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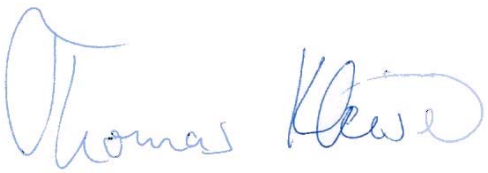
Request for Review

Dear Sirs,

Please find below the response to the review formulated for the CDM project “Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China” with the registration number 2344. In case you have any further inquiries please let us know how we can kindly assist you.

Yours sincerely,



Thomas Kleiser
Carbon Management Service

Industrie Service

Response to the CDM Executive Board

Question 1

Further clarification is required how the DOE has validated that continuing and real actions were undertaken to secure the CDM status as per EB 41, annex 46 (paragraph b).

Response by PP

According to the requirement of EB 41, *the project participant must indicate, by means of reliable evidence, 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;

As indicated in PDD, the main equipment import contract of the project was signed and came into force on 6 June 2005, and the civil construction work for the #1 waste heat boiler of the first 377.2MW NGCC unit started on 10 Aug. 2005, thus the start date of the project activity is prior to the expected date of submission for validation by the DOE (Dec. 2007). In accordance with the specific guidelines for completing the CDM-PDD given by the CDM EB, the following Chronological list of key events/activities associated with the project activity indicated the serious consideration of CDM in the decision to proceed with the project activity and that **continuing** and **real** actions were taken to secure CDM status for the project in parallel with its implementation:

Date	Event of CDM status	Event of project implementation	Evidence
March 2004	The project owner Henan Zhongyuan Gas Power Company Ltd. (hereafter refers to as the PO) got the information on another NGCC project, Beijing No.3 thermal power plant, which was a CDM case study by World Bank, from Prof. Liu in Tsinghua University Jan. 2004. The PO informed its departments to study the materials in March 2004. → continuous and real action to secure the CDM		Study report and internal memo
10 May	The PO had a board meeting, deciding that the CDM should be seized to improve the low internal return rate of the		Board meeting minutes

2004	project investment → serious consideration of the CDM		
10 May 2004	The PO established a CDM working team → continuous and real action to secure the CDM		Internal memo
12 Oct. 2004		The purchase order of the key equipments was signed between Henan Zhongyuan Gas Power Co., Ltd, China National Technical Import & Export Corp. and Sec-Led Consortium. However the contract came into force on 6 June 2005 only when several conditions were met (see below).	The equipment purchase contract with the signatures of four parties: Henan Zhongyuan Gas Power Co., Ltd., Shanghai Electric (Group) Corp., China National Technical Import & Export Co. and SIEMENS AG
Note: On 17 Nov 04, call for public input of the proposed new methodology: Baseline methodology for grid connected electricity generation plants using non-renewable and less GHG intensive fuel (NM0080).			
3 April 2005	the PO invited Prof. Liu in Tsinghua University to be the CDM consultant for the proposed project → continuous and real action to secure the CDM		Invitation letter
6 June 2005		The main equipment import contract between Henan Zhumadian Zhongyuan Gas Power Plant, China National Technical Import & Export Co. (CNTIC) and Shanghai Electric Group Co. (SEC)- SIEMENS Consortium came into force → actual project starting date, in line with the EB's CDM glossary	Letter from CNTIC, and Contract No. 04DE01GTA01XC0015, please refer to CNTIC Document No. G17ZY/11, 06/06/ 2005

Note: On 13 April 2006, the Methodology Panel announced its recommendation to approve the methodology decided at its meeting from 4th to 7th, April 2006 and AM0029 was approved in May 2006 by the EB. After that, the CDM developing work was accelerated according to updated requirement of methodology, and the 1st CDM working was held three months later on 14 Aug 2006 (see below). Until this time, only less than 10% of the total investment has been committed to. It is clearly shown that the project could have been stopped without major financial consequences in case the methodology had not been implemented.			
14 Aug. 2006	The 1st CDM working meeting for the project was held in the Zhumadian Zhongyuan Gas Power Plant. Major issues discussed including introduction of the NGCC plant and CDM development rules and procedure, basic data and parameters requirement, working plan, institutional arrangement for the CDM management. → continuous and real action to secure the CDM		Meeting Memos (in Chinese) available from the PO.
14 Aug. 2006	The CDM consultant service agreement for the Zhumadian Zhongyuan NGCC project was signed by GCCI/INET, Tsinghua University and the Accord Global Environment Technology Co. Ltd. → continuous and real action to secure the CDM		Meeting Summary
17 Nov. 2006	The 2nd CDM working meeting for the project was held in the Zhumadian Zhong yuan Gas Power Plant. Major issues discussed in detail including identification of Baseline scenario, how demonstrate additionality, estimation of leakage, how to prepare the PDD, detailed list of the data and parameter required, potential risks in the PDD development. → continuous and real action to secure the CDM		Meeting Summary
09 March 2007	The ERPA got signed → continuous and real action to secure		ERPA documentation

	the CDM		
April 2007	The draft version PDD was finished, but there was still lack of some information and the commercial negotiations delayed the efficient PDD development.		Internal communication between the seller and the buyer
June 2007		#1 unit went into operation	Operational data
5 Sept. 2007	The Project PDD was on CDM Website for GSP 1 → continuous and real action to secure the CDM		UNFCCC
15 Dec 2007	Approval of project by NDRC/DNA of China		http://cdm.ccchina.gov.cn/web/main.asp?ColumnId=25
Dec. 2007		#2 unit went into operation	Operational data
28 Feb. 2008	the on-site validation working meeting with DOE → continuous and real action to secure the CDM		Validation report
18 May 2008		The natural gas sales agreement between the PO and China Petroleum and Natural Gas Co. Ltd. was signed.	Agreement
24 July 2008	The Project PDD was on CDM Website for GSP 2		UNFCCC

