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Mr. Hans Jürgen Stehr
Chair, CDM Executive Board
UNFCCC

Response to the request for review for the CDM project activity "Jiangsu Qingshi Cement Plant's Low Temperature Waste Heat Power Generation" (Ref. no. 1309)

2008-01-11

Dear Mr. Stehr,

The DOE TUV Rheinland Japan Ltd was informed on 28 December 2007 that the CDM project "Jiangsu Qingshi Cement Plant's Low Temperature Waste Heat Power Generation" (Ref. no. 1309), is under request for review because three requests for review have been received from members of the board. All of these requests for review contain the same 4 issues.

We would like to provide our response to the issues raised as follows:

Issue 1 raised:

The DOE should explain in detail what steps it has taken to determine that the benchmark proposed by the project participants is the most suitable indicator against which to assess the financial viability of this project activity.

TUV's response:

The project proponent selects the benchmark analysis (Option III of Step 2 of "Tool for the demonstration and assessment of additionality") for conducting the investment analysis. The validation team considers this selection appropriate because the proposed project would indirectly generate revenue stream through displacement of electricity purchased from the provincial grid at a higher price.

During validation the assessment team has reviewed the source of the 12% benchmark quoted in the PDD ("Inform on Economic Assessment Method and Parameter of Construction Projects – version 3", which is attached as Annex 1a). The document provides the financial benchmark for capital construction projects including the cement industry, which is categorized under construction materials industry in China. This reference document was compiled by a group of sectoral experts[1],, and approved by both NDRC and MOC for application in China as declared in the document and presented on Page 3 of Annex 1a.

[1] Including representatives from the National Development & Reform Commission (NDRC), Ministry of Construction (MOC), China International Engineering Consulting Corporation (CIECC), Chemical Industry Design & Planning Institute, Chinese Academy of Social Sciences, China Construction Bank, Beijing Huazhi Boyu Engineering Consulting Corporation, Tongji University, Tsinghua University, General Research Institute for Nonferrous Metals (GRINM), Ministry of Communications, Beijing Shangshan Yilan Technological Consulting Corporation

According to the news report on the "Review Meeting on Inform on Economic Assessment Method and Parameter of Construction Projects – version 3" (Annex 1b, see http://www.risn.org.cn/jjp/file/003.htm), the "Inform on Economic Assessment Method and Parameter of Construction Projects – version 3" had been subjected to a rigorous censoring of 150 representatives of NDRC, MOC, major banks in China, big state owned companies, sectoral experts and design companies, etc, which agreed the validity and application of the document unanimously.
It is therefore considered that the document is the most suitable reference for providing the financial benchmarks for the economic assessment concerning the respective industries in China, and is considered to be the most suitable guideline for determine the financial indicators for the project.

The project owner (Jiangsu Qingshi Cement Co. Ltd.) is focused on the business of cement production only, with no previous investments in waste heat utilization for power generation. Given that and considering the project serves for captive electricity production and not export of electricity, the application of the 12% benchmark for cement industry is deemed appropriate (rather than a benchmark for commercial power generation).

Based on the above reasons, the validation team hence accepts the 12% benchmark for the cement industry as the most suitable indicator for assessment of the financial viability of this project activity.

Issue 2 raised:

The DOE should provide information regarding how the key input values of the investment analysis have been validated and determined to reflect the true situation facing the underlying project activity.

TUV's response:

The key inputs values of the investment analysis in PDD are principally based on "Chapter 8 – Economic Analysis" of the Feasibility Study Report (FSR), which is prepared by Tianjin Cement Industry Institute Co., Ltd (http://www.tcdri.com.cn/), a leading government-approved Design Institute in China since it's establishment in 1953 that has been responsible for the development and implementation of the first waste heat recovery project from cement plant in China. The FSR was duly subjected to review and approval by the Jiangsu Economic and Trade Commission (E&TC). The DOE can confirm, after checking the relevant document, that the FSR has been approved by the local government, and is the official document after it has been approved, and accordingly the data of the FSR is deemed credible. The letter of FSR approval issued by the Jiangsu E&TC and further details on the responsible design institute are provided in Annex 2a.

The following is an excerpts extracted from the FSR and presents the guideline documents adopted for the investment analysis which demonstrates that the inputs values adopted for the investment analysis are in accordance with appropriate guidelines and best available market information:

1. Construction and Installation works: in accordance with《Budget for Power Construction Works》published by China Power Enterprises Association, with adjustments to the present price level of Jiangsu Province;
2. Price of Equipments: In accordance with《Summary Price Collection of Machine Equipments Costs in Engineering Construction》, and adjusted based on actual costs of other similar projects.
3. Price of Material: Based on actual price of local market.
4. Equipments transportation costs: based on a rate of 3.5% of the costs of the equipments.

5. Others: in accordance with 《Budgeting Management System and Regulation for the Power Industry Fundamental Construction》, with adjustments against actual situation.

