JQA

12 May 2009

CDM Executive Board
UNFCCC Secretariat
Martine Luther King Strasse 8
P.O. Box 260124, D-53153 Bonn Germany
Attention: Mr. Daniele Violetti

Initial Comments on Request for Review
"Ningxia Yinchuan No. 1 Natural Gas Cogeneration Project" (Ref. 2373)

Dear Mr. Daniele Violetti,

To result in the faster registration of the proposed project activity by the decision of the next EB meeting, we wish our comments on "Ningxia Yinchuan No. 1 Natural Gas Cogeneration Project" could be supportive for the discussion.

Yours sincerely,

Tsutomu MATSUNO
Senior Executive
Japan Quality Assurance Organization

Initial comments by JQA for the request for review of
"*Ningxia Yinchuan No.1 Natural Gas Cogeneration Project*"
(Ref. No. 2373)

1. *Further clarification is required if the starting date of the project activity is as per the CDM glossary of terms as the fuel price and supply agreement is dated 16 May 2006.*

Response by PP:

According to the definition of starting date in *Glossary of CDM terms (Version 04)*，which is defined as "*The starting date of a CDM project activity is the earliest date at which either the implementation or construction or real action of a project activity begins. In light of the above definition, the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity*", the starting date of the project activity is the date of entry into force of (the 15th of May, 2007) purchase contract of the main equipment .This date adequately represents the earliest of the dates at which the implementation or construction or real action of the project activity began.

Detailed information regarding the timeline of the proposed project is shown in the PDD, which is as follows:

Date	Project Implementation	CDM Consideration
Apr. 2004		Under the help of Ministry of Science and Technology and Department of Science and Technology of Ningxia, the implementation of China-Canada Pilot Project-Local (Ningxia) CDM Capacity Building was conducted.
09/09/2004		Project owner participated the interim meeting of China-Canada Pilot Project-Local (Ningxia) CDM Capacity Building
17/11/2005		Ningxia HANAS Natural Gas Thermal Power Co., Ltd submitted a letter to the Department of Science & Technology of Ningxia to ask for support on improving the financial feasibility of the proposed project by using CDM.
29/11/2005		Reply of the Department of Science & Technology of Ningxia
Jan. 2006		Ningxia CDM Service Center conducted a research on potential CDM projects development, including the proposed project.
Apr. 2007	FSR was finished	
09/05/2007	Board meeting of Ningxia HANAS Natural Gas Thermal Power Co., Ltd, acknowledging that CDM is a decisive factor for smooth	

	implementation of the proposed project.	
15/05/2007	Purchase contract of main equipment was signed and became effective	
14/08/2007	Construction contract of the project was signed	
10/09/2007		ERPA was signed
10/09/2007	The project construction was started formally	
04/05/2008	The proposed project was approved by the local government	
13/05/2008		Making public available for validation
25/06/2008		Gain LoA of China DNA
10/12/2008	Natural Gas Purchase Agreement was signed	

As to "the fuel price and supply agreement dated on 16 May 2006", the further clarification is made as follows.

1) The natural gas purchase agreement was signed on 10th of Dec.2008 (Annex 1), which is later than the date of signing purchase contract of the main equipment.
2) On 16th of May 2006, the project owner held a meeting with gas supplier related to issues on gas supply and price (Annex 2), the document listed in the validation report is the minute of that meeting which shows the preliminary intent of gas supply and price between them rather than the fuel price and supply agreement.
3) Further, the minute dated on the 16th of May, 2006, does not commit to expenditures. It should be excluded as a starting date in light of the definition of starting date.

Based on the above analysis, the date of entry into force of purchase contract of the main equipment (the 15th of May, 2007) is considered as the starting date of the proposed project.

Response by DOE:

In the context of the project development process, the Minute of the fuel price and supply for the project activity was prepared on 16 May 2006.
Ningxia HANAS Natural Gas Thermal Power Co., Ltd finally decided to proceed with the proposed natural gas cogeneration project as CDM at the Board Meeting held on 09 May 2007, based on the final FSR (April/2007) and the Minute.