Response by DOE

As pointed out by the PPs response, the requirements to demonstrate continuous CDM consideration throughout the implementation of a CDM project were further clarified in EB41, Annex 46 paragraph b guidance. Zhumadian project took the following continuing and real actions to secure CDM status for the project in parallel with its implementation:

(a) Before the project start date on 6th of July 2005, when the main equipment import contract between Henan Zhumadian Zhongyuan Gas Power Plant, China National Technical Import and Export Corporation (CNTIC) and Shanghai Electric Group Co. (SEC)-SIEMENS Consortium came into force, the project owner (PO) had seriously considered the CDM:
   - On 10th of May 2004, by setting up a CDM working team
   - On 17th November 2004, taking note of the submission of a new methodology "Baseline methodology for grid connected electricity generation plants using non-renewable and less GHG intensive fuel (NM0080)" to the meth panel
   - On 3rd of April 2005 when Prof. Liu of Tsingshua Universtity was invited to develop the project as CDM project.

(b) After the project start date the following actions were taken to secure the CDM status:
   - On 13th of April 2006, the PO took note of the meth panel's recommendation to approve the methodology, and subsequently AM0029 was approved by EB n May 2006
   - On 14th of August 2006, the CDM consultant agreement was signed by GCCI/INET, Tsinghua University and the Accord Global Environment Technology Co. Ltd.
   - On 14th of August and 17th November 2006 the first and second CDM working meeting took place
   - On 9th of March 2007 the ERPA was signed
   - 5th September 2007 the PDD was published for GSP on CDM Website

From project start date (6th of July 2005) until approval of the methodology in May 2006, there is a gap in the actions taken to secure the CDM. This can be explained by the fact the PO had to wait for the methodology approval before starting the detailed development of the project. However, given the sequence of events, bearing in mind that the methodology was submitted November 2004, TÜV SÜD is strongly convinced that the delayed start of the PDD development is well justified. It is further noted that only 10% of the total investment were spend before the methodology was approved.

Question 2

Further clarification is required on how the DOE has validated the suitability of the input values to the investment analysis, as per the guidance of EB 38 paragraph 54, including the assumption of fuel price used in the FSR versus the value used in the PDD.

Response by PP

As per guidance given by EB 38 paragraph 54, if the value is sourced from approved FSR, then it could be regard as credible and can be applied to investment analysis. In fact, as mention in page 18 of PDD and P14 of FVR, most data applied in investment analysis are steamed from the FSR compiled in May 2004 except for the price of natural price, which were calculated by GEDI based on LNG sales and purchase contract and the calculation model in FSR complied in Henan Provincial Electric Power Design Institute, May 2004. Meanwhile, the declaration documents given by Design Institute (See Annexure II) also confirm that all date in FSR which related to investment analysis have not changed from May 2004 to June 2005 (starting date of proposed project) except the price of natural gas.

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[For Input value of Fuel Price]

The value of fuel price in FSR is 1.1 RMB/Nm3, which is 6% lower than the value applied in PDD. First of all, we would like to emphasize that even if we do not take this change into account i.e. if we leave the fuel price as it was in the FSR, the IRR 5.77% is still obviously lower than the benchmark. Secondly, the description below will explain why that we choose 1.1798 RMB/ Nm3 in PDD for calculating the IRR.

It was presented in the PDD that the price of natural gas in the FSR is 0.48+0.62 = 1.1 Yuan/ Nm3, 0.48 is the gas field benchmark and 0.62 is the transportation price.

However, after compiled of FSR, "Henan DRC notice on the Yunan sub-pipeline natural gas transportation price", document No. [2004]1653, was issued on 8 Sept.2004, in which the natural gas transportation price from "west to east" pipeline to "Yunan Gas pipeline, Zhumadian City" is 0.15Yuan/ Nm^3, that means the transportation price will increased by 0.15Yuan/ Nm^3 .

After that, "NDRC notice on adjustment of the gas field benchmark price for natural gas pipelined from the West to the East", Document No. Fagaijiage [2005] 439, was issued on 19 March, 2005, in which the gas field benchmark price is raised from 0.48 to 0.52 Yuan/Nm3, increasing by 0.04Yuan/Nm3.

On the other hand, as indicated in Sub-step 1a. Apply benchmark analysis of Section B5 in PDD, page 17 that in the PDD for the proposed project, the 8% of IRR benchmark value without VAT was adopted, which was consistent with that IRR benchmark value used in the FSR, 2004 May version. Also in Table 3 Main parameters for calculation of financial indicators (in Yuan RMB) in PDD, page 18, by tax law, the current gas price includes 13% VAT rate for NG supply, and 7% tax rate for NG transportation, so the net gas price without VAT should be:

(0.52/(1+13%)+(0.62+0.15)/(1+7%))=1.1798 Yuan/Nm3, which actually used in the IRR calculation spreadsheet

Then, the main equipment import contract of the project was signed and came into force on 6 June 2005, which was considered as the start date of the proposed project, and the civil construction work for the #1 waste heat boiler of the first 377.2MW NGCC unit started on 10 Aug. 2005.

