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|---|---|---|---|---|---|
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**Request for Review**

Dear Sirs,

Please find below the response to the request for review formulated for the CDM project with the registration number 1671. In case you have any further inquiries please let us know as we kindly assist you.

Yours sincerely,

Abhishek Goyal
Carbon Management Service

Enclosure:
- Levelized cost spreadsheets
- Method and Parameters of economic assessment for project construction (version 3)
- Tariff document

## Response to the CDM Executive Board

### Issue 1:

Further clarification is required on how the DOE has validated the suitability of the input values, as per the guidance of EB 38 paragraph 54 (c), this validation should include justification of the appropriateness of applying fixed tariff and O&M costs throughout the period of assessment.

Response by TÜV SÜD:

The input values used for the IRR calculation were derived from the Feasibility Study Report which was approved by the NDRC. Each figure in the IRR spreadsheet as well as the calculation processes has been verified by the validation team. Furthermore, considering the impacts to the IRR results, additional evidences have been reviewed to prove the total investment, the annual operation costs, the tariff and the yearly power output assumed in the FSR are suitable and realistic.

- Since the project is still at the first beginning, no purchasing contract of equipment or construction agreement is available. However, the input value is compared with the applied values of similar projects in China which are either registered or currently under validation. The investment per unit (15,350RMB/kW) is at the same level of the average unit cost (15,000RMB/kW).
- The tariff of purchasing the electricity from the grid is applied. The assumed tariff of 0.419 RMB/kWh (excl. VAT) was further confirmed with the invoice issued by the grid company. Even with the real one at that time (0.427 RMB/kWh) which is slightly higher, the IRR is still much lower than the benchmark (changed from 9.59% to 9.77%).

Implementing the fixed tariff and O&M cost in the entire assessment period is a common practice in China. Moreover, it's also the regulation set by NDRC, which could be evidenced with "Method and Parameters of economic assessment for project construction (version 3)", the one generally used as the guidebook.

Response by PP:

The guidance of EB 38 paragraph 54(c) is as follows:

"The Board clarified that in cases where project participants rely on values from Feasibility Study Reports (FSR) that are approved by national authorities for proposed project activities, DOEs are required to ensure that:

(c) On the basis of its specific local and sectoral expertise, confirmation is 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."

All the input values are valid and applicable at the time of the investment decision, although this guidance was not published when the proposed project submitted for registration.

The project owner made the investment decision based on the FSR, and all the input values used in the investment analysis were taken from the Feasibility Study Report, which was designed by Anshan Iron and Steel Group (AISG) Design and Research Institute[1], a government-accredited third party.

In accordance to Chinese procedures, assumptions and data sources for the economic evaluation are based on relevant national standards and criteria. Furthermore, all the data in the FSR was assessed by designated independent experts and finally approved by Anshan City Development and Reform Commission[2]. Therefore, the values are considered to be reliable and suitable to be applied in IRR calculation in the PDD.

In China design institutes are required to conduct the investment analysis of an FSR in accordance with the guidance taken from "Method and Parameters of economic assessment for project construction (Version 3)", published by the NDRC and the Ministry of Construction of China.

The guidance makes a very clear explanation on the price system applied in investment analyses. It states that fluctuation of input values of tariff rates should be applied during the construction period as the period is short and predictable. As such a contingency allowance for inflation of capital costs is required.

The guidance also states that tariff rates for both output and input values should be predicted at the beginning of the operation period and that these predictable tariff rates will be fixed and applied throughout the operation period. This is due to the fact that the operation period is long and it is difficult to predict the inflation rate and the outcome of that rate[3].

So, according to this guidance a contingency allowance for inflation rate is included in the fixed assets investment (see the table of fixed assets investment below) and a fixed input value of electricity tariff and O&M tariff rate were applied IRR calculation over the whole operation pe-

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[1] Qualification rank: A. No.060005-sj, issued by National Ministry of Construction of P.R China

[2] FSR Approval No. Anfagaifa(2006)180

[3] P84 Method and Parameters of economic assessment for project construction (Version 3)

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riod. . All Design Institutes adopt this practice and as such all Chinese companies assess their investments based upon these principals. As such the decision to go ahead with the project is based on the assumptions of fixed O&M and electricity tariff rates.

