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To: CDM Executive Board
From: Climate Change Capital Ltd[1]
Re: Project Participant response to Request for Review of project 1726
Date: 31 July 2008

We refer to the requests for review by three Board members regarding project activity 1726 "Ma Steel (new plant) CDQ and waste heat utilization project" and would like to provide the following initial responses to the issues raised.

Please note that all referenced documentation has been made available to the DOE.

Question 1. The DOE shall describe how the reliability of the input values used in the investment analysis has been validated in accordance with the requirements of EB38 paragraph 54(c).

The majority of the input values for the investment analysis have been taken from project feasibility study report (FSR) of August 2005 with the exceptions as noted below. The FSR was prepared by ACRE Coking & Refractory Engineering Consulting Corporation, MCC. This entity is an independent design organisation which is A class accredited by the Construction Department of People's Republic of China to compile design FSR's for the metallurgy industry which includes coke dry quenching projects. This accreditation is evidenced by the certificate within the project FSR[2]. The FSR must also comply with the Guideline of Economic Assessment issued by National Development and Reform Committee. The Guideline of Economic Assessment provides guidelines on the reasonable evaluation on the economic benefits of projects to be constructed. The guidelines should be consulted when the following documents are prepared: Project Planning, Opportunity Research, Project Proposal and Feasibility Study Report[3]. As stated in the validation report (pg 10), the FSR is required by the government and is peer reviewed prior to the issuance of the project approval by the relevant authority. In this particular case the FSR was approved by the Maanshan Development and Reform Commission in August 2006 and the approval documentation reiterates key investment criteria such as total investment cost[4]. The FSR is therefore a reliable and independent source of information on which to base an investment decision.

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[1] Climate Change Capital in its capacity as investment manager for Project Participants Climate Change Capital Carbon Fund II s.à r.l. and Climate Change Capital Carbon Managed Account Limited.
[2] Certificate for Engineering Design, Project Feasibility Study Report, Aug 2005
[3] Extract from Economic Assessment of Construction Projects, Methods and Parameters referring to guidelines for FSRs pg 5
[4] Project Approval from Maanshan Development and Reform Committee, Aug 2006

The following data are the only discrepancies from the FSR:

Parameter	Grid power price
Value in FSR	0.38 RMB/kWh
Value applied	0.42735 RMB/kWh
Source of value applied	Actual power tariff net of VAT[5] for power purchased from the grid in 2005 as set by the East China Power Grid[6].
Reason for not applying FSR value	FSR value is based on Ma Steel internal pricing[7]. Using the higher grid based power price raises project revenues (avoided costs) and leads to a higher IRR and hence provides a conservative interpretation of the additionality requirements.

Parameter	Electricity consumption costs (part of the Annual O&M costs)
Value in FSR	18.73 million RMB
Value applied	21.07 million RMB
Source of value applied	Calculated value based on FSR and Actual power tariff net of VAT for power purchased from the grid in 2005 as set by the East China Power Grid.
Reason for not applying FSR value	The O&M cost includes the cost for 4.21GWh/yr of electricity consumed by auxiliary equipment[8]. For the *electricity consumption costs* the project FSR used 0.38RMB/kWh as the tariff, but the PDD used 0.42735RMB/kWh (net of VAT) as the tariff (see above for explanation).

Parameter	Annual O&M costs – Steam Consumption cost
Value in FSR	95,899t/h
Value applied	6,000t/h
Source of value applied	Reasonable estimate agreed with DOE during validation based on precedent of other projects
Reason for not applying FSR value	The CDQ plant consumes a certain volume of steam supplied from an external source as part of the normal operations of the plant. The FSR estimate of steam consumption was an erroneous assumption as steam utilization only relates to "start-up" and auxiliary purposes. It was agreed with the DOE during the validation process[9] to take a conservative approach and to reduce this cost item to a reasonable level for the purposes of the IRR calculation (resulting in an increased IRR). In addition, a requirement to monitor steam consumption is included in the PDD monitoring plan so that accurate project emissions can be recorded and accounted for during the crediting period. The cost associated with steam consumption now constitutes only 1.0% of annual O&M costs.
Note	Annual steam consumption influences annual O&M costs. The only changes in the annual O&M costs relative to the FSR are due to the change in electricity consumption costs and the reduced steam consumption.