As mentioned above, NG price changes were issued by the governmental authorities after the FSR (May 2004), but prior to the start date of the project (6 June 2005). It mean that project owner has already know the increasing of fuel price before making their financial decision for implementing the project Therefore it needs to be reasonably taken into account in investment analysis with IRR calculation in the PDD.

In addition, the gas price at present is 1.65 Yuan/Nm^3 (See Annexure III), higher than the 1.1798 Yuan/Nm3 in PDD, therefore, applying the price of 1.1798 Yuan/Nm3 in the investment analysis is conservative and credible.

[For Input value of fixed investment]

As indicated in timeline. The project expects to be final completed in July 2009 and the last phase of the project is still under construction currently. Even though, from the closing accounts report provided by independent third party, the actual investment committed by March 2009 has already slightly exceeds the total fixed investment in FSR. Therefore, adopting the value of

fixed investment from FSR is applicable and conservative when the investment decision was made.

[For input value of O&M cost]

For the proposed project, the cost of fuel forming 90 per cent of the O&M cost. Then, the increase of the fuel price form 1.1798 to 1.8 Yuan/m3 could already indicated that the O&M cost won't be less than the value in FSR. Beside, under currently circumstances in China, both the price of materials and salary of employee are also unlikely to decrease.1 Therefore, adopting the value of O&M cost from FSR is applicable and credible when the investment decision was made.

[For input value of annual power generation]

3500hrs is the standard design of operation hours for natural gas project according to "Thermal Power Engineering Design Reference Cost Index (2005 Edition)", issued by China Institute of Power Planning and Design, and has also been properly adopted in the FSR. Therefore, adopting the value annual power generation from FSR is applicable and credible when the investment decision was made.

[For value of tariff price]

In China, the electricity tariff was highly regulated by the government. The electricity tariff will not be significantly changed without regulation by the government. In order to ensure the stability of the price for the whole country, the central government has very strict control for the basic price such as the tariff. Meanwhile, according to P85 in Financial Assessment Methods and Parameters for Construction issued by the National Development and Reform Commission and the Ministry of Construction, "it is hard either to predict the future price level in the preliminary study phase or to ensure the reliability of the predicted result due to the long-term operation period. So usually, the price level of the project input and project output in the first year of operation period should be fixed in the investment analysis during the operation period." Thus, during the period of investment decision, the project owner applied fixed electricity tariff 0.424 RMB/kwh derived from approved FSR is available at investment decision. Moreover, this value could also be proved as conservative during the investment decision from another side by comparing the value of 0.40 RMB/kwh applied in another registered project: Henan Zhengzhou Grid Connected Natural Gas Combined Cycle Power Plant (1304), with same region of the proposed project and similar starting date. Therefore, adopting the value of tariff price from FSR is applicable and credible when the investment decision was made.

In conclusion, the suitability of the input values to the investment analysis, including the assumption of fuel price used in the FSR versus the value used in the PDD, are justified in line with both the guidance on FSR of EB 38 paragraph 54 and the guidance on the assessment of investment analysis (Version 2) of EB 41, Annex 45.

Response by DOE

1 http://www.stats.gov.cn/tjsj/ndsj/

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As per the guidance of EB 38 paragraph 54, the suitability of the input values used in the investment analysis, including the assumption of fuel price used in the FSR versus the value used in the PDD have been validated as follows:

(a) The FSR was finalized in May 2004 and the in Board meeting on 10th May 2004 the PP decided to seek the support of the CDM to improve the internal return rate. Further the conditional purchase order for the key equipments was placed on 12th October 2004 which came into force on 6th June 2005 (start date). Thus it can be considered that the period of time between the finalization of the FSR and the investment decision is sufficiently short and it is unlikely in the context of the underlying project activity that the input values would have materially changed. This is further confirmed by the letter from the design institute;

(b) The values used in the PDD for the investment analysis are fully consistent with the FSR except for the NG price. The price of NG stated in the FSR is 1.1 Yuan/ Nm^3 (0.48 as benchmark and 0.62 as transportation) which was increased by 0.15Yuan/ Nm^3 in transportation price based on Henan DRC notice issued on 8th Sep 2004 and again by 0.04Yuan/Nm^3 in NG benchmark price based on NDRC notice on 19th March 2005. Since these increases were made before the placement of the conditional purchase order and the start date of the project activity respectively therefore were accepted as appropriate.

Further, it has been checked that even with keeping the NG price as 1.1 Yuan/ Nm^3 as indicated in the FSR, the benchmark is still not crossed (5.77%);

(c) On the basis of local and sectoral expertise and the cross-checks performed through the information available on other NG based power projects in China and the actual invoices of the natural gas during the projects operation, we can confirm that the input values from the FSR were valid and applicable at the time of the investment decision.

The supporting documents for investment analysis are being submitted as Annexure-I, II and III.