The natural gas purchase agreement was made on 10 December 2008. In preparing the Minute, the PP did not intend to conclude an agreement to commit fuel price. Therefore, JQA confirms that the date on which the purchase contract of main equipment was singed and became effective, i.e., on 15 May 2007, is identified as starting date of the proposed project.

2. Further clarification is required on how the DOE has validated the investment analysis, in particular, the benchmark used and the suitability of the input values as per the guidance of EB 38 paragraph 54(c).

Response by PP:

Besides the clarification from our DOE, we would like to clarify the issue raised as follows.

For the benchmark of 8% applied in the PDD, it is based on *Interim measures for economical assessment of electrical technological transformation project* released by State Power Corporation of China, which is deemed as an appropriate benchmark reference for economical assessment of power generation sector in China (Annex 3). In fact, all of the NG and LNG power generation projects in China, including those that have been registered as CDM projects, applied such benchmark. **Therefore, the benchmark of 8% is appropriate for the investment analysis of the proposed project.**

For input values, it is further clarified as follows:

1) The input values of investment analysis are fully consistent with the values used in the FSR compiled in April 2007 by Hubei Electric Power Design Institute which is an independent third party accredited by government.

2) The FSR was finalized in April 2007, while the investment decision took place on 9th of May 2007. It can be confirmed that the period of time between the finalization of the FSR and the investment decision is sufficiently short. Thus it is unlikely that the input values would have materially changed, and it is reasonable to assume that the FSR has been the basis of making decision to proceed with the investment in the proposed project.

3) It is confirmed that the input parameters used in the investment analysis are reasonable and adequately represent the economic situation of the proposed project.
The detailed information is shown in the following table.

Parameters	Value in the investment analysis based on FSR	Comments
Static total investment	298.01Million RMB	The proposed project is the "first of its kind" in Ningxia Autonomous Region. The static total investment includes the cost of equipment, installation, construction etc with increasing trend. Thus the static total investment of the proposed project is reasonable.
Gas price	1.18 RMB/m^3	The value of 1.18 RMB/m^3 used in investment analysis is sourced from the FSR, which is lower than the average gas price (1.27RMB/m^3) of west-to-east natural gas transmission[1]. From the Link 1, it can be confirmed that the gas price used for power generation ranged from 1.1 RMB/m^3 to 1.2 RMB/m^3 in 2003[2]. Moreover, the natural gas price keeps increasing rather than decreasing[3]. Therefore, 1.18 RMB/m^3 of gas price used in the investment analysis is

[1] http://news.xinhuanet.com/newscenter/2003-09/17/content_1086531.htm

[2] ibid

[3] http://www.unsbiz.com/information.do?method=detail&id=159044

		reasonable and conservative.
Average O&M cost	91.23 million RMB	The 83.8% of O&M cost, natural gas cost, is continuously rising [4]. The cost of other material is also rising in recent years[5]. The wages for the workers have been keeping increasing as well[6]. All of these factors will make O&M cost increase. So the value of O&M cost applied in the investment analysis is reasonable and conservative.
Tariff (excluding VAT)	0.402 RMB/kWh	The tariff of the proposed project has been approved by Ningxia Provincial Price Bureau (Annex 4), which is consistent with the tariff in FSR. In China, the tariff is strictly regulated by the government. Once the tariff is identified and approved, it cannot be changed without governmental adjustment. Thus, it is appropriate.
Project lifetime	20 years	Common use in China, it is appropriate for the proposed project.
VAT	17%	As decided by *Regulations of the People's Republic of China on Value Added Tax*[7]
Income tax	33%	As decided by *Regulations of the People's Republic of China On Enterprises Income Tax*[8]
City preservation and development Tax	7%	As decided by *Regulations of the People's Republic of China on City Maintenance and Construction Tax.*[9]
Education surcharges	3%	As decided by *Decision of the State Council on Amending the Interim Provisions on the Collection of Educational Surcharges*[10].

