A	TM	1.2, 4.4, 4.5, 4.6, 5.1, 11.1, 12.1
Shigenari Yamamoto	JQA	LA	TR	1.1, 1.2, 2.2, 3.1, 4.1, 4.3, 4.6, 8.1, 9.1, 10.1, 11.2, 13.1

LA: Lead Assessor; A: Assessor; TL: Team Leader; TM: Team Member; TR: Technical Reviewer

The validation team and technical reviewer cover the sectoral scope 1 defined by the methodology AM0062 and necessary technical area 1.1.

The role and responsibility of the team leader is mainly to prepare the validation plan including the Desk Review, the Site-visit and related documentation and to manage the validation activities of the team. And the leader is responsible for stating the validation opinion and conclusion in the validation report.

The role and responsibility of the team members are to implement the Desk Review and the Site-visit including the investigation of background information and interviews with the project participants and related stakeholders, and also to indicate potential CARs and/or CLs and/or FARs through the validation activities.

A trainee, who is under observation, is not a team member formally. However, he is required to assist the team activities under the instruction of the team leader.

Ikuo Tamori is a chemical engineer and had been engaged in the research and development in a field of Air Pollution and Natural Resources for 30 years at a national research institute. He was engaged in the operation, research and development of coal combustion, thermal energy generation and particulate matter generation system. He was registered as an auditor (ISO 14001) authorized under the JEMAI AE100 in August 2003. From his educational background and direct work experience, it has been demonstrated that he has sufficient sectoral competence in "T.A 1.1 based on CDM Accreditation Standard for Operational Entities (Version 02). After joining the Global Environment Department of JQA, he has experienced many validation/verification of CDM projects including power generation projects related to Sectoral Scope 1 as a lead assessor.

Jun Takata holds Master's Degree of Urban Environmental Engineering and has experienced the validation/verification of several CDM projects including the power generation projects related to Sectoral Scope 1, and waste heat recovery and wastewater treatment projects since 2008. He has also successfully completed ISO 14001 Training Course and GHG Validator/Verifier Training Program (Energy Sector and Waste Handling and Disposal Sector). From the above mentioned educational background and experience of assessment, it has been demonstrated that he has sufficient sectoral competence in T. A 13.1 based on CDM Accreditation Standard for Operational Entities (Version 02). After assigned as a trainee of this project at the start of the validation, he was qualified as CDM/JI assessor of JQA on 23/06/2009 during the validation of the project.

Tadashi Yoshida is a chemical engineer and had been engaged in research and development in a field of chemical processes such as coal liquefaction and natural gas conversion technologies for more than thirty years at a national research institute. After joining the Global Environment Department of JQA in 2009, he has experienced many validation/verification of CDM projects in the field of hydropower, wind power and municipal solid waste management since 2009. He has also successfully

completed ISO 14001 Training Course and GHG Validator/Verifier Training Program (Energy Sector). From the above mentioned educational background and experience of assessment, it has been demonstrated that he has sufficient sectoral competence in T. A 1.2 based on CDM Accreditation Standard for Operational Entities (Version 02). After assigned as a trainee of this project at the start of the validation, he was qualified as CDM/JI assessor of JQA on 08/10/2010 during the validation of the project.

Shigenari Yamamoto, as a technical reviewer, worked for manufacturing steel as an expert of mechanical engineering for more than 16 years in Sumitomo Metal Industries before joining JQA. Through the operation and maintenance of Sinter Plant Heat Recovery, Coke Dry Quenching and Top Pressure Recovery Turbine, he has directly experienced thermal energy generation. He has also successfully completed GHG Validator/Verifier Training Program (Energy Sector) and obtained technical knowledge on thermal energy generation by steam turbine, gas turbine, cogeneration, etc. From the above mentioned educational background and experience of assessment, it has been demonstrated that he has sufficient sectoral competence in T. A 1.1 based on CDM Accreditation Standard for Operational Entities (Version 02). He has participated in several validation/verification activities including the power generation projects related to Sectoral Scope 1 as a lead assessor.

2 VALIDATION PROCESS

The validation process of JQA consists of the following four phases:

- 1) Document review;
- 2) Follow-up actions (e.g., Site-visit and telephone or e-mail interviews);
- 3) Reference to available information relating to projects or technologies similar to the proposed CDM project activity under validation; and
- 4) Review, based on the approved methodology being applied, of the appropriateness of formulae and correctness of calculations.

The PDD is made publicly available on the UNFCCC and JQA websites. If JQA receives any public comments, project participants and the CDM secretariat are notified that public comments have been received. Any comments received are to be uploaded to the UNFCCC and JQA websites.

In the validation, Table 1-Table 4 of Appendix A “CDM Validation Checklist” prepared by JQA based on “CDM Validation and Verification Manual (VVM), Version 01.2” and “Guidelines for Completing the PDD (CDM- PDD), Version 07” are utilized as tools for validation.

The Validation Checklist serves the following purposes:

- To organize, detail and clarify the requirements a CDM project is expected to meet; and
- To ensure a transparent validation process by inducing the validator to document how a particular requirement has been validated and which conclusions have been reached.

Table 1 : Comprehensive Checklist for Validation

Table 2 : PDD Requirements and CARs / CLs / FARs

Table 3 : Validation Requirements of VVM and CARs / CLs / FARs

Table 4 : CARs / CLs Resolution

Table 3 is newly added based on the requirements of VVM.

JQA raises a corrective action request (CAR) 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.

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

JQA raises a forward action request (FAR) during validation to highlight issues related to project implementation that requires review during the first verification of the project activity, if necessary. FARs shall not relate to the CDM requirements for registration.

Finally, all the CARs and/or CLs are resolved through the project participant's correspondences to those requests, which are described in Table 4.

2.1 Schedule

The process was implemented as follows:

- 10/04/2009: Contract for Validation
- 01/05/2009 – Publication of the PDD (Version 01.1) on the
- 30/05/2009: UNFCCC and JQA websites
- 03/06/2009: Preparation of the Desk Review Report
- 17-19/06/2009: Site-visit
- 25/06/2009: Preparation of the Site-visit Report
- 28/12/2010: Receipt of the revised PDD (Version 02.5)

- 25/01/2011: Preparation of the Draft Validation Report (Version 01)
- 01/02/2011: Technical review
- 15/02/2011: Receipt of the revised PDD (Version 02.6)
- 16/02/2011: Preparation of Draft Validation Report (Version 01.1)
- 25/02/2011: Certification Committee of JQA
- 07/04/2011: Receipt of the revised PDD (Version 02.7)
- 12/04/2011: Preparation of the Validation Report (Version 01)
- 12/04/2011: Submission of the Documents for Request for Registration to EB by JQA
- 25/06/2011 –
- 22/07/2011: Request for Review Period
- 21/07/2011: Issuance of “Request for Review” by EB
- 15/08/2011: Receipt of the revised PDD (Version 02.8)
- 18/08/2011: Preparation of the Validation Report (Version 01.1)

2.2 Document review

The Document Review is conducted by using the Validation Checklist (Appendix A), which is prepared for CDM project activities.

The main purposes of the Desk Review are as follows:

- Assess the completeness of the PDD in accordance with the “Guidelines for Completing the PDD (CDM-PDD)” including “Glossary of CDM terms” ;
- Review the PDD in order to examine the conformity of the project activity for the requirements;
- Collect information regarding the project activity from independent sources for validation, if necessary;
- Identify any issues to be confirmed at the Site-visit.

In addition, the main focuses of the Document Review are as follows:

- Justification and appropriateness of the baseline and monitoring methodologies for the proposed project
- Transparency and conservativeness of the assumptions for the baseline
- Technological, political, socio-demographic and environmental and legal aspects and trends relevant to the proposed project
- Additionality of the proposed project
- Appropriateness of the calculation of GHG emission reductions
- Responsibility and authority for monitoring, measurement and recording activities in the monitoring plan including quality control and quality assurance

2.3 Follow-up actions

The follow-up actions include the Site-visit to the project site and the interviews

mainly with the key persons in the host country including local project participants and governmental officials.

The followings are investigated in this process:

- SD policy in the host country including Environmental Impact Assessment (EIA)
- CDM approval and authorization procedures
- Technologies related to the project activity in the host country
- Appropriateness of the project boundary including GHG emission sources
- Monitoring plan and monitoring structure
- EIA and local stakeholders consultation
- Circumstances around the project site including nearest towns and villages

2.4 Resolution of Clarifications and Corrective Action Requests

The project participants are requested to respond as to how to resolve CARs and CLs listed in the Desk Review Report and the Site-visit Report.

The project participants are to resolve CARs and CLs, which are to be reflected in the revised PDD, and to submit it to JQA.

2.5 Internal Quality Control

The manager of CDM/JI Assessment Division assigns the validation team after taking into consideration the following:

- Project expertise requirements;
- Assessor qualification suitable for the technical and regional aspects of the project;
- Knowledge of environmental laws and regulations in the host country.

Through the validation process, the validation team prepares the draft validation report including draft conclusion. The leader of the validation team provides the documents including the outline of the validation result and the conclusion of the team to the technical reviewers and the Certification Committee of JQA, as a function to ensure that the validation has been appropriately carried out.

The technical reviewers review appropriateness of the validation and report the review results to the validation team. The validation team responds to the technical reviewers' comments and revises the documents.

After the technical review, the Certification Committee, upon receipt of the draft validation report from the team, deliberates appropriateness of the validation and its procedures, and reports the result of judgment to the Senior Executive of JQA. Finally the Senior Executive decides the validity of the project activity as DOE.

3 VALIDATION FINDINGS

3.1 Approval and Participation

Letter of Approval signed by DNA of China was issued in March 2010 (**Ref. 3**) and provided from Kyushu Electric Power Co., Inc. on 03/06/2010.

- i) The government of China ratified the Kyoto Protocol on 30/08/2002.
- ii) This is approval of voluntary participation in the proposed CDM project activity.
- iii) This project contributes to Sustainable Development in China.
- iv) Name of Project participant: Shaanxi Huadian Pucheng Power Generation Co., Ltd.
- v) Title of Project activity: "Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China"

The LoA is unconditional with respect to i) - v) above.

JQA confirmed through cross-checking the information on website of the Department of Climate Change, NDRC¹ that there was no doubt of its authenticity.

Letter of Approval signed by DNA of Japan was issued on 14/09/2010 (**Ref. 4**) and provided from Kyushu Electric Power Co., Inc. on 21/09/2010.

- i) The government of Japan ratified the Kyoto Protocol on 04/06/2002.
- ii) This is approval of voluntary participation in the proposed CDM project activity.
- iii) Name of Project participant: Kyushu Electric Power Co., Inc.
- iv) Title of Project activity: "Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China"

The LoA is unconditional with respect to i) - iv) above.

JQA confirmed through cross-checking the information on website of the Ministry of Economy, Trade and Industry² that there was no doubt of its authenticity.

The project participants are Shaanxi Huadian Pucheng Power Generation Co., Ltd. (PP of the Host Party) (hereinafter referred to as Pucheng) and Kyushu Electric Power Co., Inc. (PP of Annex I Party).

JQA confirmed through the document review that the PPs were listed in A.3 of the PDD and that this information is consistent with the contact details provided in Annex I of the PDD.

And there is no entity other than one approved as PP included in those sections.

In conclusion, JQA confirms that the project satisfies Para. 45 – 48, 52 - 53 of VVM.

¹ http://cdm.ccchina.gov.cn/website/CDM/pdf/Item_new/Item_new5160.pdf

² http://www.meti.go.jp/policy/energy_environment/global_warming/j-cdm/110214project-ichiran731.pdf

It is also assessed through the checklist (Table 1 of Appendix A).

3.2 Project design document and Project description

JQA confirmed that the PDD was prepared using the latest version of the PDD Form (Version 03), and that the PDD was in compliance with the guideline for completing the PDD (Version 07).

The Project company operates six turbine units of coal fired power plant in Pucheng County, of which two turbine units are to be retrofitted by the project activity. The proposed project activity aims at increasing the efficiency of electricity generation by approximately 10% (relative to the baseline) through retrofitting 2 x 330 MW steam turbines used in a coal-fired power plant owned by Shaanxi Huadian Pucheng Power Generation Co., Ltd., located in Sunzhen, Pucheng County, Weinan City, Shaanxi Province, China. The plant delivers electricity through Shaanxi Electric Power Corporation to North-West Power Grid (NWPG).

The energy efficiency of a power plant is subject to the thermal efficiencies of its boiler and turbine, and therefore the efficiency improvement of either or both of them leads to improvement in the efficiency of the power plant. Through several performance tests, it has been determined that the efficiencies of the steam turbines at Pucheng Power Plant are relatively low (**Ref. 6**).

There are 57 units of 300 MW-class units in NWPG, but none of them has been retrofitted (**Ref. 7**). This CDM project activity is expected to pioneer the way for other power plants. The project is classified into the large scale projects with emission reductions more than 60,000 tCO₂e/y.

The main target of this turbine retrofitting project activity is the optimization of the design of steam flow paths in the steam turbine. The project activity involves the replacement of the rotors and rotating blades of high-, medium- and low-pressure turbines, while it utilizes the existing base and outer casing without modification (**Refs. 8-9**). Modifying the design of the blades, whose performances and designs greatly affect turbine efficiencies, will lead to a reduction in steam flow leakage and internal loss, thus improve the internal efficiency of turbines. As a result of the project activity, Pucheng Power Plant will achieve lower coal consumption rates by approximately 10 wt%, and CO₂ emissions from the power plant will be reduced by 270,205 tCO₂e per year. The methodology AM0062 was developed by the PPs for this project activity.

Prior to the implementation of the project activity, these two turbines (No.1 and No.2 units) with low-energy efficiency, which were made in Romania using the technology developed by Alstom in 1960s, have been operated since 03/09/1996 and 27/04/1998, respectively (**Ref. 10**). Since the start of operation, these turbines have not reached the rated heat capacity. The use of these turbines has resulted in a decrease in the generation efficiency of the power plant, but the power plant has been forced to keep

running without retrofitting the turbines because of the low return rate on the investment in the turbine retrofitting project activity while the power demand was high.

The retrofitting of the turbines will increase their heat rates by approximately 10% and also increased the output of the power plant from 330 MW to 360 MW. However, the main operational conditions such as steam temperature and pressure remain unchanged before and after the retrofitting of the turbines. In addition, the amount of electricity supplied to the grid is also unchanged under the power purchase agreement between the Project company and the grid company.

The Project company contracted with Dongfang Turbine Co., Ltd. which is one of the three biggest turbine manufacturers in China, and has cooperated technologically with Hitachi Co., Ltd. in Japan.

Through the validation process, JQA issued one CAR and several CLs regarding the description of the project activity and confirmed their resolutions as follows; (For details, refer to Table 4 of Appendix A)

CAR 01: Source showing “increasing the efficiency rate of the turbines by approximately 10%” is not provided in the PDD.

Resolved: Following documents were provided and the increase in the efficiency of the turbine by approximately 10% was confirmed;

- *Performance tests of the turbines before and after the retrofitting showing approximately 10% increase of the turbine efficiency (Ref. 29),*
- *Turbine Retrofitting Project Agreement between Shaanxi Huadian Pucheng Power Generation Co., Ltd. and Dongfang Turbine Co., Ltd. (supplier) in which the supplier ensures approximately 10% increase of the turbine efficiency (Ref. 26).*

CL 02: The information of Pucheng’s activity including Phase 2 and Phase 3 provided at SV is not introduced in the PDD.

Resolved: The information on Phase 2 (2 x 330 MW units) and Phase 3 (2 x 660 MW units) was introduced in the PDD.

CL 04: The baseline scenario and the project scenario are not described in the PDD.

Resolved: Both scenarios were described in A.2.

CL 05: Evidence showing that the technology used in the existing turbines was developed in 1960s is not provided.

Resolved: It was confirmed through the FSR that the technology had been developed in 1960s in Romania (Ref. 20).

CL 06: While the contribution of the project activity to the sustainable development is discussed in A.2 and A.4.3 of the PDD, the “sustainable development” itself is not specified.

Resolved: The contributions to the sustainable development were described in A.2

in the following aspects:

- Coal saving,
- Emission reductions of CO₂, SO₂ and NO_x,
- Reductions of coal ash,
- Spread of positive economic effects and further technology development.

CL 10: It is not described how advanced, and environmentally safe and sound the project technology is.

Resolved: The manufacturer and the features of the technology adopted before and after retrofitting were compared in Table 1 of the PDD. The description was consistent with the findings at SV.

CL 12: Information on the age and average lifetime of the power generation equipments and industry standards is not included in the PDD.

Resolved: The procedure for estimating remaining lifetime of the power generation equipments was described in A.4.3 by referring to “Standard for the Specification for Stationary Utility Condensing Steam Turbine (SD269-88)” established by the Ministry of Water Resources and Electric Power, P.R. China (effective on 01/07/1988) (Ref. 11). According to the Standard, the technical lifetime of a domestically-produced condensing steam turbine with a capacity of more than 12 MW should be at least 30 years. Therefore, the remaining lifetime of the equipment at the start of the project activity (02/04/2007) is at least 15 years, far more than 10 years of the crediting period.

CL 13: The monitoring equipments and their locations are not described in the PDD.

Resolved: The locations of monitoring equipments were clearly illustrated in Figure 5 of the PDD (Refs. 12-13).

CL 15: Evidences of performance tests including heat rates and the increased efficiency guaranteed are not provided.

Resolved: Following evidences were provided; 1) Reports of performance test for No.1 and No.2 turbines (Ref. 29), 2) Turbine retrofitting project agreement (Ref. 26). It was confirmed that the turbine efficiency at the maximum output was estimated based on the test data and the increase of turbine efficiency 10% was guaranteed by the agreement..

CL 16: The load factor in Table 2 in relation to baseline scenario is not explained with any source.

Resolved: The definitions of load factor and average availability hours, and source of the data were newly explained in “Note” and “Source” under Table 2.

Through the review of documents, observation and the interview with the PP during

the physical site inspection, JQA confirms that the description of the proposed project activity in the PDD is accurate and complete and satisfies Para. 55, 59-60, 63 of VVM.

3.3 Baseline and monitoring methodology

3.3.1 Applicability of the selected methodology to the project activity

The methodology and tools applied are as follows:

- AM0062 Energy efficiency improvements of a power plant through retrofitting turbines (Version 1.1);
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 02);
- Combined tool to identify the baseline scenario and demonstrate additionality (Version 02.2);
- Tool to calculate the emission factor for an electricity system (Version 02).

The methodology AM 0062 was developed by the PPs for this project activity. The methodology is only applicable if all the following conditions are met:

Condition 1: The electricity is generated using fossil fuels; no biomass or waste heat is used;

The proposed project power plant is for coal-fired electricity generation and is not co-combustion with biomass. The waste heat is not also used for electricity generation.

Condition 2: The power plant where the project activity is applied supplies electricity to a grid only;

The project power plant supplies all the generating electricity to NWPG through Shaanxi Electric Power Corporation (Ref. 14).

Condition 3: In case of steam turbines, the steam supply and electricity generation should be separately measurable for each turbine retrofitted under the project activity;

The steam supply and electricity generation can be separately measured for each turbine of No.1 and No.2 as illustrated in Figure 5 of the PDD (Ref.13).

Condition 4: Activities covered under the following two categories are not eligible as CDM activity under this methodology:

- (a) All the recommended regular or preventive maintenance activities (including replacement and overhauling) as provided by the manufacturer of turbine;
- (b) A superior practice of preventive maintenance e.g. sophisticated cleaning systems, resulting into an improved efficiency compared to historical efficiency after maintenance;

There were neither preventive maintenance nor replacement in the history of

these two project activity turbines since the starting of the commercial operation in 1996 and 1998, respectively. Therefore, this project does not fall under either category above (Ref. 15).

Condition 5: Project activities are only eligible when:

- (a) The operational parameters of turbines, that affect the energy efficiency of turbine, remain the same (subject to a variation of $\pm 5\%$) in the baseline and the project scenario (e.g. steam pressure and temperature, quality of steam in the case of a saturated steam turbine; condenser vacuum, and combustion temperature for gas turbine) ;

The project activity does not include any boiler retrofitting and does not change the operational parameters of the turbines such as main steam pressure and temperature, etc. in both scenarios as shown in Table 1 of the PDD.

- (b) The project activity does not increase the lifetime of the existing turbine during the crediting period (i.e. this methodology is applicable up to the end of the lifetime of the existing turbine, if shorter than crediting period);

The existing turbines have a lifetime of 30 years and started the commercial operation on 03/09/1996 and 27/04/1998, respectively (Ref. 11). Since the start date of crediting period would be on 01/07/2011, the remaining lifetimes of them are more than 15 years and 17 years, which are much longer than the crediting period of 10 years.

Condition 6: Where applicability conditions of the latest version of Board approved “Tool to calculate the emission factor for an electricity system” apply.

The tool is referred to, in order to estimate the OM, BM and CM emission factors of NWPG for the calculation of baseline emissions in a project activity which substitutes electricity from the grid. The project activity meets the applicability condition of the tool.

In contrast, the methodology is not applicable:

To project activities that involve fuel switch;

The project activity does not involve any fuel switch before and after the retrofitting of the turbine because the project activity is implemented in a coal-fired power plant.

To combined cycle power plants, cogeneration plants, or the power plants that are part of an industry and a portion of the electricity is used to meet the internal demand of the industry.

The project power plant is neither combined cycle power plant nor cogeneration plant and the electricity generated is to be supplied to NWPG.

Finally, if the application of the procedure to identify the baseline scenario provides the results that the continuation of the current practice is the most plausible baseline scenario, this methodology can be applicable.

Through the assessment based on “Combined tool to identify the baseline scenario and demonstrate additionality (Version 02.2)” (hereinafter referred to as the combined tool), the most plausible baseline scenario was determined as “continuation of the current practice”.

Through the validation process, JQA issued several CLs regarding the applicability conditions and confirmed their resolutions as follows:

CL 17: Regarding Condition 4, it is not clear why the project activity does not fall under either of two categories prescribed in AM0062.

Resolved: JQA observed some turbine blades to be installed at the site visit and confirmed that the retrofitting project fell under neither the periodic inspections nor preventive maintenance.

CL 18: Regarding Condition 5(a), it is not clear whether the operational parameters of the turbines remain unchanged before and after the retrofitting.

Resolved: JQA confirmed through checking the performance test data that the operational parameters of the turbines are not changed. These parameters were summarized in Table 1 of the PDD.

CL 19: Regarding Condition 5(b), evidence showing the operation start date of turbines is not provided.

Resolved: The certificates of the acceptance inspection for No.1 and No.2 turbines were provided. The dates in the PDD were revised to 03/09/1996 for No.1 turbine and 27/04/1998 for No.2 one, respectively. JQA confirmed that these dates were consistent with those in the certificates (Ref. 10).

CL 20: Regarding Condition 6, the applicability condition requested by the tool as to the project activity supplying the electricity to a grid is not justified.

Resolved: It was appropriately justified by referring to the tool.

Through the observation during the site visit and the review of the relevant documents, JQA confirms that the project activity meets all the applicability conditions prescribed in AM0062 / Version 1.1 and complies with Paras 70 and 71 of VVM.

3.3.2 Project boundary

In case of steam turbines, the spatial extent of the project boundary includes the turbines that are retrofitted, and directly connected to an electric generator (turbo-generator), boiler and condenser in the power plant and the electricity grid to which the CDM project power plant is physically connected (**Ref. 12**). This is in

accordance with the methodology AM0062.

There is only one kind of GHGs involved in the project activity; CO₂ emitted from the coal-fired power plant which is an important emission source. The emissions of CH₄ and N₂O are assumed to be very small and are excluded for simplification in this methodology. Through the site visit, JQA confirmed that there were not other GHG emission sources to contribute more than 1% of the overall expected average annual emission reductions within the project boundary, which were not addressed by AM0062, in response to Para.77 of the VVM.

Through the review of the documents, the observation and the interview with the PP during SV, JQA confirms that the delineation of the project boundary in the PDD is correct and meets the requirements of AM0062. The project boundary of the proposed project activity complies with Para 78 of VVM.

3.3.3 Baseline identification

Baseline identification is implemented as per Step 1 of the combined tool.

According to the methodology AM0062/Version 1.1, the following scenarios should be considered as alternative baseline scenarios:

- Continuation of the current practice – the turbine continues to be operated without retrofitting;
- Turbine retrofit project activity is implemented without CDM;
- Part of turbine retrofit project activity is implemented without CDM;
- Turbine retrofit project activity (or part thereof) is implemented without CDM at a later point in time when technology is more common practice or other barriers are removed;
- A new turbine (either steam turbine, open cycle or combined cycle turbine) with a higher efficiency is installed to replace the existing turbine;
- Other retrofit activities that could result in increase in electricity generation.

JQA assessed the realities of these six alternative baseline scenarios described in the PDD.

Scenario 1 Since the start of commercial operation of the No.1 and No.2 project activity turbines in 1996 and 1998, respectively, any retrofitting and/or replacement of the turbines have not been implemented. Therefore, these turbines can operate over 15 years for the No.1 turbine and 17 years for the No.2 turbine, i.e. long enough for the crediting period of 10 years. The operation safety and stability of the turbines are assured without retrofitting. No additional cost is required. A realistic option.

Scenario 2 If the economical and/or financial condition of the project activity is

proven to be feasible by the investment analysis, this scenario is a realistic option. Credibility is discussed in Section 3.4.3 of the report.

- Scenario 3 It is not a realistic option because part replacement of the turbines has limited energy-saving effect and further requires shutdown of the power plant.
- Scenario 4 Since the turbines were made in Romania and there is no original documentation of the design, a custom-design is required again. Therefore, it is not expected to come down in price over time. The latest technology necessary for the retrofitting of the turbine has been already prepared by Dongfang Turbine Co., Ltd. which is cooperated with Hitachi Co., Ltd. in Japan. Furthermore, as the remaining lifetimes of the turbines become shorter, the IRR becomes lower.
- Scenario 5 Replacing the existing turbines with new highly efficient turbine require a large investment. Since the existing turbines have more than 15 years' lifetime, such a large investment would be avoided before completing the depreciation of the turbines. It is an unlikely option.
- Scenario 6 Other retrofit activities such as a more expensive boiler retrofit have less energy-saving effects than a turbine retrofit.

Thus, only Scenario 1 and Scenario 2 were considered as realistic alternatives.

The consistency of these two scenarios with mandatory applicable laws and regulations were examined. As laws and regulations relating to energy saving, there are "Energy Saving Law" enacted on 01/08/2008 and "Circulation-type Economy Promotion Law" issued on 29/08/2008. Shaanxi Province also promulgated the "Energy Saving Act" on 01/12/2006. However, all of these laws are related to the promotion of its policy for shutting down inefficient small-scale power plants and therefore 300 MW-class power plants are not a target of the policy.

From the above assessment, the following two scenarios are determined as the plausible and credible candidates for the baseline scenario:

- Scenario 1 - Continuation of the current practice – the turbine continues to be operated without retrofitting
- Scenario 2 - Turbine retrofit project activity is implemented without CDM

Scenario 2 was excluded by an investment analysis in Section 3.4.3 and hence only Scenario 1 remained as the baseline scenario.

JQA reviewed the following documents referred to in the PDD to assess whether all the assumptions and data used for identification of the baseline scenario were correctly quoted and interpreted:

- SD269-88 Standard for Stationary Utility Condensing Steam Turbine (**Ref. 11)**)

- Energy Saving Law (**Ref. 16**)
- Circulation-type Economy Promotion Law (**Ref. 17**)
- Energy Saving Act (**Ref.18**)
- Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects (China Electric Power Press, 2003) (**Ref. 51**)

Through the validation process, JQA issued the following two CLs and confirmed their resolutions.

CL 23: It is not clear what kinds of legal and regulatory requirements relating to the project activity there are.

Resolved: It was added that there were a few laws relating to the project activity including Energy Saving Law and Circulation-type Economy Promotion Law and that these laws were not mandatory regulations.