Question 3

Further details regarding the common practice analysis should be provided in accordance with step 4 of the additionality tool, i.e. similar project activities should be described and the differences between each of these projects and the project activity should be clearly indicated.

Response by PP

As discussed in PDD, the region to be analyzed should be the province of Henan because the equipment cost, the price of coal, natural gas and electricity are different from province to province. References and examples showing the difference between the various provinces and “the price of coal, natural gas and electricity are different from province to province”:

1. http://cdb.serc.gov.cn/UploadImages/20081142072290.doc, showing the electricity sales price for power plants in different provinces in CCPG is different. For example, the electricity price for coal fired power plants selling electricity in central China region is: in Hubei Province o.351Yuan/kWh, Hunan Province 0.369Yuan/kWh, Jiangxi Province 0.357Yuan/kWh, Henan Province 0.321Yuan/kWh, Sichuan Province 0.318Yuan/kWh, Chongqing City 0.312Yuan/kWh.

2. http://www.coalprice.cn/news/coal_hq/coal_hq/2008-1-14/20081141627056730.htm, showing the coal price in different provinces is different. For example, in central China region, the coal price in Hunan Province is 338Yuan/ton, in Sichuan Province is 400Yuan/ton, in Xuchang City of Henan Province is 370Yuan/ton.
3. The natural gas price is composed of the gas field benchmark price and the natural gas transportation price (main pipeline and sub-pipeline). The different location of the projects results in different natural gas price. Thus the projects in different provinces have different natural gas price for power generation. For example, the NG price for power plants in Wuhan City of Hubei Province[2] is 1.40Yuan/m^3, while for the proposed project it is 1.29Yuan/m^3.

According the documentation provided by Central China Power Grid Control Centre on 22 April 2009 (See Annexure IV), there are only two grid-connected natural gas power plants existing in the Henan Province, for comparison in the sense that they are comparable under the similar operation circumstance.

- Henan Zhongyuan Gas Power Plant (2×377.2MW), which is the proposed project itself and is described in detail in the PDD (the proposed project).

- Zhengzhou natural gas power plant (2×390MW)[3], which is quite similar to the proposed project activity and there are no significant differences between the two projects. (Registered CDM project in UNFCCC: http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1187936755.18/view)

Moreover, it could be prove from another side that our discussion above is reality form the PDD and validation report[4] (compiled by Roy, Fan and Waikwok, Wong in Tuv Rheinland Japan Ltd) of another register project in Henan province: Henan Zhengzhou Grid Connected Natural Gas Combined Cycle Power Plant (1304):

Step 2: Common practice analysis

The PDD cited another NGCC project with Henan Province which is also in the process of CDM validation. This is confirmed during site interviews with relevant government representatives and the fact that in China only single cycle power generation is relatively more common. The project activity will be among the "first of its kind" in Henan, using natural gas as energy source to tackle growing power demand in peak consumption times.

Thus, According to the step 4 of additionality tool, there is no other similar project in project's region without the help of CDM and it is therefore not possible to discuss/compare the project to any other project not registered as CDM. In other words, the project can absolutely not be considered as common practice.

Response by DOE

For carrying out the common practice analysis, the relevant region has been validated as Henan Province. This has been done due to the fact that the electricity tariffs, coal prices and NG prices are different across the provinces. As these are very critical parameters therefore comparison of such project activities being carried out in other provinces would not be appropriate. The variations of the stated parameters in the provinces were checked from the various websites, namely:

[2] http://www.wuhan.gov.cn/publish/wuhan/zwpd/gwgg/bmwj/wjj/2006-06-0935974.html
[3] http://cdm.unfccc.int/UserManagement/FileStorage/9K6OR9FROC8WJE6IXZNKM5GOHY65HI
4 http://cdm.unfccc.int/UserManagement/FileStorage/N01B8NOE0NY0OHE6HNPNVABN0UY84Q

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- On the electricity price http://cdb.serc.gov.cn/UploadImages/20081142072290.doc;
- On the Coal price http://www.coalprice.cn/news/coal_hq/coal_hq/2008-1-14/20081141627056730.htm;
- On NG price http://www.wuhan.gov.cn/publish/wuhan/zwpd/gwgg/bmwj/wjj/2006-06-0935974.html;

Further, the assessment of common practice analysis in accordance with the additionality tool has been done as follows:

Sub-step 4a: Analysis of other activities similar to the proposed project activity – As the project activity is located in Henan Province it has been considered as the relevant region.

According to the letter provided by the Central China Power Grid, there is only one other similar project existing in the region - Zhengzhou natural gas power plant (2×390MW). This information has also been checked from other sources namely the research paper - China's Natural Gas Industry and Gas to Power Generation, IEEJ: July 2007, available at http://eneken.ieej.or.jp/en/data/pdf/397.pdf

Further, Zhengzhou natural gas power plant is a registered CDM project activity (Project no. 1304 - http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1187936755.18/view) thus is excluded from the analysis. Thus there are no similar options occurring in the region.

Sub-step 4b: Discussion of any similar Options that are occurring: – In light of the above, it can be concluded that similar activities are not widely observed and commonly carried out in the region. This is further reinforced based on the fact that large coal based power plant are planned for the grid.

The supporting documents for common practice analysis are being submitted as Annexure-IV.