In conclusion, the input values from the FSR were valid and applicable at the time of the investment decision. The suitability of the input values to the investment analysis is in compliance with the guidance of EB 38 paragraph 54(c).

Response by DOE:

1. Benchmark
The benchmark is set as 8% based on “Interim measures for economical assessment of electrical technological transformation project” issued by State Power in China (Annex 3). The benchmark rate identified for power industry is appropriate, taking into account the timing of preparation of the final FSR in April 2007.

2. Input values

[4] ibid

[5] http://www.mofcom.gov.cn/aarticle/difang/ningxia/200507/20050700197684.html

[6] http://www.nxnet.net/olddate/main/2007-07/02/content_1765901.htm

[7] http://www.lawinfochina.com/law/display.asp?id=553

[8] http://www.lawinfochina.com/law/displayModeTwo.asp?id=625

[9] http://www.lawinfochina.com/law/display.asp?id=871

[10] http://www.lawinfochina.com/law/display.asp?db=1&id=4568

1) Validity and applicability of input values at the time of the investment decision:
The key parameters for IRR calculation such as static total investment, project lifetime, O & M cost including (mainly fuel cost), annual operation hours, annual electricity generation delivered to the grid and prospective power price are correctly introduced into the PDD from the Feasibility Study Report (April 2007, prepared by Hubei Electric Power Design Institute, Certification No. 170026-sj, 170026-kj, 2030822003).
The FSR for the proposed project activity was completed in April 2007 and the decision to proceed with CDM project activity was made by the Board on 09 May 2007. Accordingly, the input values in the FSR are applicable at the time of the investment decision.

2) Cross-checking:
The validation team conducted the cross-checking through the survey of publicly available documents and comparison of the registered CDM project activities in China similar to the proposed project activity.

a) Investment (RMB/kW)
The investment cost per unit capacity of the proposed project is 4,656 RMB/kW (64MW) and those of other registered CDM project activities are in the range between 3,134 and 4,202 RMB/kW (400 – 600MW). The cost per unit capacity of the proposed project activity is a little bit higher than those of the other larger projects. However, it is known that the investment cost per unit depends on the size of capacity. Meanwhile, the proposed project is the "first of its kind" in Ningxia, which is located in the northwest of China. Accordingly, the validation team considers that the higher investment cost per unit capacity of the proposed project is within a reasonable extent.

b) Lifetime (years)
The lifetime of the proposed project activity is 20 years in the FSR and it is at same level of other similar projects.

c) Annual operation (hours)
The annual operation hours of the proposed project activity is 5,500 hrs/year, while the hours of other project activities are between 3,500h and 5518.8h. It is appropriate that the proposed project has 5500 hrs/year considering this cogeneration project is located in the cold region of northwest of China. Accordingly, the validation team considered that the annual operation hours is within a reasonable extent.

d) Power tariff (RMB/kWh)
The power tariff of the proposed project activity is 0.402 RMB/kWh and was set by its local government. The validation team confirmed the document issued by Ningxia Provincial Price Bureau (Validation Report Ref. No. 9, Annex 4) and the same value used in the final FSR.

e) O&M cost (Mainly Fuel price (RMB/m^3))
The fuel price accounts for 83.8 % of O&M cost. The fuel price of the proposed project activity is 1.18 RMB/m^3. It is used in the final FSR based on the Minute of fuel price and supply (Validation Report Ref. No. 16, Annex 2). And the fuel price in the Minutes was confirmed by the contract dated on 10 December 2008. Natural gas price keeps increasing rather than decreasing in recent years[11]. Accordingly, the price set by the contract would not be lowered in the future.

As the result, the validation team confirmed that the input values of the proposed project activity are appropriate as a natural gas cogeneration CDM project activity in China.

[11] http://www.unsbiz.com/information.do?method=detail&id=159044

3. *Further clarification is required why the income, if any, from the supply of waste heat for residential heating has not been considered in the investment analysis for the project activity.*

Response by PP:

As for the income of heat supply, we'd like to give the following clarification:

In the FSR, which was formulated by an independent government-accredited third party, and has been approved by the government, the financial assessment for power generation and heat supply are independent of each other.