CL 24: Evidence showing “None of the turbines of the 57 units has been retired or retrofitted” is not provided.

*Resolved: The list of the 57 units was provided as evidence and shown on footnote of the PDD as “investigated by Northwest Electric Power Research Institute” (**Ref. 7**). For more details, refer to 3.4.2 Barrier analysis.*

JQA confirms that the most plausible baseline scenario is identified in accordance with AM0062 and that the proposed project activity complies with Para 87-88, 106 of VVM.

3.3.4 Algorithms and/or formulae used to determine emission reductions

JQA reviewed the calculation of project emissions, baseline emissions, leakage and emission reductions provided in the PDD and the calculation spreadsheet of GHG emission reductions to confirm whether;

- All assumptions and data used by the project participants are listed in the PDD, including their references and sources;
- All documentation used by 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 is applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;
- All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.

The results of the assessment are described in detail in 1) to 5) below.

1) Description of Assumptions and Data Used

JQA assessed whether all assumptions and data used by the PPs were listed in the PDD, including their references and sources.

Data and parameters used by the PPs in the calculation of project emissions, baseline emissions, leakage and emission reductions were as follows:

$EF_{FF, BL}$ (tCO₂/TJ): CO₂ emission factor of the fossil fuel used in the project activity turbine prior to the implementation of the project activity,

$NCV_{FF, PJ}$ (TJ/t) : Net calorific value of fossil fuel used in the project activity turbine during year y,

$w_{C, i, y}$ (tC/t): Weighted average mass fraction of carbon in fuel type i in year y,

$F_{GRID, y}$ (tCO₂/MWh): Emission factor of the electricity grid to which the project activity turbine is connected.

CAP_{max} (MW): Maximum power generation capacity of the project activity turbine prior to the implementation of the project activity,

HMR_x (h) : Average hours in which the plant can not operate due to maintenance or repair in the three most recent years x prior to the implementation of the project activity,

$EG_{Tur, x}$ (MWh/y) : Quantity of electricity supplied by the project activity turbine to the electricity grid in year x prior to the implementation of the project activity,

$EG_{PJ, y}$ (MWh/y): Quantity of electricity supplied by the project activity turbine to the grid in year y,

$\eta_{BL, y}$ (%) : Energy efficiency of the turbine without retrofitting in year y,

$\eta_{PJ, max}$ (%): Load v/s Energy efficiency curve of the turbine immediately after retrofitting,

$FC_{Tot, y}$ (t) : Total fuel consumption in boiler in year y,

$FC_{PJ, y}$ (t) : Actual fuel consumption towards electricity generation in project activity turbine in year y,

f_{tur} (-) : Proportion of heat input of steam to turbine to the enthalpy of total steam generated by boiler in year y,

$HI_{PJ, y}$ (TJ) : Heat input to the steam turbine in year y. In case of multi-cylinder steam turbines, this includes the heat input at the inlet of first stage and the heat inputs in re-heaters of steam between various cylinders(e.g. high-pressure, medium pressure and low-pressure cylinders).

$HI_{Tot, y}$ (TJ) : Heat input of total steam generated by boiler(s) in year y.

The appropriateness of the assumption used is discussed in 3.3.4.4) Correct Application of Methodology/Tools.

JQA confirmed that all data and parameters used by the PPs were listed in B.6.2 and

B.7.1 of the PDD, including their references and sources.

2) Correct Interpretation of Documentation

JQA reviewed all documentation used as the basis for assumptions and sources of data. The following documents were quoted by the PPs.

- AM0062 / Version 1.1
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 02)
- Tool to calculate the emission factor for an electricity system (Version 02)
- Bulletin on Baseline Emission Factors for Regional Power Grids in China (latest version at the time of publicity of the PDD) (**Ref. 62**)
- China Electric Power Yearbook 2003 – 2007
- Chinese Energy Statistical Yearbook 2005 – 2007

Through the validation process, one CL was issued and resolved. Refer to Table 4 of Appendix A for details.

CL 40: Source of the data for calculating the emission factors is not shown.

Resolved: The sources such as China Electric Power Yearbook 2003-2007 and Chinese Energy Statistical Yearbook 2005-2007 were provided in Annex 3. The emission factors were confirmed through those issued by NDRC.

Through the review of the PDD and relevant documents, JQA confirmed that all documentation used by PPs was correctly quoted and interpreted in the calculation of project emissions, baseline emissions, leakage and emission reductions.

3) Appropriateness of Values Used in the PDD

JQA assessed whether all the values of data, except for default values, used in the calculation of emission reductions were reasonable in the context of the proposed project activity.

When the PDD was publicly available on the UNFCCC website, the 2006 IPCC default values were used for $EF_{FF,BL}$ and $NCV_{FF,PJ}$ in the calculation of $EF_{BL,y}$ (Eq. 8 in the PDD). However, in the proposed project activity the operational conditions of the power generation plant are not changed before and after the retrofitting of the turbine except for the use of the retrofitted turbines and the calorific value of coal used is also adjusted to be the same level by blending some kinds of coal. Therefore, the use of actual data of the coal used is preferable rather than the use of the IPCC default value in the *ex-ante* estimation of baseline emissions and project emissions. The values of $EF_{FF,BL}$, $NCV_{FF,PJ}$ and $w_{C,i,y}$ of coal listed below are obtained by the analysis of coal actually used in the

project activity. For details, refer to the “Coal” sheet of the ER calculation spreadsheet attached where the carbon content, the calorific value and the calculated CO₂ emission factor of coal used during 2006-2008 prior to the implementation of the project activity are summarized with the annual consumption of each coal. The CO₂ emission coefficient COEF_{i,y} used for the estimation of project emissions is calculated by using Option A (Eq. 27 in the PDD) in “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”.

EF_{FF,BL}(tCO₂/TJ) : This is the weighted average of emission factor calculated from carbon content (%) by ultimate analysis and NCV (TJ/t) by calorific value measurement of the coals. The value of 101.32 tCO₂/TJ is used (**Refs. 76, 77**).

NCV_{FF,PJ} (TJ/t) : This is the weighted average of NCV of the coals which is determined by calorific value measurement.. The value of 0.0207 TJ/t is used (**Refs. 76, 77**).

w_{C,i,y} (tC/t) : This is the weighted average mass fraction of carbon in coals which is determined by ultimate analysis. The value of 0.57 tC/t is used (**Refs. 76, 77**).

EF_{GRID,y} (tCO₂/MWh): The simple OM method was used for the proposed project activity. Data from China Electric Power Yearbook 2003-2007 showed that this method could be applied to the proposed project because the share of low-cost/must-run resources in the total generation of NWPG was around 20% and clearly lower than 50%. In accordance with the latest version of “Tool to calculate the emission factor for an electricity system” (Version 02), the *ex-ante* option was selected to calculate the emission factors of the baseline. “Bulletin on Baseline Emission Factors for Regional Power Grids in China” (**Ref. 62**) was used to calculate the OM and BM emission factors of NWPG. JQA confirmed that the OM emission factor was 1.1225 tCO₂/MWh, the BM emission factor was 0.6199 tCO₂/MWh and the CM emission factor was 0.8712 tCO₂/MWh and these values were consistent with the latest data published by the NDRC in 2008.

CAP_{max} (MW): The value of 330 MW is based on the commissioning certificate of the power plant (**Ref. 10**).

HMR_x (h): This is hours from the historical records of maintenance and repair intervals for the latest three years (2006-2008). JQA confirmed through the cross-check with the historical data that these values in the PDD and the calculation spreadsheet were consistent with the historical record data shown below (**Ref. 19**):

No.1 turbine: 734.00 (2006), 1436.80 (2007), 402.25 (2008)

No.2 turbine: 390.17 (2006), 807.21 (2007), 334.00 (2008)

$EG_{Tur,x}$ (MWh/yr): This is the historical record of power generation for the latest three years (2006-2008). JQA confirmed that the values in the PDD and the calculation spreadsheet were consistent with the historical record data shown below (**Ref. 19**):

No.1 turbine: 1,360,024 (2006), 1,414,918 (2007), 1,595,788 (2008)

No.2 turbine: 1,710,194 (2006), 1,685,454 (2007), 1,814,276 (2008)

$EG_{PJ,y}$ (MWh): The quantity of electricity generated and consumed by auxiliary facilities was continuously measured by electricity meters. The net quantity of electricity ($EG_{PJ,y}$) supplied to the grid was calculated by subtracting the quantity of electricity consumed by auxiliaries from the quantity of electricity generated. JQA confirmed that the quantity of electricity supplied to the grid was 1,456,910 MWh for the No.1 turbine and 1,736,641 MWh for the No.2 turbine, which was calculated from the data of latest three years ($EG_{Tur,x}$) (**Ref. 19**).

$\eta_{BL,y}$ (%): Energy efficiency of the turbine without retrofitting was determined by the performance tests in accordance with ASME PTC6-1996. The tests were conducted by Shaanxi Electric Power Research Institute during 13-15/01/2009 for the No.2 turbine and during 15-17/08/2009 for the No.1 turbine. The efficiency at the full load of 330 MW was estimated on the extended straight line of the two largest loads among the test loads because performance tests at the full load had not been permitted by the grid company due to its power supply management. This is a conservative approach because a slope of the load-efficiency curve should lie below a straight line. JQA confirmed through the performance test reports (**Ref. 29**) that the values were 40.85% for the No.1 turbine and 41.35% for the No.2 turbine at the full load of 330 MW.

$\eta_{PJ,max}$ (%): Energy efficiency of the turbine immediately after retrofitting was determined by the performance tests in accordance with ASME PTC6-1996. The tests were conducted by Hangzhou Huadian Electric Power Experimentation Research Institute during 7-10/11/2009 for the No.2 turbine and by Huadian Electric Power Research Institute from 28/02/2010 to 10/03/2010 for the No.1 turbine. The efficiency at the full load of 360 MW was estimated to be the same as the average of the two maximum tested loads because performance tests at the full load had not been permitted by the grid company due to its power supply management. This is a conservative approach because efficiency at the full load of 360 MW should be larger than efficiency at the maximum test load. JQA confirmed through

the performance test reports (**Ref. 29**) that the values were 45.46% for the No.1 turbine and 45.45% for the No.2 turbine at the full load of 360 MW.

$FC_{PJ,y}$ (t): This is a calculated value of coal consumed toward electricity generation, obtained by the following equation: $FC_{PJ,y} = FC_{Tot,y} \times f_{tur}$. JQA confirmed through the cross-check with the historical data that 557,032 t for the No.1 turbine and 664,089 t for the No.2 turbine were correctly calculated (**Ref. 19**).

$FC_{Tot,y}$ (t): This is an average value of coal consumed in boiler which is calculated from the most recent three year's historical data. JQA confirmed through the cross-check with the historical data that 763,785 t for the No.1 turbine and 922,411 t for the No.2 turbine were correctly calculated (**Ref. 19**).

f_{tur} (-) : This is a calculated value obtained by the following equation: $f_{tur} = HI_{PJ,y} / HI_{Tot,y}$ as prescribed by the methodology AM0062 / Version 1.1. In the PDD, f_{tur} is calculated *ex-ante* by the following equation: $f_{tur} = (3.6/1,000 \times EG_{AVR}) / (FC_{AVR} \times NCV_{FF,PJ} \times \eta_{BL,y})$, where EG_{AVR} and FC_{AVR} are the average quantities of electricity generation and coal consumption for the latest three years (2006-2008), respectively. JQA confirmed that 0.729 for the No.1 turbine and 0.720 for the No.2 turbine were correctly calculated.

$HI_{PJ,y}$ (TJ): This is the value calculated from the flow rate, pressure and temperature of the steam continuously monitored at the turbine inlet. The enthalpy of steam is determined using the steam table. In the PDD, $HI_{PJ,y}$ is calculated from $FC_{PJ,y}$ and $NCV_{FF,PJ}$. JQA confirmed that 11,537 TJ for the No.1 turbine and 13,754 TJ for the No.2 turbine were correctly calculated.

$HI_{Tot,y}$ (TJ): This is the value calculated from the flow rate, pressure and temperature of the steam generated by boiler and continuously monitored. The enthalpy of steam is determined using the steam table. In the PDD, $HI_{Tot,y}$ is calculated from $FC_{Tot,y}$ and $NCV_{FF,PJ}$. JQA confirmed that 15,819 TJ for the No.1 turbine and 19,105 TJ for the No.2 turbine were correctly calculated.

Through the validation process, the following CARs and CLs were issued and resolved. In addition, FAR 01 was issued for the first verification. Refer to Table 4 of Appendix A for details.

CAR 06: The values of HMR_x and $EG_{Tur,x}$ in the tables of B.6.2 are different from their sources provided.

Resolved: The values listed in the table for HMR_x and $EG_{Tur,x}$ were corrected by cross-checking with the historical data.

CAR 07: “ $\eta_{BL,y}$ for No.1” and “ $\eta_{PJ,max}$ ” listed in B.7.1 are not in line with the methodology.

Resolved: They were moved to B.6.2 in line with the methodology.

CAR 09: With respect to the calculation of $COEF_{i,y}$, Option B of "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" is chosen without any justification. Justification for not choosing Option A is not described in the PDD although Option A is the preferred approach according to the tool. Monitoring parameter for calculating the $COEF_{i,y}$ is not included in B.7.1.

Resolved: $COEF_{i,y}$ was calculated by using the chemical composition of coal in accordance with the Tool (Option A). Accordingly, $EF_{FF,BL}$ was re-calculated based on ultimate analysis and proximate analysis of the coal used from 2006 to 2008. $w_{C,i,y}$ was added as the monitoring parameter for the calculation of $COEF_{i,y}$.

CL 38: It is not clear how " $\eta_{PJ,max}$ for No.2 turbine" is derived from the data in the table of Annex 3.

Resolved: Both values of " $\eta_{BL,max}$ " and " $\eta_{PJ,max}$ " were determined by extrapolation of the performance test data with the regression analysis in a conservative manner.

CL 41: The temperature and the pressure of steam are absent from the direct monitoring items.

Resolved: They were added as direct items including calibration of monitors, in line with the methodology.

CL 43: It is not clear whether $EF_{GRID,y}$ in B.7.1 is directly monitored.

Resolved: It was moved to B.6.2 in line with the methodology.

CL 44: It is not clear whether $FC_{PJ,y}$ is directly monitored.

Resolved: $FC_{Tot,y}$ was listed as a directly monitored parameter, while $FC_{PJ,y}$ is calculated from $FC_{Tot,y}$. JQA confirmed that $FC_{PJ,y}$ was calculated by the equation " $FC_{PJ,y} = FC_{Tot,y} \times f_{tur}$ ", while it is listed in B.7.1 in line with the methodology.

FAR 01: Regarding the baseline emission factor of the project activity turbine ($EF_{BL,y}$), the following FAR was raised. Eq. 8 in the PDD is to be reviewed, referring to the corrected equation in the methodology AM0062 / Version 02 in the first periodic verification.

Through the resolution of these CARs and CLs, JQA confirmed that all values used in the PDD were considered reasonable in the context of the proposed CDM project activity.

4) Correct Application of Methodology / Tools

JQA reviewed the PDD and the spreadsheet in order to assess whether the equations and parameters in the PDD were correctly applied in accordance with AM0062 / Version 1.1 and tools applied.

As for the baseline emissions (BE_y), AM0062 / Version 1.1 provides some options at each step.

Step 1: Determine baseline emissions for different scenarios of project electricity generation

There are three options Case a)-c), one of which will be chosen based on the quantity of electricity generation in year y . Among these three options, Case c) is chosen, i.e., the quantity of electricity supplied by the project activity turbine to the grid ($EG_{PJ,y}$) is lower or the same as the historical average annual generation level (EG_{AVG}) before and after the implementation of project turbine retrofitting. The appropriateness of PPs' choice is validated as follows:

► Appropriateness of choice of Case c)

In the PDD, justification of the choice of Case c) is made based on a) the agreement with the Grid (PPA) and b) historical amount of net electricity supply to the Grid.

a) Agreement with the Grid

In the PPA and the Notification (only 2009) (**Ref. 14**), the amount of electricity supply to the Grid by Project company including this project (Phase I) are determined as shown in Table 2, but the amount of electricity supply from this project alone is not specified. JQA calculated the amount of power supply from this project (Phase I), based on the generation capacity of each Phase, to assess if the electricity supply from the project had been increased after the retrofitting of the project turbines. The calculated amount of electricity supply from the project in 2010 has become smaller compared to those before retrofitting (2006-2008). It can be confirmed that the contracted quantity would not be increased by the project activity.

Table 2 Electricity supplied to the grid determined by the PPA

(Unit: GWh)

Phase	Turbine	2006	2007	2008	2009	2010
I	No.1,2	6,072	6,072	5,495	4,103	3,828
II	No.3,4					
III	No.5,6	-	-	-	2,622	3,727
Total		6,072	6,072	5,495	6,725	7,555
Phase I (estimated using capacity ratio)		3,036	3,036	2,748	2,052	2,088

Phase I (the proposed CDM project activity): 330MW×2 (until 2009), 360MW×2 (from 2010)

Phase II: 330MW×2

Phase III: 660MW×2 (Commercial operation was started in 2009)

b) Historical amount of net electricity supply to the Grid

JQA checked the historical performance data of the power plant for the purpose of assessing if the net power supply to the grid remains unchanged before and after the implementation of the project activity.

Net electricity supply to the grid and operating hours of the power plant in 2006-2011 are summarized in Figure 1 and Figure 2, respectively (**Ref. 19**).

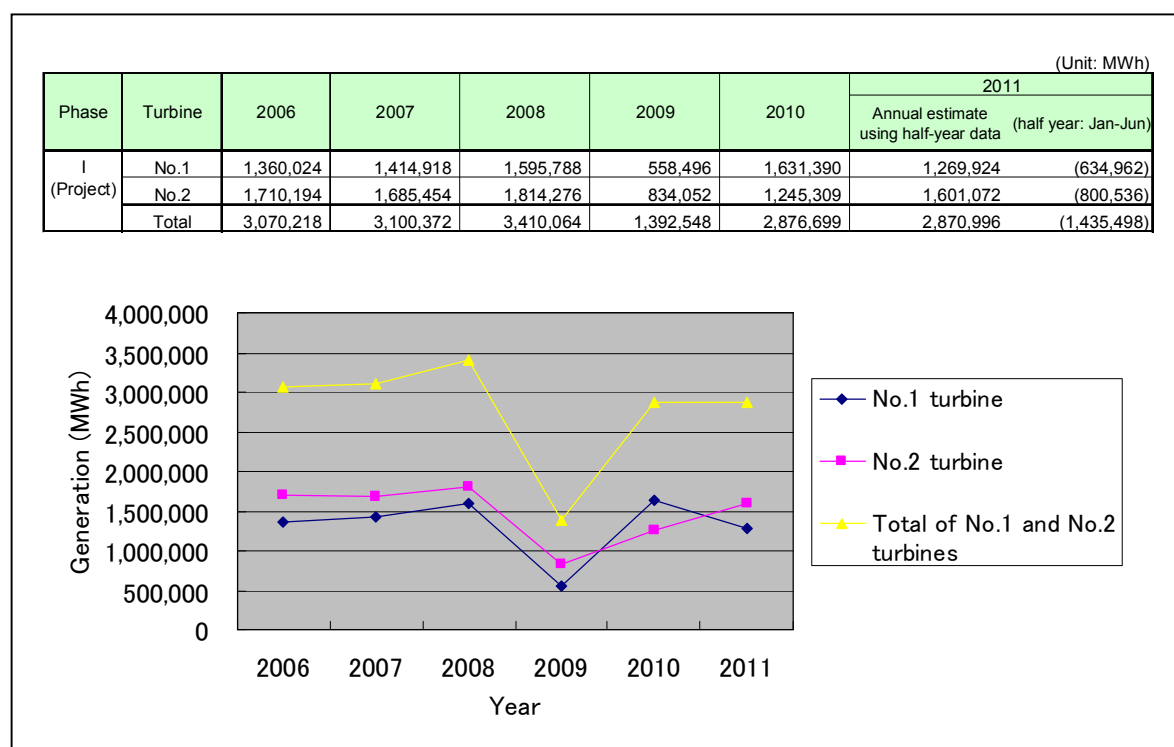


Figure 1. Net electricity supply to the grid before and after retrofitting of turbine

(Unit: hr)

Phase	Turbine	2006	2007	2008	2009	2010	2011	
							Annual estimate using half-year data	(half year: Jan-Jun)
I (Project)	No.1	6517.70	6535.05	7165.78	2755.17	7248.40	5,705	(2,852.57)
	No.2	8059.05	7790.41	8299.26	3716.46	5928.26	7,066	(3,533.18)
	Avg.	7,288	7,163	7,733	3,236	6,588	6,386	(3,192.88)

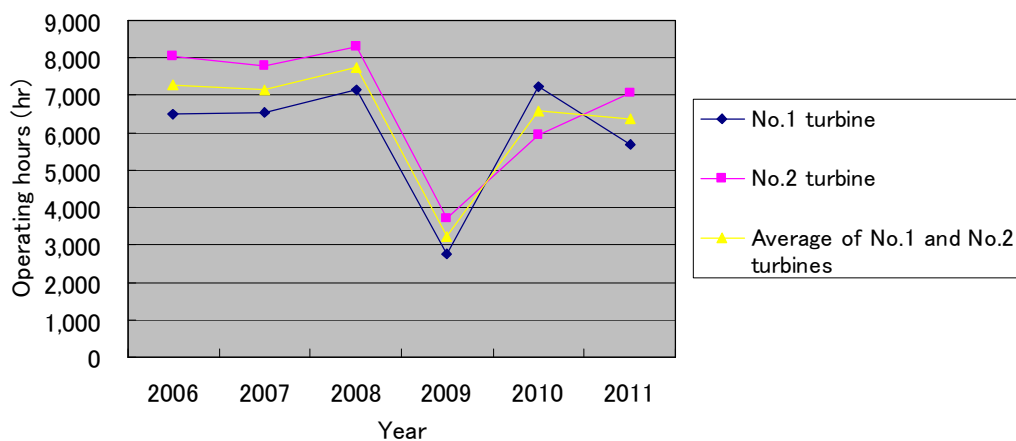


Figure 2. Operating hours before and after retrofitting of turbine

It should be noted that the annual values in 2011 are re-calculated based on the actual data from January to June. The results of net electricity supply to the grid and operating hours are found to be at the same level before and after the retrofitting. The data of net electricity supply and operating hours in 2009 were smaller than those in other years, due to the retrofitting process of turbines.

From the above, the PP's assumption that the net power supply to the grid would not increase in spite of the increase of 60MW in installed capacity ($660\text{MW} \Rightarrow 720\text{MW}$) justifies the choice of Case c) of BEy calculation in AM0062. Therefore, JQA concludes that the application of equation 3 (Case c) of AM0062 in the emission reductions calculation is valid.

Step 2: Determine baseline emission factor for steam turbine ($EF_{BL,y}$)

$EF_{BL,y}$ is calculated by using Eq. 8 in the PDD. Option B is chosen among Option A to C for the determination of baseline turbine efficiency ($\eta_{BL,y}$). Efficiency was determined by the performance tests in

accordance with ASME PTC6-1996 and GB8117-87.

Step 3 : Determine the $EG_{adjusted}$

The determination of adjusted electricity generation ($EG_{adjusted}$) is not applicable in the *ex-ante* calculation. The efficiency of project activity turbine ($\eta_{PJ,y}$) is determined by the performance tests in accordance with ASME PTC6-1996.

Step 4: Determine $EF_{GRID,y}$

$EF_{GRID,y}$ is calculated according to “Tool to calculate the emission factor for an electricity system (Version 02)” and “Bulletin on Baseline Emission Factors for Regional Power Grids in China”.

Step 4-1: Identify the relevant electricity systems

NWPG is identified as the Project electric power system.

Step 4-2: Choose whether to include off-grid power plants

Option I is chosen (Only grid power plants are included in the calculation).

Step 4-3: Select a method to determine the OM

The simple OM method is used for the project because low-cost/ must-run resources constitute clearly less than 50% of the total grid generation in average of the five most recent years.

Step 4-4: Calculate the OM emission factor

Option B (i.e. Eq.16 in the PDD) is chosen. A 3-year generation-weighted average value is taken for the OM emission factor. The value is 1.1225 tCO₂e/MWh which is consistent with that presented by the “Bulletin” from Chinese DNA (**Ref. 62**).

Step 4-5: Identify the group of power units to be included in the build margin

Option I is chosen. In the crediting period, the BM emission factor ($EF_{BM,y}$) is calculated *ex-ante* based on the most recent information available on plants already built at the time of CDM-PDD submission to the DOE.

Step 4-6: Calculate the BM emission factor

The calculation of the BM emission factor is derived from “Bulletin on Baseline Emission Factors of the China's Regional Grids” renewed on 30/12/2008. The value is 0.6199 tCO₂e/MWh, which is consistent with that presented by the “Bulletin” from Chinese DNA.

Step 4-7: Calculate the CM emission factor

The CM emission factor is calculated as weighted average of the OM

and the BM. The value of the defaults weights of the w_{OM} and the w_{BM} used are 0.5, respectively. The CM emission factor of the baseline is calculated *ex-ante* to be 0.8712 tCO₂e/MWh and will not be updated during the first crediting period of the project activity.

As for the project emissions (PE_y), AM0062 prescribes the use of the latest approved version of “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 02)”. The CO₂ emissions from fossil fuel consumption ($PE_{FC,j,y}$) are calculated by using Eq. 24 and Eq. 27 in the PDD. Here, the CO₂ emission coefficient ($COEF_{i,y}$) is obtained by using Option A, i.e. by the use of the carbon content ($w_{C,i,y}$) of coal determined by ultimate analysis. $FC_{PJ,y}$ is estimated by the following equation: $FC_{PJ,y} = FC_{Tot,y} \times f_{tur}$, as mentioned in the preceding section.

Although Option B was chosen for the determination of $COEF_{i,y}$ in the original PDD, it was changed to Option A after CAR 09 was issued. The annual emission reductions were revised from 235,592 tCO₂e to 270,205 tCO₂e due to the above change.

As for the leakage, no leakage is identified under this methodology.

The selections of these options and their rationales are described in the PDD in a transparent manner. JQA confirmed that the emission factors of NWPG were calculated appropriately according to the tool.

With respect to the calculation of baseline emissions, one CL was issued and then resolved.

CL 39: The equation of BE_y in B.6.3 is not the same as that in B.6.1.

Resolved: It was revised as follows: 1) The three optional equations of BE_y , Case a) to c) were listed in B.6.1, and 2) Case c) was chosen with the justification of the quantity of electricity generated in the project activity.

Through the resolution of one CL, JQA confirmed that the baseline methodology and the tool were correctly applied to calculate project emissions, baseline emissions, leakage and emission reductions.

5) Reproducibility of calculation

The PDD provides all equations and values used for the calculation of baseline emissions, project emissions, leakage and emission reductions in B.6.1, B.6.2, B.6.3, B.6.4 and B.7.1 in a transparent manner. The values in the spreadsheet of GHG

emission reductions provided are in accordance with those in the PDD.

Through independent re-calculations, JQA confirms that all estimates of the emission reductions can be replicated using the data and parameter provided in the PDD. The project activity satisfies Para 92(a)-(e) of VVM.

3.4 Additionality of a project activity

Additionality of the project activity was assessed using “Combined tool to identify the baseline scenario and demonstrate additionality (Version 02.2)” in accordance with AM0062.

3.4.1 Prior consideration of CDM

► Timelines

Table 3 shows the implementation timeline of the proposed project activity including the events and actions which have been taken to achieve CDM registration, and the starting date of the project activity.

All the events and actions were assessed through the evidences provided by the PPs.