Question 4

Further clarification is required how the DOE has validated the sufficient availability of the natural gas in the region to avoid any leakage by confirming the existing and projected supply and demand balance in the region.

Response by PP

First, it is indicated in the Section B.2. in the PDD, page 9, that the natural gas consumed in the proposed project comes from "West-to-East natural gas transmission Pipeline" (via Southern-Henan branch pipeline), and the gas supply is sufficiently available according to the approved FSR. The natural gas sales agreement between the PO and China Petroleum and Natural Gas Co. Ltd. was signed on 18 May 2008 and the contract can guarantee the natural gas supply to meet the gas demand of the project activity. Moreover, the China Petroleum and Natural Gas Co. Ltd. have agreed to include the amount of natural gas required by the Project in its gas supply and distribution plan for "the West to East natural gas transmission pipeline." (see "Answer letter on use of natural gas requested by the Henan Zhongyuan gas power plant", Document No. Shiyoujihan [2003]78.)

On the other hand, the total annual natural gas supply from "West-to-East natural gas transmission Pipeline" is 17.4 G m^3 in 2008[5]. Thus, the natural gas consumption of proposed project has only account 1.94% (0.338 G m3) of the total supply. Meanwhile the annual natural supply

5 (http://finance.sina.com.cn/roll/20090402/18452768459.shtml)

of "West-to- East" is increasing year by year[6], that means the ratio of proposed project is expected to go futher down during the operational period. Furthermore, the whole potential natural gas reserve of the "West-to-East natural gas transmission Pipeline" is more than 10,000 G m^3. It means that the project's total natural gas consumption of whole operation (20 years) would only account less than 0.1% of the potential supply capacity of the "West-to East natural gas transmission pipeline".

In addition, based on the "*Introduction to the Development Status of Gas Turbine Power Generation Project and Follow-Up Services and Spare Parts Procurement issued by China National Technical Ex-Im. Corp. in 2006",* it is shown that there are other natural gas fired power plants under development in Henan Province, which could further prove that the development of other natural gas power plants are not constrained by the supply of natural gas in the region.[7]

Therefore, it could be concluded that the capacity of natural supply in project's region is sufficiently available for meeting the local natural gas demand.

Response by DOE

As per the methodology, the applicability clause of sufficient availability of NG in the region is to ensure that there are no price-inelastic supply constraints. The validation of this applicability clause was done on the basis of following documents:

1. Feasibility study report - Indicating the sufficient availability of NG;
2. Letter from the gas supplier China Petroleum and Natural Gas Co. Ltd. - Indicating the inclusion of the gas requirement of the project activity in its gas supply and distribution plan for "the West to East natural gas transmission pipeline";
3. Gas supply agreement - between the project participant - Henan Zhongyuan Gas Power Company Limited and the gas supplier China Petroleum and Natural Gas Co. Ltd.;

The subsequent information provided by the PP further supports the statement on sufficient availability of NG in the region, as the project requirement of NG stated as 522,620,000 Nm^3 in the PDD is less than 0.2% of the capacity of the West-to-East pipeline indicated as 12 and 30 billion cubic meters for the first and second phase respectively - (http://www.rigzone.com/news/article.asp?a_id=74360, http://www.chinagate.cn/news/2007-08/28/content_8758407.htm).

The letter provided by the gas supplier is being submitted as Annexure-IV.

Question 5

Further clarification is required how the DOE has validated the levelized cost calculation of the alternatives as the alternatives should also provide the similar level of services. Further the spreadsheet for the calculations should also be submitted and the DOE should validate the input values used.

Response by PP

The spreadsheet for calculations has been submitted for DOE validating.

It is indicated in the Step 1: Identify plausible baseline scenarios of Section B.4 in the PDD, page 10, for alternative c) that Henan power grid is dominated by coal-fired power plants, and the newly installed capacities are mainly the coal-fired units. From 2001 to 2005, the share from

[6] http://www.huaxia.com/xj-tw/2007/00690665.html
[7] http://cdm.unfccc.int/UserManagement/FileStorage/N01B8NOE0NY0OHE6HNPNVABN0UY84Q

fossil fuel fired electricity generation in the total generation mix was 95.51% in 2001, 94.58% in 2002, 94.6% in 2003, 94.08% in 2004 and 95.2% in 2005, respectively. Therefore building a coal-fired power plant with de-SOx and peak load regulation function is one of the baseline alternatives. In terms of the law and regulation aspects, considering "The Notice on relevant requirements regarding the project planning and construction of coal fired power plants" issued by NDRC of China (file No. NDRC-Energy [2004]864) which stated that "the unit capacity to be selected for power construction should be in principle 600MW and above", thus 600MW coal fired sub-critical and super-critical power plants could be the alternatives in absence of this proposed project.

Also it is indicated in the Section B.4, in the PDD, page 12-15, that

Step 2: Identify the economically most attractive baseline scenario alternative.