The income and cost of heat supply were originally included in the investment analysis of the PDD. However, in the 40th Meeting of Chinese DNA on which DNA's LoA was applied, it suggested not including the heat supply part in the investment analysis of the PDD as it is a separated portion in FSR. The suggestion was followed and the financial assessment for power generation directly deriving from the FSR was used e.g. both the income and cost of heat supply were not taken into consideration in the investment analysis.

Response by DOE:

In the FSR, the financial assessments were separated for components of power generation to the grid and heat supply to the residential area, taking into account respective costs and income.

JQA confirms that the investment analysis in the PDD is made, only based on the component for the power generation, which is in line with that of FSR.

4. *Further clarification is required on how the DOE has validated the sensitivity analysis in particular, the justification on why the projected variations in the parameters that would make the IRR cross the benchmark are unlikely to occur.*

Response by PP:
No comment.

Response by DOE:

The validation team has examined the sensitivity analysis of the PDD in accordance with Guidance of the Assessment of Investment Analysis (Version 02). And the team confirmed that key parameters identified for sensitivity analysis were appropriately assessed.

1. Static total investment:
   The static total investment is 298.01 million RMB and sourced from FSR. The appropriateness of the value was confirmed through the cross-checking and taking into account information provided in the other CDM project activities in China.
   The IRR value by the 10% reduction of the investment cost results in 7.99%, which is lower than the Benchmark.
2. Power delivered to the grid:
   The power delivered to the grid depends on the annual operation hour of the gas turbine generator. The hours are 5500 hrs/year. By the 10% increase of annual operation hours, the IRR is slightly lower than the Benchmark.
3. Annual O&M cost (Mainly Fuel price):
   The fuel price accounts for 83.8 % of the annual O&M cost. The price is set by the contract between the project participant and the supplier. With a 4.45% reduction in

the cost including fuel price, the IRR could be over the Benchmark. However, the price set in the PDD was confirmed by the contract dated on 10/12/2008. And Natural gas price keeps increasing rather than decreasing in recent years[12]. Accordingly, a 4.45% reduction in the fuel price is quite unlikely to occur.

4. Power price:
   The power price (0.402 RMB/kWh) is based on the notice of Ningxia Price bureau (Annex4).
   With a 3.3% tariff increase, the IRR could be over the Benchmark. However, the power price is under the strict control of the government in China and the central government stated a policy in order to keep the commodity price stable, including power price. Accordingly, a 3.3% increase of Power price is quite unlikely to occur.

In conclusion, JQA confirms that the variations in the parameters that would make the IRR cross the benchmark are unlikely to occur.

5.	**Further clarification is required how the DOE has validated the selection of baseline alternatives, in particular how a 600 MW coal fired plant was considered an alternative to a 64 MW natural gas plant. The spreadsheet for the levelized cost calculation should also be submitted and the DOE should validated the input values used, in particular, whether the same values of parameters were used for all alternatives, e.g., PLF/operating hours, operating lifetime, etc.**

Response by PP:

Besides the clarification from our DOE, we would like to clarify the issue in the following two parts.

The first part:
As per AM0029, the identification of alternative baseline scenarios should include all possible realistic and credible alternatives that provide **outputs or services** comparable with the proposed CDM project activity. **These alternatives need not consist solely of power plants of the same capacity, load factor and operational characteristics, however they should deliver similar services (e.g. peak vs. base load power).**

Alternatives to be analyzed should include, inter alia:
a) The project activity not implemented as a CDM project;
b) Power generation using natural gas, but technologies other than the project activity;
c) Power generation technologies using energy sources other than natural gas;
d) Import of electricity from connected grids, including the possibility of new interconnections.

Alternatives should meet the following conditions:
a) Service provided should be comparable with the proposed CDM project activity (e.g. peak-load vs. base-load power);
b) They should include technologies adopted by existing, under-construction and to-be-constructed power plants;
c) They should be in compliance with all applicable legal and regulatory requirements.