EB 38 paragraph 54(c) states 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…on the basis of its specific local and sectoral expertise,

[5] The power price net of VAT is used as Chinese tax laws allow the deduction of VAT on products purchased to be deductable from VAT of products sold. Tax regulation issued by the State Administration on Taxation 中华人民共和国增值税暂行条例实施细则财法字[1993]第38号 Clause No.14 http://www.chinatax.gov.cn/n480462/n480513/n480919/index.html
[6] Anhui Grid Tariff Policy, 2005. 0.500RMB/kWh (220kV) including VAT of 17%.
[7] Ma Steel Internal Settlement Pricing, 2005. Price for Electricity from Captive Power Plant – 0.38RMB/Kwh
[8] The project revenue (avoided cost) is calculated on the basis of electricity generated not electricity supplied, so it is correct to consider a cost item for electricity consumed by auxiliary equipment within the IRR calculation as long as the same tariff is used for the revenue and cost lines.
[9] Email communication between CCC and DOE on 29 Feb 08

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.

It should be noted that the validation report for the project activity was submitted on 4 March 2008 and thus before EB 38. Nonetheless, as stated in the Validation Report (pg 10-11) during the validation process the DOE has assessed the suitability of the input values in a way which meets the requirements subsequently set by the EB.

Question 2. The PP/DOE should justify why the sensitivity analysis has not been carried out with electricity tariff, which could be a significant input in determining the project IRR.

No sensitivity analysis has been carried out with the electricity tariff, because the electricity tariff is not subject to large changes when accounting for inflation. We will elaborate on this point below, using historical data.

The underlying reason why sensitivity analyses with regards to the electricity tariff are commonly not carried out for CDQ projects in China can be understood with reference to the selection criteria for input parameters that should be varied in a sensitivity analysis: those input parameters which have a considerable impact on the main financial indicators, and for which, at the same time, substantial changes are likely.

The electricity tariff for electricity bought from the grid has a large impact on the financial indicators of the project activity in question but historically we have not seen large changes in power prices in real terms. To see this more clearly, we present the following data on the electricity tariff for industrial users in Anhui Province (where the project activity is located)[10].

Year	Power price (RMB/kWh)
2000	0.4420
2005	0.5000
2006	0.5225
2008	0.5620

On the basis of these data, we can calculate an average growth rate of the electricity tariff for industrials users in the period immediately before the decision to implement the CDQ projects, 2000-2005[11]. The growth rate of the power price in this period was 2.50% on an annualized basis.

The IRR calculation used in the additionality section of the PDD compares the real IRR with the real benchmark in both cases taking out the effects of general price increases due to inflation[12]. Therefore, the key parameter that is relevant here is not

[10] Data taken from Anhui Grid Tariff Policy documentation for 2000, 2005, 2006 and 2008. Publically available data was not available for 2001-2004

[11] Calculated as $((p2005)/p2000)^{0.2} – 1) * 100\%$, with p2005 the electricity tariff in 2005 and p2000 the electricity tariff in 2000.

[12] This is in line with theory, which states that for the NPV calculation either both cash flows and the discount rate should be without inflation, or both with inflation. To quote:
“Inflation is not included and the cash flows are assumed not to include inflation. If inflation is included in the cash flows then the discount rate should be altered using the Fisher formula, which is:
Nominal rate = (1+r)(1+I)-1
where: r = discount rate and I = inflation rate”
See A.L. Day, Mastering Financial Modelling in Microsoft® Excel, Prentice Hall Financial Times, Second Edition, 2007., and in particular p.258.

the development of the nominal electricity price, but the real electricity price after taking inflation into account. To see the development of the real electricity tariff in China, we have to take the rate of inflation in China into account.