Table 3 Timeline of the CDM project activity

No.	Date (DD/MM/YY)	Implementation / Event and action	Ref.
1	February 2005	Completion of the FSR	20
2	7 December 2005	China Huadian Corporation, the parent company of Shaanxi Huadian Pucheng Power Generation Co., Ltd, consulted with Mitsubishi Research Institute, Inc. about a turbine retrofit project at Pucheng Power Plant using CDM.	21
3	27 March 2006	The turbine retrofit project at Pucheng Power Plant was approved by China Huadian Corporation.	22
4	12 May 2006	Board meeting in which the decision of implementation of the project activity was made.	23
5	15 May 2006	Report on the implementation of a CDM project activity was submitted to Shaanxi Development and Reform Commission by Pucheng Power Plant	24
6	31 May 2006	The application for environmental impact assessment was accepted by Shaanxi	25

		province officials.	
7	5 October 2006	A new CDM methodology for a turbine retrofit project activity was submitted to UNFCCC as NM0203 with the PDD of this project activity.	The methodology was submitted through JQA.
8	2 April 2007	Pucheng Power Plant placed an order for turbines with Dongfang Turbine Co., Ltd.	26
9	30 November 2007	The new CDM methodology for a turbine retrofit project activity was approved as AM0062 by CDM Executive Board.	The methodology was approved at EB 36.
10	12 May 2008	Sichuan Earthquake damaged factories of Dongfang Turbine Co., Ltd. significantly and caused the delivery delay.	27 (Notice of delivery delay from Dongfang Turbine Co., Ltd. dated on 27 October 2008)
11	11 July 2008	FSR was approved by Shaanxi Development and Reform Committee (SDRC).	36
12	23 September 2008	Shaanxi Huadian Pucheng Power Generation Co., Ltd. signed an ERPA with Kyushu Electric Power Co., Inc.	28
13	10 April 2009	Kyushu Electric Power Co., Inc. signed a contract with Japan Quality Assurance Organization (DOE) for CDM validation.	Validation service agreement between Kyushu Electric Power Co., Inc. and JQA
14	13 -15 January 2009	Performance test of No.2 turbine before retrofitting.	29
15	18 February 2009 - 15 July 2009	Retrofitting of No.2 turbine.	30
16	20 July 2009	No.2 turbine was reconnected to the grid.	31
17	13 - 20 August 2009	168 hour-test of No.2 turbine.	32, 33
18	15 - 17 August 2009	Performance test of No.1 turbine before retrofitting.	29
19	20 August	Starting full operation of No.2 turbine.	31

	2009		
20	15 September 2009 - 10 January 2010	Retrofitting of No.1 turbine.	30
21	7 - 10 November 2009	Performance test of No.2 turbine after retrofitting.	29
22	20 January 2010	No.1 turbine was reconnected to the grid.	34
23	28 January 2010 - 4 February 2010	168 hour-test of No.1 turbine.	35
24	4 February 2010	Starting full operation of No.1 turbine.	34
25	28 February 2010 - 10 March 2010	Performance test of No.1 turbine after retrofitting.	29

► Starting date of the CDM project activity

The starting date of the CDM project activity, 02/04/2007, shown by No.8 in Table 3 is in compliance with “Glossary of CDM Terms”. The starting date of a CDM project activity is the date when Pucheng placed an order for turbines with Dongfang Turbine Co., Ltd. The date was confirmed by the contract between Pucheng and Dongfang Turbine Co., Ltd.

According to Annex 22, EB49 “Guidance on the Demonstration and Assessment of Prior Consideration of the CDM”, the proposed project activity belongs to “Existing project activity”.

► “Awareness of the CDM and decision to proceed with the project as the CDM”

The awareness of the CDM shown by No.2 in Table 3 is evidenced by the minutes of the consultation by MRI on the applicability of the CDM project (**Ref. 21**). Prior to the consultation by MRI, the FSR of the turbine retrofit project was prepared by Northwest Electric Power Research Institute in February 2005 because Pucheng had already recognized the low efficiency of the two turbines, and the FSR was approved by Shaanxi Development and Reform Committee (SDRC) on 11/07/2008 (**Ref. 36**). While technical feasibility and initial cost estimations for several retrofitting cases adopting domestic and foreign technologies were studied in the FSR, no study on economic feasibility was made. It should be noted that the FSR was neither the basis of the

investment decision nor the IRR calculation in the PDD due to the reason above. The long gap between the completion of the FSR and its approval of the SDRC is because Pucheng considered at the first stage that the approval for the FSR was not necessary due to a retrofitting plan of turbines which is not a new project.

After the consultation by MRI, China Huadian Corporation, the parent company held an expert meeting to deliberate the necessity of retrofitting turbines based on the FSR. It was confirmed through the comments of expert meeting that the performance from both the turbines did not reach the rated heat capacity and continuous operation was economically unattractive.

And then, the board meeting of Pucheng was held on 12/05/2006 and made decision to approve the proposed project as a CDM project activity (No. 4 in Table 3). This decision was confirmed through the minutes of the board meeting. It was demonstrated in the meeting minutes that the estimated cost of about 300 million CNY was higher than the initial estimated cost in FSR due to the increase of material costs, and the resulting IRR was below the benchmark, hence the benefit of CDM was necessary for improving the profitability of the project.

Through the validation process, CAR 02 was issued and resolved.

CAR 02: “Awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project” are not described.

Resolved: The event that China Huadian Corporation, the parent company of the PP, consulted with MRI was set as the awareness of the CDM. The board meeting decided to implement the project activity as CDM on 12/05/2006. The fact was described in the PDD.

► “Continuing and real actions” of the CDM

After the awareness and decision making to proceed with the project as a CDM project, the report on the implementation of the proposed project activity was submitted to SDRC by Pucheng on 15/05/2006 (**Ref. 24**) and then the environmental impact registration table was prepared and approved by Shaanxi Environmental Protection Bureau (SEPB) on 31/05/2006 (**Ref. 25**).

A new CDM methodology developed by MRI was submitted to UNFCCC through JQA on 05/10/2006 and approved as AM0062 on 30/11/2007. In parallel with the development of the methodology, Pucheng placed an order for turbines with Dongfang Turbine Co., Ltd. on 02/04/2007, which is set as the starting date of the project activity as stated above. Then the retrofitting of two turbines was completed on 15/07/2009 for No.2 turbine and on 10/01/2010 for No.1, respectively, even though the Sichuan Earthquake happened on 12/05/2008 damaged the plant of the turbine supplier and

caused the delivery delay of new turbine blades.

In the timeline, major events including the emission reductions purchase agreement between the parent company and Kyushu Electric Power Co., Inc. and the validation service agreement between Kyushu Electric Power Co., Inc. and JQA were listed. Furthermore, performance tests before and after retrofitting, reconnection to the grid after retrofitting, test operation and the start of full operation for No.1 and No.2 turbines were described as major events in the timeline.

Through the validation process, CAR 03 was issued and resolved.

CAR 03: Some events including ERPA signed with Kyushu Electric Power Co., Inc. and contract with DOE are absent in the implementation timeline.

Resolved: Following events were added:

- *ERPA signed between both the PPs,*
- *Contract with DOE,*
- *Completion of the FSR,*
- *Board meeting in which the decision of implementation of the project activity was made,*
- *Performance tests of turbines.*

In conclusion, as mentioned above, the starting date of the CDM project activity was confirmed to be 02/04/2007 by the evidences. The timeline indicates that Pucheng was aware of the CDM prior to the project activity start date, and the benefits of the CDM were a decisive factor in the decision to proceed with the project, and further continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. All the gap between documented evidences is less than 2 years.

Therefore, JQA confirms that the proposed CDM project activity complies with the requirements of “Guidelines on the Demonstration and Assessment of Prior Consideration of the CDM”.

3.4.2 Barrier analysis

The barrier analysis is implemented as per Step 2 of the combined tool.

► Technological barrier

The following technological barriers should be taken into consideration.

◆ Project-specific technological barrier

The two turbines concerned were manufactured by General Turbine, Inc. (Manufacturer in Bucharest, Romania) and delivered from Romania to China as consideration of loan. These two turbines have been in commercial operation since 1996 and 1998, respectively. However, the critical information such as drawing for detailed design of the turbines, except for the information necessary

for the maintenance and inspection, was not available at that time from Romania to China Huadian Corporation. As a result, they had to newly remake a precise drawing upon retrofitting by themselves.

◆ Technological barrier upon retrofitting turbines

There existed the technological difficulties upon the retrofitting of the relevant turbines because there had not been any retrofitting experiences on 57 units of 300MW-class turbine connected to North West Power Grid (Refer to Barriers due to prevailing practice below).

The thermal efficiency of steam turbines is directly determined by the optimization of steam flow path, i.e., the performance of rotating blades and stator vanes of turbines, which needs the use of the most advanced technology to implement the retrofitting of turbines.

The remake of precise drawing based on the accurate measurement of the relevant parts of turbines and high-precision processing technology are essential for the implementation of turbine retrofitting. Therefore, there existed a high technological barrier for the turbine retrofitting, taking the level of such technologies in China at that time into consideration.

◆ Role of CDM to overcome the technological barrier

MRI, consultant of the project activity, visited China Huadian Corporation in Beijing in December 2005, and made approach about the improvement of low-efficiency steam turbines by the CDM scheme. Prior to the consultation by MRI, FSR of the turbine retrofit project was prepared by Northwest Electric Power Research Institute in February 2005 because Project company had already recognized the low efficiency of the two turbines. As the result of technical feasibility analysis in case of using domestic and foreign technologies, the FSR concluded that only the technology of Alstom (a foreign technology) could be recommended because Alstom was the developer of the turbines concerned and also had advanced, matured and credible technology for turbine retrofitting. However, Project company hesitated to put the retrofitting into action due to the following reasons:

- The risk of retrofitting fault which leads to lower efficiency than estimated, due to the technological barriers mentioned above,
- The higher estimated cost for the retrofitting with the Alstom's technology compared to other suppliers'.

With the explanation by the experts on the side of MRI and by introducing some examples of small-scale turbine (less than 200MW) retrofitting with high-precision processing technology in China through the technical collaboration between Hitachi Co., Ltd. and Dongfang Turbine Co., Ltd., China

Huadian Corporation was convinced of the feasibility of the turbine retrofitting plan. The plan was approved by China Huadian Corporation on 27 March 2006, and then the decision of implementation of the project was made by Project company on 12 May 2006. Under technological circumstances in China at that time, the technology-sharing agreement between Dongfang Turbine Co., Ltd. (China) and Hitachi Co., Ltd (Japan) greatly contributed to the solution of the technological barriers which the Project company had faced.

This case is a good example which has eliminated the high risk of technological/economical barriers through the introduction of one of the most advanced Japanese technologies and CDM scheme in the retrofitting of turbines which requires high-precision processing technology.

Thus JQA has confirmed that the consultation from the MRI helped Project company to overcome the technological barriers and to minimize the financial risk due to the technological failure in the turbine retrofitting project. It can be confirmed that the CDM incentive was a decisive factor for the PPs to invest on the turbine retrofitting project.

► Barriers due to prevailing practice

◆ Justification of the criteria applied to limit to “300 MW class power plants”

The reduction of CO₂ emissions and the promotion of energy savings were one of the key policies in the 11th Five Year Plan (2006-2010) in China. The installation of large-scale power plants, the abolition of old small-scale (less than 200MW) and low-efficiency power plants and improvement of power generation efficiency have been strongly promoted in the field of power industry. Table 4 shows that as of 2009, the medium sized 200-400MW class power plant has highest proportion in the composition ratio, followed by a large class of more than 400MW (**Ref. 78**). Most of the large-scale power plants with high efficiency have been introduced during the last ten years, meanwhile the medium-sized plants were mostly introduced in the 1980s and many of them were low in efficiency. Hence, the efficiency improvement of 300MW class turbine is an important issue to promote energy saving in the energy sector of China. From the above technological background in China, the criteria applied to limit to “300 MW class power plants” is deemed reasonable.

Table 4 Capacity and ratio of coal-fired power plant in China

Year	Total capacity of coal-fired power plant (MW)	Capacity of electricity generation unit (MW)		
		0–200 MW class	200–400 MW class	400–1000 MW class
2000	235,402	103,507 (43.6 %)	111,955 (47.2 %)	19,940 (8.4 %)
2009	631,065	154,976 (23.8 %)	251,977 (38.7 %)	224,112 (34.3 %)

◆ Retrofitting project in NWPG

JQA has confirmed through the interview with the officials of SDRC and the review of a list of 57 units of 300MW-class power plants in NWPG (**Ref. 7**) provided by the PP that none of turbines is retrofitted not only in Shaanxi Province but in NWPG. The list presents the result of the investigation by Northwest Electric Power Research Institute (changed the name to Shaanxi Electric Power Research Institute in December 2006) which produced the FSR of the project activity.

Furthermore, JQA has interviewed two experts in China about the retrofitting of turbine as follows.

➤ Interview with Dr. Li Bao-Qing³, Vice President of FDPT

He has extensively familiar with the turbine retrofitting project in China with technical information.

According to his comments, the retrofitting projects of 300MW-class turbine have started from around 2005 and more than fifty turbine retrofitting projects are currently completed in China. It seems that the proposed project is the first case in the retrofitting of 300MW-class turbine in NWPG.

➤ Interview with Professor Xu Hong⁴

³ Position: Deputy Technology Department Manager, Research Department Manager.
Academy: Master and PhD degrees in School of Material Science and Engineering, Tianjin University between 1996 and 2002.
Major research: Computational Structural Mechanics and Materials Technology and Application.
He conducted as a Chief Technical Engineer and Officer who has taken charge for designing of turbine capacity of 300MW.

His accomplishments effectively facilitate the Chinese turbine manufacture and production industry's evolution, particularly in the conception and methodology of design.

⁴ Position: Dean of the School of Energy, Power and Mechanical Engineering of North China Electric Power University (NCEPU), the senior member of Chinese Society for Electrical Engineering (CSEE) and the committee member of National Standardization Technical Committee of Turbine (NSTCT).

Major research: Theoretical and experimental study on the intensity of power generation equipment, damage characterization and detection techniques of high-temperature component, and energy saving of thermal power plant.

According to his comments, retrofitting turbine projects were mainly implemented by Dongfang Steam Turbine Factory, Harbin Steam Turbine Factory, Shanghai Steam Turbine Factory, Beijing Full Three Dimension Power Engineering Co.,Ltd. (FTDPE), and Beijing Full Four Dimension Power Tech.Co.,Ltd. (FFDPT), etc. Therefore, JQA conducted telephone survey against Dongfang Steam Turbine Factory, Harbin Steam Turbine Factory, Shanghai Steam Turbine Factory and web survey against FTDPE and the FDPT.

As a result of the telephone survey, the former three companies answered as follows:

- Dongfang Steam Turbine Factory: No retrofitting turbine projects in NWPG except the proposed project activity were conducted. It was evidenced by the list of retrofitting turbine project of the company (**Ref. 79**).
- Harbin Steam Turbine Factory: No retrofitting turbine projects in NWPG were conducted. It was evidenced by the list of retrofitting turbine project of the company (**Ref. 80**).
- Shanghai Steam Turbine Factory: No retrofitting projects of turbines which were manufactured by other companies were conducted.

As a result of the web survey, the following results are obtained through the list of retrofitting projects:

- FTDPE⁵: No retrofitting turbine projects in NWPG were conducted.
- FDPT⁶: No retrofitting turbine projects in NWPG were conducted.

Through the interview with the experts and the government officials, the review of the list prepared by the independent third party and telephone and web surveys, JQA could not find any retrofitting projects connected to NWPG except this project, and concludes that no retrofitting turbine projects were implemented in NWPG at the time of decision making to proceed with the CDM project activity and hence the project was “first-of-its-kind”.

The PDD described that technological barriers and barriers due to prevailing practice have been lessened by the technological development in China and the technological cooperation with Japan and other developed countries, and the two alternative scenarios remained without detailed analysis of barriers. The PPs’ such consideration in the PDD is deemed conservative.

Through the validation process, CL 26 was issued and resolved.

CL 26: There is no referring to Step 2 “Barrier analysis” in accordance with the requirement of “Combined tool”.

Resolved: Step 2 “Barrier analysis” was added discussing through providing two sub-steps. The technological barriers and lack of prevailing

⁵ Retrofitting project list of FTDPE: <http://www.bf3d.com.cn/ShowInfo.asp?id=122&pid=136>

⁶ Retrofitting project list of FDPT: <http://www.fullpower.com.cn/case01.asp>

practice were discussed. The description was confirmed through the interview with the experts and the officials of SDRC, the review of the list of 57 units of 300MW-class power plants in NWPG prepared by Northwest Electric Power Research Institute and telephone and web surveys.

JQA confirms that the project satisfies Para. 115 – 117 of VVM.

3.4.3 Investment analysis

Since there are still two alternative scenarios remaining after “Step 2. Barrier analysis”, including the proposed project activity undertaken without being registered as a CDM project activity, the investment analysis is implemented as per Step 3 of the combined tool and “Guidance on the Assessment of Investment Analysis” included in the combined tool.

Since Scenario 1 is the continuation of current practice, it was not possible to conduct an investment comparison analysis. Therefore, benchmark analysis was conducted in order to evaluate the financial attractiveness of Scenario 2: Turbine retrofit project activity implemented without CDM.

According to the combined tool, the PPs selected the project internal rate of return (IRR) as the most suitable financial indicator for the project type and decision-making context and compared it with an appropriate benchmark.

With respect to the IRR calculation, initial investment was the cost for retrofitting two turbines and income was the saving costs of coal consumption. The means of validation are described below.

► Parameters for economical/financial calculations

The parameters used in the IRR calculation and their assumptions are summarized in Table 5. It should be noted again that the FSR prepared before the awareness of the CDM was not the basis of the investment analysis, as described in Section 3.4.1.

Table 5 Parameters used for investment analysis

No.	Parameter	Unit	Value	Ref.	Assumption
1	Initial investment	CNY	295,000,000	37 (20, 23, 38 and 39)	Estimation of suppliers at the time of decision to proceed with the investment.
2	Coal consumptio	10 ³ t/y	128.8	40	Estimation based on the three-year historical coal

	n				consumption taken into consideration of the turbine efficiency improvement.
3	Coal price	CNY/t	207.1	41 42 75	Historical coal price in 2005.
4	O&M costs	EUR/t	0	-	Retrofitting turbines will not affect the O&M method and costs.
5	Income tax	%	15 (1 st and 2 nd years) 28.5 (3 rd year) 33 (4 th year -)	43 -47	According to “Provisional Regulations of the People’s Republic of China on Enterprise Income Tax” and “China Western Development”
6	Interest rate of loan payment	%	6.26	48	Calculated from loan rate issued by the People’s Bank of China.
7	Debt ratio	%	80	74	Project company’s decision.
8	Project lifetime (IRR calculation period)	years	18	49	Set as the remaining lifetime from the expected starting date of operation.
9	Depreciation period	years	20	50	Parent Company’s rule.
10	Residual value rate	%	3	50	Parent Company’s rule.
11	Exchange rate	EUR /CNY	0.09877	Web survey	Exchange rate at the time of investment decision
12	Exchange rate	USD /CNY	0.1248	Web survey	Exchange rate at the time of investment decision

► Initial investment

The initial investment cost used in the IRR calculation was 295 million CNY, which was sourced from the comparative estimates from the several suppliers. JQA confirmed that the investment cost was consistent with “Report on the turbines retrofitting project costs (10/05/2006)” issued by Department of Planning and Development of Pucheng (**Ref. 37**). JQA checked the breakdown of the initial investment cost summarized in Table 6.

Table 6 Breakdown of initial investment costs for turbine retrofitting project

Items	(A) Average of estimates (million CNY)	Number of quotation	(B) Adopted cost based on estimates (million CNY)
Turbine retrofitting	178	4	130
Retrofit of feed-water pumps, etc.	20	3	15
Retrofit of condenser control system	10	4	10
Retrofit of transformers	45	3	40
Retrofit of Generators	89	2	80
Others (installation, adjustment and tests, etc.)	-	-	20
Total	342 (100%)	-	295 (86.3%)

As shown in Table 6, the total amount of initial investment cost was conservatively set to be smaller by about 14% than the sum of estimates. The appropriateness of the initial investment costs was validated by the following three approaches:

(i) Minutes of Pucheng’s board meeting

As described in “Awareness of the CDM...” of Section 3.4.1, JQA confirmed through the minutes of board meeting (**Ref.23**) in which the investment decision was made that the estimated cost at the time of investment decision was approximately 300 million CNY.

(ii) Actual investment cost

The administrative ledger for the contract of turbines retrofitting project (**Ref. 38**) provided by the PPs shows that actual payment for the project activity was 351 million CNY, which was higher than the costs used in the IRR calculation. The actual payment was consistent with the contracted cost of 350,847,500CNY in the PDD. The correctness of the administrative ledger was confirmed through checking the costs of several items in the administrative ledger with those in the contracts for major equipments such as turbines, capacity expansion of generators and transformers.

(iii) Cost estimation in the FSR

While the FSR prepared 15 months before the investment decision did not supply the basis of the IRR calculation, JQA conducted the comparison of the costs between the PDD and the FSR. Table 7 summarizes the cost estimations for technically reliable cases in the FSR. The FSR mentioned that Case ii) “Some parts from domestic supplier” in the Table 7 was more cost efficient than Case i) “All the parts from Alstom company”, but Case ii) was technically inferior. The adopted cost of 295 million CNY in the PDD is between both the costs in the table.

Table 7 Cost estimation in the FSR

	Procurement of the parts	
Case	i) All the parts from Alstom company*	ii) Some parts from domestic supplier
Estimated cost	311 million CNY for two turbines	260 million CNY for two turbines

Note: The projects turbines were designed based on the technology of Alstom Company.

In addition, JQA checked the CDM projects developed in China through the UNFCCC website. Among the CDM project activities utilizing AM0062, none of them was registered on the website as of 11/01/2011. As mentioned above, the project is proposed with the development of the methodology and there is no turbines retrofitting project of 300MW-class power plants in NWPG. Hence, relative comparisons of the input values used in the IRR calculation are next to impossible based on the ongoing CDM project activities.

Through the validation process, CL 28 and CL 29 relating to sources and evidences of data used in the IRR calculation were issued and resolved.

CL 28: Source of the values listed in the table is not described.

Resolved: The table was revised to Table 4 with sources.

CL 29: Evidences of the following data and assumption used in the IRR

calculation are not provided:

- initial investment, coal price, monthly records of coal consumption, income tax, interest rate, debt ratio, depreciation period and residual value rate.

Resolved: All the evidences were provided. The evidences and means of validation are described in this section.

Through the validation above, JQA considered that the initial investment cost used in the IRR calculation was appropriate at the time of investment decision. Actual payment was larger by about 19% than the initial investment in the IRR.

◆ Coal consumption and coal price

Coal consumptions of 557,032 t/y for No.1 turbine and 664,089 t/y for No.2 turbine were calculated based on the three-year historical data (2006 – 2008) and used in the calculation of emission reductions. JQA confirmed through checking monthly records of coal consumption for No.1 and No. 2 turbines (**Ref. 40**) and the spreadsheet that the coal consumptions were appropriately calculated taking the rates of turbine efficiency improvement into consideration.

The price of coal used in the Project company was obtained by the coal purchase tables attached to financial statement of Project company (**Ref. 41**) provided by the PPs. The coal purchase table shows the annual amount and expenditure of coal purchased by the Project company. JQA reviewed the coal price through cross-checking the several coal purchase contracts between Project company and coal mining companies (**Ref. 75**). As a result, JQA confirmed that the actual price of coal purchased in 2005 was 207.1CNY/t and the value was credible. The value of 207.1CNY/t was used over the entire period of the IRR calculation.

With respect to the future trend of coal price, the PPs estimated the future coal price in the original PDD by using World Energy Outlook 2005. However, World Energy Outlook 2005 estimated the coal import prices of OECD and does not include data for China. Hence, CL 60 regarding the use of World Energy Outlook 2005 to the future coal prices was issued and resolved.

CL 60: The use of World Energy Outlook 2005 for the future trend of coal prices used in the IRR calculation is not justified.

Resolved: The PPs used the actual prices of 207.1CNY/t in 2005 over the whole period of the IRR calculation, instead of the data of World Energy Outlook 2005.

JQA checked the change of coal prices at the time of decision making obtained from

Ministry of Commerce People's Republic of China⁷ to validate the appropriateness of the PP's application of constant coal prices in the IRR calculation. Figure 3 shows the price of standard bituminous coal (calorific value: 7,000kcal/kg) in Chinese market from June 2003 to December 2006.

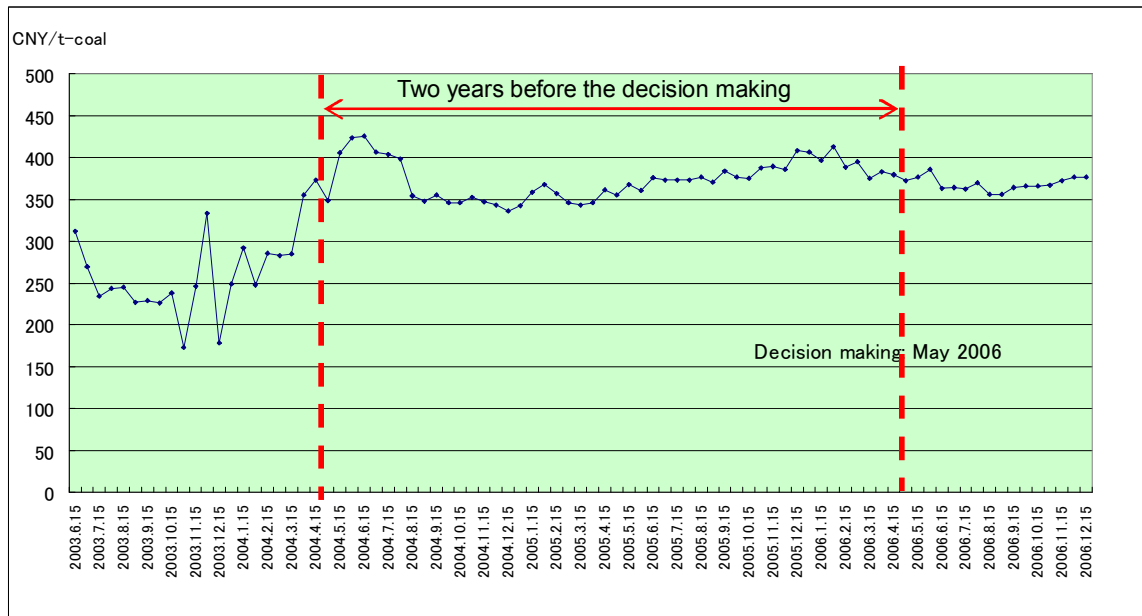


Figure 3. Change in the price of bituminous coal from the data of Ministry of Commerce People's Republic of China

Figure 3 shows that the price of standard coal is generally kept at the level from 350 CNY/t to 400 CNY/t over two years before the decision making. From the results, it could be said at the time of decision making that the future trend of coal prices would be expected to keep roughly constant.

On the other hand, as mentioned above, the price of coal used in the Project company was 207.1 CNY/t, smaller than the commercial coal price of 350-400 CNY/t in Figure 3. This is due to the difference in the quality of coal, that is, the PP's coal has a higher ash content and lower calorific value (4,500 - 5,000 kcal/kg) than the standard coal. According to several coal purchase contracts, the price of coal is determined based on the calorific value and rises/reduces with the rate of 0.042 CNY/kcal.

By using the above rate, the commercial coal prices with 7,000 kcal/kg, 350 - 400 CNY/t, would be calculated to be 245 - 316 CNY/t for the calorific values of Project company's coal, 4,500 - 5,000 kcal/kg because the difference in their calorific value between both coals is 2,000 - 2,500 kcal/kg.



Historically, there was a gap between the power coal price and commercial coal

⁷ <http://cif.mofcom.gov.cn/cif/html/>

price in China because of the inflexible electricity tariff and priority of electricity generation among power sector. According to the report from University of International Business and Economics⁸, the average power coal price was cheaper by approximately 20 % than the commercial coal price from 1997 to 2004. By using the decrease rate of 20 % to convert the commercial coal into power coal, the commercial coal prices with 4,500 - 5,000 kcal/kg, 245 - 316 CNY/t, would be recalculated to be 196 - 253 CNY/t. The resultant value is almost the same level as the actual price of coal used in the Project company.