As the proposed project is designed to provide peak load regulation service, the

[12] http://www.unsbiz.com/information.do?method=detail&id=159044

alternatives which cannot provide such similar service as the proposed project, will be excluded. Based on the conditions above and the characteristic of the proposed project, the plausible baseline scenarios are identified as follows:

The project activity not implemented as a CDM project:
The proposed project activity not implemented as a CDM project, is a plausible baseline scenario and in line with current laws and regulations.

Power generation using natural gas, but technologies other than the project activity:
Technologies for power generation using natural gas include single cycle power generation technology and gas-steam combined cycle power generation technology. However, the thermal efficiency of single-cycle gas turbine is only 38%~39.5%[13] which is much lower than that of the combined cycle, i.e. about 55%. Now the single-cycle power generation technology is rarely used in China[14]. Therefore, single cycle power generation is not a realistic and credible alternative and thus this alternative is not feasible.

Power generation technologies using energy sources other than natural gas:
Power generation technologies using energy sources other than natural gas are analyzed as follows:

a) For hydropower or wind power
There are no hydropower or wind power projects that can undertake the task of peak-load regulation in Ningxia as the proposed project does. Therefore, power generation using water source and wind source are not feasible as baseline scenario.

b) For nuclear power
Nuclear power station can not be operated as peak load regulation[15], so it does not provide similar services compared with the proposed project. Thus it is not a feasible baseline scenario.

c) For oil-fired power
"*The Notice on Printing Mid Long Term Specific Plan of Energy-saving*" issued by NDRC (file No. NDRC-Environment and Resource [2004]2505)[16] states that "the new built or extension of oil-fired power unit is prohibited" (Annex 5). Therefore, oil-fired power plant is not a feasible baseline scenario.

d) For coal-fired power
Coal fired plants are considered capable of delivering similar services as the project activity as they are currently used across China to provide the peak load regulation as well as base load generation[17]. The technology of providing the peak load regulation using coal fired plants is mature and available in China. The notice issued by the State Council Office (decree No.[2002]6) on April 14, 2002[18], strictly prohibits the installation of coal-fired generators with capacity of 135 MW or below (Annex 6). Moreover, according to *the Notice on relevant requirements regarding the project planning and construction of coal fired power plants* issued by National Development

[13] http://www.chinapower.com.cn/articleattachment/1000/art1000310.doc

[14] http://www.hdrqw.com/news/20060505-31.htm

[15] Safety Management Rules on Nuclear Power Generation, Ministry of Power Industry

[16] http://www.ndrc.gov.cn/hjbh/jnjs/t20050711_45823.htm

[17] http://www.cnaec.com.cn/Info/Show.asp?ID=226054&SortID=

[18] http://www.gov.cn/gongbao/content/2002/content_61480.htm

and Reform Commission (File No. NDRC-Energy [2004]864)[19], the unit capacity to be selected for coal-fired power construction should be in principle 600 MW and above (Annex 7).

Since the coal-fired power with a unit capacity of 600 MW can be considered capable of delivering similar services as the project activity, it is in line with the Methodology.

Considering that the coal fired generation technology is commonly used in China now sub-critical or super-critical coal-fired power plant with a unit capacity of 600 MW could be the considered as realistic and credible alternatives of the proposed project.

Import of electricity from connected grids, including the possibility of new interconnections:
According to the published *Bulletin of Determination of Baseline Emission Factor of Chinese Power Grid* by Chinese DNA[20], in the past years, the NWPG has no electricity imported from connected grids. Therefore, importing electricity from connected grids is unrealistic and this alternative is not feasible.

To sum up, the possible baseline scenarios include:
Alternative scenario 1: The proposed project activity not implemented as a CDM project;
Alternative scenario 3-1: Subcritical coal-fired power plant with a unit capacity of 600 MW;
Alternative scenario 3-2: Supercritical coal-fired power plant with a unit capacity of 600MW.

The second part:
The spreadsheet for levelized cost calculations has been submitted to DOE during the validation process.