Below we compare the increase in the electricity tariff with the inflation in China. The inflation percentage is measured as the change in the annual rate of change in the GDP deflator in the period 2000-2005, as this is the most appropriate measure for inflation in China[13].

First, we calculate the GDP deflator on the basis of the following data in the table below[14]. Note that the GDP is in constant prices, and are expressed in terms of the GDP of the preceding year. E.g., real GDP in 2000 was 108.4% of the real GDP in 1999, indicating a real annual GDP growth of 8.4% per year for the year 2000. Similarly, the GDP growth rate in 2001 was 8.3%.

Year	GDP, current prices (100 million RMB)	GDP, constant prices, preceding year = 100
2000	98,000.5	108.4
2001	108,068.2	108.3
2002	119,095.7	109.1
2003	135,174.0	110.0
2004	159,586.7	110.1
2005	184,739.1	110.4
2006	211,808.0	111.1
2007	NA	NA
2008	NA	NA

From the data provided, the rate of change of the GDP deflator can be calculated according to the following procedure:

First, calculate an index for the GDP at constant prices, by setting the index for 2000 at 100 and linking the other indices through multiplication and dividing by 100:

Year	GDP, constant prices, preceding year = 100	Index of GDP at constant prices
2000	108.4	100.0
2001	108.3	108.3
2002	109.1	118.2
2003	110.0	130.0
2004	110.1	143.1
2005	110.4	158.0
2006	111.1	175.5
2007	NA	NA
2008	NA	NA

Given that the IRR is calculated as the discount rate that sets the NPV equal to zero, this is equally relevant for IRR.

[13] Extract from http://www.hm-treasury.gov.uk/economic_data_and_tools/gdp_deflators/data_gdp_backgd.cfm

"Other widely known measures of inflation are the Consumer Prices Index (CPI, formerly known as the HICP), the Retail Prices Index (RPI), and the Retail Prices Index excluding mortgage interest payments (RPIX), all of which measure prices of goods and services purchased for the purpose of consumption by households in the UK. Further information on RPI, RPIX and CPI - and the differences between them - can be found at http://www.statistics.gov.uk/cci/nugget.asp?id=181

The GDP deflator is a much broader price index than the CPI, RPI or RPIX (which only measure consumer prices) as it reflects the prices of **all** domestically produced goods and services in the economy. Hence, the GDP deflator also includes the prices of investment goods, government services and exports, and subtracts the price of UK imports."

[14] The data for the calculation of the rate of change of the GDP deflator are from the China Statistical Yearbook 2007, Beijing, China Statistical Press. Specific pages used are p. 57 and 59.

Then, the index of the GDP deflator can be calculated as follows:

100 * (GDP(y) / GDP(2000)) / (I(y)/100))

With:
GDP(y) The GDP in current prices in year y
I(y) The index of GDP at constant prices in year y

The following table summarizes the calculation results:

Year	Index of GDP at constant prices	Index of the GDP deflator (D)
2000	100.0	100.0
2001	108.3	102.1
2002	118.2	102.6
2003	130.0	105.3
2004	143.1	112.6
2005	158.0	117.3
2006	175.5	121.1
2007	NA	NA
2008	NA	NA

Inflation over the period x-y, measured as the rate of change of the index of the GDP deflator, can then be calculated as:

Inflation = $(D(y)/D(x))^{(1/(y-x))}$

The following table presents some of the key results:

Period	Growth rate power price	Rate of inflation	Annual rate of change real power price
2000-2005	2.50%	3.24%	-0.74%
2005-2008	4.79%	5.46%[15]	-0.67%

Prior to the decision to implement the project, electricity tariffs had been slightly decreasing in real terms, by about 0.74% per year.