JQA concludes that the actual coal price of 207.1 CNY/t used in the IRR calculation is on the whole reasonable.

Table 8 Comparison of coal prices

	Type	Commercial coal	Power coal
Calorific value		 Decreased by 20%	
7,000 kcal/kg	Decreased by 0.042 CNY/kcal	350 - 400 CNY/t	-
4,500 - 5,000 kcal/kg		245 - 316 CNY/t	196 - 253 CNY/t

◆ Operating and Maintenance Costs (O&M costs)

The O&M costs excluding coal cost does not change before and after retrofitting of turbines. Hence, the O&M costs of zero in the IRR calculation is considered to be appropriate.

◆ Income tax

The income tax rate of 33% was usually used according to “Provisional regulations of the People’s Republic of China on Enterprise Income Tax” published on 13 /12/1993 (**Ref. 43**). In addition to the regulations, tax benefit under “China Western Development Policy”, which is a temporary legislation with a ten-year term limited from 2001 to 2010, was applied to the project activity. China Western Development is a policy adopted by the Chinese government to boost its less developed western regions covering Shaanxi Province, and the main components of its strategy include the development of infrastructure such as energy, transport and telecommunication. JQA confirmed through checking the notifications regarding tax policies of China Western Development from State Administration of Taxation and Tax Bureau of Shaanxi Province, Tax Bureau of Weinan City (**Refs. 44-47**) that the project fulfilled the

⁸ <http://faculty.washington.edu/karyiu/confer/beijing06/papers/dong.pdf>

requirements for capturing the tax benefit.

All the notifications above were published from 2001 to 2003 before the investment decision on the project activity. Thus the income tax benefit shown in Table 9 was applied to the project in accordance with the notifications.

Table 9 Income tax rates for the project activity

Years	Income Tax Rates	Remarks
1 st and 2 nd years	15%	
3 rd year	28.5%	The beginning of each year is set as October. The weighted average of 15% and 33% was calculated as follows: $15\% \times 3/12 + 33\% \times 9/12 = 28.5\%$
After 4 th year	33%	

JQA considered that the income tax rates were appropriately estimated taking the tax policies of Chinese government into consideration.

◆ Interest rate and debt ratio

The interest rate of 6.26% was calculated from the official lending interest rate by the People's Bank of China taking the expected special tax benefit for the project activity. The interest rate for more than 5-year loan at the time of investment decision was confirmed as 6.39% on 28/04/2006 through the RMB benchmark deposit and loan rate issued by the People's Bank of China (**Ref. 48**). It was expected at the time of investment decision to capture a tax benefit of 2% discount from the standard interest rate above based on their commercial transaction. Thus the interest rate was calculated as follows:

$$6.39\% : \text{standard interest rate} \times (1 - 0.02: \text{discount rate}) = 6.26\%$$

While the evidence of 2% discount was not provided to DOE, JQA considered that the effects of the discount rate on the IRR calculation were negligible, and that the adoption of the discount rate resulted in the conservative calculation of the IRR.

Hence, the interest rate applied in the IRR calculation was considered to be appropriate at the time of investment decision.

The PPs assumed to finance 80% of the initial investment, that is 236 million CNY with above the interest rate. The debt ratio of 80% was confirmed by the report (**Ref. 74**) in which the initial investment for the project was expected to be 295 million RMB and the IRR calculation would be conducted with the assumption of 80% debt ratio.

◆ Project lifetime (IRR calculation period)

The project lifetime for the IRR calculation, 18 years, was determined as the period from the expected starting date of operation, October 2008 to the end of the expected operational lifetime, September 2026. This assumption is deemed appropriate.

◆ Depreciation and Residual value

Depreciation was calculated using the straight line method with the depreciation period of 20 years. As described in the PDD, the calculated method is general approach for power plants in China. The depreciation period of 20 years is confirmed by the application for the change of the depreciation period (**Ref. 50**), in which the depreciation period was changed from 17 years to 20 years within the limited period of the parent company's rule. Residual value rate of 3% was also confirmed by the application above.

As described in "Project lifetime" above, the remaining lifetime of 18 years was different from the depreciation period of 20 years. This is because the remaining lifetime for the turbines is calculated at the start of project turbine operation for No.1, 3/09/1996, and on the other hand the depreciation period for the turbine blades is calculated at the expected start of retrofitted turbine operation, October 2008.

JQA confirmed that the depreciation calculation was in accordance with the local accounting practice and appropriate.

Through the validation process, CL 30 was issued and resolved.

CL 30: It is not clear why the fair value in 2025 in the spreadsheet is 2,287 thousand Euro, not including the fair value for two years (Years 19 and 20).

Resolved: The currency unit used in the IRR was changed from Euro to CNY. The fair value was revised as 37,465 thousand CNY through recalculation including the two years.

◆ Exchange rate

JQA obtained the exchange rates as of 28/04/2006 as 0.0989 EUR/CNY 0.1247 USD/CNY through Yahoo Finance website (<http://finance.yahoo.com/currency-converter/#from=CNY;to=EUR;amt=1>), and confirmed that exchange rates for EUR and USD to CNY used in the IRR calculation, 0.09877 EUR/CNY and 0.1248 USD/CNY are appropriate.

► Benchmark

In China, the benchmark supplied by the national authority is commonly used for the assessment of investment analysis for the CDM project activities in line with Guidance

on the Assessment of Investment Analysis.

JQA reviewed the original text of the source of the benchmark, “Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects” (**Ref. 51**) issued by State Power Corporation and confirmed that;

- The type of the benchmark is a project IRR after tax
- The benchmark rate is 8% and
- The benchmark is applicable to the power industry.

Through the validation process, JQA issued CL 32 for the benchmark, 12% used in the PDD publicly available version, because the source of the value was not referred in the PDD. After issuing CL, the PPs revised the benchmark to 8% with the reference of “Interim Rules”. The reason why the PPs chose 12 % as the benchmark was that they regarded the internal requirement as the benchmark (**Ref.23**). Hence the CL 32 was resolved.

CL 32: The evidence of benchmark of 12% is to be provided.

Resolved: The benchmark was revised to 8% after tax, referring to the Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects.

JQA confirms that the benchmark is suitable for the proposed project activity and thus the project satisfies Para 112 of VVM.

► Calculation of the investment analysis

It was confirmed through reviewing the spreadsheet that the calculation of the project IRR for the project activity was correctly conducted and made in a transparent manner according to the combined tool and “Guidance on the Assessment of Investment Analysis”.

All the relevant assumptions were provided in the spreadsheet, so that a reader could reproduce the analysis and obtain the same results.

The IRR calculation demonstrates that the resultant IRR without CER is determined as 5.5% below the benchmark of 8%. It also demonstrates that the resultant IRR with CER of 8.0 Euro/tCO₂ is 11.7% beyond the benchmark.

Through the validation process, CL 31 and CL 59 were issued and resolved.

CL 31: It is not clear whether the IRR calculation with CER was conducted.

Resolved: The results of IRR calculation with/without CER were added in the PDD. And the spreadsheet was provided to DOE.

CL 59: It is not clear why interest repayment is included in the IRR calculation.

Resolved: The interest repayment was excluded in the IRR calculation in line with the Guideline.

► Sensitivity Analysis

“Guidance on Assessment of Investment Analysis” requests the PPs to conduct the sensitivity analysis including variables constituting more than 20% of either total project costs or total project revenues.

The PPs identified two variables: Initial investment and Coal price as the parameters taken into consideration in accordance with the guidance. The PPs conducted the sensitivity analysis by varying the parameters to the point of crossing the benchmark and the results are summarized in Table 10.

Table 10. Variation ratios of parameters crossing the benchmark

Parameters	Variation ratios
Initial investment	-19.5%*
Coal price	+27.5%

*: $100\% - 80.5\% = 19.5\%$

The PPs justified the reason in the PDD why the situation that the project IRR crosses the benchmark as a result of the change of the key parameters seems very unlikely to occur. JQA also considered that the situation would not occur as explained below.

- Initial investment: Even if the lowest cost (technically inferior case) in the FSR, 260 million CNY was applied, it would reduce the cost to 11.9%. Given that it was very important to secure the technical reliability, it would be difficult to achieve the cost reduction to 19.5% considering the significant economic growth in China at that time. Furthermore, the actual investment cost, 351 million CNY is higher than that used in the IRR calculation.
- Coal price: As described in “Coal consumption and coal price” above, the coal prices over two years prior to the investment decision was kept at the constant level. Average increase of 27.5% for coal price would not be deemed realistic.

It was confirmed through validation for the calculation of the sensitivity analysis in the spreadsheets that the calculation was appropriate and reproducible.

Through the validation process, CL 33 was issued and resolved.

CL 33: Clarification why the IRRs for investment cost and coal price would not cross the benchmark within +/- 10% is not provided.

Resolved: The clarification that such a situation would not occur was added referring to the prediction of the coal price by World Energy Outlook 2005. Initial investment cost finally increased up to 350,847,500CNY beyond the estimate.

In conclusion, all the input parameters were confirmed to be valid at the time of investment decision. As the result of the investment analysis, IRR without CERs and with CERs are 5.5% below the benchmark of 8% and 11.7% beyond the benchmark, respectively. The result provides a valid argument in favor of additionality that the project activity is unlikely to be financially/economically attractive.

It was confirmed through validation for the sensitivity analysis that the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions. Thus, the baseline scenario is Scenario 1, i.e. “Continuation of current practice - the turbine continues to be operated without retrofitting”.

JQA assessed the benchmark, parameters, calculation and sensitivity analysis, and confirms that the investment analysis is correctly carried out in accordance with Para 108-113 of VVM and “Guidance on the Assessment of Investment Analysis”.

3.4.4 Common practice analysis

The common practice analysis is implemented as per Step 4 of the combined tool.

JQA reviewed the elements for implementing common practice as described in Table 11.

As defined in the identification of alternative scenario above, NWPG is selected as a geographical scope of the common practice analysis. JQA considers that the selected geographical scope is appropriate because the regulation/ tariff / notification, etc. for power plants are determined by each grid company under which the power plant is located.

JQA considered that the definition of the similar project activities as the turbine retrofitting project for 300MW-class power plants is to be appropriate. As mentioned in Section 3.4.2, none of turbine retrofit projects for 300MW-class power plants had been carried out in NWPG.

JQA confirms that the proposed project activity is not a common practice and satisfies Para 120 of VVM.

Table 11. Common practice analysis

Element on the Common practice analysis	Validation Comment
a) geographical scope	Identified geographical scope, NWPG is appropriate because the electricity generated will be delivered to the grid.
b) existence of similar projects · parameters for similarity	Similar activities are appropriately defined as turbine retrofitting project for 300MW-class power plants. No similar

	activities are identified.
c) essential distinctions	Not applicable.

3.5 Monitoring plan

As described in Section 3.3.4, several parameters are monitored and calculated according to the following tools drawn upon by AM0062 / Version 1.1, which had been originally developed for this project.

- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 02)
- Tool to calculate the emission factor for an electricity system (Version 02)

The monitoring plan provided in the PDD complies with the requirements of AM0062 / Version 1.1 and the above tools.

1) Operational and management structure

The project company has established a set of management system such as ISO 9001, ISO 14001 and OHSMS 18001 and hence the monitoring procedure for the CDM project activity was established based on these management systems.

2) Data collection

The data relevant for the emission reduction will be logged by the operator on a daily basis and the log book will be checked by an operational manager. The calculation of heat input and emission reductions is processed under the support of Mitsubishi Research Institute, Inc. The operational manager is also responsible for cross-checking the amount of net electricity generation and coal consumption against receipt and/or invoices.

3) Maintenance and calibration

The instruments will be calibrated on a regular basis during the annual maintenance. The calibration status of all CDM-related instruments will be recorded and provided in a monitoring report. The details of the calibration are included in B.7.1. The monitoring location of the instruments for measuring the flow rate, temperature and pressure of steam is clearly illustrated in Fig.5 of the PDD.

Through the validation process, several CLs were issued and resolved. Refer to Table 4 in Appendix A for detail.

CL 45: Accepted industry standards or national standards for measurement of electricity generated and actual fuel consumption are not shown.

Resolved: Following standards were identified for the monitoring parameters:

- JJG 596-1999 for $EG_{PJ,y}$, (Ref. 55)

- JJG 539-1997 for $FC_{PJ,y}$, (**Ref. 53**)
- JJG 875-2005 for P (pressure of steam) and Q (flow rate of steam) (**Ref. 56**)
- JJG 160-2007 for T (temperature of steam) (**Ref. 57**)

CL 46: Description on the operational and management structure including the operational manager is absent.

Resolved: The structure was described including the use of the management system (ISO 9001, ISO 14001 and OHSM 18001) established within the power plant (Refs. 58-60)

CL 47: The calibration process is not clear, while there is the process described in "the annual maintenance".

Resolved: It was clearly described in "QA/QC procedures to be applied" in B.7.1. for each monitoring parameter.

JQA has confirmed through the review of the relevant documents and the interview with PPs that the monitoring system and activity are in compliance with the requirements of the methodology applied and the PPs are able to implement the monitoring plan and the means of implementation including data management and QA/QC are satisfactory. The monitoring plan of the project activity satisfies Para 122, 123 of VVM.

3.6 Sustainable development

It is appropriately described in A.2 of the PDD that the proposed project will contribute to the China's sustainable development by leading the way for retrofits of 200-300MW-class turbines. Retrofitting to improve the energy efficiencies of turbines will decrease coal consumption and contribute to saving coal, which will cause not only CO₂ but also SO₂ and NO_x emission reductions. Moreover, this project is expected to trigger the spread of high-efficient turbine technology in China.

As described in Section 3.1, JQA confirmed the validity of LoA from DNA of China. The LoA describes as follows: "2. Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China complies with the permission requirements provided for in the Measures for Operation and Management of Clean Development Mechanism Project in China, and assists China in achieving sustainable development".

JQA confirms that the proposed project activity satisfies Para 125, 126 of VVM.

3.7 Local stakeholder consultation

The stakeholders' consultation process is not required for the project activity which is classified as the third class under the EIA Law in the case the environmental impacts

are very low or positive. The fact was confirmed through interview with the official of Shaanxi Environmental Protection Bureau during the site visit. However, the process was carried out two times in 2008 and 2009 (**Ref. 61**).

The first was conducted during 1 to 04/11/2008 through providing the information on the CDM project plan and its effects to residents living in the vicinity of the project site, and five comments with positive opinion were recovered.

As another process a stakeholder consultation meeting was held on 26/02/2009 at a conference room of the project company. Twenty persons including five residents of Baiqisi Village of Dongchenzhen Town, the nearest village from the project site and several officials of local governments joined the meeting, invited through telephone. After introduction of the project activity by the person responsible for the CDM project and discussion with the attendants, questionnaires were distributed and recovered. There was not negative opinion against the proposed project. The consultation process was conducted prior to the publication of the PDD on the UNFCCC website during 01/5/2009-30/5/2009.

JQA confirmed through the minutes of the meeting and answered questionnaires (**Ref. 61**) and interview with several persons during the site-visit that all comments indicated positive opinions for the project.

Through the validation process, several CLs were issued and resolved in the revised PDD. Refer to Table 4 in Appendix A for detail.

CL 52: It is not clear whether there are any rules or guidelines on the stakeholders consultation applied to the project activity.

Resolved: The description that the process was voluntarily conducted by the PP without the direction of SEPB was added.

CL 54: The following situation on the stakeholder's meeting is not clear:

- How and when the stakeholders were notified about the meeting?
- How the explanation of the project activity was made in the meeting?

Resolved: The following explanation was added in the PDD:

- *The stakeholders were notified on the phone during the previous week of the meeting,*
- *The project outline and social benefits were explained by the person responsible for the CDM project activity.*

CL 55: The situation of the project site is not clear in relation to neighboring villages.

Resolved: The description was added in detail as "Note".

JQA confirms that the stakeholders' consultation by PPs was held in a transparent manner. It deems that PPs have taken due account of the stakeholders comments satisfactorily. Therefore, the project satisfies Para 128, 129 of VVM.

3.8 Environmental impacts

The environmental impact registration table (**Ref. 25**) was prepared for the project activity which was classified as a third class. The third class means the environmental impacts are very low or positive impacts under the EIA Law (**Ref. 73**). The table was provided to DOE.

The table was submitted to Shaanxi Environmental Protection Bureau (SEPB) on 31/05/2006 and approved on the same day because the table does not need deliberation by the technical committee in SEPB.

The table describes the environmental impacts of the project activity and actions to be taken, as well as during retrofitting and after retrofitting. After retrofitting SO₂ and NO_x emissions are estimated to be reduced due to the effect of turbine efficiency improving.

Through the validation process, the following CL was issued and resolved. Refer to Table 4 in Appendix A for detail.

CL 51: It is not clear how the EIA Law covers the project activity. The EIA report and its approval are not provided to DOE.

Resolved: The description of how the EIA Law was applied to and what procedures were taken for the project activity was added.

Based on the above-mentioned facts, JQA confirms that PPs have undertaken an analysis of environmental impacts in accordance with procedures as required by the host Party. Therefore, the project satisfies Para 131, 132 of VVM.

4 GLOBAL STAKEHOLDER PROCESS

4.1 Description of how and when the PDD was made publicly available

The PDD for the project activity was made publicly available on the JQA website as well as the UNFCCC website. Comments by Parties, stakeholders and NGOs were invited from 01/05/2009 to 30/05/2009 on these websites.

4.2 Description of how comments were received and made publicly available

No comment was received through the public comment inviting period.

4.3 Explanation of how due account has been taken of comments received

Not applicable.

4.4 Compilation of all comments received

Not applicable.

5 VALIDATION OPINION

1. Japan Quality Assurance Organization (JQA) as a DOE has performed the validation of “Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China”. The validation has been performed on the basis of UNFCCC criteria for CDM including Article 12 of the Kyoto Protocol, modalities and procedures for CDM (Marrakesh Accord), subsequent decisions of COP/MOP and CDM-EB, host country criteria as well as criteria given to provide for consistent project operation, monitoring and reporting.
2. Standard auditing techniques have been applied to the validation. The project specific CDM Validation Checklist has been prepared in order to report the nature of the issues raised, the nature of the responses provided by the project participants, the means of validation and the resulting changes in the PDD in a transparent and unambiguous manner. The validation, which consists of the three phases including the desk review of documents, the background investigation and the resolution of outstanding CARs and CLs, has been conducted by JQA with sufficient evidences to determine the fulfillment of all relevant UNFCCC criteria for CDM.
3. The project host party is China and the Annex I party is Japan. Both Parties fulfill the participation criteria and have approved the project and authorized the project participants. The DNA of China states that the project assists in achieving sustainable development.
4. The project correctly applies the approved baseline and monitoring methodology, AM0062 “Energy efficiency improvements of a power plant through retrofitting turbines” (Version 1.1). Through replacing the rotors and rotating blades, the project will increase the efficiency rate of the turbines and reduce the coal consumption. The project correctly applies “Combined tool to identify the baseline scenario and demonstrate additionality” (Version 02.2), “Guidelines on the assessment of investment analysis” (Version 03.1) and “Guidelines on the demonstration and assessment of prior consideration of the CDM” (Version 03) for assessment of additionality. The investment analysis implemented in line with the tool has demonstrated that the project is not economically and financially feasible without the revenue from the sales of CERs and is not a likely baseline scenario. Therefore, emission reductions attributable to the project activity are additional to any that would occur in the absence of the project activity.

5. The emission reductions are estimated in line with the applied methodology as 2,702,050 tCO₂e in total for the selected ten years crediting period, and 270,205 tCO₂e on annual average. It is likely that the estimated amount of emission reductions will be achieved given that the underlying assumptions do not change.
6. All CARs and CLs issued by JQA have been sufficiently resolved and the PDD has been revised accordingly. In summary, it is the JQA's opinion that "Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China" as described in the PDD (Version 02.8) as of 15/08/2011 meets all relevant UNFCCC requirements for CDM and all relevant host country criteria. JQA thus judges that "Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China" is valid as a CDM project activity and requests the registration of the project as a CDM project.

6 REFERENCES

Category 1 Documents to be submitted to CDM EB:

- 1 PDD Version 01.1 for GSP, 29 April 2009 and PDD Version 02.8, 15/08/2011.
- 2 Calculation spreadsheet for GHG emission reductions and financial analysis.
- 3 Letter of Approval for Shaanxi Huadian Pucheng Power Generation Co., Ltd. issued by DNA of China, No.2377, March 2010.
- 4 Letter of Approval for Kyushu Electric Power Co., Inc. issued by DNA of Japan, 14/09/2010.
- 5 Modalities of communication signed on 18/02/2011 between Shaanxi Huadian Pucheng Power Generation Co., Ltd. and Kyushu Electric Power Co., Inc.

Category 2 Documents:

6. Overall efficiency and turbine efficiency of No.1 and No.2 turbines.
7. List of 57 units of 300MW-class power plants in the North-West Power Grid (NWPG) provided on 21/06/2010.
8. Notification of 2007 maintenance and retrofitting plan (No. 154) (08/02/2007) and Notification of 2008 alteration plan of retrofitting (No. 1290) (02/09/2008).
9. Execution plan of commissioning and performance test of No.2 steam turbine (09/02/2009).
10. Acceptance inspection of 330MW No.1 and No.2 steam turbines with the starting date of their operation (03/09/1996 and 27/04/1998).
11. DL/T 892-2004 (SD269-1988) Specification of steam turbine for power plant (IEC 60045-1:1991), Electric Industry Standards of China, promulgated on 20/10/2004, enforced on 01/04/2005, published by NDRC (20/10/2004).
12. Block diagram of coal-fired power generation system.
13. Flow diagram of steam line and measuring points.
14. Power Purchase Agreements between Shaanxi Huadian Pucheng Power Generation Co., Ltd. and Shaanxi Electric Power Corporation 2006, 2007, 2008 and 2010.
Notification on Electric Power Purchase Plan for the year 2009 issued by Shaanxi Electric Power Company.
15. Maintenance plan for No.2 turbine in 2009.
16. Energy Saving Law, enacted on 01/04/2008.
17. Circulation-type Economy Promotion Law, issued on 29/08/2008.
18. Energy Saving Act, promulgated on 01/10/2006.
19. Monthly operation record of Pucheng Plant from 2006 to Jun. 2011.
20. FSR on Phase I retrofitting plan of steam turbines prepared by Northwest Electric Power Research Institute (Feb. 2005).

21. Minutes of the consultation on the applicability of the CDM project between Shaanxi Huadian Pucheng Power Generation Co., Ltd. and MRI on 07 December 2005.
22. Comments of expert meeting to China Huadian Corporation on Phase I retrofitting plan of steam turbines (27/03/2006).
23. Minutes of Board Meeting for Phase I retrofitting plan of steam turbines (12/05/2006).
24. Notification of CDM project activity plan to Shaanxi DRC (No. 9) (15/05/2006).
25. Application of EIA to Shaanxi Environmental Protection Bureau and its approval on Phase I retrofitting plan of steam turbine (No. 11) (31/05/2006).
Attached: Preparation of Environmental Impact Registration Table (30/05/2006).
26. Turbine Retrofitting Project Agreement between Shaanxi Huadian Pucheng Power Generation Co., Ltd. and Dongfang Turbine Co., Ltd. signed on 02/04/2007.
27. Notice of delivery delay of No.1 steam turbine from Dongfang Turbine Co., Ltd. (27/10/2008).
28. ERPA with Kyushu Electric Power Co., Ltd. (23/09/2008).
29. Reports of performance test for No.1 and No.2 turbines
 - Performance test for No.1 turbine before retrofitting conducted by Shaanxi Electric Power Research Institute from 15/08/2009 to 17/08/2009,
 - Performance test for No.2 turbine before retrofitting conducted by Shaanxi Electric Power Research Institute from 13/01/2009 to 15/01/2009,
 - Performance test for No.1 turbine after retrofitting conducted by Huadian Electric Power Research Institute from 28/02/2010 to 10/03/2010,
 - Performance test for No.2 turbine after retrofitting conducted by Hangzhou Huadian Electric Power Experimentation Research Institute from 7/11/2009 to 10/11/2009.
30. Reports on the start and completion of the retrofitting for No.1 (start date: 15/09/2009, completion date: 10/01/2010) and No.2 turbines (start date: 18/02/2009, completion date: 15/07/2009).
31. Request for confirmation regarding capacity increase of Unit No.2 to Shaanxi Electric Power Dispatch Center issued by Shaanxi Huadian Pucheng Power Generation Co., Ltd. on 31/08/2009.
32. Internal completion notice of 168-hours test operation with Unit No.2 after retrofitting to interested departments by Dept. of Production and Technology,

- Shaanxi Huadian Pucheng Power Generation Co., Ltd. on 20/08/2009.
33. Letter of Confirmation to Shaanxi Huadian Pucheng Power Generation Co., Ltd. responding to "Request for confirmation regarding capacity increase of Unit No.2" issued by Shaanxi Electric Power Dispatch Center on 27/10/2009.
 34. Request for confirmation regarding capacity increase of Unit No.1 to Shaanxi Electric Power Dispatch Center issued by Shaanxi Huadian Pucheng Power Generation Co., Ltd. on 08/02/2010.
 35. Internal completion notice of 168-hours test operation with Unit No.1 after retrofitting to interested departments issued by Dept. of Production and Technology, Shaanxi Huadian Pucheng Power Generation Co., Ltd. on 05/02/2010.
 36. Approval of FSR by SDRC (No. 856) (11/07/2008).
 37. Report on the turbines retrofitting project costs issued by Dept. of Planning and Development, Shaanxi Huadian Pucheng Power Generation Co., Ltd. on 10/05/2006.
 38. Administrative ledger for contract of the turbines retrofitting project showing the amount of contract.
 39. Contracts for retrofitting the major equipments such as turbines, capacity expansion of generators and transformers.
 40. Monthly records of coal consumption for No.1 and No.2 turbines of Pucheng Plant from 2006 to 2008.
 41. Coal purchase tables attached to financial statement of Shaanxi Huadian Pucheng Power Generation Co., Ltd. from 2003 to 2005.
 42. World Energy Outlook 2005 published by International Energy Agency.
 43. Provisional Regulations of the People's Republic of China on Enterprise Income Tax published by Ministry of Finance, the State Administration of Taxation on 13/12/1993.
 44. Notification of "Acceptance of qualification of tax break under China Western Development to Shaanxi Huadian Pucheng Power Generation Co., Ltd." (No. [2003] 16) issued by Tax Bureau of Weinan City on 09/02/2003.
 45. Notification of the policy for tax break under China Western Development (No. [2001] 202) issued by State Administration of Taxation on 30/12/2001.
 46. Notification of the implementation of tax revenue policy under China Western Development (No. [2002] 47) issued by State Administration of Taxation on 10/05/2002.
 47. Supplementary notification to "Notification of the implementation of tax revenue policy under China Western Development" (No. [2002] 186) issued by Tax Bureau of Shaanxi Province on 16/08/2002.