1. as per AM0029, the levelized cost of electricity production should be used as financial indicator when identifying the economically most attractive baseline scenario alternative. the levelized cost formula used is as follows[21], which is sourced from the publication of IEA.

$$EGC = \frac{\sum_t [(I_t + M_t + F_t)(1+r)^{-t}]}{\sum_t [E_t (1+r)^{-t}]} \qquad \text{(B.1)}$$

Where:
EGC: Levelized electricity generation cost per kWh
I_t: Investment expenditures in the year t
M_t: Operation and maintenance expenditures in the year t
F_t: Fuel expenditures in the year t
E_t: Electricity generation in the year t
r: Discount rate

2**.** the input value for levelized cost of these three alternatives can be substantiated as follows:

[19] http://www.chinavalue.net/wiki/showcontent.aspx?titleid=61239

[20] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1888.pdf

[21] Appendix 5:"cost estimation methodology" in "Project costs of Generating Electricity", Page 174, IEA, 2005 update. http://www.iea.org/textbase/nppdf/free/2005/ElecCost.pdf

All parameters used to calculate the levelized cost of the proposed project are sourced from the FSR, which was completed by an independent third-party and approved by Ningxia DRC.

The main parameters for super critical coal-fired power plant with a unit capacity of 600 MW and sub critical coal-fired power plant with a unit capacity of 600 MW are sourced from *Thermal Power Engineering Design Reference Cost Index*(TPEDRCI) released by China Institute of Power Planning and Design (Annex 8), which is the standard reference used by power plant operators and investors for assessing the financial feasibility of construction of new fossil fuel fired power plants. Coal consumption of sub critical coal-fired power plant (305g/kWh)) is sourced from *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) (Annex 7).

The input parameters for levelized cost of these three alternatives are further described as follows:

Input parameters	alternatives	value	Data source
Investment Expenditure (It)	Alternative 1	4,656 RMB/kW	FSR
	Alternative 3-1	3748 RMB/kW	TPEDRCI
	Alternative 3-2	3919 RMB/kW	TPEDRCI [22]
Operation and Maintenance Expenditures (Mt)	Alternative 1	**Material fee**: 12.06 RMB/MWh	FSR
		Water fee: 2.17 RMB/MWh	
		Employee payment: 1.22million RMB	
		Maintenance expenditure: 4.42million RMB	
		Insurance expenditure(average): 0.28 million RMB	
		Other cost: 13.7 RMB/MWh	
	Alternative 3-1	**Material fee**: 5RMB/MWh	TPEDRCI
		Water fee:1RMB/MWh	
		Desulfuration fee:3.64RMB/t-coal	
		Discharger fee: SO_2: 2.6million RMB/unit generator, NO_x: 2.93million RMB/unit generator, soot: 0.15million RMB/unit generator	
		Annual average wage:50thousand RMB/capita/year	
		Welfare and social insurance: 60%	
		Repair fee rate:2.5%	
		Fixed assets insurance rate:0.25%,	

[22] Based on adjustment module table of TPEDRCI, the unit investment expenditure of supercritical coal-fired power plant is calculated as follows: unit Investment Expenditure of 2×600MW new built sub critical =【unit investment Expenditure of 2×600MW new built super critical×2×600×1000 – Cost of Super critical bituminous coal + Cost of Sub critical bituminous coal – Cost of Super critical condensing turbine + Cost of Sub critical condensing turbine 】/2/600/1000 = 3748 RMB/kW.