We conclude that the electricity tariff, in real terms, has been almost constant in the period directly before the decision to implement the project; and that in fact the electricity tariff, in real terms, had slightly fallen. On the basis of the insignificant change in the real electricity tariff over the period directly preceding the project implementation, it is appropriate not to conduct a sensitivity analysis with regards to the electricity price. This judgment is also borne out by the developments since the decision to implement the project, which showed again a decrease in the real electricity tariff, with an annual rate of change of the real electricity tariff in the period 2005-2008 of -0.67%

[15] For this period it is not possible to calculate the rate of change of the GDP deflator, because data necessary for this calculation are not available. We have therefore used the rate of change of the consumer prices, which can be obtained from the website of the National Bureau of Statistics of China. For the period from December 2005 to December 2006, CPI rose by 2.8%; from December 2006 to December 2007, CPI rose by 6.5%, and from May 2007 to May 2008, 7.7%. From this the rate of change in consumer prices over the period 2005-2008 may be estimated. See http://www.stats.gov.cn/english/.

Therefore, if anything, at the moment of decision-making the real power price could be expected to fall slightly, and ignoring this is a conservative interpretation of the additionality argument.

As can now be seen in the IRR calculation spreadsheet, we have conducted such a sensitivity analysis as required by EB39 Annex 35 para 15, and we can conclude that electricity tariff would need to increase in real terms with +0.33% over the whole project lifetime instead of dropping by -0.74% in order for the IRR of the project to reach the benchmark. This is a very unlikely scenario in light of the historical experience prior to the decision to implement the project, as well as contrary to the historical experience after the decision to implement the project.[16]

Question 3. Taking into consideration that the operating capacity of a CDQ is directly linked to the operating capacity of the coke ovens and that - depending on the coke demand - the coke ovens. capacity can be increased or decreased by changing the heating temperature in the coke ovens. heating chambers, the PP/DOE should provide more information regarding the maximum and the minimum design production capacities of the coke ovens and of the connected CDQ. Subsequently the PP/DOE should apply this range to the sensitivity analysis in determining the project IRR

Coking oven batteries are designed to operate under standard parameters to consistently produce coke of a suitable quality and to optimise the lifetime of the coke oven battery equipment. A CDQ unit is subsequently designed on the basis of the designed coke oven battery operational parameters.

There are two possible scenarios by which a coke oven battery operator 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 causes a variation in the amount of available waste heat over a set period of time, and/or;
B. A change in the coke oven battery operational hours which results in a change in the number of hours in which waste heat can be utilised for electricity generation.

<u>Scenario A: A change in throughput</u>

It is theoretically possible to both increase and decrease the throughput of the coke oven batteries.

Reducing throughput can occur in practice to match output to 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. This would result in more available waste heat for recovery by the CDQ unit. However there are two key implications of this change to normal operational practice.

[16] IRR New CDQ 1 2 RFR 24_07_08_v5.xls

1. Operational implications at the coking plant

Increasing the throughput has implications for the operation of the coking plant and the product quality. These implications are listed below and are supported by discussions with a senior process engineer responsible for Coke Plant Technologies from Siemens VAI[17].

Shortening the coking time will result in:

a) *Poorer quality coke:* The coke from #1 (new) coke oven and #2 (new) coke oven (to which the project activity is associated) is used in the blast furnace facilities at Ma Steel. 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 Institute[18]

   *'**Coke is the most important raw material fed into the blast furnace in terms of its effect on blast furnace operation and hot metal quality**. A high quality coke should be able to support a smooth descent of the blast furnace burden with as little degradation as possible while providing the lowest amount of impurities, highest thermal energy, highest metal reduction, and optimum permeability for the flow of gaseous and molten products. **Introduction of high quality coke to a blast furnace will result in lower coke rate, higher productivity and lower hot metal cost.'***