Furthermore, in China, the tariff rate of electricity is priced by government[4], (the NDRC)[5]. Changes in the electricity tariff are unpredictable and any value applied would thus be arbitrary. This unpredictability is dealt with by analysis of the IRR in the sensitivity analysis, where the robustness and the likelihood of the project exceeding the benchmark is dealt with.

If the fluctuations of these tariffs and costs are considered then national statistics may be used to determine the historic 5 year trend and this may be applied as a reasonable forecast of the future trend. When this is done, it can be seen that the average increase in the electricity tariff is much lower than the average increase of O&M costs. This means that the IRR will be even lower than that presented in the FSR and PDD.

The reason for this is that China controls energy prices in order to keep down inflation. The Government will only raise tariffs when it is absolutely necessary and therefore when the costs of power production have increased sufficiently to justify an increase.
The tariffs are therefore increased only due to the rise in operation costs of the power generators[6].. This is demonstrated by the adjustments made in 2006 and 2008[7][8]. These adjustments were made due to large increases in the coal price, transportation and interest rates.

By way of example, according to Liaoning provincial statistics, the annual growth rates from 2002 to 2006 is 4.97%[9].
However, the annual growth rate of purchase prices for raw materials, fuels and power in Liaoning province are 5.1% in 2002, 12.1% in 2003, 8.1% in 2004, 4.2% in 2005 • 4.8% respectively[10], average annual growth rate is 8.8% from 2002 to 2006.

A broad overview is extended to labor rate; there is the same up-trend. From 2002 to 2006. Labor rate increases even faster, growth rate amounts to 7.1% in 2002, 10.6% in 2003, 11% in 2004, 15.2% in 2005, 11.6% in 2006[11], average annual growth rate is 11.1%.

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[4] Temporary management method of selling price of electricity , No. 514,Fagaijiage (2005)

[5] Temporary management method of selling price of electricity , No. 514,Fagaijiage (2005)

[6] NDRC issued the notice regarding the suggestion of implementing tariff rates linkage of electricity and coal (No.2909 • fagaijiage (2005)

[7] The Notice on adjustment for Tariff Rate of ECPG from NDRC, No.1231, fagaijia(2006)

[8] The Notice on increasing Tariff Rate of ECPG from NDRC, No.1678, fagaijia(2008)
[9] 2002 Tariff rate of electricity in liaoning province, ,
http://www.fjjg.gov.cn/fjwjj/jgfw/gjjgzc/webinfo/2002/12/1187774412824087.htm
2006 selling price table of electricity in Liaoning
http://dbj.serc.gov.cn/djjnWeb/staticinfo/list.do?infoId=20070831101916181947293929760108&staticinfo=20060924094830724392575892159503

[10] Indices of Purchasing Prices of Raw Materials ,Fuesls and Powers, Liaoning Statistical Communiques 2003,2004,2005,2006,2007

From the statistics, there is clearly a trend of increasing costs in the material, coal, water, transportation and labor. By averaging growth rate of raw materials, fuels and power and labor, giving an annual average growth rate 8.98%.

Based on the average growth rate of the electricity tariff of 4.97%, and an average growth rate of the O & M cost of 8.98%, the IRR will be 8.96 %. If we assume that the tariff rate increase by 4.97% but no increase in O&M costs, then the IRR will be 10.24% and still below the benchmark.

| | | | |
|---|---|---|---|
| tariff rate | 4.97% | 4.97% | 0.00% |
| Annual O&M cost | 8.98% | 0.00% | 8.98% |
| IRR | 8.96% | 10.24% | 8.49% |

Therefore the static input values in the investment analysis are conservative.

Details of the input values used in the investment analysis are further substantiated below:

- Capital costs – the investment in fixed assets in the IRR calculation in the PDD is consistent with the Feasibility Study Report and its approval from local government.