48. RMB Benchmark Deposit and loan rate issued by The People's Bank of China ([http://www.pbc.gov.cn/publish/zhengcehuobisi/631/2010/20101227152806168813259/20101227152806168813259 .html](http://www.pbc.gov.cn/publish/zhengcehuobisi/631/2010/20101227152806168813259/20101227152806168813259.html)).
49. Specification for Stationary Utility Condensing Steam Turbine (SD269-88) published by the Ministry of Water Resources and Electric Power, P. R. China on 11/04/1988.
50. Application for the change of the depreciation period to China Huadian Corporation on 03/11/2005.
51. Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects issued by State Power Corporation in March 2003.
52. Instruction of coal measuring equipment (General Measure GM8803).
53. Verification Regulation of Digital Indicating Weighing Instrument (JJG 539-97) ratified by Bureau of Quality and Technical Supervision on 01/09/1997.
54. Data of monthly coal consumption for the years of 2006-2008.
55. Verification Regulation of Electrical Energy Meters with Electronics (JJG 596-1999) published by Bureau of Quality and Technical Supervision on 21/10/1999.
56. Verification Regulation of Digital Pressure Gauges (JJG 875-2005) published by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China on 20/12/2005.
57. Verification Regulation of Standard Platinum Resistance Thermometer (JJG 160-2007) published by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China on 14/06/2007.
58. Certificate Conformity of Quality Management System (ISO 9001). (17/08/2007).
59. Occupational Health & Safety Management System Certificate (OHSMS GB/T 28001:2001) (17/08/2007).
60. Certificate of Registration (ISO 14001:2004). (10/09/2007).
61. Public notice of stakeholders meeting for environmental impacts assessment. Minutes of the stakeholders meeting for Phase I retrofitting plan of steam turbines and results of questionnaires (20/10/2008 and 26/02/2009).
62. Bulletin on Baseline Emission Factors for Regional Power Grids in China.
63. Subcontracting Agreement between Kyusyu Electric Power Co., Inc. and MRI under the Emission Reductions Purchase Agreement signed on 13/11/2008.
64. Rule for the Examination of Measurement Standard (JJF1033-2008) published by General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China on 31/01/2008.
65. Qualification certificates of the personnel for calibrating the monitoring

instruments issued by Shaanxi Electric Power Corporation.

66. Qualification certificates for the testing institutes issued by China Electric Power Construction Association.
67. Data of monthly output for the years of 2006-2008 with in-house demand.
68. Properties, calorific value and ultimate analysis of coal used.
69. Administrative regulation for retrofitting of China Huadian Corporation.
70. Specification of Phase I desulfurization process for No.1 and No.2 steam turbines (Dec. 2008).
71. Notification of Shaanxi Price Bureau on the price of grid electricity (No. 94) (30/06/2008).
72. Notification of Shaanxi Price Bureau on the tariff raise of grid electricity (No. 10) (20/08/2008).
73. Law of the People's Republic of China on the Environmental Impact Assessment (Adopted 28/10/2002. Effective 01/09/2003).
74. Report on the financing for turbine retrofitting project issued on 10/05/2006 (Evidence of debt ratio 80%).
75. Coal purchase contracts in 2005.
76. Summary of coal data obtained by ultimate analysis and proximate analysis from 2006 to 2008.
77. Certificates of ultimate analysis and proximate analysis data of coals used by Project company
78. Dr. Li Bao-Qing, Full Dimension Power Tech. Co., Ltd.: "Energy saving and environmental technology in the coal-fired power generation, and business matching of operation and maintenance technology", Japan-China Renovation Workshop 2011, 23-24 Feb. 2011.
79. List of retrofitting turbine project of Dongfang Steam Turbine Factory.
80. List of retrofitting turbine project of Harbin Steam Turbine Factory.

7 LIST OF INTERVIEWED PERSONS

No.	Organization	Name and Position
Shaanxi Pucheng Hudian Power Generation Co., Ltd.		
1	Mr. Zhang Wangxi	Vice General Manager, Shaanxi Pucheng Hudian Power Generation Co., Ltd.
2	Mr. Wang Qinglong	Senior Engineer of Plant/Development Department, Shaanxi Pucheng Hudian Power Generation Co., Ltd.
3	Mr. Wang Weidong	Engineer of Technology Environment Department, Shaanxi Pucheng Hudian Power Generation Co., Ltd.
4	Mr. Hu Binlin	Vice Manager of Production Technical Department, Shaanxi Pucheng Hudian Power Generation Co., Ltd.
5	Mr. Chen Liquan	Engineer of Production Technical Department, Shaanxi Pucheng Hudian Power Generation Co., Ltd.
6	Mr. Zhang Jianzheng	Fuel Department, Shaanxi Pucheng Hudian Power Generation Co., Ltd.
7	Mr. Han Yanjun	Secretary of GM Office, Shaanxi Pucheng Hudian Power Generation Co., Ltd.
8	Mr. Ren Qingjie	Chief, Shaanxi Pucheng Hudian Power Generation Co., Ltd.
9	Mr. Shuai Rui	Engineer, Shaanxi Pucheng Hudian Power Generation Co., Ltd.
Local Government Officials		
10	Ms. Ma Shumei	Planning Department, Shaanxi Development and Reform Commission
11	Mr. Ma Hongsheng	Environmental Resource Department, Shaanxi Development and Reform Commission
12	Mr. Wang Tuanan	Environmental Assessment Department, Shaanxi Environmental Protection Bureau
Local Stakeholders		
13	Mr. Zhao Junhu	Manager, Dongchenzhen Government of Pucheng County
14	Mr. Chu Guangming	Chief, Environmental Protection Bureau of Pucheng County Government
Mitsubishi Research Institute, Inc.		
15	Mr. Kuniyuki Nishimura	Research Director and Leader, Climate Change Strategy Group, Environment & Research Division, Mitsubishi Research Institute, Inc.
16	Ms. Keiko Sato	Researcher, Climate Change Strategy Group, Environment & Research Division, Mitsubishi Research Institute, Inc.
17	Mr. Minoru Fujii	Technical Adviser, Takenaka Partners
18	Mr. Chen Zili	STB Consulting China

CDM VALIDATION CHECKLIST

Kyushu Electric Power Co., Inc.

“Energy efficiency improvements of Pucheng Power Plant
through retrofitting turbines in China”

Project No. JQA-C0116
(1812000137)

18 August 2011



Japan Quality Assurance Organization

Appendix A

Ref. No. Documents

- 1 GUIDELINES FOR COMPLETING THE PROJECT DESIGN DOCUMENT (CDM-PDD) AND THE PROPOSED NEW BASELINE AND MONITORING METHODOLOGIES (CDM-NM) Version 07. (Annex12 of the EB41 report)
- 2 CLEAN DEVELOPMENT MECHANISM VALIDATION AND VERIFICATION MANUAL Version 01.2 dated 30/07/2010 (Annex 1 of the EB55 report)
- 5 Glossary of CDM terms Version 05 and paragraph 71 of EB47 report
- 19 Others

Table 1 Comprehensive Checklist for Validation

Section Seq. No.	Requirement	Ref. No.	Conclusion	Comments
1. Approval				
1.01	44. Have all Parties involved approved the project activity?	2	OK	The approvals of the project activity by both the Parties were confirmed through both LoAs. - Approval letter of DNA of China dated March 2010 - Approval letter of DNA of Japan dated 14 September 2010
1.02	45. Was it confirmed that the DNA of each Party indicated as being involved in the proposed CDM project activity in section A.3 of the PDD has issued a written letter of approval (LoA)? If yes, are the following clear? - who provided the LoA, the PP or the DNA; - when the LoA has been issued; - what the reference (number) of LoA is; - what supporting documentation (e.g. DNA's Website, etc) is.	2	OK	The DNA of each Party has issued the LoA below. - Approval letter of DNA of China dated March 2010 (No. 2377) - Approval letter of DNA of Japan dated 14 September 2010 - Both LoAs were provided by Kyushu Electric Power Co., Inc. - Issued dates were confirmed. - References were confirmed.
1.03	45. (a) Did each letter confirm that the Party is a Party to the Kyoto Protocol?	2	OK	- LoA of China writes "1. China approved the KP to UNFCCC on 30 August 2002, and is Party to KP." - LoA of Japan writes "Note 1: Japan has accepted KP on June 4, 2002."

Table 1 Comprehensive Checklist for Validation

Section Seq. No.	Requirement	Ref. No.	Conclusion	Comments
1.04	45. (b) Did each letter confirm that Participation is voluntary?	2	OK	- LoA of China writes "3. Shaanxi Huadian Pucheng Power Generation Co., Ltd. is hereby authorized as China's participant to voluntarily participate in and carry out the project activity." - LoA of Japan writes "As the DNA for Japan, the Government of Japan approves the project "Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China" and authorizes voluntary participation of the above-mentioned entity in the project "Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China", in accordance with Article 12.5 (a) and 9 of the KP to UNFCCC"
1.05	45. (c) Did each letter confirm that in the case of the host Party, the proposed CDM project activity contributes to the sustainable development of the country? (This requirement is the same as Para. 45. (c).)	2	OK	- LoA of China writes "2. Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China complies with the permission requirements provided for in the Measures for Operation and Management of Clean Development Mechanism Project in China and assists China in achieving sustainable development".
1.06	45. (d) Did each letter confirm that it refers to the precise proposed CDM project activity title in the PDD being submitted for registration?	2	OK	Each LoA refers to the precise proposed CDM project activity title in the PDD.
1.07	46. Is/Are the LoA(s) of approval unconditional with respect to (a) to (d) of para. 45?	2	OK	Both LoAs are unconditional with respect to (a) to (d) above.
1.08	47. Was it determined whether the LoA(s) has/have been issued by the respective Party's DNA?	2	OK	LoA was issued by DNAs of China and Japan, respectively.
1.09	48. If in doubt of the authenticity of the LoA, was the authenticity of the LoA verified with the DNA?	2	OK	Website information on Chinese DNA and Japanese DNA are consistent with LoA of China and Japan, respectively.

Appendix A

Table 1 Comprehensive Checklist for Validation

Section Seq. No.	Requirement	Ref. No.	Conclusion	Comments
1.10	49. The validation report shall, for each Party involved: (a) Indicate whether a letter of approval has been received, with clearly referencing the letter itself and any supporting documentation;	2	OK	Refer to Section 3.1 of Validation Report.
1.11	49. The validation report shall, for each Party involved: (b) Indicate whether the DOE received this letter from the project participants or directly from the DNA;	2	OK	Refer to Section 3.1 of Validation Report and 1.02 above.
1.12	49. The validation report shall, for each Party involved: (c) Indicate the means of validation employed to assess the authenticity if paragraph 48 above applies;	2	OK	Refer to Section 3.1 of Validation Report and 1.09 above.
1.13	49. The validation report shall, for each Party involved: (d) Contain a clear statement regarding whether the DOE considers the letters are in accordance with paragraphs 45.48 above.	2	OK	Refer to Section 3.1 of Validation Report.
1.14	50. If letters of approval contain additional specification of the project activity, such as the PDD version number, then the request for registration shall be made on the basis of the documents specified in the letter. If a letter of approval refers to a specific version of the validation report and the DOE therefore is unable to submit this precise version of the validation report, the DOE shall take one of the following options: (a) Insert a statement in the validation report to indicate that the final letter of approval has not been received and that a request for registration will not be submitted until it has been received; (b) Update the validation report to reflect the receipt of the letter of approval. If this option is chosen, validation report major number shall remain unchanged and the minor number shall be increased. The validation report shall contain confirmation that this is the only change that has been made to the version referred to in the letter of approval.	2	NA	Both the LoAs refer to neither additional specification of the project activity nor a specific version of the validation report.

Table 1 Comprehensive Checklist for Validation

Section Seq. No.	Requirement	Ref. No.	Conclusion	Comments
2. Participation				
2.01	51. Have all project participants been listed in a consistent manner in the project documentation?	2	OK	The names of PPs in A.3 and Annex 1 of the PDD are consistent with LoAs.
2.02	51. Has the participation of the project participants in the project activity been approved by a Party to the Kyoto Protocol?	2	OK	Refer to 1.04 above.
2.03	52. Are the project participants listed in tabular form in section A.3 of the PDD? And has the participation of each project participant been approved by at least one Party involved, either in a letter of approval or in a separate letter specifically to approve participation?	2	OK	The PPs are listed in tabular form in A.3 of the PDD. The participation of each PP has been approved by each Party involved in the LoA.
2.04	52. Are any other entities other than those approved as project participants included in these sections of the PDD?	2	OK	No entities other than those approved as PPs are included.
2.05	53. If in doubt of the participation approval, was it verified with the DNA that the approval of participation is valid for the proposed CDM project participant?	2	NA	There is not in doubt of the participation approval.
2.06	54. The validation report shall, for each project participant: (a) Indicate whether the participation has been approved by a Party to the Kyoto Protocol;	2	OK	Refer to Section 3.1 of Validation Report.
2.07	54. The validation report shall, for each project participant: (b) Describe the means of validation employed to draw this conclusion.	2	OK	Refer to Section 3.1 of Validation Report.

Table 1 Comprehensive Checklist for Validation

Section Seq. No.	Requirement	Ref. No.	Conclusion	Comments
3. Global Stakeholder Process				
3.01	40. Has the PDD of the project activity under consideration made publicly available in accordance with the latest version of the "Procedures for processing and reporting on validation CDM project activities."?	2	OK	The PDD of the project activity has been made publicly available on 1 May 2009 in accordance with the latest version (Version 02) of procedures.
3.02	41. During the validation of the project activity, has the comments received been taken into account? Does the validation report include details of actions taken to take due account of the comments during the validation process, ?	2	NA	No comment has been received.
3.03	42. If comments are not sufficiently substantiated or if they indicate that the project activity does not comply with the CDM requirements, has further clarification from the entity providing the comment been requested by the DOE? (However, the DOE is not required to enter into a dialogue with Parties, stakeholders or NGOs that comment on the CDM requirements. If no additional information or substantiation is provided in response to a request for clarification, the DOE shall proceed to assess the comments as originally provided.)	2	NA	No comment has been received.
3.05	41. The validation report shall include details of actions taken to take due account of the comments during the validation process?	2	NA	No comment has been received.

Table 1 Comprehensive Checklist for Validation

Section Seq. No.	Requirement	Ref. No.	Conclusion	Comments
4. Project Design Document				
4.01	56. Is the PDD in accordance with the applicable CDM requirements for completing PDD as follows? - Fully completed; - Fully written in English language; - Using the latest template without modifying its format, font, headings or logo; - Using tables and their columns without modifying or deletion;	2	OK	The PDD is fully completed using the latest template, version 03 in accordance with the applicable CDM requirements for completing PDD.
4.02	55. Is the PDD used as a basis for validation prepared in accordance with the latest template of CDM-PDD and guidance from the CDM Executive Board?	2	OK	The PDD is prepared in accordance with the latest template (version 03) of CDM-PDD and guidance from EB.
4.03	57. The validation report shall contain a statement regarding the compliance of the PDD with relevant forms and guidance.	2	OK	Refer to Section 3.2 of Validation Report.
5. Modalities and Communication				
5.01	Are the modalities of communication between project participants and the Executive Board indicated at the time of registration by submitting a statement signed by all project participants? (All official communication from and to project participants, after a request for registration is submitted by a DOE, shall be handled in accordance with these modalities of communication.)	5	OK	Modalities of communication signed on 18 February 2011 by Shaanxi Huadian Pucheng Power Generation Co., Ltd. and Kyushu Electric Power Co., Inc.

Appendix A

Table 2 PDD Requirements and CARs / CLs / FARs

Remarks:

MoV	: Means of Validation
DR	: Desk review refers to CARs/CLs/FARs found out through the desk review for the PDD/Version 01.1 (prepared on 29 April 2009) based on the approved methodology, AM0062/Version 1.1, and so on.
SV	: Site-visit conducted from 17/06/2009 to 19/06/2009
DR'	: Desk review refers to CARs/CLs/FARs found out through the desk review for the PDD/Version 02 (prepared on 29 January 2010) - Version 02.8 (prepared on 15 August 2011)
CC	: Comments from the Certification Committee
CAR	: Corrective Action Request, in the case that one of the following occurs: <ul style="list-style-type: none">(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.
CL	: Clarification Request, in the case that information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.
FAR	: Forward Action Request, during validation to highlight issues related to project implementation that require review during the first verification of the project activity.
NA	: Not Applicable at the time of implementing DR or SV

Appendix A

Table 2 PDD Requirements and CARs / CLs / FARs

Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
A		General description of the project activity			
A.1		Title of the project activity			
A.1.01	1	The title of the project activity	DR	Energy efficiency improvements of Pucheng Power Plant through retrofitting turbines in China	OK
A.1.02	1	The current version number of the document	DR	Version 01.1 - <i>Version 02.8</i>	OK
A.1.03	1	The date when the document was completed	DR	29 April 2009 - <i>15 August 2011</i>	OK
A.2		Description of the project activity			
A.2.01	1	The description of the project activity to be presented in this section is a brief summary of the detailed description given in the sections "A.4." (in particular "A.4.3.") and "B.3." (1) The purpose of the project activity with a concise description (a couple of paragraphs) of:	SV	It is not clear what China Huadian Corporation is.	CL 1
A.2.02	1		SV	The information of Pucheng's activity including Phase 2 and Phase 3 provided at SV is not introduced in the PDD.	CL 2
A.2.03	1		SV	The operation starting dates of the turbines (No.1 and No.2) are different from those in the acceptance inspections provided at SV.	CL 3
A.2.04	1	(a) The scenario existing prior to the start of the implementation of the project activity; (b) The project scenario, including a summary of the scope of activities/measures that are being implemented within the proposed project activity; (c) The baseline scenario, as identified in section "B.4 Description of how the baseline scenario is identified and description of the identified baseline scenario".	DR	The baseline scenario and the project scenario are not described in the PDD.	CL 4

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
A.2.05	1		DR	Source showing “increasing the efficiency rate of the turbines by approximately 10%” is not provided in the PDD.	CAR 1
A.2.06	1	(2) Explain how the proposed project activity reduces greenhouse gas emissions making reference to the scenarios, emission sources and gases described in sections "A.4.3." and "B.3.".	DR'	Evidence showing that the technology used in the existing turbines was developed in 1960s is not provided.	CL 5
A.2.07	1	(3) The view of the project participants on the contribution of the project activity to sustainable development (max. one page).	DR	While the contribution of the project activity to SD is discussed in A.2 and A.4.3, SD itself is not specified.	CL 6
A.3		Project participants			
A.3.01	1	List of PPs and Parties involved	DR	List of Parties involved: - “China” is not appropriate. List of PPs: - Shaanxi Huadian Pucheng Power Generation Co., Ltd. (China) - Kyushu Electric Power Co., Inc. (Japan)	CL 7
A.3.02	1	Provide contact information in Annex 1	DR	It is provided.	OK
A.4		Technical description of the project activity			
A.4.1		Location of the project activity			

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
A.4.1.01	1	Host Party	DR	"China" is not appropriate.	CL 7
A.4.1.02	1	Region/State/Province, etc.	DR	Shaanxi Province	OK
A.4.1.03	1	City/Town/Community, etc.	DR	The name of city is absent.	CL 8
A.4.1.4		Detail of physical location			
A.4.1.4.01	19	Are the geographical coordinates of the project site(s) provided in the PDD for a clear identification of the site(s)?	DR	The latitude and longitude of the project site is absent.	CL 9
A.4.2		Type and category(ies) and technology			
A.4.2.01	1	Identify and indicate in the PDD correctly which category(ies) the project activity belongs to?	DR	Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)	OK
A.4.3		Technology to be employed by the project activity			
A.4.3.01	1	Include a description of how environmentally safe and sound technology, and know-how to be used, is transferred to the host Party.	DR/SV	It is not described how advanced, and environmentally safe and sound the project technology is.	CL 10
A.4.3.02	1	Further explain the purpose of the project activity, as described in section "A.2.", taking the information provided in that section as a basis and including a detailed description of: (a) The scenario existing prior to the start of the implementation of the project activity, with a list of the equipment(s) and systems in operation at that time;	DR	The scenario existing prior to the implementation of the project activity is clearly described with the technical specification of the steam turbines.	OK
A.4.3.03	1	(b) The scope of activities/measures that are being implemented within the project activity, with a list of the equipment(s) and systems that will be installed and/or modified within the project activity;	DR	The scope of the retrofitting project is described.	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
A.4.3.04	1	(c) The baseline scenario, as identified in section "B.4.", with an indicative list of the equipment(s) and systems that would have been in place in the absence of the project activity.	DR	The baseline scenario is not referred to.	CL 11
A.4.3.05	1	Include the description of the scenarios, inter alia: (a) A list and the arrangement of the main manufacturing/production technologies, systems and equipments involved. Include in the description information about the age and average lifetime of the equipments based on manufacturer's specifications and industry standards, and existing and forecast installed capacities, load factors and efficiencies. The monitoring equipments and their location in the systems is of particular interest;	SV	Description on the characteristics of the turbine technology is absent, while the "4-cylinder 4-exhaust F.I.C-condensing turbine" is introduced in A.4.3. of the PDD.	CL 10
A.4.3.06	1		DR	Information on the age and average lifetime of the power generation equipments and industry standards is not included in the PDD.	CL 12
A.4.3.07	1		DR	The monitoring equipments and their locations are not described in the PDD.	CL 13
A.4.3.08	1	(b) The emissions sources and the greenhouse gases involved in the project activity, according to the methodology used; and existing and forecast energy and mass flows and balances of the systems and equipments included in the project activity;	DR	The emission sources and the GHGs are described in detail in A.2 and B.3, respectively. The heat rates before and after retrofitting of the turbines are described.	OK

Appendix A

Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
A.4.3.09	1	(c) The types and levels of services (normally in terms of mass or energy flows) provided by the systems and equipments that are being modified and/or installed under the project activity and their relation, if any, to other manufacturing/production equipments and systems outside the project boundary. The types and levels of services provided by those manufacturing/production systems and equipments outside the project boundary may also constitute important parameters of the description. The description should clearly explain how the same types and levels of services provided by the project activity would have been provided in the baseline scenario.	DR	The description “the heat rates (design value 8229.9kJ/kWh) have decreased over the years due to aging degradation” is not clear.	CL 14
A.4.3.10	1		DR	Evidences of performance tests including heat rates and the increased efficiency guaranteed are not provided.	CL 15
A.4.3.11	1		DR'	The load factor in Table 2 newly added in relation to baseline scenario is not explained with any source.	CL 16
A.4.3.12	1	The baseline scenario can be described with a lower level of detail in case it is not an existing facility, i.e. in case it is derived from a hypothetical facility that would have been built in the absence of the proposed project activity and for which no historical data is available.	DR	The baseline scenario is "continuation of current practice".	NA

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
A.4.3.13	1	Finally, avoid adding information, which is not essential to understanding the purpose of the project activity and how it reduces greenhouse gases emissions. Do not include information related to equipments, systems and activities that are auxiliary to the main scope of the project activity and do not interfere directly or indirectly with emissions of greenhouse gases and/or with mass and energy balances in the project activity.	DR	No inessential information is described.	OK
A.4.4		Estimated amount of emission reductions			
A.4.4.01	1	Indicate the chosen crediting period	DR	The fixed crediting period, 10 years, is chosen.	OK
A.4.4.02	1	Provide the total and annual estimation of emission reductions for the chosen crediting period, which are consistent with other data presented in the PDD. Information on the emission reductions shall be indicated using the tabular format provided.	DR/SV	It was confirmed through checking the emission reduction calculation spreadsheet that the calculation was appropriately conducted and that the emission reductions in A.4.4. are consistent with those in the spreadsheet.	OK
A.4.4.03	1	Use internationally accepted standard format for values where 1,000 represents one thousand and 1.0 represents one.	DR	Internationally accepted standard format for values is used.	OK
A.4.5		Public funding of the SS project activity			
A.4.5.01	1	In case public funding from Annex 1 Parties is involved, provide in Annex 2 information, which includes an affirmation information that such funding does not result in a diversion of ODA.	DR	No public funding is involved.	OK
B		Application of a baseline and monitoring methodology			
B.1		Title and reference of the approved baseline and monitoring methodology applied			

Appendix A

Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc
B.1.01	1	Indicate: (a) The approved methodology and the version of the methodology that is used; (b) Any methodologies or tools which the approved methodology draws upon and their version.	DR DR'	(a) Applied methodology: AM0062 (Version 1.1) - Request for registration can be submitted until 12 April 2011. (b) Applied tools: - Combined tool to identify the baseline scenario and demonstrate additionality (Version 02.2) - Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (Version 02) - Tool to calculate the emission factor for an electricity system (Version 01.1) <i>The version was updated to Version 02.</i> <i>These versions were confirmed to be the latest.</i>	OK
B.2		Justification of the choice of the methodology and why it is applicable to the project activity			
B.2.01	1	Justify the choice of methodology by showing that the proposed project activity meets each of the applicability conditions. Explain documentation has been used and provide the references to the document or include the documentation in Annex 3.	DR	Regarding Condition 4, it is not clear why the project activity does not fall under either of two categories prescribed in AM0062.	CL 17
B.2.02	1		DR	Regarding Condition 5 (a), it is not clear how the operational parameters of the turbines remain unchanged before and after the retrofitting.	CL 18
B.2.03	1		DR	Regarding Condition 5 (b), evidence showing the operation start date of turbines is not provided.	CL 19

Appendix A

Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.2.04	1		DR	Regarding Condition 6, the applicability condition requested by the tool as to the project activity supplying the electricity to a grid is not justified.	CL 20
B.3		Description of the sources and gases included in the project boundary			
B.3.01	1	Describe which emission sources and gases are included in the project boundary for the purpose of calculation project emissions and baseline emissions, using the table	DR	All the emission sources and gases in the project boundary are described in the table of the PDD.	OK
B.3.02	1	In cases where the methodology allows project participants to choose whether a source or gas is to be included in the project boundary, explain and, where necessary, justify the choice.	DR	AM0062 specifies the sources and gases to be included.	NA
B.3.03	1	In addition to the table, present a flow diagram of the project boundary, physically delineating the project activity, based on the descriptions provided in section "A.4.3.". Include in the flow diagram all the equipments, systems and flows of mass and energy described in that section. Particularly, represent in the diagram the emissions sources and gases included in the project boundary and the monitoring variables.	DR	The monitoring variables and locations of monitoring equipments are not provided in Figure 1.	CL 21
B.4		Description of how the baseline scenario is identified and description of the identified baseline scenario.			
B.4.01	1	Explain how the most plausible baseline scenario is identified in accordance with the selected baseline methodology.	DR	The most plausible baseline scenario is identified in accordance with the methodology.	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.4.02	1	Where the procedure involves several steps, describe how each step is applied and transparently document the outcome of each step.	DR	The application of each step and its outcome are transparently documented.	OK
B.4.03	1	Explain and justify key assumptions and rationales. Provide relevant documentation or references. Illustrate in a transparent manner all data used to determine the baseline scenario (variables, parameters, data sources etc.).	DR	The description of “implementation of turbine retrofit project in power plant is not subject to obligate notification to the competent authority in China” in Sub-step 1b is not clear.	CL 22
B.4.04	1		DR	It is not clear what kinds of legal and regulatory requirements relating to the project activity there are.	CL 23
B.4.05	1		DR'	Evidence showing “None of the turbines of the 57 units has been retired or retrofitted” is not provided.	CL 24
B.4.06	1		DR	The description “The operation and maintenance of these turbines have been carried out in a similar manner” is not clear in this context.	CL 25
B.4.07	1	Provide a transparent and detailed description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed project activity.	DR	The identified baseline scenario is transparently described.	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.5		Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality)			
B.5.1.01	1	Explain how and why this project activity is additional and therefore not the baseline scenario in accordance with the selected baseline methodology.	DR	Refer to B.5.1.02 - B.5.1.17 below.	NA
B.5.1.02	1	Where the procedure involves several steps, describe how each step is applied and transparently document the outcome of each step.	DR	There is no referring to Step 2 “Barrier analysis” in accordance with the requirement of “Combined tool”.	CL 26
B.5.1.03	1	Explain and justify key assumptions and rationales. Provide relevant documentation or references. Illustrate in a transparent manner all data used to assess the additionality of the project activity (variables, parameters, data sources etc.).	DR	The meaning of “The calculation was conducted in a conservative manner” is not clear.	CL 27
B.5.1.04	1		DR	Source of the values listed in the table is not described.	CL 28
B.5.1.05	1		DR/SV	It was confirmed through checking the spreadsheet that the input values and calculation were correct.	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.5.1.06	1		DR'	Evidences of the following data and assumption used in the IRR calculation are not provided: - initial investment, - coal price and monthly records of coal consumption, - income tax, - interest rate, - debt ratio, - depreciation period, - residual value rate.	CL 29
B.5.1.07	1		DR'	It is not clear why the fair value in 2025 in the spreadsheet is 2,287 thousand Euro, not including the fair value for two years (Years 19 and 20).	CL 30
B.5.1.08	1		DR	It is not clear whether the IRR calculation with CER was conducted.	CL 31
B.5.1.09	1		DR	The evidence of benchmark of 12% is to be provided.	CL 32
B.5.1.10	1		DR	Clarification why the IRRs for investment cost and coal price would not cross the benchmark within +/- 10% is not provided.	CL 33