The sources of data for the various key inputs values applied are presented below:

Item	Data & Source in Feasibility Report	Remarks on Validation pf Parameters
Installed capacity:	13.5MW (Chapter 8)	1. Power from 1,000 t/d & 2,000 t/d cement production lines = 6MW 2. Power from 5,000 t/d cement production lines = 7.5MW 3. Total power =13.5MW Confirmed by site inspection, i.e. checking on equipments' identity plates and equipment supply contracts)
Estimated annual grid-electricity:	90.08GWh (Chapter 8)	Net annual electricity supply based on 7,200 operating hours of per year: 6MW – 36.43GWh 7.5MW – 53.65GWh Calculation of the estimated net electricity : 36.43+53.65 = 90.08GWh The annual operation hours of 7,200 hrs are considered reasonable, which is close to the reported 8,000 annual operating hours of the cement production lines (based on a historic plant availability of 92% of the cement plant achieved in recent years by the project owner), with some reasonable allowance provided for the potential shutdowns of the power plants due to lack of operating experience, and for plant maintenance.
Project lifetime:	21yrs (Chapter 8)	This consists of 1 year of construction phase and 20 years of operation phase. This is considered reasonable for new power equipment installation, and the fact that the cement production lines are also newly built with an expected service life of approximately 25 years, with the earliest of 1000 t/d line in operation since 2001.
Total investment:	RMB 99.62 million Yuan	Feasibility Report(Chapter 8) (Confirmed by interview with the top management of project owner during on-site visit that the overall investment would even go beyond RMB $100 million due to the increasing raw material prices and labour costs, and by checking of invoices.)
Prospective pool purchase price:	RMB 0.342Yuan/kWh (excluding VAT) (Chapter 8)	Based on the latest announced "Notice about adjust electricity purchase price of East China Power Grid" from NDRC" (No.FaiGaiJiaGe 2006 1230); http://www.ndrc.gov.cn/zcfb/zcfbtz/tz2006/t20060630_75077.htm (Annex 2b), the current tariff is RMB 0.332 Yuan/kWh, which is similar to the estimated tariff adopted in the financial analysis.
Tax:	Income tax rate is 33%; value added tax rate is 17%, city construction maintenance tax is 7% of	The applied tax rates are in line with the existing tax laws in China, as enclosed in Annex 2c.

	VAT, education appended fee is 4% of VAT (Chapter 8)	
Operational cost:	0.27 yuan/kWh(6MW), 0.274 yuan/kWh(7.5MW) (Chapter 8)	The operational cost is calculated based on raw material consumption, labour costs (salary & welfare), maintenance and repair expenses, etc, which does not include the initial investment costs, in accordance with the above FSR mentioned principles. All parameters were checked against the FSR (details in IRR table) and confirmed to be applied correctly. The operating costs were further reviewed during site interview with the project owner, where it is reported that the operational cost would be even higher than those predicted in the FSR due to the increasing raw material prices and labour costs.

Issue 3 raised:

The methodology requires that "among the alternatives that do not face any prohibitive barriers, the most economically attractive alternative should be considered as the baseline scenario". No such comparison has been conducted in the determination of the baseline.

TUV's response:

As per ACM0004: "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation"/Version 02, the baseline scenario should be selected from an evaluation of all potential realistic and credible alternatives. As stipulated by the methodology, the PDD has identified the following alternatives to the project activity:

Alternative 1 – The proposed project activity not undertaken as a CDM project activity;
Alternative 2 – Import of electricity from the grid;
Alternative 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;
Alternative 4 – A mix of option (2) & (3), in which case the mix of grid and captive power should be specified;
Alternative 5 – Other uses of the waste heat and waste gas.

These alternatives are described in a transparent manner in the PDD and only Alternative 2 was considered feasible and could be realistic. The audit team has verified the justification for the barriers faced by the alternatives and is described as follows:-

Alternative 1 – The audit team has checked up with the IRR calculation and observed in the spreadsheet that a project IRR of 8.22% shall be resulted from the proposed project without CDM income. While the benchmark IRR for construction material industry is 12.0% (according to "Inform on Economic Assessment method and parameter of Construction Projects"), the project could not demonstrate its financial attractiveness to the investor. Please refer to Section 3.2.3 of the Validation Report for details.

Alternative 2 – There is no barrier in legal, financial, technical or any other aspects.

Alternative 3 – Development of other renewable energy source in Jiangsu Province is very limited. According to the China Electric Power Yearbook 2006 (Annex 3a), it is noted the wind and hydro resource is so scarce that it counts for only less than 1% of the overall electricity generation in Jiangsu Province, where the majority of energy source remains the fossil fuel. The main reasons include the comparatively high investment cost for wind projects and the inadequacy of practically exploitable hydro resource in Jiangsu Province.

For construction of fossil fuel power plants, it is prohibited by the <Notice on strictly prohibiting the installation of thermal power units with capacity of 135MW or below> released by State Council on 15th April 2002 (Ref. No.: GuoBanFaMingDian [2002] (6)) and <Temporary rules on construction management of small-scale thermal power units> released by State Council in August 1997 for strictly controlling the construction of thermal power plants with capacity under 100MW.

It is also confirmed by the local government officials from Yixing Economy and Trade Commission (Mr. Tielin Zhang, Officer) and Yixing Power Supply Bureau (Mr. Xuguang Wang, Customer Manager) during stakeholder interview and is concurred by the validation team that development of other energy sources is not feasible due to the lack of energy resources as mentioned above.