The key input values taken from the FSR are detailed and evidenced as follows:

Table of Total fixed asset investment12

| Total investment Content | Value in FSR (Million RMB) |
|---|---|
| Construction Cost | 72.19 |
| Key Equipment Cost | 265.32 |
| Installation Cost | 64.75 |
| Other Construction Engineering Costs (including land and other construction costs, duty and surcharge for imported equipments) | 24.14 |
| Contingency cost | 34.11 |
| TOTAL | 460.52 |

Comparing the total investment in terms of RMB per kW, the project investment can be seen to be the same as other waste heat projects in China. For example, it is shown in the EB web-site that the total investment (RMB/kW) of most the CDQ projects is about 15000 RMB/kW13, while the proposed project is 15,350 RMB/kW. This demonstrates that the capital cost of the project used in IRR calculation is reasonable.

[11] 5-22 Indices of wage of Staff and Workers , China Statistical Year Book 2003,2004,2005,2006, 2007 http://w ww.stats.gov.cn/tjsj/ndsj/2007/html/E0522e.htm

[12] Total investment estimate table p97, FSR of Anshan(Yingkou) Iron and Steel Group CDQ Power Generation project

[13] http://cdm.unfccc.int/Projects/registered.html

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- Electricity generated – The designed capacity is 2X15MW. The annual gross power generation of both generators is 166,000 MWh, and the self consumed electricity is 32,788 MWh. Then the net electricity output is 133,212 MWh. The operational hours are 8160 hours. Only 600 hours (25days) is for maintenance and repairs of Coke oven and generator. From the applied operation time, it can be seen that the project almost run full year. Therefore, the power generation applied in IRR calculation is very conservative.

Power tariff – The power tariff used in the IRR calculation also from FSR, and the data 0.419 RMB/kWh (excl. VAT) is the tariff rate that the project owner pays for purchasing power from Northeast China Power Grid. The actual tariff rate in invoice of purchase electricity is 0.427RMB/kwh[14], there is only slightly higher than one applied in IRR calculation which leads a slightly higher IRR of 9.77% compared to 9.59%.

- O&M costs-- The O&M costs for the project are taken from the FSR for the project.

A full breakdown of these costs has been showed in the table below. The costs include raw material cost (coke loss during coke dry quenching process), auxiliary material ( phosphate, hydrazine), power and fuel including self consumption of electricity, fresh water, steam, nitrogen and compressed air, coke oven gas), labor, repair and maintenance, and other expenses covering administration and overhead costs which include office expenses, training cost, travel cost, sharing cost of the board, payment of national insurance, medical treatment insurance, unemployment insurance, housing fund for employees, property tax, payment of environment protection fee and other sundries.

O & M Cost Table[15]

| No. | item | unit | Quantities | Price | Amount (10,000 yuan • |
|---|---|---|---|---|---|
| 1 | material expenditure | | | | 2,090.83 |
| 1.1 | Coke loss during coke dry quenching | t | 24,598 | 850 | 2,090.83 |
| 2 | auxiliary material | | | | 0.52 |
| 2.1 | phosphate | kg | 2000 | 1.8 | 0.36 |
| 2.2 | hydrazine | kg | 190.4 | 8.5 | 0.16 |
| 3 | Fuel and power | | | | 1,803.53 |
| 3.1 | electricity | MWh | 29418.4 | 419 | 1,232.63 |
| 3.2 | fresh water | km3 | 1574.9 | 2,520 | 396.87 |
| 3.3 | steam | GJ | 4,319.36 | 30 | 12.96 |
| 3.4 | compressed air | km3 | 10519.7 | 63 | 66.27 |

[14] Invoice of purchase electricity

[15] Production cost table, p85,-p86 FSR of Anshan Iron and Steel Group CDQ Power Generation Project;

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| | | | | | |
|---|---|---|---|---|---|
| 3.5 | nitrogen | km3 | 6511.7 | 80 | 52.09 |
| 3.6 | coke over gas | GJ | 17,078.88 | 25 | 42.7 |
| 4 | Recovery | | | | 157.5 |
| 4.1 | Recovery of coke powder | t | 5,000 | 315 | 157.5 |
| 5 | labour | Person/year | | | 435.02 |
| 6 | repairs and maintenance | | | | 3,500 |
| 7 | other expenses | | | | 1000 |
| | Total O & M(1+2+3-4+5+6+7) | | | | 8695.8 |

All of the tariff rates above are estimated in accordance with the average tariff rate of Liaoning province in 2006.