		Other cost:10RMB/MWh	
	Alternative 3-2	**Material fee**: 5RMB/MWh	TPEDRCI
		Water fee:1RMB/MWh	
		Desulfuration fee:3.64RMB/t-coal	
		Discharger fee: SO_2: 2.6million RMB/unit generator, NO_X: 2.93million RMB/unit generator, soot: 0.15million RMB/unit generator	
		Annual average wage:50thousand RMB/capita/year	
		Welfare and social insurance: 60%	
		Repair fee rate:2.5%	
		Fixed assets insurance rate:0.25%,	
		Other cost:10RMB/MWh	
Fuel expenditure (Ft)	Alternative 1	**Gas consumption:** 0.203 m^3/kWh	FSR
		Gas price:1.18 RMB/m^3	
	Alternative 3-1	**Coal consumption:**305 gce/kWh	File No. NDRC-Energy [2004]864 [23]
		Coal price: 430 RMB/tce	TPEDRCI
	Alternative 3-2	**Coal consumption:** 299 gce/kWh	TPEDRCI
		Coal price: 430RMB/tce	
Electricity generation (Et)	Alternative 1	**Capacity**:64 MW **Operation hours:** 5500h	FSR
	Alternative 3-1	**Capacity:** 2*600MW **Operation hours:**5000h	TPEDRCI
	Alternative 3-2	**Capacity:**2*600MW **Operation hours:** 5000h	TPEDRCI
Years (t)	Alternative 1	**Operation lifetime:**20 year Construction period: 2 year	FSR
	Alternative 3-1	**Operation lifetime:**20 year Construction period: 44 months	TPEDRCI
	Alternative 3-2	**Operation lifetime:**20year Construction period: 44 months	TPEDRCI

Therefore, the input parameters for calculating levelized cost of each alternative are reliable.

Based on the above-mentioned input parameters, the levelized cost of Alternative 1, Alternative 3-1 and Alternative 3-2 are respectively 0.3846RMB/kWh, 0.2586 RMB/kWh and 0.2607 RMB/kWh.(For the detailed calculation, please refers to Annex 9). According with the methodology, the baseline alternative with the best financial indicator, i.e. the lowest levelized cost, can be selected as the most plausible scenario. After the sensitive analysis, alternative 3-1 still remains the lowest indicator. Therefore, alternative scenario 3-1, subcritical coal-fired power plant with a unit capacity of 600

[23] The coal consumption for sub-critical power plant is not available on TPEDRCI. Then refer to: The Notice on relevant requirements regarding the project planning and construction of coal fired power plants" issued by NDRC of China, NDRC, http://www.chinavalue.net/wiki/showcontent.aspx?titleid=61239

MW, is selected as the baseline alternative of the proposed project.

The FSR and TPEDRCI (*Thermal Power Engineering Design Reference Cost Index (2005 Edition)*), the data source for levelized cost of electricity production, have already been submitted to DOE during the validation process.

According to the methodology, "*these alternatives need not consist solely of power plants of the same capacity, load factor and operational characteristics, however they should deliver similar services (e.g. peak vs. base load power)*." So it is understandable that in order to deliver similar services (e.g. peak vs. base load power), there is some difference between some values used for alternatives.

Response by DOE:

The PP listed several alternative scenarios in this paper such as:

1. The project activity not implemented as a CDM project
2. Power generation using natural gas, but technologies other than the project activity
3. Power generation technologies using energy sources other than natural gas
   a) Hydropower or wind power
   b) Nuclear power
   c) Oil-fired power
   d) Coal-fired power
4. Import of electricity from connected grids, including the possibility of new interconnections

The validation team checked key documents provided by the PP and confirmed that the explanation/justification is correct. The validation team concluded the most plausible baseline alternative to the proposed project activity could be coal-fired power plant.

a) A new built or extension of oil-fired power unit is prohibited by the notice of NDRC (Annex 5).
b) The installation of less than 135MW coal-fired power plant is strictly prohibited by the decree of the State Council Office (Annex 6).
c) The Thermal Power Engineering Design Reference Cost Index (2005 Edition) provides a credible technical and financial indices for 600 coal-fired power plant (Annex 8).

After having excluded the alternatives not providing peak load, or not in compliance with all applicable legal and regulatory requirements, three options for the plausible baseline scenarios are selected and confirmed in the PDD for the financial comparison of the baseline alternatives. They are:
Alternative scenario 1: The proposed project activity not implemented as a CDM project;

Alternative scenario 3-1: Subcritical coal-fired power plant with a unit capacity of 600 MW;
Alternative scenario 3-2: Supercritical coal-fired power plant with a unit capacity of 600MW.