   *'**The properties of coke** and coke oven pushing performance **are influenced by following** coal quality and battery operating variables: rank of coal, petrographic, chemical and rheologic characteristics of coal, particle size, moisture content, bulk density, weathering of coal, **coking temperature and coking rate**, soaking time, **quenching practice, and coke handling. Coke quality variability is low if all these factors are controlled. Coke producers use widely differing coals and employ many procedures to enhance the quality of the coke and to enhance the coke oven productivity and battery life.'***

b) *A failure to meet the expected operational life of the coke oven battery (COB):* Operating a coking plant at a higher throughput than its design parameters, without any additional capital expenditure, results in a reduction in the coke oven battery service life due to equipment damage (e.g. refractory damages etc.)[19]. Siemens VAI have provided some examples of examples of coke oven battery service lifetimes around the world. For blast furnace coke production the coking time is generally 14-25 hours (depending the Coke Oven Battery technology, dimensions, heating system, gas treatment technology, coal physical/chemical matters, etc). Siemens VAI have had experience of coke oven batteries with 20-40 years of operation in Sweden, Finland and Germany where these plants were operated within the environmental and blast-furnace requirements. Siemens have also worked with a coke oven battery operator in the Ukraine where the coke oven batteries were closed after just 9 years of operation as the ovens had been operated with a coking time of 14 hours. The cost of repairing/rebuilding the coking oven was estimated to be 50-100m EUR.

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

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[17] Email communication between CCC and Siemens VAI made available to the DOE

[18] Coke production for blast furnace ironmaking, American Iron and Steel institute http://www.steel.org/AM/Template.cfm?Section=Articles3&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=12304

[19] Email communication between CCC and Siemens VAI made available to the DOE

case of wall cracks, emissions of COG via the heating gasses[20]. Increasing the temperature of the coking oven increases the internal pressure of the oven. This increased pressure increases the leak rates as seals are designed for the operational pressure. Therefore, if the objective is to reduce the coking time but maintain normal operating emissions levels, it would be necessary to make additional capital investments e.g. upgrade the door seals and tightening equipment to prevent increased leakage. All coking plants in China are designed to operate in accordance with the Emission Standard of Air Pollutants for Coke Ovens (GB 9078-1996) issued by former State Environment Protection Administration in 1996[21]. This emissions standard is referenced in section 6.6 of the FSR. Although we have no third party evidence or test data that an increase in throughput would result in Ma Steel exceeding the limits permitted by law, this will be considered by Ma Steel in any decision making process[22].

A prudent coke oven battery operator would therefore take these operational impacts into consideration when deciding whether to increase throughput. Ma Steel are unlikely to compromise the coke quality and lifetime of the coking equipment through increasing throughput by reducing the coking time. This can be demonstrated by the operating history of the coking plants which are associated with the project activity. The coking ovens are designed to operate with a coking time of 25.2 hours[23]. Since commissioning, Ma Steel has been operating the coking ovens at a coking time of 25.8 hours to maintain the coke quality required for the iron and steel production[24].

2. Maximum electrical output of the CDQ generation equipment

CCC commissioned expert technical due diligence from Harworth Power to evaluate the maximum electrical output of the CDQ generation equipment on the basis of the data in the FSR.

The full analysis has been made available to the DOE and is attached to this letter for the Executive Board's reference[25]. We provide a summary of the consultant's conclusions below:

In Harworth Power's professional opinion, for the purpose of determining the maximum output from the project, the limiting factor should be considered to be within the power generating plant rather than the coking plant, as it is impossible to generate more power than the design capacity of the power plant.

The Design generating capacity of each Steam Turbine Generator (STG) is 18MWe (from FSR and PDD) and the normal Operating Load of each STG is 14.681MWe (from FSR).

Each STG can only produce as much power as the steam enthalpy from the WHRB can deliver. The WHRB system at Ma Steel (New Plant) CDQ is designed to produce a normal operating steam flow of 70 tph of steam per boiler, which will produce an Operating Load of 14.681MWe from each STG. The FSR (and therefore PDD) assumes 8,160 operational hours (93% availability) giving an anticipated Annual Gross Generation of 239.6 GWh from the two units.