The loss due to Coke Dry Quenching process is estimated based on 0.8% of annual Coke output amount. (24,598-5,000)/2,550,000=0.8%

**Issue 2:**

Further clarification is required on how the DOE has validated the existence of the investment and technological barriers.

Response by TÜV SÜD:

The additionality of the project has been demonstrated through Investment analysis. It is found out that the barrier analysis is not appropriate when re-assessing the project. Further since the additionality is convincingly demonstrated through investment analysis, the DOE agrees to remove the barrier analysis from the revised PDD.

Response by PP:

This principal mechanism for demonstration of additionality for this project is through the use of an investment analysis. As such the barrier analysis need not to be applied and the project participant agrees to the removal of this section.

**Issue 3:**

Further clarification is required how the sensitivity analysis of the investment analysis takes into account the technical minimum coking time, which reflects the maximum coke production.

Response by TÜV SÜD:

Once the CDQ is put into operation, the operation parameters shall be fixed to guarantee the quality of coke products. Hence, the output of the coke is linear with the operation hours. The only approach of increasing the coke product in the set period is raising the throughput and heating the coal. However, according to the study of American Iron and Steel Institute, such approach will impact the quality of coke, damage the instrument and cause more emission. Therefore, the DOE does not expect the coke production would vary significantly within the fixed coking time.

Response by PP:

There are two possible scenarios by which project owner could change the coking operational parameters which could impact the electrical output of the CDQ plant.

A.A change in the throughput of the coking ovens which can causes a variation in the amount of available waste heat over at a certain period of time, and/or;

B A change in the coke oven operational hours which could also results in a change in amount of waste heat hence influence output of power generation

Scenario A: A change in throughput of coke production

It is theoretically possible to both increase and decrease the throughput of the coke production. Reducing throughput can occur in practice in order to meet the demand demand. It is possible to either lengthen the oven charge time thereby turning around less coke over each 24hr period, or to stand a bank of ovens (e.g. of a bank that has fifty ovens, only forty are used). Both of these activities will reduce throughput and therefore the available waste heat. This will have a negative impact on the project IRR.

To increase the throughput it is necessary to shorten the coking time and to heat the coal to a higher end temperature. Both approaches can generate more available waste heat for recovery by the CDQ unit. However these also can cause some disadvantages to the coking production.

(a) Shortening the coking time may result in poorer quality coke
High and consistent coke quality is important for iron and steel production as demonstrated in the following extract from information provided by the American Iron and Steel Institute16

(b) A failure to meet the expected operational life of the coke oven battery (COB).

[16] Coke production for blast furnace ironmaking, American Iron and Steel institute

http://www.steel.org/AM/T

Operating a coking plant at a higher throughput than its design parameters, without any additional capital expenditure, may results in a reduction in the lifetime of coke oven battery due to equipment damage (e.g. refractory damages etc.)17

c) Higher emissions

The main emissions sources from the coking process are door emissions, emissions from charging holes and ascension pipes and also, in the case of wall cracks, emissions of COG via the heating gasses18

Under consideration of the potential impact on coke production which can directly affect Iron and Steel production, the project owner impossibly to apply these approaches to increase output of coke and power generation.

B. A change in the coke oven operational hours which could also results in a change in amount of waste heat hence influence output of power generation

Under this scenario, the coking ovens operate for more hours than designed. Designed operational hours for coking plants are calculated taking into account the time required for scheduled maintenance and shutdown periods. If scheduled maintenance take less time than generally expected, this will, theoretically allow the CDQ unit to operate for more hours than designed. This sensitivity analysis has already been conducted.

With regard to annual generation, it can be considered as power output or annual operational hours, since they will get the same result when this parameter changes. From the FSR the annual operational hours used in the IRR calculation is 8160 hours, which excludes 600 hours in a year for maintenance and repairs.

This operational hour figure is lower than 8486 hours in the coke oven operation, which is calculated by 2,550,000 tons/yr / (150.25 tons/hour*2 sets)19. This can be considered as the technical minimum coking time, which reflects the maximum coke production.

If 8486 hours is used in IRR calculation, the IRR will be 9.95%. This is still well below the benchmark of 13%. If the operational hours of the project are compared to the maximum coke production hours then there is only a 4% decrease and is still within the scope of the sensitivity analysis in the PDD (-10% to +10%).