The data and parameters for the financial analysis of the sub-critical and super-critical coal fired power plants are taken from the Thermal Power Engineering Design Reference Cost Index(2005 Edition, issued by China Institute of Power Planning and Design), which is generally used by the developers of power plants in China for designing and assessment of power generation projects, and 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).

The validation team has compared the input parameters for the levelized cost analysis included in the PDD with the parameters source and was able to confirm that the values applied are consistent with the value stated.

The input values for alternatives used in the levelized cost calculation:

1. Annual Power Generation
    a) The annual power generation of the proposed project is constant through the project lifetime (318 GWh/y)
    b) The annual power generation of the alternative 3-1 is constant through the project lifetime (6,000GWh/y).
    c) The annual power generation of the alternative 3-2 is constant through the project lifetime (6,000GWh/y).
2. Investment Expenditure
    a) The investment expenditure of the proposed project is constant through the project lifetime (4,656 RMB/kW)
    b) The investment expenditure of the alternative 3-1 is constant through the project lifetime (3748 RMB/kW).
    c) The investment expenditure of the alternative 3-2 is constant through the project lifetime (3919 RMB/kW).
3. O&M cost
    a) The O&M cost of the proposed project is constant except for Fixed asset insurance expenditure through the project lifetime as the fixed asset depreciated year by year.
    b) The O&M cost of the alternative 3-1 is constant except for Fixed asset insurance expenditure through the project lifetime as the same reason as the proposed project.
    c) The O&M cost of the alternative 3-2 is constant except for Fixed asset insurance expenditure through the project lifetime as the same reason as the proposed project.
4. Fuel expenditure
    a) The annual fuel expenditure of the proposed project is constant through the project lifetime (7.642 million RMB/y).
    b) The annual fuel expenditure of the alternative 3-1 is constant through the project lifetime (77.142 million RMB/y).
    c) The annual power generation of the alternative 3-2 is constant through the project lifetime (78.69 million RMB/y).
5. Annual operating hours
    a) The annual operation hours of the proposed project is constant through the project lifetime (5,500hrs/y)
    b) The annual operation hours of the alternative 3-1 is constant through the project lifetime (5,000hours/y).
    c) The annual operation hours of the alternative 3-2 is constant through the project lifetime (5,000hours/y).
6. Operating lifetime

a) The operating lifetime of the proposed project is 20years (plus 2 years for construction).
b) The operating lifetime of the alternative 3-1 is 20 years (plus 4 years for construction).
c) The operating lifetime of the alternative 3-2 is 20 years (plus 4 years for construction).

The validation team has checked the spreadsheet for the levelized cost calculation attached. The validation team was able to confirm that the calculation was correct and subcritical coal-fired power plant with a unit capacity of 600 MW which has the lowest levelized cost was selected as the baseline alternative of the proposed project.

The validation team further examined the parameters used for the levelized costs of three alternatives.

1) The operating hours for the project activity are 5,500 hours. As the value used is longer than the other two alternatives, the levelized cost is calculated conservatively.
2) Operational lifetime of the project activity for calculation is 20 years plus 2 years for construction. Operational lifetimes of the two alternatives are 20 years plus 4 years for construction and 24 years. The impact by calculating the costs for the longer years is less than 1% and negligible.

The leverized costs are also compared, assuming the same capacity and annual hours.

Comparison of Leverized Costs

	Capacity (MW)	Annual Hours (hrs)	Levelized Cost (RMB/kWh)
Proposed project activity	64	5,500	0.385
Alternative 3-1	64*[1]	5,500	0.352
	135*[1]	5,500	0.294
	1200	5,000	0.259
Alternative 3-2	64*[1]	5,500	0.353
	135*[1]	5,500	0.296
	1200	5,000	0.261

*[1]: The minimum capacity for Coal-fired plant in China is restricted over 135MW.

As the result, the financial indicator of the proposed project activity is higher than those of other two alternatives.
The alternatives can provide services comparable with the proposed CDM project activity, thus the validation team confirms that a 600 MW coal fired plant can be an alternative to a 64 MW natural gas plant.