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.5.1.11	1		DR	It is not clear whether there are similar project activities, while there is the description “Few retrofitting turbine project activities for 300MW-class power plants”.	CL 34
B.5.1.12	1		DR'	It is not clear why interest repayment is included in the IRR calculation .	CL59
B.5.1.13	1		CC	The use of World Energy Outlook 2005 for the future trend of coal prices used in the IRR calculation is not justified.	CL60
B.5.1.14	1	If the starting date of the project activity is before the date of validation, provide evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity. This evidence shall be based on (preferably official, legal and/or other corporate) documentation that was available at, or prior to, the start of the project activity.	DR	Refer to next column.	CAR 2
B.5.1.15	1	In such cases project proponents shall provide an implementation timeline of the proposed CDM project activity. The timeline should include, where applicable, the date when the investment decision was made, the date when construction works started, the date when commissioning started and the date of start-up (e.g. the date when commercial production started).	DR/SV	“Awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project” are not described.	CAR 2

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.5.1.16	1		DR	It is not clear whether the project activity needs the amendment of Power Purchase Agreement with the grid company regarding the change of the turbine capacity from 330MW to 360MW.	CL 35
B.5.1.17	1	In addition to this implementation timeline project participants shall provide a timeline of events and actions which have been taken to achieve CDM registration, with description of the evidence used to support these actions. These timelines will allow the DOE to assess the serious consideration of the CDM in the project decision making process and project implementation.	DR/SV	Some events including ERPA signed with Kyushu Electric Power Co., Inc. and contract with DOE are absent in the implementation timeline.	CAR 3
B.6		Emission reductions			
B.6.1.		Explanation of methodological choices:			
B.6.1.01	1	Explain how the procedures, in the approved methodology to calculate project emissions, baseline emissions, leakage emissions and emission reductions are applied to the proposed project activity.	CC	Regarding the baseline emission factor of the project activity turbine (EFBL,y) , the following FAR was raised. Eq. (8) in the PDD is to be reviewed, referring to the corrected equation in the methodology AM0062 / Version 02 in the first periodic verification.	FAR 1
B.6.1.02	1	Clearly state which equations will be used in calculating emission reductions.	DR	The equation numbers are absent, while they are given in AM0062.	CL 36
B.6.1.03	1	Explain and justify all relevant methodological choices, including: (a) Where the methodology includes different scenarios or cases, explain and justify which scenario or case applies to the project activity (e.g. which scenario in ACM0006 is applicable);	DR	Clarification on the methodological choices for Case a) to c) of Step 1 is absent. It is not clear whether the electricity generation in the project activity exceeds "Baseline Maximum" in relation to the operation time.	CAR 4

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.6.1.04	1	(b) Where the methodology provides different options to choose from (e.g. which methodological approach is used to calculate the "operating margin" in ACM0002), explain and justify which option is chosen for the project activity;	DR	Clarification on the methodological choices for Case 1 and Case 2, and Option A to Option C of Step 2 is absent.	CAR 5
B.6.1.05	1	(c) Where the methodology provides for different default values, explain and justify which of the default values have been chosen for the project activity.	DR	NA	NA
B.6.2.		Data and parameters that are available at validation			
B.6.2.01	1	Include a compilation of information on the data and parameters that are not monitored throughout the crediting period but that are determined only once and thus remains fixed throughout the crediting period AND that are available when validation is undertaken.	DR	Refer to B.7.1.02 below.	CAR 7
B.6.2.02	1	Data that becomes available only after validation of the project activity (e.g. measurements after the implementation of the project activity) should not need to be included here but in the table in section B.7.1.	DR	Data that becomes available only after validation of the project activity are not included in B.6.2.	OK
B.6.2.03	1	This may includes data that is measured or sampled, and data that is collected from other sources (e.g. official statistics, expert judgment, proprietary data, IPCC, commercial and scientific literature, etc.).	DR	EEEE,BL from IPCC is included.	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.6.2.04	1	Data that is calculated with equations provided in the methodology or default values specified in the methodology should not be included in the compilation.	DR	No data that is calculated with equations provided in the methodology or default values specified in the methodology is included.	OK
B.6.2.05	1	Provide for each data or parameter the chosen value or, where relevant, the qualitative information, using the table provided. Particularly: (a) Provide the actual value applied. Where time series of data is used, where several measurements are undertaken or where surveys have been conducted, provide detailed information in Annex 3;	DR DR'	Sources of the values of HMR _x and EGT _{ur,x} are to be provided. Some of the values listed in the tables are different from those of sources provided.	NA CAR 6
B.6.2.06	1	(b) Explain and justify the choice for the source of data. Provide clear and transparent references or additional documentation in Annex 3;	DR	Explanation and justification of the choice for the source of data are provided.	OK
B.6.2.07	1	(c) Where values have been measured, include a description of the measurement methods and procedures (e.g. which standards have been used), indicate the responsible person/entity having undertaken the measurement, the date of measurement(s) and the measurement results. More detailed information can be provided in Annex 3.	DR'	The date of the performance test for No.2 turbine in the table for $\eta_{BL,x}$ in B.6.2. is not consistent with the date in the test data provided.	CL 37
B.6.2.08	1		DR'	It is not clear how " $\eta_{PJ,max}$ for No.2" is derived from the data in the table of Annex 3.	CL 38
B.6.3.		Ex-ante calculation of emission reductions			

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.6.3.01	1	Provide a transparent ex ante calculation of project emissions, baseline emissions (or, where applicable, direct calculation of emission reductions) and leakage emissions expected during the crediting period, applying all relevant equations provided in the approved methodology.	DR	The equation of BEy in B.6.3 is not the same as that in B.6.1.	CL 39
B.6.3.02	1	Use estimations for parameters that are not available when validation is undertaken or that are monitored during the crediting period.	CC	With respect to the calculation of COEF _{i,y} , Option B of "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" is chosen without any justification. Justification for not choosing Option A is not described in the PDD although Option A is the preferred approach according to the tool.	CAR 9
B.6.3.03	1	Document how each equation is applied, in a manner that enables the reader to reproduce the calculation.	DR	Source of the data for calculating the emission factors is not shown.	CL 40
B.6.3.04	1	Where relevant, provide additional background information and or data in Annex 3, including relevant electronic files (i.e. spreadsheets).	DR	ER calculation spreadsheet is provided.	OK
B.6.4.		Summary of the ex ante estimation of emission			
B.6.4.01	1	Summarize the results of the ex ante estimation of emission reductions for all years of the crediting period, using the table provided.	DR	The results of the <i>ex-ante</i> estimation of emission reductions for all years of the crediting period are summarized by using the table.	OK
B.7.		Application of the monitoring methodology and description of the monitoring plan			
B.7.1.		Data and parameters monitored			

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.7.1.01	1	Include specific information on how the data and parameters that need to be monitored would actually be collected during monitoring for the project activity.	DR/SV	The temperature and the pressure of steam are absent from the direct monitoring items.	CL 41
B.7.1.02	1	Data that is determined only once for the crediting period but that becomes available only after validation of the project activity (e.g. measurements after the implementation of the project activity) should be included here.	DR	" $\eta_{BL,y}$ for No.1" and " $\eta_{PJ,max}$ " listed in B.7.1 are not in line with the methodology.	CAR 7
B.7.1.03	1		DR	"Mass or volume unit" for FCPJ,y is not given as SI unit.	CL 42
B.7.1.04	1		DR/SV	It is not clear whether EFGRID,y in B.7.1 is directly monitored.	CL 43
B.7.1.05	1		DR'	It is not clear whether FCPJ,y is directly monitored.	CL 44
B.7.1.06	1		CC	Monitoring parameter for calculating the COEFi, y is absent (refer to B.6.3.02).	CAR 9
B.7.1.07	1	Provide for each parameter the following information, using the table provided below: (a) The source(s) of data that will be actually used for the proposed project activity (e.g. which exact national statistics). Where several sources may be used, explain and justify which data sources should be preferred;	DR/SV	The sources of data that will be actually used are described in the table.	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.7.1.08	1	(b) Where data or parameters are supposed to be measured, specify the measurement methods and procedures, including a specification which accepted industry standards or national or international standards will be applied, which measurement equipment is used, how the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person/entity that should undertake the measurements and what is the measurement interval; (i) A description of the QA/QC procedures (if any) that should be applied; (ii) Where relevant: any further comment.	DR	Accepted industry standards or national standards for measurement of electricity generated and actual fuel consumption are not shown. National Standard of electricity meter showing the accuracy is absent.	CL 45
B.7.2.		Description of the monitoring plan			
B.7.2.01	1	Provide a detailed description of the monitoring plan. Describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects generated by the project activity.	DR	Description on the operational and management structure including the operational manager is absent.	CL 46
B.7.2.02	1		DR	The calibration process is not clear, while there is the process described in "the annual maintenance".	CL 47
B.7.2.03	1		SV	The locations of the monitoring instruments such as electricity meters and steam flow meters are not described.	CL 13

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
B.7.2.04	1	Clearly indicate the responsibilities for and institutional arrangements for data collection and archiving.	DR	Evidence showing the relationship of the responsibilities between PPs and Mitsubishi Research Institute, Inc. (MRI) in relation to the calculation of the heat inputs and emission reductions is to be provided.	CL 48
B.7.2.05	1	The monitoring plan should reflect good monitoring practice appropriate to the type of project activity.	DR	The project company is responsible for data collection and instrument calibration supported by MRI. The data monitored will be logged by operators on daily basis, and archived data will be checked by an operational manager.	OK
B.8.		Date of completion of the application of the baseline and monitoring methodology and the name of responsible person(s)/entity(ies):			
B.8.01	1	Provide date of completion of the application of the methodology to the project activity study in DD/MM/YYYY.	DR	Completion data: 21/04/2009. <i>It was revised to 15/08/2011.</i>	OK
B.8.02	1	Provide contact information of the person(s)/entity(ies) responsible for the application of the baseline and monitoring methodology to the project activity.	DR	Kuniyuki Nishimura (Mr.) Mitsubishi Research Institute, Inc. Tokyo, Japan E-mail: kuni@mri.co.jp Tel: +81-3-3277-5439 Fax: +81-3-3277-0512 <i>"Tel" and "Fax" were changed as follows because the office was moved:</i> <i>Tel: +81-3-6705-5439</i> <i>Fax: +81-3-5157-2146</i>	OK
B.8.03	1	Indicate if the person/entity is also a project participant listed in Annex 1.	DR	Mitsubishi Research Institute, Inc. is a consultant and not a project participant.	OK
C		Duration of the project activity/Crediting period			
C.1.		Duration of the project activity			

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
C.1.1.		Starting date of the project activity			
C.1.1.01	1	The starting date of a CDM project activity is the earliest of the date(s) on which the implementation or construction or real action of a project activity begins/has begun (EB33, Para 76/CDM Glossary of terms/EB41).	DR	The date of contract for retrofitting turbines is set as the starting date of the project activity, which is 02/04/2007. Evidence of contract indicating the starting date of the project activity is to be provided.	OK CL 49
C.1.1.02	1	Contain not only the date, but also a description of how this start date has been determined, and a description of the evidence available to support this start date.	DR	The date and how this start date has been determined are described.	OK
C.1.2.		Expected operational lifetime			
C.1.2.01	1	State the expected operational lifetime in years and months.	DR DR'	Evidence is to be provided for "the remaining lifetime of the existing No.1 turbine at the starting date of the project activity". While the evidence "Standard for the Specification for Stationary Utility Condensing Steam Turbine (SD269-88)" was provided, the lifetime "18 years and 11 months" is not consistent with the 30 years described in the evidence, calculating from the starting date of the project activity "02/04/2007" and the starting date of No.1 turbine operation "03/09/1996".	NA CL 50
C.2.		Choice of crediting period and related information			
C.2.01	1	State whether the project will use a renewable or fixed crediting period and complete C.2.1 or C.2.2 accordingly. It should be noted that the crediting period may only start after the date of registration of the proposed activity as a CDM project activity.	DR	Refer to C.2.2 below.	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
C.2.1.		Renewable crediting period			
C.2.1.01	1	Each crediting period shall be at most 7 years and may be renewed at most two times.	DR	NA	NA
C.2.1.1.		Starting date of the first crediting period			
C.2.1.1.01	1	State the dates in DD/MM/YYYY	DR	NA	NA
C.2.1.2.		Length of the first crediting period			
C.2.1.2.01	1	State the length of the first crediting period in years and months	DR	NA	NA
C.2.2.		Fixed crediting period			
C.2.2.01	1	Fixed crediting period shall be at most 10 years.	DR	It is 10 years and 0 months.	OK
C.2.2.1.		Starting date of the first crediting period			
C.2.2.1.01	1	State the dates in DD/MM/YYYY	DR DR'	The starting date, 01/07/2009 is not acceptable at the time of Desk Review. The starting date, 01/01/2011 is not acceptable at the time of final preparation of the PDD.	CAR 8 CAR 8'
C.2.2.2.		Length			
C.2.2.2.01	1	State the length in years and months	DR	10 years and 0 months.	OK
D.		Environmental impacts			
D.1.		Documentation on the analysis of the environmental impacts, including transboundary impacts:			
D.1.01	19	Describe whether there are any requirements for an Environmental Impact Assessment (EIA) in the host country. If yes, describe whether an EIA have been approved by local/central government.	DR/SV	It is not clear how the EIA law covers the project activity. The EIA report and its approval are not provided to DOE.	CL 51
D.2.		If environmental impacts are considered significant as required by the Host Party.			

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
D.2.01	1	If environmental impacts are considered significant by the project participants or the Host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the Host Party.	DR DR'	It is to be confirmed after obtaining the EIA report and its approval. <i>- It was confirmed through the interview with official of SEPB and the approval of environmental impacts registration table that the environmental impacts were relatively low with the appropriate measures.</i>	NA
E.		Stakeholders' comments			
E.1.		How comments by local stakeholders have been invited and compiled			
E.1.01	1	The local stakeholder process shall be completed before submitting the proposed project activity to a DOE for validation.	DR DR'	It is to be confirmed at SV. <i>- It was confirmed through the interview with two residents and minutes of stakeholders meeting that the local stakeholders consultation was conducted on 26 February 2009, which is before the date of publicity of the PDD, 01 May 2009.</i>	NA
E.1.02	1	Describe the process by which comments by local stakeholders have been invited and compiled. (An invitation for comments by local stakeholders shall be made in an open and transparent manner, in a way that facilitates comments to be received from local stakeholders and allows for a reasonable time for comments to be submitted. In this regard, project participants shall describe a project activity in a manner which allows the local stakeholders to understand the project activity, taking into account confidentiality provisions of the CDM modalities and procedures.)	DR/SV	It is not clear whether there are any rules or guidelines on the stakeholders consultation applied to the project activity.	CL 52

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
E.1.03	1		DR/SV	Information handed over to the residents and three comments received are to be confirmed at SV.	CL 53
E.1.04	1		DR	The following situation on the stakeholder's meeting is not clear: - How and when the stakeholders were notified about the meeting? - How the explanation of the project activity was made in the meeting?	CL 54
E.1.05	1		DR/SV	The invitation and the questionnaires are to be confirmed at SV. - There is no invitation as the stakeholders were notified about the meeting by the phone. It was added in the PDD. - The team confirmed through the questionnaires provided that nobody had a negative comment on the project activity.	NA
E.1.06	1		SV	The situation of the project site is not clear in relation to neighboring villages.	CL 55
E.2.		Summary of the comments received			
E.2.01	1	Identify stakeholders that have made comments and provide a summary of these comments.	DR/SV	It is to be confirmed at SV. - <i>The minutes of the Stakeholder's meeting were provided.</i> - <i>The validation team confirmed through the interview with local residents and the minutes provided by the PP that nobody had a negative comment on the project activity.</i> - <i>The description in the PDD is consistent with the minutes.</i>	NA

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
E.3.		Report on how due account was taken of any comments received			
E.3.01	1	Explain how due account have been taken of comments received.	DR	The same as E.2.01.	NA
Annex 1		Contact information on PPs			
Annex 1.1	1	Fill for each organization listed in section A.3 the following mandatory fields: Organization, Name of contact person, Street, City, Postfix/ZIP, Country, Telephone and Fax or e-mail.	DR	The information on both the PPs is confirmed. Following were revised: - "Direct tel:" of Shaanxi Huadian Pucheng Power Generation Co., Ltd. - Representative of Kyushu Electric Power Co., Inc.	OK
Annex 2		Information regarding public funding			
Annex 2.1	1	Provide information from Parties included in Annex I on sources of public funding for the project activity which 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 those Parties.	DR	This project will not receive any public funding.	OK
Annex 3		Baseline information			
Annex 3.1	1	Provide any further background information used in the application of the baseline methodology. This may include tables with time series data, documentation of measurement results and data sources, etc.	DR'	While the results of the performance tests are provided, following are to be added or reviewed: - Summary of the performance tests including the procedures and results, - Parameters to be listed in the tables 9-12, - Explanation of "THA" for the tests after retrofitting.	CL 56
Annex 3.2	1		DR'	The dates of performance tests are to be specified.	CL 57
Annex 3.3	1		DR'	For assuring consistency and transparency, explanation of the estimation method for the turbine efficiency is to be provided based on the regression analysis.	CL 58

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.
Annex 4		Monitoring information			
Annex 4.1	1	Provide any further background information used in the application of the monitoring methodology. This may include tables with time series data, additional documentation of measurement equipment, procedures, etc.	DR	No additional information is provided.	OK

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Table 3 Validation Requirements of VVM and CARs / CLs /FARs

Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.		E. Validation requirements based on paragraph 37 of the CDM modalities and procedures				
VVM E.2.		Participation				
VVM E.2.01	2	52. Are the project participants listed in tabular form in section A.3 of the PDD?	DR	The PPs are listed in tabular form in section A.3.	OK	OK
VVM E.2.02	2	52. Is the information consistent with the contact details provided in annex 1 of the PDD?	DR	The names of PPs and Parties involved are consistent with those in annex 1.	OK	OK
VVM E.4.		Project description				
VVM E.4.01	2	59. Does the description of the proposed CDM project activity as contained in the PDD sufficiently cover all relevant elements? Is it accurate? And Does the description provide the reader with a clear understanding of the nature of the proposed CDM project activity?	DR	Refer to A.2 and A.4.3 of Table 2.	CAR 1	OK
VVM E.4.02	2	60. In case of proposed CDM project activities in existing facilities or utilizing existing equipments, was a physical site inspection conducted to confirm that the description in the PDD reflects the proposed CDM project activity for the following types of CDM project activities unless other means are specified in the methodology? (a) Large scale projects; (b) Non-bundled small scale projects with emission reductions exceeding 15,000 tonnes per year; (c) Bundled small scale projects, each with emission reductions not exceeding 15,000 tonnes per year.	DR'	It was confirmed through SV that the proposed project activity was a large scale project, because the annual average emission reductions of the project activity is 270,205 tCO ₂ e, over 60kt/yr.	OK	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.4.03	2	63. In case of the proposed CDM project activity involving the alteration of an existing installation or process, does the project description clearly state the differences resulting from the project activity compared to the pre-project situation?	DR	The proposed project activity involves retrofitting the existing turbines. The advanced technology to be installed is described in the PDD, so that the differences resulting from the project compared to the pre-project situation is clearly stated.	OK	OK
VVM E.4.04	2	64. The validation report shall: (a) Describe the process undertaken to validate the accuracy and completeness of the project description; (b) Contain the DOE's opinion on the accuracy and completeness of the project description.	DR'	It is described in Section 2 and 3.2 of the Validation report.	OK	OK
VVM E.5.		Baseline and monitoring methodology				
VVM E.5.b.		Applicability of the selected methodology to the project				
VVM E.5.b.01	2	70. Is the methodology correctly quoted and applied?	DR	Refer to B.1.01 of Table 2.	OK	OK
VVM E.5.b.02	2	71. By validating the documentation referred to in the PDD and by verifying that its content is correctly quoted and interpreted in the PDD, is it confirmed that each of the applicability conditions of the methodology or any tool or other methodology component referred to therein is met? If the DOE, based on local and sectoral knowledge, aware that comparable information is available from sources other than that used in the PDD, was the PDD cross checked against the information to confirm that the project activity meets the applicability conditions of the methodology?	DR DR'	Several CLs were issued. <i>Refer to B.2 of Table 2.</i>	CL	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.5.b.03	2	72. If the DOE cannot make a determination regarding the applicability of the selected methodology to the proposed CDM project activity then the DOE shall request clarification of the methodology in accordance with the guidance provided by the CDM Executive Board.18	DR'	Refer to B.2 of Table 2.	NA	NA
VVM E.5.b.04	2	73. If the DOE determines that the proposed CDM project activity does not comply with the applicability conditions of the methodology the DOE may proceed by means of requesting revision to or deviation from the methodology in accordance with the guidance provided by the CDM Executive Board.19	DR'	Refer to B.2 of Table 2.	NA	NA
VVM E.5.b.05	2	74. If the DOE has requested clarification of, revision to or deviation from a methodology, the DOE shall not submit a request for registration until the CDM Executive Board has approved the proposed deviation or revision.	DR'	The DOE did not request clarification of revision to or deviation from a methodology.	NA	NA
VVM E.5.b.06	2	75. Under no circumstance shall the DOE consider the submission of a request for registration as a means of seeking clarification from the CDM Executive Board on the applicability of a methodology.	DR'	Ditto.	NA	NA
VVM E.5.b.07	2	76. The validation report shall include an unambiguous validation opinion regarding the applicability of the selected methodology to the proposed CDM project activity.	DR'	It is described in Section 3.3.1 of the Validation report.	OK	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.5.b.08	2	77. The validation report shall indicate whether emission sources, which are not addressed by the applied methodology and are expected to contribute more than 1% of the overall expected average annual emissions reductions, have been identified.	DR'	It is described in Section 3.3.2 of the Validation report.	OK	OK
VVM E.5.c.		Project boundary				
VVM E.5.c.01	2	79. Does the delineation in the PDD of the project boundary meet the requirements of the selected baseline methodology? (Based on documented evidence and corroborated by a site visit)	DR'	The delineation of the project boundary in the PDD was confirmed to be in line with the requirements of AM0062 through the confirmation of following by the team during the SV: • The retrofit project of No.2 steam turbine enters its final stage and its commissioning is planned to start on 15 July 2009. On the other hand, the retrofit work of No.1 turbine is still before launching. The PPA with the grid company was provided at SV. The performance tests for two steam turbines after retrofitting were provided to DOE after SV.	OK	OK
VVM E.5.c.02	2	79. Have all sources and GHGs required by the methodology been included within the project boundary?	DR	Refer to B.3.01 of Table 2.	OK	OK
VVM E.5.c.03	2	79. If the PDD chooses the choices provided by the methodology, is the justification provided reasonable based on assessment of supporting documented evidence provided by the project participants and corroborated by observations?	DR	Refer to B.3.02 of Table 2.	NA	NA

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.5.c.04	2	80. In the validation report , the DOE shall describe how the validation of the project boundary has been performed, by detailing the documentation assessed (e.g., a commissioning report) and by describing its observations during any site visit undertaken in accordance with paragraphs 59-62 above (i.e., observations of the physical site or equipment used in the process).	DR'	It is described in Section 3.3.2 of the Validation report.	OK	OK
VVM E.5.c.05	2	80. The DOE shall provide a statement whether the identified boundary and the selected sources and gases are justified for the project activity.	DR'	It is described in Section 3.3.2 of the Validation report.	OK	OK
VVM E.5.d.		Baseline identification				
VVM E.5.d.01	2	83. Based on financial expertise and local and sectoral knowledge, are all scenarios that are considered by the project participants and are supplementary to those required by the methodology, reasonable in the context of the proposed CDM project activity and no reasonable alternative scenario is excluded,?	DR	The listed alternative scenarios are appropriate in the context of the proposed CDM project activity. No reasonable alternative scenario is excluded.	OK	OK
VVM E.5.d.02	2	84. By validating the assumptions, calculations and rationales used, as described in the PDD, is the baseline scenario identified reasonable?	DR	Refer to B.4.04 of Table 2.	CL	OK
VVM E.5.d.03	2	84. Are documents and sources referred to in the PDD correctly quoted and interpreted?	DR	Refer to B.4.05 of Table 2.	CL	OK
VVM E.5.d.04	2	84. Was the information (the assumptions, calculations and rationales) provided in the PDD cross checked with other verifiable and credible sources, such as local expert opinion, if available?	DR'	It was confirmed through the interview with officials of SDRC that there are a few laws and regulations relating to the project activity. <i>Refer to B.4.04 of Table 2.</i>	CL	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.5.d.05	2	85. Have all applicable CDM requirements been taken into account in the identification of the baseline scenario for the proposed CDM project activity?	DR	Refer to B.4.01 of Table 2.	OK	OK
VVM E.5.d.06	2	85. Have all relevant policies and circumstances been identified and correctly considered in the PDD, taking into consideration its knowledge of the sector and/or advice from local experts?	DR'	The same as VVM.E.5.d.04 above.	CL	OK
VVM E.5.d.07	2	86. Does the PDD provide a verifiable description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed CDM project activity?	DR'	The PDD provides a verifiable description of the identified baseline scenario in B.4.	OK	OK
VVM E.5.d.08	2	87. The DOE shall clearly describe in the validation report the steps taken to assess the requirement given in paragraphs 81 and 82 above and shall provide an opinion as to whether: (a) All the assumptions and data used by the project participants are listed in the PDD, including their references and sources;	DR'	It is described in Section 3.3.3 of the Validation report.	OK	OK
VVM E.5.d.09	2	87. (b) All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PDD;	DR	It is described in Section 3.3.3 of the Validation report.	OK	OK
VVM E.5.d.10	2	87. (c) Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable;	DR	It is described in Section 3.3.3 of the Validation report.	OK	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.5.d.11	2	87. (d) Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD;	DR	It is described in Section 3.3.3 of the Validation report.	OK	OK
VVM E.5.d.12	2	87. (e) The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed CDM project activity.	DR	It is described in Section 3.3.3 of the Validation report.	OK	OK
VVM E.5.d.13	2	88. The validation report shall clearly describe other steps taken, and sources of information used, by the DOE to cross check the information contained in the PDD on this matter.	DR	It is described in Section 3.3.3 of the Validation report.	OK	OK
VVM E.5.e.		Algorithms and/or formulae used to determine emission reductions				
VVM E.5.e.01	2	90. Was it determined whether the equations and parameters in the PDD been correctly applied by comparing them to those in the selected approved methodology?	DR	Refer to B.6.1.01 and B.6.1.02 of Table 2.	CL FAR 1	OK FAR 1
VVM E.5.e.02	2	90. Does the methodology provide for selection between different options for equations or parameters? If yes, has adequate justification been provided (based on the choice of the baseline scenario, context of the proposed CDM project activity and other evidence provided)?	DR	Refer to B.6.1.03 and B.6.1.04 of Table 2.	CAR 4 CAR 5	OK
VVM E.5.e.03	2	90. If yes, have the correct equations and parameters been used in accordance with the methodology selected?	DR	Refer to B.6.1.03 and B.6.1.04 of Table 2.	CAR 4 CAR 5	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.5.e.04	2	91. If data and parameters will not be monitored throughout the crediting period of the proposed CDM project activity but have already been determined and will remain fixed throughout the crediting period, are all sources and assumptions of these data and parameters appropriate and calculations are correct?	DR	Refer to B.6.2.05, B.6.2.06, B.6.2.07 and B.6.2.08 of Table 2.	CAR 6	OK
VVM E.5.e.05	2	91. If so, are all sources and assumptions of these data and parameters applicable to the proposed CDM project activity?	DR'	i) Following sources are applicable to the proposed project activity. -Generation license for CAPmax, -Historical records of plant operation for HMRx and EGTur,x, -Performance tests for η , -China Energy Statistical Yearbook 2005-2007, -China Electric Power Yearbook 2005-2007. ii) HMRx and EGTur,x are calculated using historical records in three most recent years.	OK	OK
VVM E.5.e.06	2	91. If so, will all data sources, assumptions and calculations result in a conservative estimate of the emission reductions?	DR'	$\eta_{BL,y}$ and $\eta_{PJ,y}$ are estimated based on a conservative assumptions. This assumptions results in a conservative estimate of the emission reductions.	OK	OK
VVM E.5.e.07	2	91. If data and parameters will be monitored on implementation and hence become available only after validation of the project activity, are the estimates provided in the PDD for these data and parameters reasonable?	DR	Refer to B.7.1. of Table 2. Following issues are raised: i) EGPJ,y is to be recalculated in line with the revision of EGTur,x in B.6.1. ii) Historical record and method used for calculating FCPJ,y are not provided.	CAR 7 CAR 9	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.5.e.08	2	92. The DOE shall clearly describe in the validation report the steps taken to assess the requirement outlined in paragraph 89 above and shall provide an opinion as to whether: (a) All assumptions and data used by the project participants are listed in the PDD, including their references and sources;	DR'	It is described in Section 3.3.4.1) of the Validation report.	OK	OK
VVM E.5.e.09	2	92. (b) All documentation used by project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD;	DR'	It is described in Section 3.3.4.2) of the Validation report.	OK	OK
VVM E.5.e.10	2	92. (c) All values used in the PDD are considered reasonable in the context of the proposed CDM project activity;	DR'	It is described in Section 3.3.4.3) of the Validation report.	OK	OK
VVM E.5.e.11	2	92. (d) The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions;	DR'	It is described in Section 3.3.4.4) of the Validation report.	OK	OK
VVM E.5.e.12	2	92. (e) All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PDD.	DR'	It is described in Section 3.3.4.5) of the Validation report.	OK	OK
VVM E.5.e.13	2	93. The validation report shall clearly describe how the DOE has verified the data and parameters used in the equations, including references to any other data sources used.	DR'	It is described in Section 3.3.4.1) - 3) of the Validation report.	OK	OK
VVM E.6.		Additionality of a project activity				