Furthermore, even if we increased the operational hours for the coke oven and waste heat power plant from 8486 to 8760, the IRR would still be below the benchmark at 10.25%. This assumption is based on the whole year time for operation and it is quite impossible to happen.

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[18] European Commission. Integrated Pollution Prevention and Control – Best Available Techniques reference document on the production of Iron and Steel (Dec 2001) Pg 114

[19] FSR page 6 and 7.

In reality, the operational hours of the power plant should be less than that of the Coke oven because of the discontinuous coke production process. This is the reason why the FSR assumes slightly lower operational hours of 8160, as opposed to 8486 for the coke ovens.

**<u>Issue 4:</u>**

If the barriers to the project activity cannot be further substantiated, an economic comparison of the proposed baseline and the project activity without the CDM must be conducted.

<u>Response by TÜV SÜD:</u>

According to “Tool for the demonstration and assessment of additionality /Version 03”, benchmark analysis was used for the investment analysis of this project. As far as alternatives 1, the IRR without CDM revenues is lower than the benchmark value. Thus it was concluded that the project is not attractive from a financial point of view.

Alternative 2 is the continued situation of the present state. It needs no additional investment and faces no prohibitive barrier and is also most economically attractive, so it is considered as the baseline scenario.

Further the levelized cost analysis has also been submitted by the PP for the two alternatives.

The analysis has been validated and shows that buying power from grid is cheaper than the project activity based power. Thus the baseline scenario would be grid based power. The levelized cost analysis is being submitted.

<u>Response by PP:</u>

According to the methodology ACM0004, there are three steps to identify alternatives to the project activity:

1. Identification of alternative baseline scenarios.
2. Excluding baseline options that do not comply with legal and regulatory. requirements or depend on key resources such as fuels, materials or technology that are not available at the project site.
3. Identifying that among the alternatives that do not face any prohibitive barriers, the most economically attractive alternative should be considered as the baseline scenario

Also, the methodology ACM0004, the following five scenarios are identified as baseline alternatives for the proposed project:

(1) The proposed project activity not undertaken as a CDM project activity;

(2) The continuation of the current situation, import of electricity from NEPG grid;

(3) Existing or new captive power generation on-site, using other energy sources than waste heat and/or gas, such as coal, diesel, natural gas, hydro, wind, etc;

(4) A mix of options (2) and (3), in which case the mix of grid and captive power should be specified

(5) Other uses of the waste heat and waste gas

Section B.4 of the PDD eliminates (3), (4) and (5) due to prohibitive barriers and a lack of demand for other uses of the waste heat. Therefore the only options left to consider are options (1) and (2).

Option (1) is eliminated since it is proven to be economically unattractive and therefore additional. Option (2) is considered to be economically attractive since it is the current business as usual option for AISG. Furthermore, the savings from not purchasing power from the grid are already included in the economic analysis presented in the PDD and it is clearly demonstrated from this that it is not financially attractive to stop purchasing power in favour of investing in the CDQ project

However to further elaborate this point the project participant has prepared a cost comparison of the two options. This has been done through a Net Present Value of the costs of scenarios (1) and (2) over a 15 year lifetime and a subsequent evaluation of the levelised cost of both scenarios.

The project supplies with the electricity and steam (both of the steam revenue and steam revenue were included in the IRR calculation, but the only ERs generated from power supply was included in the PDD).The cost applied in IRR calculation represented the full cost for power generation and steam generation. For the comparison of cost of power procurement, only the cost for power generation in scenario 1 was considered in the calculation of levelised cost.

This is presented below in tables 5, 6 and 7.