According to the AM0029, Version 03, the economically most attractive baseline scenario alternative is identified using investment analysis. Given that all alternatives remaining after Step 1 are alternative (a) and (c), that are fossil-fuel-fired power plants operated within the same regional power grid (CCPG), and can deliver the same type of services (electricity supply) with comparable quality, properties under the same electricity tariff and taxation policy circumstances, and therefore that may present the costs of per unit electricity generation which are comparable with each other, thus the levelised cost in Yuan RMB/ kWh could be used as a suitable financial indicator for investment analysis. Include all relevant costs (including the investment cost, fuel costs and operation and maintenance costs, etc.) The basic levelised cost approach used in this PDD is based on Appendix 5: "Cost Estimation Methodology" in "Projected Costs of Generating Electricity" 2005 update, published by NEA, IEA and OECD[8]. The formula applied to calculate the levelised electricity generation cost (EGC) is the following:

$$EGC = \frac{\sum_t \frac{(I_t + M_t + F_t)}{(1+r)^t}}{\sum_t \frac{E_t}{(1+r)^t}} \quad (1)$$

Where:

EGC: Average lifetime levelised electricity generation cost per kWh.

I_t: Capital expenditure in the year t.

M_t: Operation and maintenance expenditures in the year t.

F_t: Fuel expenditure in the year t.

E_t: Electricity generation in the year t.

r: Discount rate.

Here, in line with the description in step 1, two newly built coal-fired power plants, i.e. Hunan Dadang Huayin Lenshuijiang Jinzhushan 2×600MW sub-critical coal-fired power plant and Henan Huaneng Qinbei 2×600MW super-critical coal-fired power plant, their operations of which are dispatched under the CCPG, are selected as sample for further analysis below, considering the availability of data and information. These two alternatives provide similar levels of services i.e. they provide peak load electricity as is confirmed by Central China Power Grid. The relevant

[8] Appendix 5: "*Cost Estimation Methodology*" in "*Projected Costs of Generating Electricity*", Page 174, Expert Group co-chaired by Dr. Gert van Uitert from the Netherlands and Prof. Alfred Voss from Germany, published by NEA, IEA and OECD, 2005 update

assumptions and parameters used for calculation of EGC of those alternative power technologies are listed in Table 1 both in Yuan RMB and in US$ as following, assuming 7.88 Yuan RMB/US$ of the exchange rate:

Table 1 Parameters and assumptions for the alternative coal-fired power plants (in Yuan RMB)

Item	Unit	Hunan Jinzhushan sub-critical (2×600MW) 1)	Henan Qinbei super-critical (2×600MW) 2)	Henan Zhongyuan Gas Power Plant (2×377.2MW) 3)
Operation lifetime	Year	19	22	20
Generation per year	GWh	5400	6250.2	2640.4
Fixed asset Investment per MW	Yuan/MW	3777	5571.1	3116.6
Materials fee	Yuan/MWh	5.17	10	5.999
O&M expenditure	Yuan/MWh	26.3	31.71	272.29
Water fee	Yuan/MWh	1	0.68	0.682
Employee	Person	457		106
Fuel consumption	gce/kWh	307	281.26	0.19793 (Nm^3/kWh)
Fuel Price	Yuan/tce	317.07	442	1.1798 (Yuan/Nm^3, w/t VAT)
Annual operating hours	Hour	4500	5500	3500[*4]
Commissioning date	Year	Mar.2006, #1 unit Unkonw. 2007, #2 unit	Nov.,2006	June 2007, #1 unit Dec 2007, #2 unit

Source:

1) Feasibility study report on Hunan Dadang Huayin Lenshuijiang Jinzhushan 2×600MW sub-critical power project (0100-8001-006-1), May, 2004. As per guidance given by EB 38 paragraph 54, these value could be regard as credible. Meanwhile, the main factor such as investment per kwh has been cross-checked as conservative by comparing with the value in “Reference Cost of Thermal Power Engineering Design” (complied by Center Design and planning Institute of Fire Power Engineering, please check Annex VI) .

2) Case study and PDD study report for Huaneng Qinbei 2×600 MW super-critical coal-fired power plant, See the second progress report on "The Study on the Methodologies and its Application of Clean Development Mechanism in China", Task II: Case Study, Case I, provided by GCCI, Tsinghua University. Feb. 29, 2004. As per guidance given by EB 38 paragraph 54, these value could be regard as credible. Meanwhile, the main factor such as investment per kwh has been cross-checked as conservative by comparing with the value in “Reference Cost of Thermal Power Engineering Design” (complied by Center Design and planning Institute of

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Fire Power Engineering .

3) Feasibility study report on Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China, F2801K-A-01. March, 2004.

4) Henan Zhongyuan Gas Power Plant is designed to be a peak loading power plant, for which the main power units are imported, for which the annual operation hour is designed to be 3500h. So the power plant will operate mainly in the peak load period under the CCPG. In summer, the plant will operate in all peak load periods as shown in the typical daily power balance sheet. In winter, the plant will operate partly in the peak load period, partly in the off-peak load period. Also in the electricity balance Table for Henan power grid (2003~ 2010) (Table 2.3.5), the electricity generation by natural gas power plant is based on 3500h/y of its annual utilization hour. Please refer to FSR No. F2801K-A-01, Section 2.3.4 and 2.3.5 (P25) in detail.

Based on the above parameters and assumption and levelised cost calculation formula, the levelised cost for the relevant generation technologies are calculated and listed in the Table 2 (both in Yuan RMB and in US$) with sensitivity analysis and comparison with 2×377.2MW NGCC units of the proposed project.