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.01	2	95. Were the reliability and credibility of all data, rationales, assumptions, justifications and documentation provided by project participants assessed by using local knowledge and sectoral and financial expertise?	DR	Refer to B.5. of Table 2 and VVM E.6. of this table.	--	OK
VVM E.6.02	2	96. Were tools and documents provided by the CDM Executive Board to demonstrate the additionality of proposed CDM project activities considered, as well as specific complementary or alternative requirements included in approved CDM methodology.	DR	"Combined tool to identify the baseline scenario and demonstrate additionality" (Version 02.2) is applied to B.5. of the PDD in line with AM0062.	OK	OK
VVM E.6.03	2	97. The validation report shall clearly describe all steps taken, and sources of information used, by the DOE to cross-check the information contained in the PDD on this matter.	DR'	It is described in Section 3.4 of the Validation report.	OK	OK
VVM E.6.04	2	97. The validation report shall contain information regarding how the DOE has determined that the documentation assessed is authentic, where appropriate.	DR'	It is described in Section 3.4 of the Validation report.	OK	OK
VVM E.6.a.		Prior consideration of the clean development				
VVM E.6.a.01	2	99. If the reported start date of the project activity is not in accordance with the "Glossary of CDM terms", Was a CAR raised?	DR DR'	The starting date of the project activity is to be confirmed after obtaining the evidential contract. <i>The reported date provided with the source is in accordance with the "Glossary".</i>	NA	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.a.02	2	100. Is it a new project activity (project activities with starting date on or after 02 August 2008) or an existing project activity (project activities with a start date before 02 August 2008), in accordance with "GUIDELINES ON THE DEMONSTRATION AND ASSESSMENT OF PRIOR CONSIDERATION OF THE CDM"?	DR	The project activity is an existing one.	NA	NA
VVM E.6.a.03	2	101. For a new project activity, for which PDD has not been published for global stakeholder consultation or a new methodology proposed to the CDM Executive Board before the project activity start date, was it confirmed by means of confirmation from the UNFCCC secretariat whether the PPs had informed the host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status? ²⁴ If such a notification has not been provided by the project participants within six months of the project activity start date, was it determined that the CDM was not seriously considered in the decision to implement the project activity? (Refer to Para 2-5 of "GUIDELINES PRIOR CONSIDERATION OF THE CDM")	DR	The project activity is an existing one.	NA	NA

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.a.04	2	<p>102. For an existing project activity, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, was the project participant's prior consideration of the CDM assessed through document reviews and does it satisfy following requirements:</p> <p>(a) Evidence that must indicate that awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the project participant, to undertake the project as a proposed CDM project activity?</p> <p>(Refer to Para 6 (a) of "GUIDELINES PRIOR CONSIDERATION OF THE CDM")</p>	DR	Refer to B.5.1.14 and B.5.1.15 of Table 2.	CAR 2	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.a.05	2	102. For an existing project activity, for which the start date is prior to the date of publication of the PDD for global stakeholder consultation, was the project participant's prior consideration of the CDM assessed through document reviews and does it satisfy following requirements: (b) Reliable evidence from project participants that must indicate that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. Evidence to support this should include, inter alia, contracts with consultants for CDM/PDD/methodology services, Emission Reduction Purchase Agreements or other documentation related to the sale of the potential CERs (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a DOE for validation services, submission of a new methodology to the CDM Executive Board, publication in newspaper, interviews with DNA, earlier correspondence on the project with the DNA or the UNFCCC secretariat? (Refer to Para 6 (b) of "GUIDELINES PRIOR CONSIDERATION OF THE CDM")	DR	Refer to B.5.1.17 of Table 2.	CAR 3	OK
VVM E.6.a.06	2	103. If evidence to support the serious prior consideration of the CDM as indicated above is not available, is it determined that the CDM was not considered in the decision to implement the project activity? (Refer to Para 9 of "GUIDELINES PRIOR CONSIDERATION OF THE CDM")	DR	It is to be confirmed after obtaining the evidence relating to prior consideration. <i>All the evidences listed in Table 5 of the PDD were provided.</i>	NA	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.a.07	2	104. The validation report shall: (a) Describe the DOE's validation of the project activity start date provided in the PDD;	DR'	It is described in Section 3.4.1 of the Validation report.	OK	OK
VVM E.6.a.08	2	104. (b) Describe the evidence for prior consideration of the CDM (if necessary) that was assessed;	DR'	It is described in Section 3.4.1 of the Validation report.	OK	OK
VVM E.6.a.09	2	104. (c) Provide a clear validation opinion regarding whether the proposed CDM project activity complies with the requirements of "GUIDELINES ON THE DEMONSTRATION AND ASSESSMENT OF PRIOR CONSIDERATION OF THE CDM".	DR'	It is described in Section 3.4.1 of the Validation report.	OK	OK
VVM E.6.b.		Identification of alternatives				
VVM E.6.b.01	2	106. Regarding the list of alternatives given in the PDD, (a) Does the list of alternatives include as one of the options that the project activity is undertaken without being registered as a proposed CDM project activity? (b) Does the list contain all plausible alternatives that are considered to be viable means of supplying the outputs or services that are to be supplied by the proposed CDM project activity, on the basis of its local and sectoral knowledge?; (c) Do the alternatives comply with all applicable and enforced legislation?	DR DR'	(a) Yes. "Turbine retrofit project activity is implemented without CDM" is listed as Scenario 2 in B.4. and B.5. of the PDD. (b) Two baseline scenarios resulted from "Step 1. Identification of alternative scenarios" were confirmed to be viable means. (c) Refer to B.4.04 of Table 2.	OK OK CL	OK OK OK
VVM E.6.b.02	2	107. The validation report shall describe whether the DOE considers the listed alternatives to be credible and complete.	DR'	It is described in Section 3.3.3 of the Validation report.	OK	OK
VVM E.6.c.		Investment analysis				

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.c.01	2	111. Is the accuracy of financial calculations carried out for any investment analysis verified by: (a) Conducting a thorough assessment of all parameters and assumptions used in calculating the relevant financial indicator, and determining the accuracy and suitability of these parameters using the available evidence and expertise in relevant accounting practices?	DR	Refer to B.5.1.03, B.5.1.04, B.5.1.06 and B.5.1.13 of Table 2.	CL	OK
VVM E.6.c.02	2	111. (b) Cross-checking the parameters against third-party or publicly available sources, such as invoices or price indices?	DR	Ditto. Several sources shown in Table 4 of the Validation Report were used for cross-checking the parameters.	CL	OK
VVM E.6.c.03	2	111. (c) Reviewing feasibility reports, public announcements and annual financial reports related to the proposed CDM project activity and the project participants?	DR	Refer to VVM E.6.c.09 below.	OK	OK
VVM E.6.c.04	2	111. (d) Assessing the correctness of computations carried out and documented by the project participants? (See Para. 8 of "Investment Analysis Guidelines")	DR	Refer to B.5.1.05, B.5.1.07, B.5.1.08 and B.5.1.12 of Table 2.	CL	OK
VVM E.6.c.05	2	111. (e) Assessing the sensitivity analysis by the project participants to determine under what conditions variations in the result would occur, and the likelihood of these conditions? (See Para. 17 and 18 of "Investment Analysis Guidelines")	DR	Refer to B.5.1.10 of Table 2.	CL	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.c.06	2	112. Is the suitability of any benchmark applied in the investment analysis confirmed by: (a) Determining whether the type of benchmark applied is suitable for the type of financial indicator presented? (See Para.12 of "Investment Analysis Guidelines")	DR	Refer to B.5.1.09 of Table 2.	CL	OK
VVM E.6.c.07	2	112. (b) Ensuring that any risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity? (See Para. 6.(a) of Step 2 of "Additionality Tool" and Para.15 of "Investment Analysis Guidelines")	DR'	The benchmark was revised to 8% referring to the Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects. The PPs adopted the benchmark supplied by State Power Company, relevant national authority.	OK	OK
VVM E.6.c.08	2	112. (c) Determining whether it is reasonable to assume that no investment would be made at a rate of return lower than the benchmark by, for example, assessing previous investment decisions by the project participants involved and determining whether the same benchmark has been applied or if there are verifiable circumstances that have led to a change in the benchmark? (See Para. 6.(c) of Step 2 of "Additionality Tool")	DR'	It is reasonable to assume that no investment would be made at the rate of return, 5.5% lower than 8%.	OK	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.c.09	2	113. In cases where project participants rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed CDM project activities: (a) Has the FSR been the basis of the decision to proceed with the investment in the project? i.e. Is the period of time between the finalization of the FSR and the investment decision sufficiently short for the DOE to confirm that it is unlikely in the context of the underlying project activity that the input values would have materially changed?;	DR'	<i>Following were confirmed through the interview with the PPs and the officials of SDRC and checking the FSR provided:</i> - The FSR was prepared by the PP in February 2005, and approved by SDRC on 11 July 2008. - While technical feasibility and rough costs for several retrofitting cases were included in the FSR, no study on economic feasibility was made. - Hence the values used for the IRR calculation were not based on the FSR.	NA	NA
VVM E.6.c.10	2	113. (b) Are the values used in the PDD and associated annexes fully consistent with the FSR? And where inconsistencies occur is the appropriateness of the values validated?	DR'	Ditto.	NA	NA
VVM E.6.c.11	2	113. (c) On the basis of its specific local and sectoral expertise, is confirmation provided, by cross-checking or other appropriate manner, that the input values from the FSR are valid and applicable at the time of the investment decision?	DR'	Ditto.	NA	NA
VVM E.6.c.12	2	114. The validation report shall: (a) Describe in detail how the parameters used in any financial calculations have been validated;	DR'	It is described in Section 3.4.3 of the Validation report.	OK	OK
VVM E.6.c.13	2	114. (b) Describe how the suitability of any benchmark applied has been assessed;	DR'	Ditto.	OK	OK
VVM E.6.c.14	2	114. (c) Confirm whether the underlying assumptions are appropriate and the financial calculations are correct.	DR'	Ditto.	OK	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.d.		Barrier analysis ²⁹				
VVM E.6.d.01	2	116. Issues that have a clear direct impact on the financial returns of the project activity cannot be considered barriers and shall be assessed by investment analysis. This does not refer to either: (a) Risk related barriers, for example risk of technical failure, that could have negative effects on financial performance; or (b) Barriers related to the unavailability of sources of finance for the project activity.	DR DR'	Refer to B5.1.02 in Table 2. <i>After adding Step 2. "Barrier analysis", "barrier" described does not include the issues that have a clear direct impact on the financial returns of the project activity. Furthermore, "barrier" refers neither (a) nor (b) in "Requirement".</i>	CL	OK
VVM E.6.d.02	2	117. By applying a two-step process to assessing the barrier analysis performed in the PDD, (a) Is it confirmed that the barriers are real? Is/are assessment of available evidence and/or interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) conducted to determine whether the barriers listed in the PDD exist?	DR'	Refer to B5.1.02 in Table 2.	CL	OK
VVM E.6.d.03	2	117. (a) Is existence of barriers substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics? (If existence of a barrier is substantiated only by the opinions of the project participants, this barrier is not considered to be adequately substantiated. If on the basis of its sectoral or local expertise, a barrier is not real or is not supported by sufficient evidence, it shall raise a CAR to have reference to this barrier removed from the project documentation.)	DR'	Ditto.	CL	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.d.04	2	117. (b) Is it determined by using the local and sectoral expertise that the barriers prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives? (Since not all barriers present an insurmountable hurdle to a project activity being implemented, is the local and sectoral expertise applied to judge whether a barrier or set of barriers would prevent the implementation of the proposed CDM project activity and would not equally prevent implementation of at least one of the possible alternatives, in particular the identified baseline scenario?)	DR'	Ditto.	CL	OK
VVM E.6.d.05	2	118. The validation report shall: (a) Provide an assessment of each barrier listed in the PDD, which describes how the DOE has undertaken validation of the barrier;	DR'	It is described in Section 3.4.2 of the Validation report.	OK	OK
VVM E.6.d.06	2	118. The validation report shall: (b) Provide an overall determination of the credibility of the barrier analysis performed.	DR'	It is described in Section 3.4.2 of the Validation report.	OK	OK
VVM E.6.e.		Common practice analysis				

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.e.01	2	120. (a) Was it assessed whether the geographical scope (e.g. the defined region) of the common practice analysis is appropriate for the assessment of common practice related to the project activity's technology or industry type, by using its local and sectoral expertise? (For certain technologies the relevant region for assessment will be local and for others it may be transnational/global. If a region other than the entire host country is chosen, the explanation why this region is more appropriate is assessed.);	DR	Refer to B.5.1.11 of Table 2.	CL	OK
VVM E.6.e.02	2	120. (b) Was it determined to what extent similar and operational projects (e.g., using similar technology or practice), other than CDM project activities, have been undertaken in the defined region by using official sources and local and industry expertise?;	DR	Refer to B.5.1.11 of Table 2.	CL	OK
VVM E.6.e.03	2	120. (c) If similar and operational projects, other than CDM project activities, are already "widely observed and commonly carried out" in the defined region, was it assessed whether there are essential distinctions between the proposed CDM project activity and the other similar activities, by using its local and sectoral expertise?	DR'	It was confirmed through the interview with the experts and the officials of SDRC and list of 57 units of 300MW-class power plants in NWPG provided and telephone and web surveys against the power equipment manufacturers and the engineering companies that none of turbine retrofit project was carried out not only in Shaanxi Province but NWPG.	NA	NA
VVM E.6.e.04	2	121. The validation report shall provide details regarding: (a) How the geographical scope of the common practice analysis has been validated;	DR'	It is described in Section 3.4.4 of the Validation report.	OK	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.6.e.05	2	121. (b) How the DOE has undertaken an assessment of the existence of similar projects;	DR'	It is described in Section 3.4.4 of the Validation report.	OK	OK
VVM E.6.e.06	2	121.(c) How the DOE has assessed the essential distinctions between the proposed CDM project activity and any similar projects that are widely observed and commonly carried out;	DR'	It is described in Section 3.4.4 of the Validation report.	OK	OK
VVM E.6.e.07	2	121. (d) Confirmation by the DOE that the proposed CDM project activity is not common practice.	DR'	It is described in Section 3.4.4 of the Validation report.	OK	OK
VVM E.7.		Monitoring plan				
VVM E.7.01	2	123. Is a two-step process to assess compliance with this requirement applied, as follows?: (a) (i) By means of document review, is the list of parameters required by the selected approved methodology identified? (a) (ii) Does the monitoring plan contain all necessary parameters? And are they clearly described in the monitoring plan?	DR	Refer to B.7.1 of Table 2.	CAR 7 CAR 9	OK
VVM E.7.02	2	123. (a) (ii) Are the means of monitoring described in the plan comply with the requirements of the methodology?;	DR	Refer to B.7.1 and B.7.2 of Table 2.	CL	OK
VVM E.7.03	2	123. (b) Implementation of the plan. By means of review of the documented procedures, interviews with relevant personnel, project plans and any physical inspection of the proposed CDM project activity site in accordance with paragraphs 59-62: (i) Are the monitoring arrangements described in the monitoring plan feasible within the project design?;	DR'	The team confirmed at SV that major monitoring equipments such as electricity meters and weight scale for coal consumption required by AM0062 were already installed and operated. The monitoring arrangements described in the monitoring plan are considered to be feasible.	OK	OK

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.7.04	2	123. (b) Implementation of the plan. (ii) Are the means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity can be reported ex post and verified?	DR'	The team confirmed at SV that the PP established the management system through acquiring the certificates of ISO 9001, ISO 14001 and OHSMS 18001. The team considered that emission reductions achieved by/resulting from the proposed CDM project activity could be reported ex post and verified.	OK	OK
VVM E.7.05	2	124. The validation report shall: (a) State the DOE's opinion of the compliance of the monitoring plan with the requirements of the methodology;	DR'	It is described in Section 3.5 of the Validation report.	OK	OK
VVM E.7.06	2	124. The validation report shall: (b) Describe the steps undertaken to assess whether the monitoring arrangements described in the monitoring plan are feasible within the project design;	DR'	It is described in Section 3.5 of the Validation report.	OK	OK
VVM E.7.07	2	124. The validation report shall: (c) State the DOE's opinion of the project participants ability to implement the monitoring plan.	DR'	It is described in Section 3.5 of the Validation report.	OK	OK
VVM E.7.08	2	127. The validation report shall indicate whether the host Party's DNA confirmed the contribution of the project to the sustainable development of the host Party. This may be reported together with the DOE's assessment of the validity of the host Party's approval (refer to paragraphs 49 and 50 above).	DR'	It is described in Section 3.6 of the Validation report.	OK	OK
VVM E.9.		Local stakeholder consultation				

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Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.9.01	2	128. Were local stakeholders (the public, including individuals, groups or communities affected, or likely to be affected, by the proposed CDM project activity or actions leading to the implementation of such an activity) invited by the PPs to comment on the proposed CDM project activity prior to the publication of the PDD on the UNFCCC website?	DR'	It was confirmed through the interview with two residents and minutes of stakeholders meeting that the local stakeholders consultation was conducted on 26 February 2009, which is before the date of publicity of the PDD, 01 May 2009.	OK	OK
VVM E.9.02	2	129. (a) Was it determined whether comments by local stakeholders that can reasonably be considered relevant for the proposed CDM project activity, have been invited, by means of document review and interviews with local stakeholders as appropriate?	DR'	Refer to E.1.01 - E.1.06 of Table 2.	CL	OK
VVM E.9.03	2	129. (b) Was it determined whether the summary of the comments received as provided in the PDD is complete, by means of document review and interviews with local stakeholders as appropriate?;	DR'	Refer to E.2.01 of Table 2.	OK	OK
VVM E.9.04	2	129. (c) Was it determined whether the project participants have taken due account of any comments received and described this process in the PDD, by means of document review and interviews with local stakeholders as appropriate?	DR'	The validation team confirmed through the interview with local residents and the minutes provided by the PP that nobody had a negative comment on the project activity.	NA	OK
VVM E.9.05	2	130. The validation report shall: (a) Describe the steps taken to assess the adequacy of the local stakeholder consultation;	DR'	It is described in Section 3.7 of the Validation report.	OK	OK
VVM E.9.06	2	130. (b) State the DOE's opinion on the adequacy of the local stakeholder consultation.	DR'	It is described in Section 3.7 of the Validation report.	OK	OK

Appendix A

Section Seq. No.	Ref. No.	Requirement	MoV	Comments	Draft Conc.	Final Conc.
VVM E.X10.		Environmental impacts				
VVM E..10.01	2	131. Have the project participants submitted documentation to the DOE on the analysis of the environmental impacts of the project activity?	DR'	Refer to D.1.01 and D.2.01 in Table 2.	OK	OK
VVM E..10.02	2	132. By means of a document review and/or using local official sources and expertise, have the project participants undertaken an analysis of environmental impacts and, if required by the Host Party, an environmental impact assessment?	DR'	Refer to D.1.01 and D.2.01 in Table 2.	CL	OK
VVM E..10.03	2	133. The validation report shall describe whether the project participants have undertaken an analysis of environmental impacts and, if required by the host Party, an environmental impact assessment in accordance with procedures as required by the host Party.	DR'	It is described in Section 3.8 of the Validation report.	Ok	OK

Table 4 CARs / CLs Resolution

Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CAR 1	Source showing "increasing the efficiency rate of the turbines by approximately 10%" is not provided in the PDD.	A.2	<i>Following documents were provided:</i> <ul style="list-style-type: none"> - Performance tests for both the turbines before and after the retrofitting, showing approximately 10% increase of the turbines efficiency rates. - Turbine Retrofitting Project Agreement between Shaanxi Huadian Pucheng 	"Approximately 10%" was confirmed through the documents provided. And the source was described in A.4.3.
CAR 2	"Awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project" are not described.	B.5	<i>The event that China Huadian Corporation, the parent company of the PP, consulted with MRI was set as the awareness of the CDM. The board meeting decided to implement the project activity as CDM on 12 May 2006. The fact was described in the PDD.</i>	Prior consideration was described. "Awareness" was confirmed through these events with evidences.
CAR 3	Some events including ERPA signed with Kyushu Electric Power Co., Inc. and contract with DOE are absent in the implementation timeline.	B.5	<i>Following events were added:</i> <ul style="list-style-type: none"> • ERPA signed between both the PPs, • Contract with DOE, • Completion of the FSR, • Board meeting in which the decision of implementation of the project activity was made, • Performance tests of turbines. 	The timeline revised in Table 5 is considered to be in compliance with the requirements.
CAR 4	Clarification on the methodological choices for Case a) to c) of Step 1 is absent. It is not clear whether the electricity generation in the project activity exceeds "Baseline Maximum" in relation to the operation time.	B.6.1	<i>The choice of Case c) was clarified in B.6.3 that "The Power Purchase Agreements for 2006-2010 indicate that the quantity of electricity supplied to the grid remains unchanged before and after retrofitting the turbines and the actual results for 2006-2011 has confirmed that."</i>	It was confirmed through PPAs from 2006 to 2010 and actual amount of electricity supplied to the grid from 2006 to 2011 that the net electricity supply to the grid remains unchanged before and after the implementation of the project activity. Hence, the choice of Case c) is deemed appropriate.
CAR 5	Clarification on the methodological choices for Case 1 and Case 2, and Option A to Option C of Step 2 is absent.	B.6.1	<i>Clarification for Case 1 and Case 2 was made in B.6.1. and for Option A to Option C was made in B.6.3.</i>	The methodological choices were appropriately clarified.

Appendix A

Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CAR 6	The values of HMR _x and EGT _{ur,x} in the tables of B.6.2 are different from their sources provided.	B.6.2	<i>Some of the values listed in the table for HMR_x and EGT_{ur,x} were revised.</i>	These values were confirmed through the historical records provided.
CAR 7	"η _{BL,y} for No.1" and "η _{PJ,max} " listed in B.7.1 are not in line with the methodology.	B.6.2 B.7.1	<i>They were moved to B.6.2.</i>	They were listed in line with the methodology.
CAR 8 CAR 8'	The starting date, 01/07/2009 is not acceptable at the time of Desk Review. The starting date, 01/01/2011 is not acceptable at the time of final preparation of the PDD.	C.2.2.1	<i>It was revised to 01/07/2011.</i>	The revision is acceptable.
CAR 9	With respect to the calculation of COEF _{i,y} , Option B of "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion" is chosen without any justification. Justification for not choosing Option A is not described in the PDD although Option A is the preferred approach according to the tool. Monitoring parameter for calculating the COEF _{i,y} is not included in B.7.1.	B.6.3. B.7.1.	<i>COEF_{i,y} was calculated by using the chemical composition of coal in accordance with the Tool (Option A). Accordingly, EF_{FF,BL} was re-calculated based on ultimate analysis and proximate analysis of the coal used from 2006 to 2008. w_{C,i,y} was added as the monitoring parameter for calculation COEF_{i,y}.</i>	EF _{FF,BL} is correctly calculated using the historical records of ultimate/proximate analysis of coal used. The addition of w _{C,i,y} is in line with the tool.
CL 1	It is not clear what China Huadian Corporation is.	A.2	<i>The description "which is one of the five biggest power companies in China" was added.</i>	The description was added in line with the finding at SV.
CL 2	The information of Pucheng's activity including Phase 2 and Phase 3 provided at SV is not introduced in the PDD.	A.2	<i>The information on Phase 2 and Phase 3 was also introduced.</i>	The description was added in line with the finding at SV.
CL 3	The operation starting dates of the turbines (No.1 and No.2) are different from those in the acceptance inspections provided at SV.	A.2	<i>The dates were revised to 3 September 1996 for No.1 and 27 April 1998 for No.2, respectively.</i>	These were revised in line with the acceptance inspections.

Appendix A

Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CL 4	The baseline scenario and the project scenario are not described in the PDD.	A.2	<i>They were described.</i>	The scenarios described are appropriate.
CL 5	Evidence showing that the technology used in the existing turbines was developed in 1960s is not provided.	A.2	<i>The FSR was provided as the evidence.</i>	It was confirmed through the FSR that the technology had been developed in 1960s in Romania.
CL 6	While the contribution of the project activity to SD is discussed in A.2 and A.4.3 of the PDD, SD itself is not specified.	A.2	<i>Contribution to sustainable development was added as follows: - Coal saving, - Emission reductions of CO2, SO2 and NOx - Reductions of coal ash production - Spread of positive economic effects and further technology development.</i>	Contribution to sustainable development was specified in A.2.
CL 7	The name of Host Parties, “China” is not appropriate.	A.3 A.4.1.1	<i>It was revised to People's Republic of China.</i>	Formal name was described.
CL 8	The name of city is absent.	A.4.1.3	<i>Weinan City was added.</i>	It was described in line with guideline.
CL 9	The latitude and longitude of the project site is absent.	A.4.1.4	<i>It was added.</i>	It was appropriately described.
CL 10	It is not described how advanced, and environmentally safe and sound the project technology is. Description on the characteristics of the turbine technology is absent, while the “4-cylinder 4-exhaust F.I.C-condensing turbine” is introduced in A.4.3. of the PDD.	A.4.3	<i>The outline of the supplier and the features of the technology to be adopted were added.</i>	The description was added in line with the finding at SV.
CL 11	The baseline scenario is not referred to.	A.4.3	<i>It was added.</i>	It was described in line with the guidelines for completing the PDD.