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**Power Generation**

| | | Reference | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| Annual Power Generation (MWh) | A | FSR | - | - | 133,212 | 133,212 | 133,212 | 133,212 |
| Discount Factor | B | $= 1 / (1 + DR)^n$ | 1 | 0.88496 | 0.78315 | 0.69305 | 0.61332 | 0.54276 |
| Present Value of Annual Generation (MWh) | C | = A x B | - | - | 104,325 | 92,323 | 81,702 | 72,302 |
| Total Present Value of Annual Generation (MWh) | D | = Sum ($C_i$) | 761,830 | | | | | |
| Power Price (RMB/MWh) | E | FSR | 427 | | | | | |

| | | Reference | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|
| Annual Power Generation (MWh) | A | FSR | 133,212 | 133,212 | 133,212 | 133,212 | 133,212 | 133,212 |
| Discount Factor | B | $= 1 / (1 + DR)^n$ | 0.26070 | 0.23071 | 0.20416 | 0.18068 | 0.15989 | 0.14150 |
| Present Value of Annual Generation (MWh) | C | = A x B | 34,728 | 30,733 | 27,197 | 24,069 | 21,299 | 18,849 |
| Total Present Value of Annual Generation (MWh) | D | = Sum ($C_i$) | | | | | | |
| Power Price (RMB/MWh) | E | FSR | | | | | | |

**Scenario 1. CDQ**

| | | Reference | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| Capital Cost | F | FSR | 230,260,000 | 230,260,000 | | | | |
| Depreciation | G | FSR | - | - | 25,351,000 | 25,351,000 | 25,351,000 | 25,351,000 |
| Amortization | H | FSR | - | - | 4,827,000 | 4,827,000 | 4,827,000 | 4,827,000 |
| O&M Cost | I | FSR | - | - | 86,958,347 | 86,958,347 | 86,958,347 | 86,958,347 |
| Residue | J | FSR | | | | | | |
| Income Tax saved (@ 33%) | k | = (F+G+H+I-J) x 0.33 | 75,985,800 | 75,985,800 | 38,654,995 | 38,654,995 | 38,654,995 | 38,654,995 |
| Total Cost | L | = F + I - K | 154,274,200 | 154,274,200 | 48,303,353 | 48,303,353 | 48,303,353 | 48,303,353 |
| Discount Factor | M | $= 1 / (1 + DR)^n$ | 1 | 0.88496 | 0.78315 | 0.69305 | 0.61332 | 0.54276 |
| Present Value of Total Annual Cost | N | = LxM | 154,274,200 | 136,526,496 | 37,828,771 | 33,476,639 | 29,625,412 | 26,217,128 |
| **Total Present Value of Annual Costs** | **O** | **= Sum ($N_i$)** | 573,816,361 | | | | | |
| **Levelised Cost (RMB/MWh)** | **P** | **= O / D** | **317** | | | | | |

| | | Reference | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|
| Capital Cost | F | FSR | | | | | | |
| Depreciation | G | FSR | 25,351,000 | 25,351,000 | 25,351,000 | 25,351,000 | 25,351,000 | 25,351,000 |
| Amortization | H | FSR | | | | | | |
| O&M Cost | I | FSR | 86,958,347 | 86,958,347 | 86,958,347 | 86,958,347 | 86,958,347 | 86,958,347 |
| Residue | J | FSR | | | | | | 56,120,000 |
| Income Tax saved (@ 33%) | k | = (F+G+H+I-J) x 0.33 | 37,062,085 | 37,062,085 | 37,062,085 | 37,062,085 | 37,062,085 | 18,542,485 |
| Total Cost | L | = F + I - J | 49,896,263 | 49,896,263 | 49,896,263 | 49,896,263 | 49,896,263 | 68,415,863 |
| Discount Factor | M | $= 1 / (1 + DR)^n$ | 0.26070 | 0.23071 | 0.20416 | 0.18068 | 0.15989 | 0.14150 |
| Present Value of Total Annual Cost | N | = LxM | 13,007,956 | 11,511,567 | 10,186,821 | 9,015,257 | 7,977,913 | 9,680,845 |
| **Total Present Value of Annual Costs** | **O** | **= Sum ($N_i$)** | | | | | | |
| **Levelised Cost (RMB/MWh)** | **P** | **= O / D** | | | | | | |