Table 2 Result and sensitive analysis of levelised cost (Unit: Yuan/KWh)

Technology	Levelised Cost	Changing in Load Factor		Changing in Fuel Price	
	RMB/kWh	10%	-10%	10%	-10%
Hunan Jinzhushan 2×600MW Sub-critical coal fired power	0.2349	0.2254	0.2466	0.2447	0.2252
Huaneng Qinbei 2×600 MW Super-critical coal fired power	0.2481	0.2379	0.2607	0.2606	0.2357
Henan Zhongyuan 2×377.2 MW Gas Power Plant	0.3687	0.3353	0.4096	0.3905	0.3470

Table 2 Result and sensitive analysis of levelised cost (Unit: US$/KWh)

Technology	Levelised Cost	Changing in Load Factor		Changing in Fuel Price	
	US$/kWh	10%	-10%	10%	-10%
Hunan Jinzhushan 2×600 MW Sub-critical coal fired power	0.02981	0.02860	0.03129	0.03105	0.02858
Huaneng Qinbei 2×600 MW Super-critical coal fired power	0.03148	0.03019	0.03308	0.03307	0.02991
Henan Zhongyuan 2×377.2 MW Gas Power Plant	0.04679	0.04255	0.05198	0.04956	0.04403

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According to the AM0029, Version 03, the baseline alternatives with the best financial indicator, i.e. the lowest levelised cost, can be pre-selected as the most plausible baseline scenario. It is clear that the project activity is not even close to be the baseline scenario, the fuel price as part of the operating and maintenance costs as well as the low operating hours being the main factor. Therefore the alternative (c), representing by Hunan Jinzhushan 2×600 MW sub-critical coal-fired power plant with the lowest levelised cost as shown above, has been pre-selected as the most plausible baseline scenario. The sensitive analysis in the previous Table 2 also sufficiently confirms and supports the conclusion that the Hunan Jinzhushan 2×600 MW sub-critical coal-fired power plant always has the lowest levelised cost among those alternatives within the reasonable variations range of the key assumptions (such as load factor and fuel price), then the Hunan Jinzhushan 2×600 MW sub-critical coal-fired power plant, i.e. the most economically attractive alternative, is selected as the most plausible baseline scenario, whose coal intensity per unit electricity generation is 307gce/KWh, with electricity generation efficiency 40.02%, (327.29gce/kWh per unit electricity delivered with electricity supply efficiency 37.54% at 6.2% of the self service rate). (Source: Feasibility study report on Hunan Datang Huayin Lenshuijiang Jinzhushan 2×600MW sub-critical power project (0100-8001-006-1), May, 2004).

It should be further clarified that in the levelized cost calculation of the alternatives, those alternatives of 2×600MW coal fired sub-critical and sub-critical power projects could also provide the similar level of peak load services as the proposed 2×377MW NGCC project. It is the common practice in the coal dominated power grid in China that during the high peak load period, coal fired power plants may also participate in the peak load dispatching, due to oil and gas fired peak load power capacity are not enough. Therefore these two coal fired power alternatives listed in the Table 1 and Table 2 as above, are designed to operate either in base load or in peak load. This is the very reason why they are the baseline alternative i.e. they provide a lot of flexibility to the grid operator as they can provide both base and peak load. The spreadsheet for the calculations under such assumption of the annual operation hours has already been submitted to the DOE for validation.

As a further sensibility analysis/ stress test, considering that in case these two coal fired power alternatives provide the similar peak load service level only as the proposed project, their annual operation hours might be reduced to the similar 3500 hours, which will increase their generation cost per kWh. Under such assumption, the resulted Table 2 is changed as below:

Under assumption that the annual operation hours for all three alternatives are 3500 hours/year

Table 2-1 Result and sensitive analysis of levelised cost (Unit: Yuan/KWh)

Technology	Levelised Cost	Changing in Load Factor		Changing in Fuel Price	
	0%	10%	-10%	10%	-10%
Hunan Jinzhushan 2×600MW Sub-critical coal fired power	0.2650	0.2527	0.2800	0.2747	0.2552
Huaneng Qinbei 2×600 MW Super-critical coal fired power	0.3126	0.2965	0.3323	0.3250	0.3001

Henan Zhongyuan 2×377.2 MW Gas Power Plant	0.3687	0.3353	0.4096	0.3905	0.3470

Table 2-2 Result and sensitive analysis of levelised cost (Unit: US$/KWh)

Technology	Levelised Cost	Changing in Load Factor		Changing in Fuel Price	
	0%	10%	-10%	10%	-10%
Hunan Jinzhushan 2×600 MW Sub-critical coal fired power	0.03362	0.03206	0.03553	0.03486	0.03239
Huaneng Qinbei 2×600 MW Super-critical coal fired power	0.03967	0.03762	0.04217	0.04124	0.03809
Henan Zhongyuan 2×377.2 MW Gas Power Plant	0.04679	0.04255	0.05198	0.04956	0.04403

It can be concluded conservatively that even under the similar peak load service level by taking annual 3500 hours for all three alternatives, the levelised generation cost for Hunan Jinzhushan 2×600 MW sub-critical coal-fired power plant still remain the lowest one.