[20] European Commission. Integrated Pollution Prevention and Control – Best Available Techniques reference document on the production of Iron and Steel (Dec 2001) Pg114
[21] Emission standard of Air Pollutants for Coke oven (GB 16171-1996)
[22] If a Finnish coking plant were to increase throughput, they would be required to obtain a temporary emissions permit from the relevant authority (communication with Siemens VAI)
[23] Section 5.1.4 Coke Oven Technical Specifications (Pg18), Project Feasibility Study, August 2005
[24] Data from Internal information website of Ma Steel Production Department, Dated 10 July 2008
[25] Letter from Harworth Power to DNV Dated 24 July 2008

The FSR states that each WHRB has a Maximum Continuous Rating[26] (MCR) of 78tph. With each WHRB operating at the MCR steam flow of 78 tph a maximum possible electrical power output from the Power Generating Plant is derived at 16.35MWe[27]. Under these conditions, the maximum Annual Gross Generation that could be achieved from the project activity is 266.83 GWh (16.35MWe x 2 = 33.7MWe x 8,160 hours)

In summary a maximum Annual Gross Generation of 266.83 GWh could be achieved if both WHRBs run at MCR continuously for 93% availability as a result of a change in the operational pattern of the Coke Ovens to enable running at a higher than normal Oven Operating Temperature to minimise oven carbonisation period.

The proposal to introduce the sensitivity into the IRR Model to include a maximum Annual Gross Generation of 266.83 GWh, while theoretically possible, is in the professional opinion of Harworth Power unrealistic.

To summarize, Harworth Power believe the scenario raised in the question from the Executive Board is not realistic for two reasons:

1. Coke ovens are operated within their normal parameters, and to change those parameters (heat, oven carbonisation time), is a very significant change to the process (it is not a matter of simple or quick adjustment).
2. It is not usual to operate a boiler of this type at its MCR. It would create a situation where unplanned maintenance would increase dramatically. It is usual to operate this type of boiler and power plant well below its originally intended Operating Flow and Load. Practically speaking, in the opinion of the Consultant, 233.2 GWh would be a more genuine upper limit of Annual Gross Generation in any sensitivity analysis.

Scenario B: A change in operational hours

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 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 carried out, the results of which are presented in the PDD and which have been validated by the DOE (Validation report Pg 11). The base case in the PDD assumes the FSR operational hours of 8,160 hours which is equal to 93% availability[28]. This design availability is already a very optimistic estimate according to the professional opinion from Harworth Power[29].

To support the opinions and statements above, we provide below a summary of the actual performance of Ma Steel (new plant) CDQ project for the first six months of 2008[30]. It can be clearly seen that the plant is operating below the design expectations at the time of decision making.

[26] Maximum Continuous Rating (MCR) is the output which cannot be exceeded by a particular item of a plant, in this case a boiler.
[27] It is worth noting that it is impossible to generate 18MW_e from this power plant, even at WHRB MCR conditions, due to a lack of sufficient steam flow capacity from the WHRB.
[28] Project Feasibility Study and Letter from Harworth Power to DNV, Dated 24th July 2008 (pg 3)
[29] Pg 3 Letter from Harworth Power to DNV, Dated 24th July 2008
[30] Jan – June 2008 New Plant Coke and Electricity production data from Ma Steel internal production records. There was no electricity production in May and June due to an unscheduled shutdown and repair activities.

2008	Jan	Feb	Mar	Apr	May	June	Total	Annual production as per FSR (and PDD)	Production to date as % of design
Coke Production (t)	179,174	167,859	178,106	172,018	187,509	181,637	**1,066,303**	2,115,000	**101%**
Electricity Production (MWh)	9,970	2,318	2,418	4,658	0	0	**19,363**	239,600	**16%**

Question 4. Further clarification is required on how the DOE has validated the baseline determination, in particular that the continuation of grid electricity imports is more economically attractive alternative than the project activity undertaken without CDM.