**Scenario 2. Power Purchase**

| | | Reference | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| Capital Cost | F | FSR | | | | | | |
| Cost of power purchase | G | FSR | 0 | 0 | 56,881,524 | 56,881,524 | 56,881,524 | 56,881,524 |
| Income Tax saved (@ 33%) | H | = G x 0.33 | - | - | 18,770,903 | 18,770,903 | 18,770,903 | 18,770,903 |
| Total Cost | J | = F + G - H | - | - | 38,110,621 | 38,110,621 | 38,110,621 | 38,110,621 |
| Discount Factor | K | $= 1 / (1 + DR)^n$ | 1 | 0.88496 | 0.78315 | 0.69305 | 0.61332 | 0.54276 |
| Present Value of Total Annual Cost | L | = J x K | - | - | 29,846,333 | 26,412,566 | 23,374,006 | 20,684,921 |
| **Total Present Value of Annual Costs** | **M** | **= Sum ($L_i$)** | 217,951,974 | | | | | |
| **Levelised Cost (RMB/MWh)** | **N** | **= M / D** | **286** | | | | | |

| | | Reference | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|
| Capital Cost | F | FSR | | | | | | |
| Cost of power purchase | G | FSR | 56,881,524 | 56,881,524 | 56,881,524 | 56,881,524 | 56,881,524 | 56,881,524 |
| Income Tax saved (@ 33%) | H | = G x 0.33 | 18,770,903 | 18,770,903 | 18,770,903 | 18,770,903 | 18,770,903 | 18,770,903 |
| Total Cost | J | = F + G - H | 38,110,621 | 38,110,621 | 38,110,621 | 38,110,621 | 38,110,621 | 38,110,621 |
| Discount Factor | K | $= 1 / (1 + DR)^n$ | 0.26070 | 0.23071 | 0.20416 | 0.18068 | 0.15989 | 0.14150 |
| Present Value of Total Annual Cost | L | = J x K | 9,935,439 | 8,792,501 | 7,780,664 | 6,885,827 | 6,093,507 | 5,392,653 |
| **Total Present Value of Annual Costs** | **M** | **= Sum ($L_i$)** | | | | | | |
| **Levelised Cost (RMB/MWh)** | **N** | **= M / D** | | | | | | |

| | | Reference | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| Annual Power Generation (MWh) | A | FSR | - | - | 166,000 | 166,000 | 166,000 | 166,000 |
| Discount Factor | B | $= 1 / (1 + DR)^n$ | 1 | 0.88496 | 0.78315 | 0.69305 | 0.61332 | 0.54276 |
| Present Value of Annual Generation (MWh) | C | = A x B | - | - | 130,003 | 115,046 | 101,811 | 90,098 |
| Total Present Value of Annual Generation (MWh) | D | = Sum ($C_i$) | 949,342 | | | | | |
| Power Price (RMB/MWh) | E | FSR | | | | | | |

| | | Reference | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|
| Annual Power Generation (MWh) | A | FSR | 166,000 | 166,000 | 166,000 | 166,000 | 166,000 | 166,000 |
| Discount Factor | B | $= 1 / (1 + DR)^n$ | 0.26070 | 0.23071 | 0.20416 | 0.18068 | 0.15989 | 0.14150 |
| Present Value of Annual Generation (MWh) | C | = A x B | 43,276 | 38,298 | 33,891 | 29,993 | 26,542 | 23,489 |
| Total Present Value of Annual Generation (MWh) | D | = Sum ($C_i$) | | | | | | |
| Power Price (RMB/MWh) | E | FSR | | | | | | |

For comparison of these two scenarios the different tax situations have been considered. This is due to the fact that scenario 1 includes a capital investment and scenario 2 does not. For scenario 1 there is a capital allowance for the depreciation and amortization of the capital cost. For both scenarios 1 and 2 income tax will be due. Income tax is due on net income and in scenarios 1 and 2 this will be different and there is a tax benefit in having higher annual costs i.e. less tax will be paid. In other words net annual income will be less when there are higher annual costs and therefore income tax will also be less. Conversely, when net annual income is higher then so are the taxes, which is the case for Scenario 1.

Tables 6 and 7 above show that the levelised cost of power generation obtained for scenario 2 (286 RMB / MWh) is less than the levelised costs for scenario 1 (317 RMB / MWh).

Whilst this difference is small when you compare the two scenarios there is no risk or indeed effort required to purchase power from the grid, whereas there are enormous risks associated with the investment of a new technology in the industry that is reliant on an unstable fuel source. Therefore the rational decision is to do nothing rather than risk capital on something that does not bring about any additional benefits. As such it can be confirmed that the baseline is indeed purchase of power from the grid and not the proposed project undertaken without the CDM.