Alternative 4 – This alternative is a mix of Alternative (2) & (3), in which case the mix of grid and captive power should be specified. Due to the regulatory restriction for prohibiting the construction of thermal power plants in China (see Alternative 3 above), this alternative 4 is therefore not feasible.

Alternative 5 – In the conventional cement production line, only part of the waste heat generated from the cement production process would be used to heat the raw materials in the SP and the majority would simply be emitted into ambient atmosphere.
The proposed project further utilized this surplus waste heat after heating the raw materials for power generation, where as revealed in the FSR, there is no other way for utilization of this surplus waste heat other than direct emitting into ambient air. This is confirmed by the audit team during on-site visit and stakeholder interview that there is no demand on heating by utilization of waste heat for the neighbor domestic and industrial users. This alternative is therefore not feasible.

The only plausible baseline scenario then remains to import electricity from the grid, i.e. Alternative 2, in which the power output equivalent to the proposed project generates would be supplied by ECPG (East China Power Grid) to which the proposed project is connected. This alternative does not face any prohibitive barrier and is therefore accepted as baseline scenario. According to the China Electric Power Yearbook 2006, ECPG is itself currently importing electricity from another power gird, i.e. Central China Power Grid (CCPG). In Year 2005, the imported electricity from CCPG contributes approximately 22% to the overall power generation in ECPG.

Issue 4 raised:

The DOE is requested to provide information to confirm how it will be ensured that the project activity will not lead to a diversion of waste heat from use in the preheating process.

TUV's response:

The validation team has checked the FSR and confirmed that the technical design requires the implementation (incl. construction and operation) of this proposed WHR project must not influence the normal production of the existing actual cement production line. In the connection of the new facilities, it is further stipulated that the Waste Heat Boiler is installed at the gas outlet of the Suspension Pre-heater (SP) after the preheating is completed. Excerpts from the FSR and engineering drawings are presented in Annex 4a.

The validation team has checked the physical parameters of the waste gases that are currently being emitted to the atmosphere from the cement production lines (which have been adopted for the design of the project), and confirmed that identical set of parameters have been implemented in the actual project. This is confirmed by checking the Boiler Supply Agreement entered into between the project proponent and the Hangzhou Boiler Company (Annex 4b).

The validation team confirmed during the site visit the following:

1. as in the pre-project scenario, all the waste gas leaving the rotary kiln is first directed into the Suspension Pre-heater (SP) and only then into the waste heat recovery unit "SP boiler". Thus a diversion of waste heat is physically not possible either.
2. the project was being implemented with the gas pipe connection clearly observed to be utilizing the waste heat after the preheating process of the SP, as shown in site photos presented in Annex 4a.
3. in the pre-project scenario, where active cooling of materials by means of water and cooling fans were employed, there has been not utilization of heat emanating from the Air Quenching Cooler (AQC) except pre-heating of combustion air, which is unchanged, thus a diversion of waste heat from that facility is not possible.

Furthermore, a potential diversion of waste heat was discussed during technical review and the following were confirmed and presented in the Validation Report:

The project owner might be tempted to increase specific fuel consumption in order to enhance the electricity output. However, this is neither technically possible without affecting the production process and product quality, nor economically reasonable for the following reasons:
1. If the amount of fuel is increased, the temperature inside the rotary kiln would increase and this would lead to cohesiveness of the raw material, blocking up the calciners in the SP.. As a result, the production of cement would be adversely affected.
2. The waste heat from low temperature waste gas takes only about 30% of the total waste heat of the whole cement production system. This is quite different from professional fuel using electricity power plant, which has a much higher efficiency (about 65% in China and 85% in advanced countries for coal–based boiler (see http://www.shanke.cn/a/23196/archives/2007/28033.shtml). Under this situation, it would not be economically meaningful for the project owner to burn more fuel for electricity generation purpose.
3. The boiler used here in cement waste heat project is "waste heat boiler", which is different from the professional boiler (Coal-based boiler) used in common thermal power plant. The waste heat boiler can only use waste heat for energy purpose but the "Coal-based boiler" can use additional fuel for energy purpose.

Furthermore, according to Paper titled *"Discuss on Cement Waste Heat Utilization for Power Generation"* (http://www.ccement.com/news/2007/4-11/C16144705.htm) (Annex 4c), it is concluded that if the project owner tends to reduce the amount of waste heat for preheating, the thermal efficiency of the power station will also be reduced. Considering both electricity per ton of clinker and thermal efficiency of the power station, the preheating process has the same impact on power generation. That means that the preheating of raw material is absolutely necessary and the part of heat using for preheating can not be reduced for electricity generation purpose.

Based on the above, the validation team concludes and confirms that the project activity will not lead to a diversion of waste heat from use in the preheating process.

In summary, we understand the issues raised in the clarification requests and regret if the previous validation report did not reflect the discussions in sufficient detail. However, we hope that the input by the project participants and this explanation will find acceptance among the members of the Executive Board.

Yours sincerely

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