According to methodology ACM0004v2, the possible alternative scenarios in absence of the CDM project activity would be as follows:

(a) The proposed project activity not undertaken as a CDM project activity;
(b) Continuation utilization of coke wet quenching and import of electricity from the East China Power Grid (continuation of current practice);
(c) New captive power generation of the equivalent amount of electricity on-site, using coal, diesel, or natural gas;
(d) New captive power generation of the same amount of electricity on-site, using hydro, wind energy sources instead of waste heat;
(e) A mix of options (b), (c) and (d);
(f) Other uses of the waste heat.

As discussed in the PDD and subsequently confirmed in the validation report, scenarios (c), (d), (e) and (f) face barriers and have therefore been excluded.

Therefore, the only remaining baseline options are scenarios (a) or (b).

To compare these two scenarios, an appropriate analysis has been carried out in accordance with the *Tool for the demonstration and assessment of additionality (version 03).* As the project generates financial and economic benefits other than CDM income, a simple cost analysis (Option I) was not applicable. Investment comparison analysis (Option II) is applicable to projects where similar investment alternatives are available but that is not the case here. Hence, the benchmark analysis (Option III) was selected to confirm the project's additionality.

Subsequent guidance issued at EB39 Annex 35 confirms the appropriateness of this benchmark approach for the evaluation of the baseline scenarios for this project. Paragraph 14 states '*If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate'* and '*The benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest.'*

The IRR analysis presented for scenario (a) within the PDD considers the additional costs, relative to scenario (b) of the investment required for the implementation of the CDQ equipment and the additional revenues, relative to scenario (b) as avoided costs of having to import less electricity than in the absence of the project activity.

The IRR analysis presented in the PDD and as validated by DNV demonstrates that, in the absence of the CDM, the project IRR is 10.29%, which is lower than the benchmark rate of 11%. This shows that scenario (a) is less financially attractive than scenario (b) and should be considered as the baseline scenario.

To further demonstrate that the continuation of grid electricity imports is more economically attractive than the project activity undertaken without CDM, we have conducted both a comparative NPV calculation and levelized power cost analysis.

NPV comparison

The comparative NPV calculation was conducted by comparing (1) the cost of continuing the baseline activity of importing electricity to (2) the cost of implementing the project without CDM revenue. In the second NPV calculation, no revenues were included for the avoided power supply costs, because the NPV of option 2 will be compared with the NPV of option 1, purchase from the grid. The discounting was conducted using the benchmark rate of 11%. The table below outlines the results and a revised IRR model is provided for your reference[31].

NPV Analysis	Unit: 10^4 RMB
Continuing with importation of electricity	-46,810.5
Project conducted without CDM	-48,246.2
Project conducted with CDM	-40,376.6

The values for the NPV are all negative, which is logical as the NPVs concern different ways of meeting the needs to provide an input in a production process rather than different ways to produce an output. The continuation of the importation of power from the grid has a less negative NPV than the project without CDM, which means that in the absence of CDM the importation of electricity from the grid is the cheapest manner to meet the project entity's electricity needs. The analysis also confirms that with CDM in place, the project becomes the cheapest way to provide the project entity with electricity.

Levelized power cost comparison

The levelized power cost was conducted by increasing the power price in the model to the level that equates the IRR to the 11% benchmark. The electricity tariff that equates the IRR to 11% is 441.75 RMB/kWh. The actual power price, at the time of decision-making, was 427.35 RMB/MWh. Therefore the levelized power supply costs comparison confirms that the project without CDM is a more expensive – and thus less economical – way to provide the project entity with electricity than purchase from the grid.

[31] IRR New CDQ 1 2 RFR 24_07_08_v5.xls