Response by DOE

In accordance with the methodology, the relevant power plant technologies (Hunan Jinzhushan sub-critical and Henan Qinbei super-critical) that have been recently constructed (2006-2007) by other parties within the Central China power grid (CCPG) are validated as plausible alternatives despite the fact that they are of different capacity (2x600 MW), load factor (51.4% and 62.8%) and operational characteristics; as they are capable of delivering similar service i.e., peak load as provided by the project activity. The letter from the grid company (CCPG) further confirms that the indicated alternatives provide similar levels of services.

The input values used for levelized cost calculation of the baseline alternatives has been validated as follows:

Capital expenditure (Capex) – The Capex for the sub-critical coal fired power plant and the project activity has been checked from their respective feasibility study reports and for the super-critical coal fired power plant from the indicated case study report.

Operating expenditure (Opex) – The Opex values were also checked from their respective feasibility study reports (sub-critical coal fired power plant and the project activity) and the indicated case study report (super-critical coal fired power plant).

Efficiency – The efficiency of the sub-critical coal based power plant is given as 37.54%. This value can be considered to be appropriate for the scale of the power plant and further is conservative in the given context when compared to the default efficiency factor for new sub-critical coal based power plant stated as 39% in annex-1 of the 'Tool to calculate the emission factor for an electricity system'. Same applies for the super-critical coal based power plant whose

efficiency is around 41%, whereas the default value indicated in the tool is 45%, thus conservative.

Operational hours (Load factor) – The operational hours taken as 4500 hours and 5500 hours for the sub-critical and super-critical power plants respectively although different from 3500 hours for the project activity were accepted because the values for the alternatives were taken from the respective feasibility study reports. Further, to show conservativeness, the PP has provided a levelized cost calculation sheet with only 3500 hours of operation for all the alternatives, this too demonstrates that still the levelized cost for the sub-critical coal based power plant is the lowest. and is deemed to be appropriate in the given context.

Fuel price – The fuel price values were also checked from the feasibility study report of the sub-critical coal fired power plant the indicated case study report of the super-critical coal fired power plant. The price of NG stated in the FSR is 1.1 Yuan/ Nm3 (0.48 as benchmark and 0.62 as transportation) which was increased by 0.15Yuan/ Nm3 in transportation price based on Henan DRC notice issued on 8th Sep 2004 and again by 0.04Yuan/Nm3 in NG benchmark price based on NDRC notice on 19th March 2005. Since these increases were made before the placement of the conditional purchase order and the start date of the project activity respectively therefore were accepted as appropriate. However, as mentioned above, even leaving the price unchanged from the FSR, the sub-critical coal based power plant is still the lowest cost alternative.

Discount rate – The discount rate has been taken as 8% for all the alternatives and is deemed to be appropriate in the given context.

The spreadsheets calculations and sensitivity analysis used for baseline determination are being submitted as Annex VI and VII**.**

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Annex 1 - Information reference list

Ref. No.	Issuance and/or submission date (dd/mm/yyyy)	Title/Type of Document	Author/Editor/Issuer	Additional Information (Relevance in CDM Context)
1	05/2004	FSR	Henan Electric Power Survey & Design Institute	Page 3, 130, 165, 166 are the data resource for investment analysis. Page 36 is the explanation of natural gas supply
2	08/03/2005	FSR Approval	NDRC	
3	28/10/2004	Application of gas price in west east gas pipeline for generation in Henan province [2004-1964]	NDRC	Approved process of natural gas price
4	08/09/2004	Application of transfer price in Henan branch of west east gas pipeline price in Henan province	NDRC	Approved process of natural gas price
5	19/03/2005	Notice on adjustment of the gas field benchmark price for natural gas pipelined from the West to the East", Document No. Fagaijiage [2005] 439	NDRC	Approved process of natural gas price
6	18/05/2008	Natural Gas sales agreement	Henan Zhongyuan Gas Power Company Ltd. and PetroChina Company Ltd.	Fuel purchasing agreement
7	22/04/2009	Confirming letter of data in FSR validated except the price of natural gas	Henan Electric Power Survey & Design Institute	
8	15/10/2003	Letter from gas supplier for proving the sufficient of fuel to Henan Zhongyuan Gas Power Company Ltd.	PetroChina Company Ltd.	Sufficient supply of fuel
9	22/04/2009	Proof letter from Central China Control Center	CCPG	Electricity power exported to CCPG in 2008
10	2008	Reference Cost of Thermal Power Engineering Design	Center Design and planning Institute of Fire Power Engineering	Design reference of thermal power plant

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11	22/04/2009	Closing accounts report letter of total investment	Beijing Hengxin Chengda construction cost consulting limited liability company	Letter of total investment
12	27/04/2009	Confirmation letter of natural gas supply before natural gas sales agreement	Henan Zhongyuan Gas Power Company Ltd.	Sufficient supply of fuel in 20 years
13	14/08/2006	The 1st CDM developing workshop meeting minutes	Henan Zhongyuan Gas Power Company Ltd.	CDM workshop
14	17/11/2006	The 2nd CDM developing workshop meeting minutes	Henan Zhongyuan Gas Power Company Ltd.	CDM workshop
15	23/03/2007	Approval of get into grid of Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China (ZYDLTSHT002)	CCPG	
16	03/2007	The price contract with Henan electric power Co. No. ZYDLQTHT030 indicating the electricity price for CCPP power, 0.48yuan/kWh (include VAT)	CCPG	