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Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CL 12	Information on the age and average lifetime of the power generation equipments and industry standards is not included in the PDD.	A.4.3	<i>The technical lifetime of 30 years was added referring to "Standard for the Specification for Stationary Utility Condensing Steam Turbine (SD269-88)".</i>	It was confirmed through the standard provided.
CL 13	The monitoring equipments and their locations are not described in the PDD.	A.4.3 B.7.2	<i>They were provided in B.7.1 and in Figure 5 of B.7.2, respectively.</i>	These were clearly illustrated.
CL 14	The description "the heat rates (design value 8229.9kJ/kWh) have decreased over the years due to aging degradation" is not clear.	A.4.3	<i>The description "decreased" was revised to "increased".</i>	It was appropriately revised.
CL 15	Evidences of performance tests including heat rates and the increased efficiency guaranteed are not provided.	A.4.3	<i>These were provided as follows: -Reports of performance test for No.1 and No.2 turbines, -Turbine retrofitting project agreement. The rise of turbine efficiency, 10% was added, referring to the contract.</i>	It was confirmed that the turbine efficiency at the maximum output was estimated using the test data. And the guaranteed 10% was confirmed though the agreement.
CL 16	The load factor in Table 2 newly added in relation to baseline scenario is not explained with any source.	A.4.3	<i>It was explained with "Note" and "Source" under Table 2.</i>	It was clearly described with the source.
CL 17	Regarding Condition 4, it is not clear why the project activity does not fall under either of two categories prescribed in AM0062.	B.2	<i>PP explained that it was referred to Scenario 4 of Sub-step 1a in B.4. (There is no original documentation.)</i>	The team observed at SV some turbine blades to be installed and confirmed that the retrofitting project fell under neither the examples of periodic inspections nor preventive maintenance.
CL 18	Regarding Condition 5 (a), it is not clear how the operational parameters of the turbines remain unchanged before and after the retrofitting.	B.2	<i>They were shown including after retrofitting in Table 1.</i>	They were confirmed through checking the performance test data.

Appendix A

Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CL 19	Regarding Condition 5 (b), evidence showing the operation start date of turbines is not provided.	B.2	<i>Certificates of the acceptance inspections for No.1 and No.2 turbines were provided. The dates were revised to 3 September 1996 for No.1 and 27 April 1998 for No.2, respectively.</i>	It was confirmed that the dates were in consistent with those in the certificates.
CL 20	Regarding Condition 6, the applicability condition requested by the tool as to the project activity supplying the electricity to a grid is not justified.	B.2	<i>Justification was made.</i>	It was appropriately justified referring to the tool.
CL 21	The monitoring variables and locations of monitoring equipments are not provided in Figure 1.	B.3	<i>They are provided in Figure 5 of B.7.2.</i>	These were illustrated.
CL 22	The description of “implementation of turbine retrofit project in power plant is not subject to obligate notification to the competent authority in China” in Sub-step 1b is not clear.	B.4	<i>The description was deleted.</i>	The deletion is appropriate.
CL 23	It is not clear what kinds of legal and regulatory requirements relating to the project activity there are.	B.4	<i>It was added that there are a few laws relating to the project activity including Energy Saving Law and Circulation-type Economy Promotion Law and that these laws are not mandatory regulations.</i>	The laws added were confirmed through interview with the officials of SDRC.
CL 24	Evidence showing “None of the turbines of the 57 units has been retired or retrofitted” is not provided.	B.4	<i>The list of 57 units was provided as evidence and shown on footnote as “investigated by Northwest Electric Power Research Institute”.</i>	Evidence showing the fact of “None of the turbines of the 57 units has been retired or retrofitted” was confirmed though the list provided. Furthermore, JQA confirmed the fact through the interview with the officials of SDRC, the experts in China and telephone and web surveys against the power equipment manufacturers and the engineering companies.

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Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CL 25	The description “The operation and maintenance of these turbines have been carried out in a similar manner” is not clear in this context.	B.4	<i>It was deleted.</i>	The deletion is appropriate.
CL 26	There is no referring to Step 2 “Barrier analysis” in accordance with the requirement of “Combined tool”.	B.5	<i>Step 2 “Barrier analysis” was added discussing through providing two sub-steps. The technological barriers and lack of prevailing practice were discussed.</i>	The description added is appropriate. The description was confirmed through the interview with the experts and the officials of SDRC, the review of the list of 57 units of 300MW-class power plants in NWPG prepared by Northwest Electric Power Research Institute and telephone and web surveys that the turbines were made in Romania and there is no original documentation of the design, and that none of turbine retrofit project was carried out not only in Shaanxi Province but NWPG.
CL 27	The meaning of “The calculation was conducted in a conservative manner” is not clear.	B.5	<i>The description was deleted.</i>	The deletion is appropriate.
CL 28	Source of the values listed in the table is not described.	B.5	<i>The table was revised to Table 4 with sources.</i>	The sources of the values were shown in detail.
CL 29	Evidences of the following data and assumption used in the IRR calculation are not provided: <ul style="list-style-type: none"> - initial investment, - coal price and monthly records of coal consumption, - income tax, - interest rate, - debt ratio, - coal price and monthly records of coal consumption, - depreciation period, - residual value rate. 	B.5	<i>All the evidences were provided.</i>	These were confirmed to be consistent with input values of the calculation spreadsheet.

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Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CL 30	It is not clear why the fair value in 2025 in the spreadsheet is 2,287 thousand Euro, not including the fair value for two years (Years 19 and 20).	B.5	<i>The currency unit used in the IRR was changed from Euro to CNY. The fair value was revised as 37,465 thousand CNY through recalculation including the two years.</i>	The recalculation was confirmed as appropriate.
CL 31	It is not clear whether the IRR calculation with CER was conducted.	B.5	<i>The results of IRR calculation with/without CER were added in the PDD. And the spreadsheet was provided to DOE.</i>	The results were confirmed through the spreadsheet.
CL 32	The evidence of benchmark of 12% is to be provided.	B.5	<i>The benchmark was revised to 8% after tax, referring to the Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects.</i>	8% was confirmed through checking the interim rules.
CL 33	Clarification why the IRRs for investment cost and coal price would not cross the benchmark within +/- 10% is not provided.	B.5	<i>The clarification that such a situation would not occur was added referring to the prediction of the coal price by World Energy Outlook 2005. Initial investment cost finally increased up to 350,847,500CNY beyond the estimate.</i>	The clarification is appropriate considering that the coal price was referred to the prediction by World Energy Outlook issued by IEA and crossing point of the benchmark is beyond +/- 10%.
CL 34	It is not clear whether there are similar project activities, while there is the description "Few retrofitting turbine project activities for 300MW-class power plants".	B.5	<i>The description was revised to "none of the turbines of the 57 units in the NWPG has been retrofitted" referring to the current situation of 300MW-class units in NWPG.</i>	The revision is appropriate. The geographical scope of NWPG is considered as appropriate because the proposed project activity delivers electricity generated to the NWPG. Furthermore, the team confirmed through the interview with SDRG that the turbine retrofit CDM project is the first case in Shaanxi Province and considered to be the first case even in the whole China.
CL 35	It is not clear whether the project activity needs the amendment of Power Purchase Agreement with the grid company regarding the change of the turbine capacity from 330MW to 360MW.	B.5	<i>The description "The project activity does not cause any amendment" was added.</i>	The description was confirmed through PPA.
CL 36	The equation numbers are absent, while they are given in AM0062.	B.6.1	<i>The equations were numbered.</i>	The numbering is transparent.

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Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CL 37	The date of the performance test for No.2 turbine in the table for $\eta_{BL,x}$ in B.6.2. is not consistent with the date in the test data provided.	B.6.2	<i>It was revised in consistent with the test data.</i>	The revision was confirmed through the test data.
CL 38	It is not clear how " $\eta_{PJ,max}$ for No.2" is derived from the data in the table of Annex 3.	B.6.2	<i>The explanation how the estimated values of "$\eta_{BL,max}$" and "$\eta_{PJ,max}$" are determined was added through revising the description in Annex 3.</i>	Both values of " $\eta_{BL,max}$ " and " $\eta_{PJ,max}$ " were extrapolated using the regression analysis for the performance tests considering conservativeness.
CL 39	The equation of BEy in B.6.3 is not the same as that in B.6.1.	B.6.3	<i>It was revised as follows: - The three optional equations of BEy, Case a) to c) were listed in B.6.1, - Case c) was chosen with the justification of the quantity of electricity generated in the project activity.</i>	The revision is appropriate.
CL 40	Source of the data for calculating the emission factors is not shown.	B.6.3	<i>It was shown in Annex 3.</i>	The emission factors were confirmed through those issued by NDRC.
CL 41	The temperature and the pressure of steam are absent from the direct monitoring items.	B.7.1	<i>They were added as direct items including calibration of monitors.</i>	They were described in line with the methodology.
CL 42	"Mass or volume unit" for FCPJ,y is not given as SI unit.	B.7.1	<i>It was revised to "t".</i>	It was expressed in SI units.
CL 43	It is not clear whether EF _{GRID,y} in B.7.1 is directly monitored.	B.7.1	<i>It was moved to B.6.2.</i>	The revision is in line with the methodology.
CL 44	It is not clear whether FCPJ,y is directly monitored.	B.7.1	<i>FCTot,y was listed as a directly monitored parameter, while FCPJ,y is calculated from FCTot,y.</i>	FCPJ,y is calculated by " $FCPJ,y = FCTot \times ftur$ ".
CL 45	Accepted industry standards or national standards for measurement of electricity generated and actual fuel consumption are not shown. National Standard of electricity meter showing the accuracy is absent.	B.7.1	<i>Following standards were identified for the monitoring parameters: - JJG 596-1999 for EGPJ,y, - JJG 539-1997 for FCPJ,y, - JJG 875-2005 for P and Q, - JJG 160-2007 for T.</i>	National standards were described for EGPJ,y, FCPJ,y, P and Q, and T, respectively. The accuracy of electricity meter was described as 0.5s.

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Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CL 46	Description on the operational and management structure including the operational manager is absent.	B.7.2	<i>It was described illustrating the structure in Figure 4.</i>	The structure was described including the use of the management system (ISO 9001, ISO 14001 and OHSM 18001) established within the power plant.
CL 47	The calibration process is not clear, while there is the process described in "the annual maintenance".	B.7.2	<i>It was described in "QA/QC procedures to be applied" in B.7.1.</i>	It was clearly described for each monitoring parameter.
CL 48	Evidence showing the relationship of the responsibilities between PPs and Mitsubishi Research Institute, Inc. (MRI) in relation to the calculation of the heat inputs and emission reductions is to be provided.	B.7.2	<i>The Subcontracting Agreement between Kyusyu Electric Power Co., Inc. and MRI under the Emission Reductions Purchase Agreement was provided.</i>	The relationship between both the PPs was confirmed through the agreement.
CL 49	Evidence of contract indicating the starting date of the project activity, 02/04/2007 is to be provided.	C.1.1	<i>Retrofitting order of No.1 and No.2 steam turbines to Dongfang Turbine Co., Ltd. was provided</i>	The starting date, 02/04/2007 was confirmed through the order.
CL 50	While "Standard for the Specification for Stationary Utility Condensing Steam Turbine (SD269-88)" was provided as the evidence for "the remaining lifetime", the lifetime "18 years and 11 months" is not consistent with the 30 years described in the evidence, calculating from the starting date of the project activity "02/04/2007" and the starting date of No.1 turbine operation "03/09/1996".	C.1.2	<i>The operational lifetime was revised from "18 years and 11 months" to "19 years and 5 months".</i>	The expected operational lifetime was appropriately described.
CL 51	It is not clear how the EIA law covers the project activity. The EIA report and its approval are not provided to DOE.	D.1	<i>The description of how the EIA Law was applied to and what procedures were taken for the project activity was added.</i>	The revision is in line with the interview with SEPB.
CL 52	It is not clear whether there are any rules or guidelines on the stakeholders consultation applied to the project activity.	E.1	<i>The description that the process was voluntarily conducted by the PP without the direction of SEPB was added.</i>	The revision is in line with the interview with SEPB.

Appendix A

Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
CL 53	Information handed over to the residents and three comments received are to be confirmed at SV.	E.1	<i>The questionnaires in the consultation process were provided. The description that "three comments were received" was revised to "five".</i>	The revision was confirmed through checking the questionnaires.
CL 54	The following situation on the stakeholder's meeting is not clear: - How and when the stakeholders were notified about the meeting? - How the explanation of the project activity was made in the meeting?	E.1	<i>The following explanation was added in the PDD: - The stakeholders were notified on the phone during the previous week of the meeting, - The project outline and social benefits were explained by the person responsible for the CDM project activity.</i>	The description is in line with the interview with the two local residents.
CL 55	The situation of the project site is not clear in relation to neighboring villages.	E.1	<i>The description was added as "Note".</i>	The revision is in line with the findings at SV.
CL 56	While the results of the performance tests are provided, following are to be added or reviewed: - Summary of the performance tests including the procedures and results, - Parameters to be listed in the tables 9-12, - Explanation of "THA" for the tests after retrofitting.	Annex 3	<i>- Summary was described as "Main results of the performance tests" in Annex 3. - The parameters were reviewed and revised. - Explanation of THA was added.</i>	- The parameters in those tables are shown appropriately. - The explanation is appropriate.
CL 57	The dates of performance tests are to be specified.	Annex 3	<i>The dates before and after retrofitting were specified.</i>	The description added is appropriate.
CL 58	For assuring consistency and transparency, explanation of the estimation method for the turbine efficiency is to be provided based on the regression analysis.	Annex 3	<i>Estimation of the baseline and project turbines efficiency at full load using the performance tests was described.</i>	Both values of " $\eta_{BL_{max}}$ " and " $\eta_{PJ_{max}}$ " were extrapolated using the regression analysis for the performance tests considering conservativeness.
CL 59	It is not clear why interest repayment is included in the IRR calculation .	B.5	<i>The interest repayment was excluded in the IRR calculation.</i>	The IRR calculation is conducted in line with the Guideline.
CL 60	The use of World Energy Outlook 2005 for the future trend of coal prices used in the IRR calculation is not justified.	B.5	<i>The PPs used the actual prices of 207.1 CNY/t in 2005 over the period of the IRR calculation, instead of the data of World Energy Outlook 2005.</i>	The usage of constant prices is considered to be reasonable in view of the price change in Chinese market at the time of investment decision.

Appendix A

Draft Conc.	Comments	PDD Section	PP Response	DOE Comment and conclusion
FAR 1	Regarding the baseline emission factor of the project activity turbine (EFBL,y), the following FAR was raised. Eq. (8) in the PDD is to be reviewed, referring to the corrected equation in the methodology AM0062 / Version 02 in the first periodic verification.	B.6.1	-	-

Certificate

Dr. Ikuo TAMORI

Grade:	<u>Lead Assessor</u>
Assessor No.:	<u>CDM - LA001</u>
Assigned Date:	<u>2003.08.11</u>

This is to certify that Dr. Ikuo TAMORI is assigned as
CDM Lead Assessor by the Japan Quality Assurance Organization.

Date: February 26, 2007

Japan Quality Assurance Organization

M. Ueda

President Matahiro UEDA

Grant of technical area within CDM sectoral scope to CDM assessor

Assessor Name: Dr. Ikuo Tamori
 Grade: Lead Assessor
 Assessor No.: CDM-LA001

Sectoral Scope(SS)		Technical Area(TA)		Complex technical areas	Granted date	
					Validation	Verification
SS1	Energy industries (renewable / non-renewable sources)	TA 1.1:	Thermal energy generation from fossil fuels and biomass including thermal electricity from solar (COMPLEX)	●	28th Dec. 2010	28th Dec. 2010
		TA 1.2:	Energy generation from renewable energy sources		28th Dec. 2010	28th Dec. 2010
SS2	Energy distribution	TA 2.1:	Electricity distribution			
		TA 2.2:	Heat distribution			
SS3	Energy demand	TA 3.1:	Energy demand			
SS4	Manufacturing industries	TA 4.1:	Cement sector (COMPLEX)	●		
		TA 4.2:	Aluminum (COMPLEX)	●		
		TA 4.3:	Iron and steel (COMPLEX)	●		
		TA 4.4:	Refinery (COMPLEX)	●		
		TA 4.5:	Chemical industry (COMPLEX)	●		
		TA 4.6:	Other production			
SS5	Chemical industry	TA 5.1:	Chemical process industries (COMPLEX)	●		
SS6	Construction	TA 6.1:	Construction			
SS7	Transport	TA 7.1:	Transport			
SS8	Mining/Mineral production	TA 8.1:	Mining and mineral processes, excluding those included in TA 8.2 below			
		TA 8.2:	Oil and gas industry, coal mine methane recovery and use (COMPLEX)	●		
SS9	Metal production	TA 9.1:	Metal production			
SS10	Fugitive emissions from fuels (solid, oil and gas)	TA 10.1:	Mining and mineral processes, excluding those included in TA 10.2 below			
		TA 10.2:	Oil and gas industry, coal mine methane recovery and use (COMPLEX)	●		
SS11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	TA 11.1:	Chemical process industries (COMPLEX)	●		
		TA 11.2:	GHG capture and destruction			
SS12	Solvents use	TA 12.1:	Chemical process industries (COMPLEX)	●		
SS13	Waste handling and disposal	TA 13.1:	Waste handling and disposal			
		TA 13.2:	Animal waste management			
SS14	Afforestation and reforestation	TA 14.1:	Forestry			
SS15	Agriculture	TA 15.1:	Agriculture			
		TA 15.2:	Animal waste management			

This is to certify that Dr. Ikuo Tamori is granted the above technical areas within sectoral scope by the Japan Quality Assurance Organization.

Date: 4th April, 2011

Director of the Global Environment Department
 Japan Quality Assurance Organization

Mr. Norio Asawa 浅野 紀男

Certificate

Mr. Jun TAKATA

Grade: Assessor
Assessor No.: CDM-AS008
Assigned Date: 23 June 2009

This is to certify that Mr. Jun TAKATA is assigned as
CDM Assessor by the Japan Quality Assurance Organization.

Date: 23 June, 2009

Japan Quality Assurance Organization



Senior Executive Tsutomu MATSUNO

Grant of technical area within CDM/JI sectoral scope to CDM/JI assessor

Assessor Name: Mr. Jun Takata
 Grade: Assesor
 Assessor No.: CDM-AS008

Sectoral Scope(SS)		Technical Area(TA)		Complex technical areas	Granted date	
					Validation	Verification
SS1	Energy industries (renewable / non-renewable sources)	TA 1.1:	Thermal energy generation from fossil fuels and biomass including thermal electricity from solar (COMPLEX)	●		
		TA 1.2:	Energy generation from renewable energy sources			
SS2	Energy distribution	TA 2.1:	Electricity distribution			
		TA 2.2:	Heat distribution			
SS3	Energy demand	TA 3.1:	Energy demand			
SS4	Manufacturing industries	TA 4.1:	Cement sector (COMPLEX)	●		
		TA 4.2:	Aluminum (COMPLEX)	●		
		TA 4.3:	Iron and steel (COMPLEX)	●		
		TA 4.4:	Refinery (COMPLEX)	●		
		TA 4.5:	Chemical industry (COMPLEX)	●		
		TA 4.6:	Other production			
SS5	Chemical industry	TA 5.1:	Chemical process industries (COMPLEX)	●		
SS6	Construction	TA 6.1:	Construction			
SS7	Transport	TA 7.1:	Transport		28th Dec. 2010	28th Dec. 2010
SS8	Mining/Mineral production	TA 8.1:	Mining and mineral processes, excluding those included in TA 8.2 below			
		TA 8.2:	Oil and gas industry, coal mine methane recovery and use (COMPLEX)	●		
SS9	Metal production	TA 9.1:	Metal production			
SS10	Fugitive emissions from fuels (solid, oil and gas)	TA 10.1:	Mining and mineral processes, excluding those included in TA 10.2 below			
		TA 10.2:	Oil and gas industry, coal mine methane recovery and use (COMPLEX)	●		
SS11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	TA 11.1:	Chemical process industries (COMPLEX)	●		
		TA 11.2:	GHG capture and destruction			
SS12	Solvents use	TA 12.1:	Chemical process industries (COMPLEX)	●		
SS13	Waste handling and disposal	TA 13.1:	Waste handling and disposal		1st Feb. 2011	1st Feb. 2011
		TA 13.2:	Animal waste management			
SS14	Afforestation and reforestation	TA 14.1:	Forestry			
SS15	Agriculture	TA 15.1:	Agriculture			
		TA 15.2:	Animal waste management			

This is to certify that Mr. Jun Takata is granted the above technical areas within sectoral scope by the Japan Quality Assurance Organization.

Date: 4th April, 2011

Director of the Global Environment Department
 Japan Quality Assurance Organization

Mr. Norio Asawa 浅輪紀男

Certificate

Dr. Tadashi YOSHIDA

Grade:

Assessor

Assessor No.:

CDM - AS009

Assigned Date:

08 October 2010

This is to certify that Dr. Tadashi YOSHIDA is assigned as
CDM Assessor by the Japan Quality Assurance Organization.

Date: 08 October 2010

Japan Quality Assurance Organization

A handwritten signature in black ink, appearing to read 'Matsuno', followed by a long horizontal stroke.

Senior Executive Tsutomu Matsuno

Grant of technical area within CDM sectoral scope to CDM assessor

Assessor Name: **Dr.Tadashi Yoshida**
 Grade: **Assessor**
 Assessor No.: **CDM-AS009**

Sectoral Scope(SS)		Technical Area(TA)		Complex technical areas	Granted date	
					Validation	Verification
SS1	Energy industries (renewable / non-renewable sources)	TA 1.1:	Thermal energy generation from fossil fuels and biomass including thermal electricity from solar (COMPLEX)	●		
		TA 1.2:	Energy generation from renewable energy sources		28th Dec, 2010	28th Dec, 2010
SS2	Energy distribution	TA 2.1:	Electricity distribution			
		TA 2.2:	Heat distribution			
SS3	Energy demand	TA 3.1:	Energy demand			
SS4	Manufacturing industries	TA 4.1:	Cement sector (COMPLEX)	●		
		TA 4.2:	Aluminum (COMPLEX)	●		
		TA 4.3:	Iron and steel (COMPLEX)	●		
		TA 4.4:	Refinery (COMPLEX)	●	28th Dec, 2010	28th Dec, 2010
		TA 4.5:	Chemical industry (COMPLEX)	●	28th Dec, 2010	28th Dec, 2010
		TA 4.6:	Other production		16 Mar. 2011	16 Mar. 2011
SS5	Chemical industry	TA 5.1:	Chemical process industries (COMPLEX)	●	28th Dec, 2010	28th Dec, 2010
SS6	Construction	TA 6.1:	Construction			
SS7	Transport	TA 7.1:	Transport			
SS8	Mining/Mineral production	TA 8.1:	Mining and mineral processes, excluding those included in TA 8.2 below			
		TA 8.2:	Oil and gas industry, coal mine methane recovery and use (COMPLEX)	●		
SS9	Metal production	TA 9.1:	Metal production			
SS10	Fugitive emissions from fuels (solid, oil and gas)	TA 10.1:	Mining and mineral processes, excluding those included in TA 10.2 below			
		TA 10.2:	Oil and gas industry, coal mine methane recovery and use (COMPLEX)	●		
SS11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	TA 11.1:	Chemical process industries (COMPLEX)	●	28th Dec, 2010	28th Dec, 2010
		TA 11.2:	GHG capture and destruction			
SS12	Solvents use	TA 12.1:	Chemical process industries (COMPLEX)	●	28th Dec, 2010	28th Dec, 2010
SS13	Waste handling and disposal	TA 13.1:	Waste handling and disposal			
		TA 13.2:	Animal waste management			
SS14	Afforestation and reforestation	TA 14.1:	Forestry			
SS15	Agriculture	TA 15.1:	Agriculture			
		TA 15.2:	Animal waste management			

This is to certify that _____
 within sectoral scope by the Japan Quality Assurance Organization.

Dr.Tadashi Yoshida

is granted the above technical areas

Date: 4th April, 2011

Director of the Global Environment Department
 Japan Quality Assurance Organization

Mr. Norio Asawa

浅野 紀男

Certificate

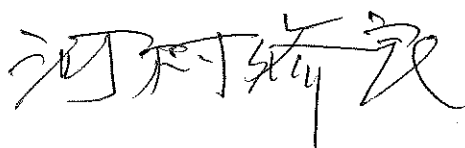
Mr. Shigenari YAMAMOTO

Grade:	<u>Lead Assessor</u>
Technical Reviewer No.:	<u>CDM / JI - TR003</u>
Assigned Date:	<u>14 July, 2010</u>

This is to certify that Mr. Shigenari YAMAMOTO is assigned as a CDM/JI Technical Reviewer for the same sectoral scope(s)/technical area(s) granted as an assessor in accordance with the "Procedure for Technical & Financial Review".

Assigned Date: 14 July, 2010

Japan Quality Assurance Organization



Quality Manager of Global Environment Department

Grant of technical area within CDM sectoral scope to CDM assessor

Assessor Name: Mr. Shigenari Yamamoto
Grade: Lead Assesor
Assessor No.: CDM-LA003

Sectoral Scope(SS)		Technical Area(TA)		Complex technical areas	Granted date	
					Validation	Verification
SS1	Energy industries (renewable / non-renewable sources)	TA 1.1:	Thermal energy generation from fossil fuels and biomass including thermal electricity from solar (COMPLEX)	●	28th Dec. 2010	28th Dec. 2010
		TA 1.2:	Energy generation from renewable energy sources		28th Dec. 2010	28th Dec. 2010
SS2	Energy distribution	TA 2.1:	Electricity distribution			
		TA 2.2:	Heat distribution		28th Dec. 2010	28th Dec. 2010
SS3	Energy demand	TA 3.1:	Energy demand		28th Dec. 2010	28th Dec. 2010
SS4	Manufacturing industries	TA 4.1:	Cement sector (COMPLEX)	●	28th Dec. 2010	28th Dec. 2010
		TA 4.2:	Aluminum (COMPLEX)	●		
		TA 4.3:	Iron and steel (COMPLEX)	●	28th Dec. 2010	28th Dec. 2010
		TA 4.4:	Refinery (COMPLEX)	●		
		TA 4.5:	Chemical industry (COMPLEX)	●		
		TA 4.6:	Other production		16th Mar. 2011	16th Mar. 2011
SS5	Chemical industry	TA 5.1:	Chemical process industries (COMPLEX)	●		
SS6	Construction	TA 6.1:	Construction			
SS7	Transport	TA 7.1:	Transport			
SS8	Mining/Mineral production	TA 8.1:	Mining and mineral processes, excluding those included in TA 8.2 below		28th Dec. 2010	28th Dec. 2010
		TA 8.2:	Oil and gas industry, coal mine methane recovery and use (COMPLEX)	●		
SS9	Metal production	TA 9.1:	Metal production		28th Dec. 2010	28th Dec. 2010
SS10	Fugitive emissions from fuels (solid, oil and gas)	TA 10.1:	Mining and mineral processes, excluding those included in TA 10.2 below		28th Dec. 2010	28th Dec. 2010
		TA 10.2:	Oil and gas industry, coal mine methane recovery and use (COMPLEX)	●		
SS11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	TA 11.1:	Chemical process industries (COMPLEX)	●		
		TA 11.2:	GHG capture and destruction		28th Dec. 2010	28th Dec. 2010
SS12	Solvents use	TA 12.1:	Chemical process industries (COMPLEX)	●		
SS13	Waste handling and disposal	TA 13.1:	Waste handling and disposal		28th Dec. 2010	28th Dec. 2010
		TA 13.2:	Animal waste management			
SS14	Afforestation and reforestation	TA 14.1:	Forestry			
SS15	Agriculture	TA 15.1:	Agriculture			
		TA 15.2:	Animal waste management			

This is to certify that Mr. Shigenari Yamamoto is granted the above technical areas within sectoral scope by the Japan Quality Assurance Organization.

Date: 4th April, 2011

Director of the Global Environment Department
Japan Quality Assurance Organization

Mr. Norio Asawa

浅野紀男